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MD880-40-INT Series Active Rectifier

Hardware Guide

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

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Preface

Introduction

The MD880-40 series low-voltage engineering active rectifier features high power density, compact structure, and high reliability. This series of rectifiers support voltage classes 400 V, 500 V, and
690 V , with rated power ranging from 64 kW to 639 kW. The maximum output power of the rectifier can be up to 6069 kW when multiple modules are connected in parallel, providing power for the subsequent inverter modules or other loads.



- The drawings in the user guide are shown for illustration only and may be different from the product. Actual products may vary.
- The user guide is subject to change due to product upgrade, specification modification as well as efforts to the accuracy and convenience of the guide.

Revision History

Date	Version	Revision
June 2025	A00	First release

Warranty disclaimer

Inovance provides warranty service to the equipment within the warranty period (as specified in the order) for failure or damage that occurs under normal use. When the warranty period expires, reasonable maintenance fee will be charged.

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 Disclaimer

- This chapter provides essential safety instructions for proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to observe the safety precautions may result in serious injury or death of personnel or device damage.
- "DANGER", "WARNING", and "CAUTION" items in this guide do not indicate all safety precautions that need to be followed; instead, 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 use.

Safety Levels and Definitions



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



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.

General 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

WARNING

- 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.

CAUTION

- 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

WARNING

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage.
- Before hoisting the equipment, ensure the components such as the front cover and terminal block 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.

CAUTION

- 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. When the product needs to be stored for an extended period, take more strict protection and necessary inspection.
- 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

DANGER

- 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.

WARNING

- 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 can 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 devices with strong electromagnetic interference, such as a transformer, install a shielding device 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 the installation is completed, remove the protective guard. Failure to comply can block the vent and affect heat dissipation, causing overheat of the product.
- 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

DANGER

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Before wiring, cut off 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.

WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even 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.

CAUTION

- Follow the electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit.
- 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

DANGER

- 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.

WARNING

- 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 powering on, check that the rated voltage of the equipment is consistent with that of the power supply. 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

DANGER

- 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.

WARNING

- 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 a fire or equipment damage.

Maintenance

DANGER

- 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.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals can generate induced voltage during rotation even after the equipment power supply is off. Failure to comply can result in electric shock.

WARNING

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

Repair

DANGER

- 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 inspection and repair, disconnect all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.

WARNING

- Submit the repair request according to the 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 property damage, personal injury, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Labels

For safe operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
	◆ Read through the safety instructions before operating the equipment. Failure to comply may result 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 an electric shock.

1 Product Information

The MD880-40 series low-voltage engineering active rectifier features high power density, compact structure, and high reliability. This series of rectifiers support voltage classes 400 V, 500 V, and 690 V, with rated power ranging from 64 kW to 639 kW. The maximum output power of the rectifier can be up to 6069 kW when multiple modules are connected in parallel, providing power for the subsequent inverter modules or other loads.

1.1 Nameplate and Model

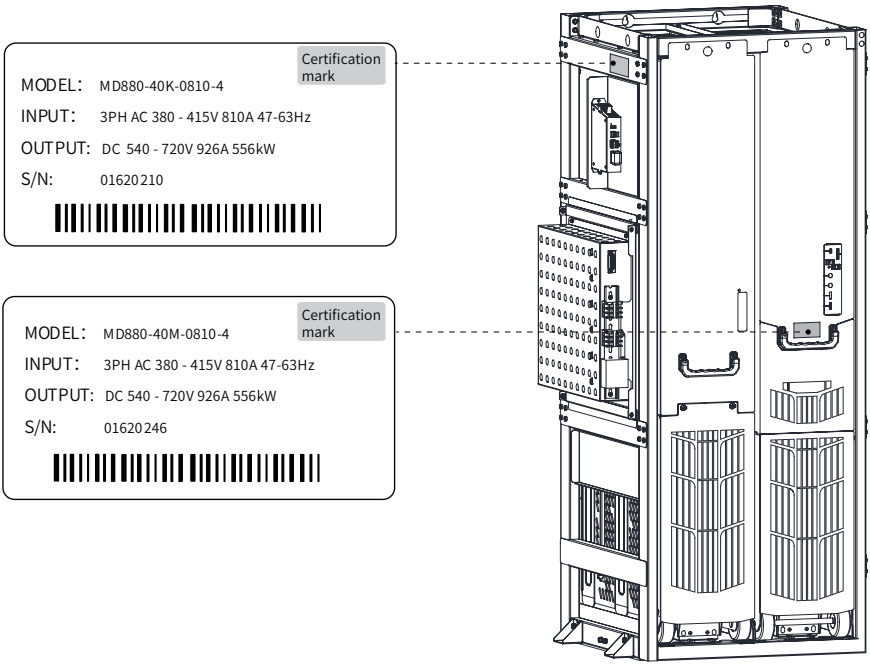


Figure 1-1 Nameplate

MD880 - 40K - 0810 - 4 X
① ② ③ ④ ⑤

①	Product series MD880: MD880 series AC drive	③	Rated current 0810: 810 A 0395: 395 A	⑤	Option -X: With options _: Standard model +JC: Filter integrated (only applicable to 40D models) +PCS: PCS standard model +JC+PCS: PCS model integrated with the filter -INT: Standard AFE (global version) -INT+PCS: Standard PCS (global version)
②	Product type 40K: Active rectifier frame assembly 40M: Active rectifier module 40F: Active rectifier filter module 40D: Integrated active rectifier module	④	Voltage class 4: Three-phase 400 VAC 5: Three-phase 500 VAC 7: Three-phase 690 VAC		

1.2 Voltage Class and Power Rating

Table 1-1 Voltage class and power rating of the active rectifier

Module model	Rated voltage	Rated power
MD880-40M-XXXX-4 (+PCS)	380 VAC to 415 VAC	64 kW to 1056 kW
MD880-40M-XXXX-5	380 VAC to 500 VAC	463 kW to 880 kW
MD880-40M-XXXX-7 (+PCS)	525 VAC to 690 VAC	84 kW to 1214 kW

1.3 Specifications and Model Selection

Table 1-2 Specifications and selection of MD880-40 series active rectifier

Active rectifier model MD880-40-…	Applications without overload					Applications with low overload		Applications with high overload		Loss	Structure
	I_N	I_N	I_{max}	S_N	P_N	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}	P_{loss}	
	A_{ac}	A_{dc}	A_{dc}	kVA	kW	A_{dc}	kW	A_{dc}	kW	kW	
U_N = 400 V (380 V to 415 V), ±10% (-15%, < 1 min) (power: 400 V)											
0575-4	575	657	854	398	394	631	379	493	296	10.7	BLCL+H8
0810-4	810	926	1204	561	556	889	533	694	417	15.5	BLCL+H8
1092-4	1092	1248	1623	757	749	1198	719	936	562	20.3	BLCL+2H8
1539-4	1539	1759	2287	1066	1056	1689	1013	1319	792	29.5	BLCL+2H8
2185-4	2185	2498	3247	1514	1499	2398	1439	1873	1124	40.6	2 x (BLCL+2H8)
3078-4	3078	3519	4574	2132	2111	3378	2027	2639	1583	58.9	2 x (BLCL+2H8)
4617-4	4617	5278	6861	3199	3167	5067	3040	3958	2375	88.4	3 x (BLCL+2H8)
U_N = 500 V (380 V to 500 V), ±10% (-15%, < 1 min) (power: 500 V)											
0540-5-CS	540	617	802	468	463	593	444	463	347	12	BLCL+H8
0810-5-CS	810	926	1204	701	694	889	667	694	521	18	BLCL+H8

Active rectifier model	Applications without overload					Applications with low overload		Applications with high overload		Loss	Structure
	I_N	I_N	I_{max}	S_N	P_N	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}	P_{loss}	
MD880-40-…	A_{ac}	A_{dc}	A_{dc}	kVA	kW	A_{dc}	kW	A_{dc}	kW	kW	
1026-5-CS	1026	1173	1525	889	880	1126	844	880	660	22	BLCL+2 x H8
1539-5-CS	1539	1759	2287	1333	1319	1689	1267	1319	990	36	2 x (BLCL+H8)
2052-5-CS	2052	2346	3049	1777	1759	2252	1689	1759	1319	44	2 x (BLCL+2 x H8)
2309-5-CS	2309	2639	3431	2000	1980	2534	1900	1980	1485	54	3 x (BLCL+H8)
3078-5-CS	3078	3519	4574	2666	2639	3378	2533	2639	1979	72	4 x (BLCL+H8)
3848-5-CS	3848	4399	5718	3332	3299	4223	3167	3299	2474	90	5 x (BLCL+H8)
4617-5-CS	4617	5278	6861	3998	3958	5067	3800	3958	2969	108	6 x (BLCL+H8)
U_N = 690 V (525 V to 690 V), ±10% (-15%, < 1 min) (power: 690 V)											
0369-7	369	422	548	441	437	405	419	316	327	12.4	BLCL+H8
0540-7	540	617	802	645	639	593	613	463	479	16.5	BLCL+H8
0701-7	701	801	1042	838	829	769	796	601	622	23.6	BLCL+2H8
1026-7	1026	1173	1525	1226	1214	1126	1165	880	910	31.4	BLCL+2H8
1402-7	1402	1603	2083	1676	1659	1539	1592	1202	1244	47.2	2 x (BLCL+2H8)
2052-7	2052	2346	3049	2452	2428	2252	2331	1759	1821	62.8	2 x (BLCL+2H8)
3078-7	3078	3519	4574	3678	3642	3378	3496	2639	2731	94.2	3 x (BLCL+2H8)
4104-7	4104	4691	6099	4905	4856	4504	4661	3519	3642	126	4 x (BLCL+2H8)
5130-7	5130	5864	7623	6131	6069	5630	5827	4398	4552	157	5 x (BLCL+2H8)

Table 1-3 Specification and selection of MD880-40D series active rectifier

Active rectifier model	Rectifier power module model	Applications without overload					Applications with low overload		Applications with high overload		Heat generation	Air volume
		I_N	I_N	$I_{max.}$	S_N	P_N	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}	P_{loss}	
MD880-40D-...	MD880-40M-...	A_{ac}	A_{dc}	A_{dc}	kVA	kW	A_{dc}	kW	A_{dc}	kW	kW	m^3/h
0094-4	0094-4	94	107	140	65	64	103	62	81	48	1.60	178
0149-4	0149-4	149	170	221	103	102	164	98	128	77	2.55	297
0183-4	0183-4	183	209	272	127	126	201	120	157	94	3.15	331
0299-4	0299-4	299	342	444	207	205	328	197	256	154	5.12	420
0395-4	0395-4	395	452	587	274	271	433	260	339	203	6.77	700
0089-7	0089-7	89	102	130	107	106	98	101	76	79	1.92	200
0173-7	0173-7	173	198	252	207	205	190	196	148	154	3.40	420
0243-7	0243-7	243	278	354	291	288	267	276	208	267	4.65	450

Table 1-4 Specification and model selection of MD880-40 series PCS

PCS model MD880-40D-...	Rectifier power module model MD880-40M-...	Applications without overload					Applications with low overload		Applications with high overload		Heat generation	Air volume
		I_N	I_N	$I_{max.}$	S_N	P_N	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}	P_{loss}	m^3/h
		A_{ac}	A_{dc}	A_{dc}	kVA	kW	A_{dc}	kW	A_{dc}	kW	kW	
0071-7+JC+PCS	0071-7+PCS	71	81	103	85	84	78	81	61	63	2.06	200
0138-7+JC+PCS	0138-7+PCS	138	158	201	165	163	151	157	118	122	3.70	420
0194-7+JC+PCS	0194-7+PCS	194	222	283	232	230	213	220	166	172	5.16	450

Definition:

I_N: Rated input (AC), output current (DC);

P_{loss}: Total loss of active rectifier frame assembly;

I_{max}.: Maximum output current can be kept for more than 10s (every 300s) at startup.

S_N: Rated apparent power

P_N: Rated output power

I_{Ld}:Rated current in low overload

P_{Ld}: Rated power in low overload

I_{Hd}:Rated current in high overload

P_{Hd}: Rated power in high overload

H8: Structure of active rectifier module

BLCL: Structure of active rectifier filter module

1.4 Product Dimensions and Weight

Table 1-5 Dimensions and weight of MD880-40 series active rectifier

Active rectifier model MD880-...	Structure	Dimensions (mm) (W x D x H)	Weight (kg)	Corresponding to module model MD880-...	Quantity	Structure	Dimensions (mm) (W x D x H)	Weight (kg)
40K-0575-4	BLCL+H8	631 x 624 x 1450	440	40M-0575-4	1	H8	230 x 582 x 1394	130
				40F-0575-4	1	BLCL	230 x 564 x 1394	240
40K-0810-4	BLCL+H8	631 x 624 x 1450	440	40M-0810-4	1	H8	230 x 582 x 1394	130
				40F-0810-4	1	BLCL	230 x 564 x 1394	240
40K-1092-4	BLCL+2H8	874 x 624 x 1450	650	40M-0575-4	2	H8	230 x 582 x 1394	130
				40F-1092-4	1	BLCL	230 x 564 x 1394	300
40K-1539-4	BLCL+2H8	874 x 624 x 1450	650	40M-0810-4	2	H8	230 x 582 x 1394	130
				40F-1539-4	1	BLCL	230 x 564 x 1394	300
40K-0369-7	BLCL+H8	631 x 624 x 1450	430	40M-0369-7	1	H8	230 x 582 x 1394	130
				40F-0369-7	1	BLCL	230 x 564 x 1394	240
40K-0540-7	BLCL+H8	631 x 624 x 1450	480	40M-0540-7	1	H8	230 x 582 x 1394	130
				40F-0540-7	1	BLCL	230 x 564 x 1394	240
40K-0701-7	BLCL+2H8	874 x 624 x 1450	680	40M-0369-7	2	H8	230 x 582 x 1394	130
				40F-0701-7	1	BLCL	230 x 564 x 1394	330
40K-1026-7	BLCL+2H8	874 x 624 x 1450	680	40M-0540-7	2	H8	230 x 582 x 1394	130
				40F-1026-7	1	BLCL	230 x 564 x 1394	330

Table 1-6 Mapping relationship of MD880-40D series active rectifier integrated products

Active rectifier model MD880-...	Corresponding to module model MD880-...	Structure	Dimensions (mm) W x D x H	Hole diameter	Weight (kg)
40D-0094-4+JC	40M-0094-4	H3	100 x 413 x 415	M6	⩽ 11
	40F-0094-4	ELCL	318 x 295 x 415	Crimping terminal	28
40D-0149-4+JC	40M-0149-4	H4	200 x 413 x 415	M10	⩽ 20
	40F-0149-4	DLCL	240 x 390 x 1130	φ8	140
40D-0183-4+JC	40M-0183-4	H4	200 x 413 x 415	M10	⩽ 20
	40F-0183-4	DLCL	240 x 390 x 1130	φ8	140
40D-0299-4+JC	40M-0299-4	H6	180 x 438 x 770	M10	35
	40F-0299-4	DLCL	240 x 390 x 1130	φ8	150
40D-0395-4+JC	40M-0395-4	H7	180 x 463 x 920	M10	45
	40F-0395-4	DLCL	240 x 390 x 1130	φ8	150
40D-0089-7+JC	40M-0089-7	H6	180 x 438 x 770	M10	35
	40F-0089-7	DLCL	240 x 390 x 1130	φ8	140
40D-0173-7+JC	40M-0173-7	H6	180 x 438 x 770	M10	35
	40F-0173-7	DLCL	240 x 390 x 1130	φ8	150
40D-0243-7+JC	40M-0243-7	H7	180 x 463 x 920	M10	45
	40F-0243-7	DLCL	240 x 390 x 1130	φ8	150

Table 1-7 Mapping relationship of MD880-40 series PCS integrated products

Active rectifier model MD880-...	Corresponding to Module Model MD880-...	Structure	Dimensions (mm) W x D x H	Hole diameter	Weight (kg)
40D-0071-7+JC+PCS	40M-0071-7+PCS	H6	180 x 438 x 770	M10	35
	40F-0071-7+PCS	DLCL	240 x 390 x 1130	φ8	140
40D-0138-7+JC+PCS	40M-0138-7+PCS	H6	180 x 438 x 770	M10	35
	40F-0138-7+PCS	DLCL	240 x 390 x 1130	φ8	150
40D-0194-7+JC+PCS	40M-0194-7+PCS	H7	180 x 463 x 920	M10	45
	40F-0194-7+PCS	DLCL	240 x 390 x 1130	φ8	150

1.5 Technical Data

Table 1-8 Technical data of MD880-40 series active rectifier

Item		Specification
Basic performance	AC input voltage	400 V system: 380 VAC to 415 VAC, ±10% (-15%, < 1 minute) 500 V system: 380 VAC to 500 VAC, ±10% (-15%, < 1 minute) 690 V system: 525 VAC to 690 VAC, ±10% (-15%, < 1 minute)
	Input frequency	47 Hz to 63 Hz
	Unbalance degree	Maximum value: 3% of the rated line voltage
	Output voltage	400 V system: 540 VDC to 720 VDC 500 V system: 540 VDC to 750 VDC 690 V system: 740 VDC to 975 VDC Sudden loading or unloading is not supported in high bus voltage. Failure to comply can result in overvoltage.
	Overload capacity	Low overload: 110% (I_{Ld}), 1 minute of continuous operation at 110% of rated load allowed per every 5 minutes High overload: 150% (I_{Hd}), 1 minute of continuous operation at 150% of rated load allowed per every 5 minutes
	Operating efficiency	> 97%
	Power factor	> 0.99 (at rated power)
	Total harmonics THD	THDI < 5% (rated power) THDU < 5% (Rsc > 20)
Operating environment	Ambient temperature	-10° C to +50° C (Derating is required for temperatures between 40°C and 50°C .)
	Ambient humidity	5% to 95% RH, without condensation
	Installation altitude	⩽ 1000 m (Derating is required for altitudes above 1000 m. The maximum altitude is 4000 m.)
Storage environment	Storage temperature	-40°C to +70°C
	Storage humidity	5% to 95% RH, without condensation

Item		Specification
Mechanical data	Vibration	Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g gravitional acceleration at 8.4 Hz to 200 Hz; in ten cycles/axis direction
	Shock	Application/Transportation scenario: Tested according to IEC 60068-2-27; 10 g gravitional acceleration; 11 ms pulse width; 18 times in total in each of X/Y/Z-axis direction
	IP rating	Frame: IP00 Cabinet: IP21
	Safety performance	Compliant with EN 61800-5-1
	Cooling mode	Forced air cooling (AF) of the module complies with EN 60146. The reactor adopts natural ventilation mode.
Protective functions	Protective functions	Providing protection against short circuit, overcurrent, overload, overvoltage, undervoltage, phase loss, three-phase unbalance, and overtemperature

Table 1-9 Technical data of MD880-40 series PCS

Item		Specification
DC side	Voltage range	690 V system: 740 VDC to 975 VDC
AC specifications (on-grid)	AC voltage	690 V system: 740 VAC to 975 VAC, ±10% (-15%, < 1 minute)
	Input frequency	47 Hz to 63 Hz
	Unbalance degree	Maximum value: ±3% of the rated line voltage
	THD (rated operating condition)	THDI < 5% (RSC < 40, compliant with IEEE 519 harmonics standard) THDU < 5% (RSC > 20)
	Power factor	> 0.99 (not involved in reactive tuning of the system in grid-connected mode under rated operating conditions)

Item		Specification
AC specifications (off-grid)	AC output voltage	690 V model: 525 VAC to 690 VAC
	AC output frequency (Rated)	50 Hz/60 Hz
	Output voltage accuracy	< 1% U_N (linearly-balanced load)
	Output frequency accuracy	< 0.5%
	Degree of voltage unbalance	< 2% or < 4% (short time) (three-phase symmetrical load)
	Total voltage harmonic distortion rate	< 5% (linearly-balanced load)
System	Overload capacity	Low overload: Operating at 110% of the rated load for 1 minute per every 5 minutes High overload: Operating at 150% of the rated load for 1 minute per every 5 minutes
	Operating efficiency	> 98% (rated operating condition)
Protective functions		Providing protection against short circuit, overcurrent, overvoltage, undervoltage, phase loss, three-phase unbalance, and overtemperature
Ambient environment	Ambient temperature	-10° C to +50° C (Derating is required for temperatures between 40°C to 50°C .)
	Ambient humidity	5% to 95% RH, without condensation
	Installation altitude	⩽ 1000 m (Derating is required for altitudes above 1000 m. The maximum altitude is 4000 m.)
Storage environment	Storage temperature	-40°C to +70°C
	Storage humidity	5% to 95% RH, without condensation

Item		Specification
Mechanical data	Vibration	Use/Transportation scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g gravitional acceleration at 8.4 Hz to 200 Hz; 10 cycles/axis direction
	Shock	Operation/Transportation scenario: Tested according to IEC 60068-2-27; 10 g gravitational acceleration; 11 ms pulse width; 18 times in total in each of X/Y/Z-axis direction
	IP rating	Frame: IP00 Cabinet: IP21
	Safety performance	Compliant with EN 61800-5-1
	Cooling mode	Forced air cooling (AF) of the module complies with EN 60146. The reactor adopts natural ventilation mode.

1.6 Hardware Principles

1.6.1 Operating Principles of the Active Rectifier

The active rectifier is a four-quadrant rectification system, consisting of the active rectifier module, active rectifier filter module, pre-charge circuit, HCU control module, and expansion module. The active rectifier rectifies three-phase AC to DC power, which is then provided to motors or other loads on a DC bus, and transfers the energy fed back by the loads to the power grid. The active rectifier filter module is an LCL filter for suppressing AC voltage and current harmonics, thus keeping the voltage and current harmonics at the power grid side to a low level.

The active rectifier can output stable and adjustable bus voltage within the allowable grid voltage range.

The active rectifier is suitable for TN, TT and IT systems.

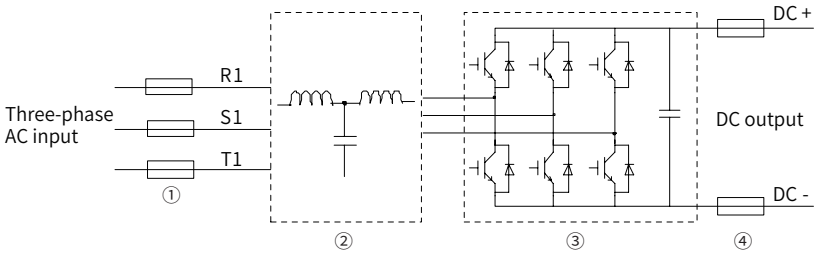


Figure 1-2 Main circuit of the an individual active rectifier

No.	Remark
①	Fuse on the AC side
②	Active rectifier filter module
③	Active rectifier module

No.	Remark
④	Fuse on the DC side

1.6.2 Operating Principles of Parallel Active Rectifiers

The active rectifier can be paralleled for capacity expansion. The two parallel units adopt the BLCL+2H8 frame structure, that is, two active rectifier modules share one active rectifier filter module. If a higher capacity is required, use the (BLCL+2H8) x N structure instead. The value of N can be up to 3 for 400 V systems or 5 for 690 V systems. Note that parallel connection is allowed only when the software/hardware specifications of the active rectifier module are the same and the specifications of the active rectifier filter modules are the same.

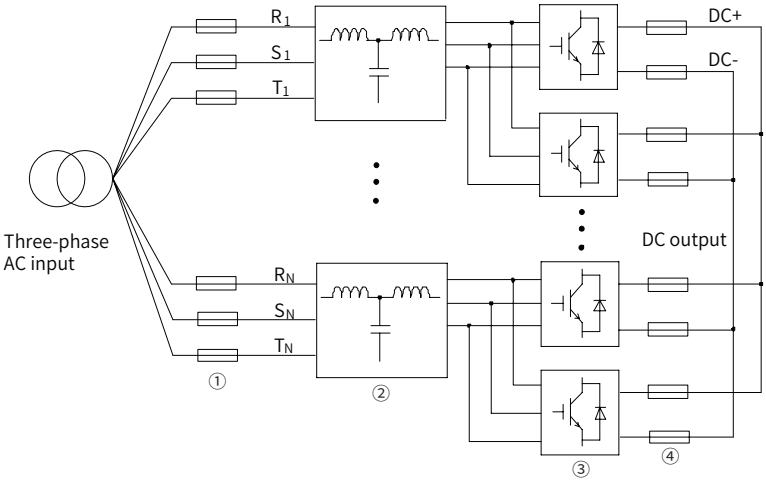


Figure 1-3 Main circuit of the parallel active rectifier system

No.	Remark
①	Fuse on the AC side
②	Active rectifier filter module
③	Active rectifier module
④	Fuse on the DC side

1.6.3 Hardware Principles of the AFE

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

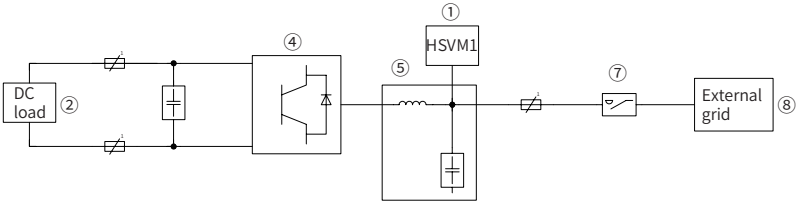


Figure 1-4 AFE sampling topology

No.	Remark
①	HSVM-10: Filter capacitor voltage sampling (standard) for the AFE control function
②	Electrical equipment: DC electrical equipment
③	Fuse on the DC side
④	AFE power module
⑤	AFE filter module
⑥	Fuse on the AC side
⑦	AC contactor
⑧	External power grid

1.6.4 Hardware Principles of PCS

The PCS is mainly composed of the PCS power module and the PCS filter module, together with the voltage/current detection circuit, power-on circuit, main controller HCU, and accessory card. The PCS can convert the AC input to adjustable DC output or convert the DC input to adjustable AC output, which is determined by system requirements. When the DC power supply is connected, the AC output converted by the PCS can be connected to the power grid or provide energy for the AC load. When the AC side is connected to the power grid, the DC output converted by the PCS can provide energy for the DC side load.

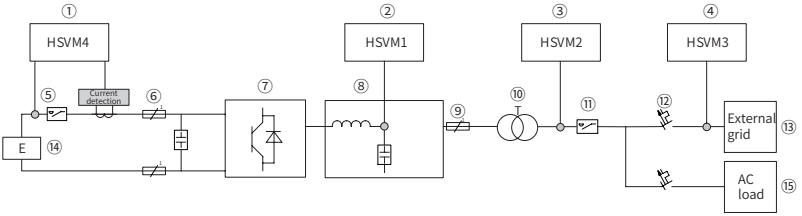


Figure 1-5 PCS sampling topology

No.	Remark
①	The HSVM-20 synchronous voltage detection module (optional) 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 for 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 for current error detection on the DC side. Current sampling channel A must be used.
②	HSVM-10: Filter capacitor voltage sampling (standard) for the PCS control function
③	HSVM-10: Output load voltage sampling (optional) for AC output accuracy compensation and PCS AC output sampling in the automatic on-grid function
④	HSVM-10: On-grid point voltage sampling (optional) in the automatic on-grid function
⑤	If the DC contactor is installed (whether it is installed depends on the system application mode), ensure that the DC contactor is properly pre-charged and the brake is applied.
⑥	Fuse on the DC side
⑦	PCS power module
⑧	PCS filter module
⑨	Fuse on the AC side
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, and on-gird applications involve an external power grid.
⑭	Battery or DC source
⑮	AC electric equipment



"Figure 1-4 AFE sampling topology" shows the complete topology of the PCS system. The actual application may be simplified to exclude the DC contactor, power transformer, parallel circuit breaker, or external power grid.

1.6.5 Electrical Diagram of a Typical Drive System

The following diagram shows the electrical wiring of the active rectifier and drive system.

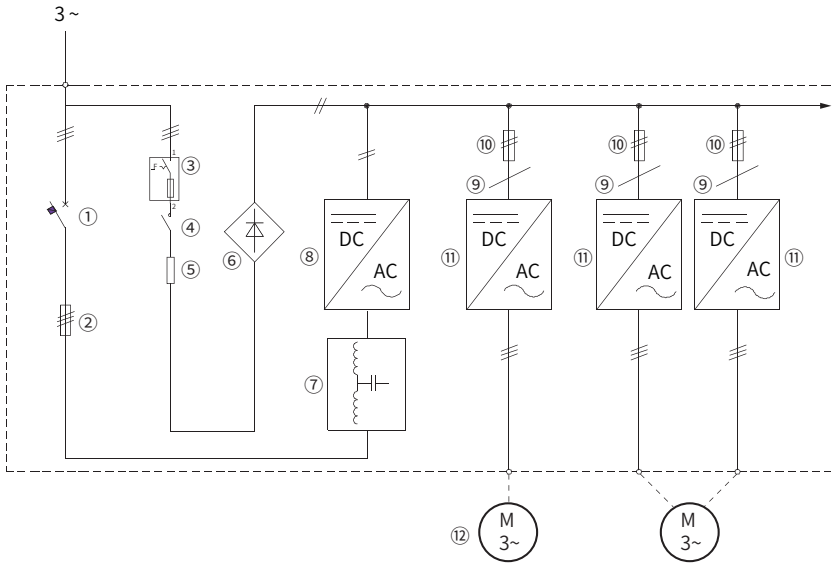


Figure 1-6 Electrical wiring of the active rectifier and drive system

No.	Remark
①	Main circuit breaker
②	Fuse on the AC side
③	Pre-charge fuse disconnector
④	Pre-charge contactor
⑤	Pre-charge resistor
⑥	Pre-charge rectifier bridge
⑦	Active rectifier filter module
⑧	Active rectifier module
⑨	Common mode filter
⑩	Fuse on the DC side
⑪	Inverter module
⑫	Motor

1.7 Electrical Principles and Wiring

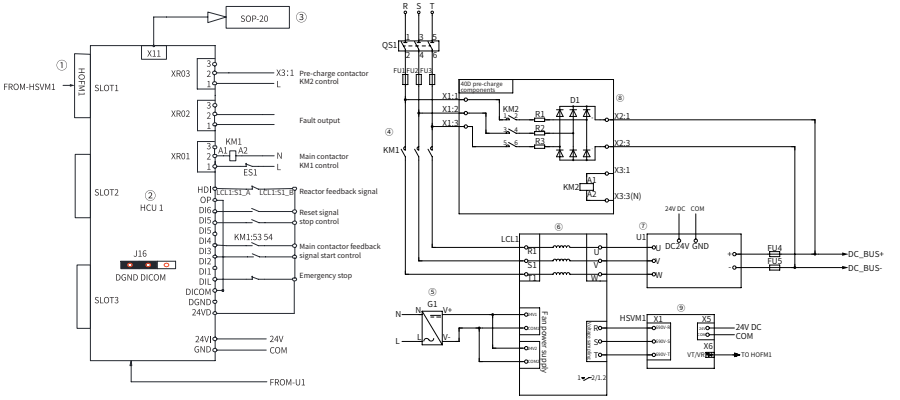


Figure 1-7 Electrical wiring of MD880-40D-XXXX+JC products

Table 1-10 Shipping list of MD880-40D+JC integrated product

No.	Component	Description
①	HOFM-30 optical fiber expansion module	This module is connected to the HCU through the slot to expand the multi-fiber interface of the HCU. For details, see the related user guide.
②	HCU controller module	This module is connected to the rectifier module U1 through the power port communication as the controller of the MD880-40D. For details, see the related user guide.
③	SOP-20 smart operating panel	This operating panel is connected to the HCU through a network cable to set parameters, program software, and start/stop the active rectifier. For details, see the related user guide.
④	Main contactor	Used to control the ON/OFF operation of the three-phase input cables.
⑤	24 V switched-mode power supply module	Used to power up the filter fan.
⑥	Input filter module	-
⑦	Active rectifier module	Used as the power module of the active rectifier.
⑧	Snubber components	Used to provide a DC bus pre-charge circuit for the active rectifier.
⑨	HSVM-10	The synchronous voltage module collects the incoming voltage for the active rectifier. For details, see the related user guide.

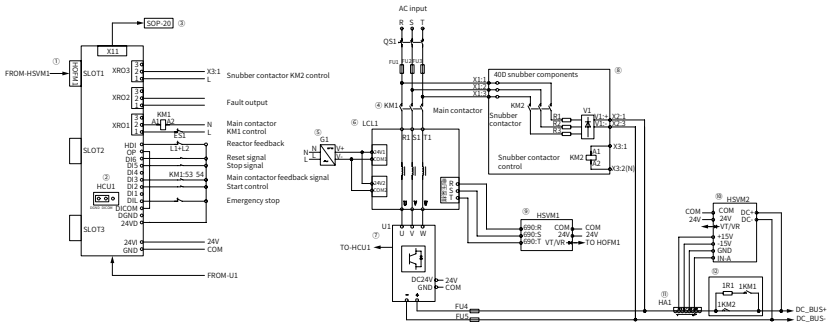


Figure 1-8 Electrical wiring diagram of MD880 series PCS integrated products

Table 1-11 Shipping list of PCS integrated product

No.	Component	Description
①	HOFM-30 optical fiber expansion module	This module is connected to the HCU through the slot to expand the multi-fiber interface of the HCU. For details, see the related user guide.
②	HCU controller module	This module is connected to the rectifier module U1 through the power port to act as the controller of the MD880-40D. For details, see the related user guide.
③	SOP-20 smart operating panel	This operating panel is connected to the HCU through a network cable to set parameters, program software, and start/stop the active rectifier. For details, see the related user guide.
④	Main contactor	Used to control ON/OFF operations of the three-phase input cables.
⑤	24 V switched-mode power supply module	Used to power up the filter fan.
⑥	Input filter module	-
⑦	Active rectifier module	Used as the power module of the active rectifier.
⑧	Snubber components	Used to provide a DC bus pre-charge circuit for the active rectifier.
⑨	HSVM-10	The synchronous voltage module collects the incoming voltage for the active rectifier. For details, see the related user guide.
⑩	HSVM-20	The synchronous voltage detection module can collect the voltage and current on the DC side. For details, see the related user guide.
⑪	DC Hall components	Used to detect the current on the DC side.
⑫	Chopper module snubber components	Used to implement the black start function, which include the pre-charge resistor and cable.

1.8 Layout and Dimensions of the Module

1.8.1 Layout of MD880-40K

The active rectifier module can be used either as a stand-alone unit or in parallel. In the case of the stand-alone mode, the maximum output current of the active rectifier module in a 400 V system is 810 A.

The AC input side of the active rectifier module is equipped with a quick connector, which is plugged into the quick connector socket inside the cabinet when the rectifier module is inserted into the cabinet. Each paralleled module can be connected to the busbar separately.

Install the power-on pre-charge circuit in the following cases:

- The active rectifier module is connected to the DC bus through a disconnector.
- The active rectifier module is directly connected to the DC bus, and the bus is incapable of charging.

Structure of active rectifier module

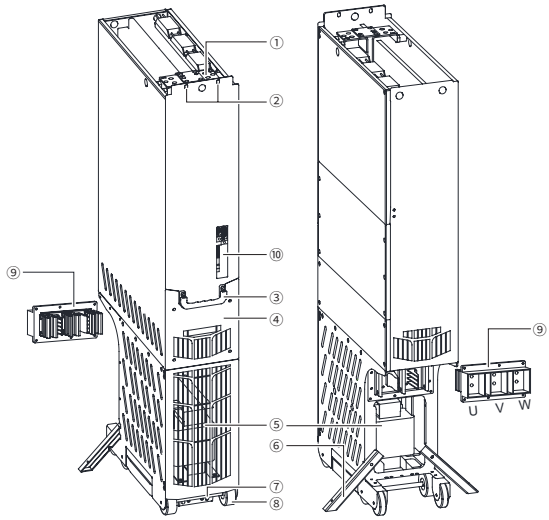


Figure 1-9 Structure of the active rectifier module

No.	Remark
①	DC output terminal
②	Top fastening hole with protective coating
③	Handle
④	Cooling fan
⑤	AC reactor

No.	Remark
⑥	Anti-tilting bracket
⑦	Bottom fixing hole with protective coating, grounding point (PE) between the active rectifier module frame and the cabinet frame
⑧	Caster
⑨	Quick connector plug (matching the quick connector socket inside the cabinet)
⑩	24 V power supply terminal/Optical fiber terminal (see "3.3.1 Connecting the Active Rectifier Module" for details)

1.8.2 Dimensions of MD880-40D Active Rectifier Module

H3

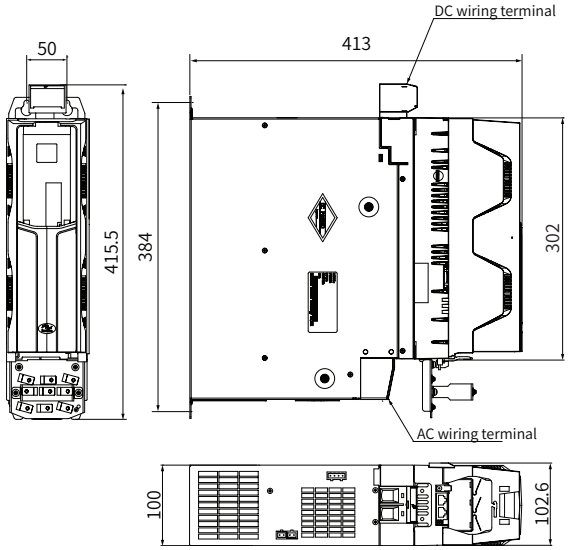


Figure 1-10 Dimensions of H3 (in mm)

Structure	Rectifier module model	Hole diameter
H3	MD880-40M-0094-4	M6

H4

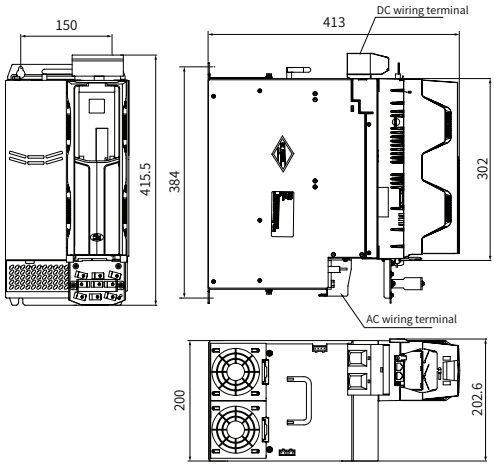


Figure 1-11 Dimensions of H4 (in mm)

Structure	Rectifier module model	Hole diameter
H4	MD880-40M-0149-4	M10
	MD880-40M-0183-4	

H6

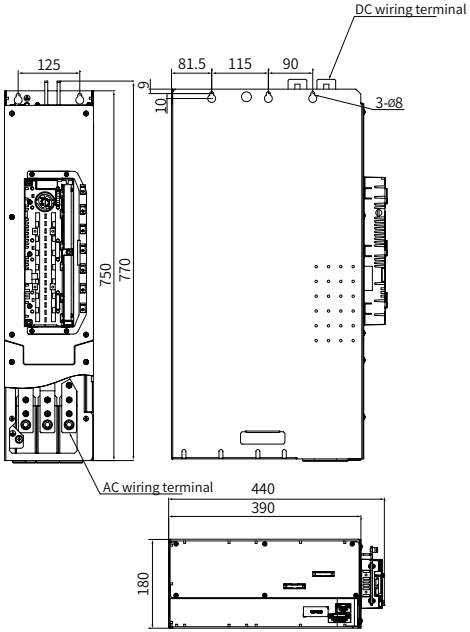


Figure 1-12 Dimensions of H6 (in mm)

Structure	Rectifier module model	Hole diameter
H6	MD880-40M-0299-4	M10

H7

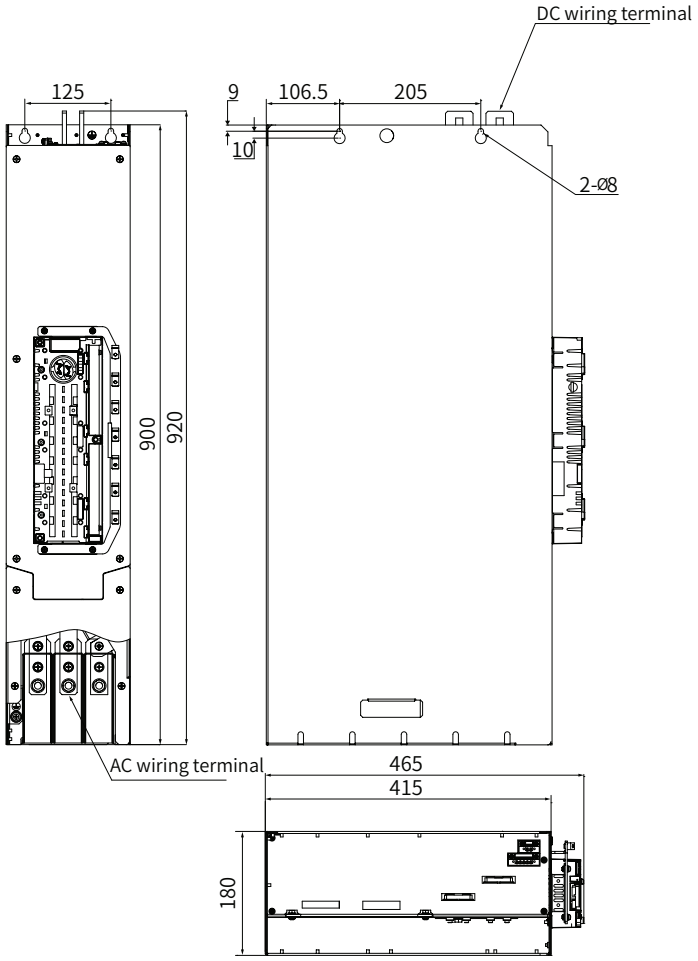


Figure 1-13 Dimensions of H7 (in mm)

Structure	Rectifier module model	Hole diameter
H7	MD880-40M-0395-4	M10

H8

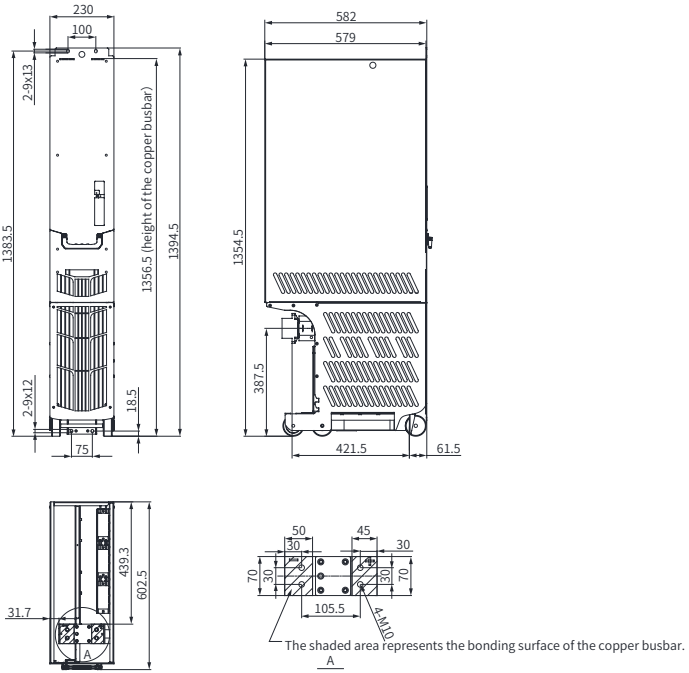


Figure 1-14 Outline dimensions of H8 (in mm)

1.8.3 Layout of MD880-40K Active Rectifier Filter Module

The active rectifier filter module is used to suppress AC voltage distortion and current harmonics, which is an important part of the active rectifier.

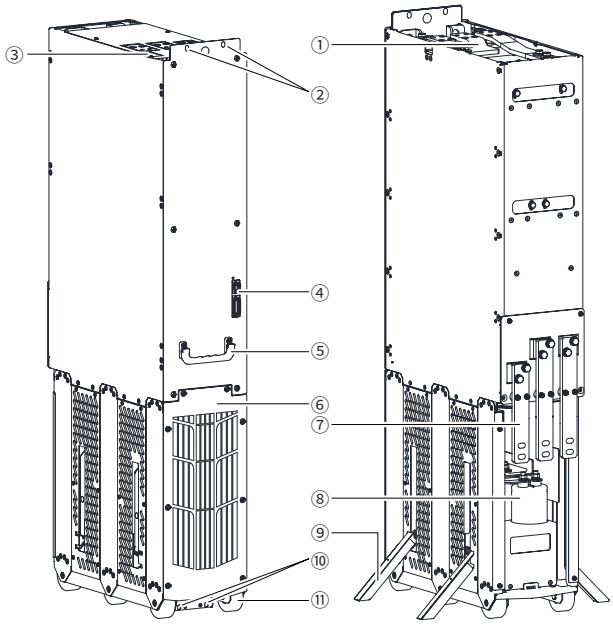


Figure 1-15 Structure of the MD880-40K active rectifier filter module

No.	Remark
①	Input copper busbar
②	Fixing hole
③	AC voltage sampling terminal
④	Fan power terminal, BLCL temperature switch terminal (see "3.3.2 Connecting the Active Rectifier Filter Module" for details)
⑤	Handle
⑥	Cooling fan
⑦	Output copper busbar
⑧	Capacitor
⑨	Anti-tilting bracket
⑩	Fixing hole with protective coating, grounding point (PE) between the module frame and the cabinet frame
⑪	Caster

1.8.4 Layout of MD880-40D-XXXX+JC Active Rectifier Filter Module

MD880-40D active rectifier filter module (DLCL)

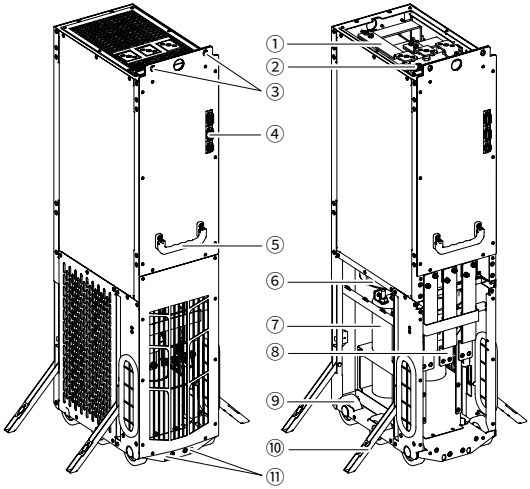


Figure 1-16 Layout of the active rectifier filter module (DLCL)

No.	Remark
①	Input copper busbar
②	AC voltage sampling terminal
③	Fixing hole
④	Fan power terminal, BLCL temperature switch terminal
⑤	Handle
⑥	Cooling fan
⑦	Capacitor
⑧	Output copper busbar
⑨	Caster
⑩	Anti-tilting bracket
⑪	Fixing hole with protective coating, grounding point (PE) between the module frame and the cabinet frame

MD880-40D active rectifier filter module (ELCL)

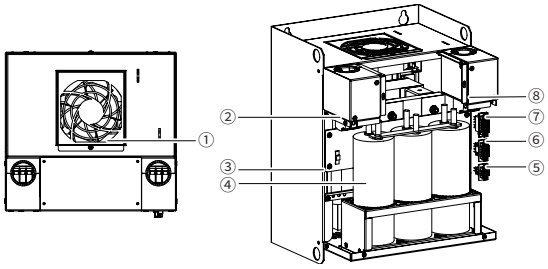
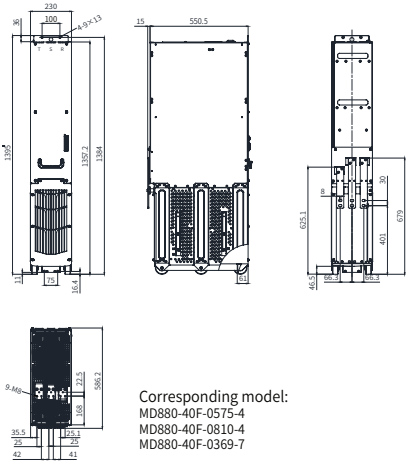


Figure 1-17 Layout of the active rectifier filter module (ELCL)

No.	Remark
①	Cooling fan
②	Input terminal
③	Reactor
④	Capacitor
⑤	Reactor temperature switch
⑥	Fan power supply interface
⑦	Voltage collection terminal
⑧	Output terminal

1.8.5 Dimensions of MD880-40K Active Rectifier Filter Module



Corresponding model:
MD880-40F-0575-4
MD880-40F-0810-4
MD880-40F-0369-7

Figure 1-18 Dimension diagram 1 of the active rectifier filter module (in mm)

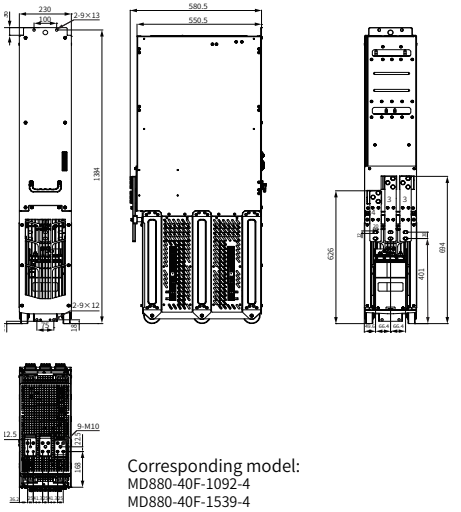


Figure 1-19 Dimension diagram 2 of the active rectifier filter module (in mm)

1.8.6 Dimension Drawing of MD880-40D-XXXX+JC Integrated Active Rectifier Filter Module

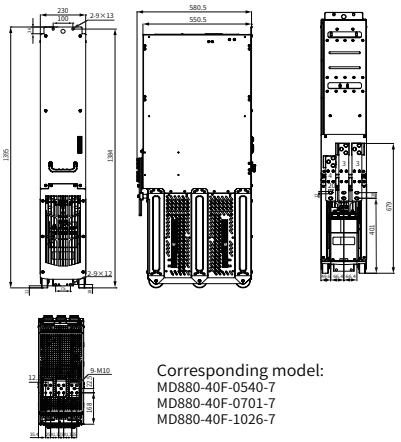
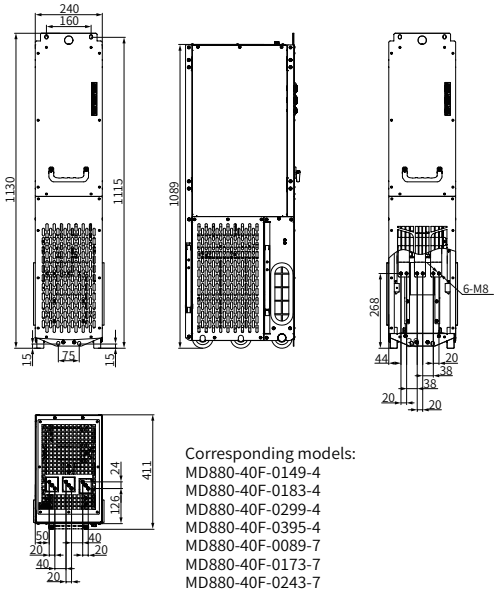
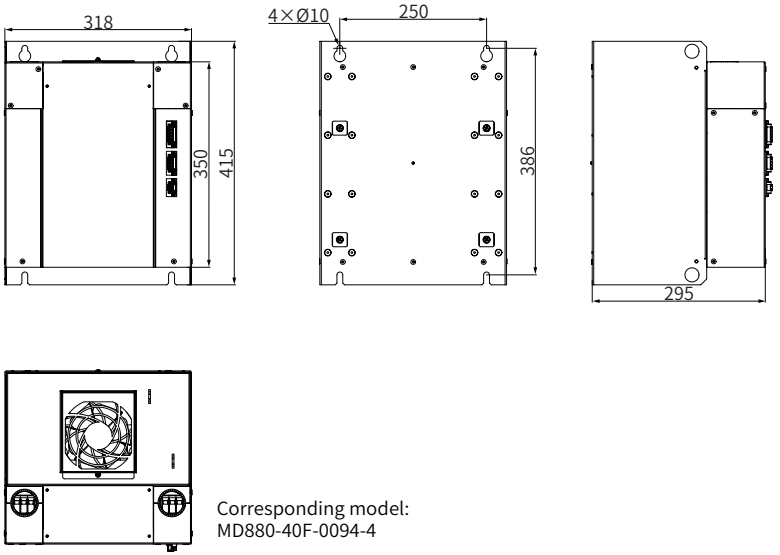


Figure 1-20 Dimension diagram 1 of MD880-40D-XXXX+JC active rectifier filter module (in mm)



Corresponding models:
MD880-40F-0149-4
MD880-40F-0183-4
MD880-40F-0299-4
MD880-40F-0395-4
MD880-40F-0089-7
MD880-40F-0173-7
MD880-40F-0243-7

Figure 1-21 Dimension drawing 2 of MD880-40D-XXXX+JC active rectifier filter module (DLCL) (in mm)



Corresponding model:
MD880-40F-0094-4

Figure 1-22 Dimension drawing 3 of MD880-40D-XXXX+JC active rectifier filter module (ELCL) (in mm)

1.8.7 Dimensions of MD880-40D Main Contactor

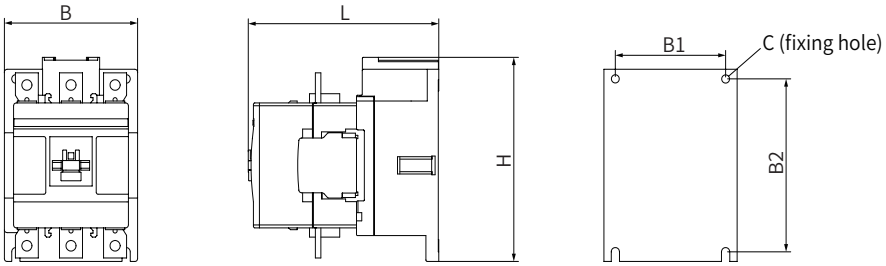


Figure 1-23 Dimension drawing of the main contactor

Model of the active rectifier kit MD880-40D-…	Outline dimensions of main contactor (mm)	Mounting dimensions of main contactor (mm)		Terminal hole diameter
	B x H x L	B1 x B2	C (Mounting hole)	
0094-4	120 x 173 x 176	100 x 130	2-M6	M8
0149-4	120 x 173 x 176	100 x 130	2-M6	M8
0183-4	145 x 212 x 210	120 x 180	2-M8	M10
0299-4	160 x 218 x 232	130 x 180	2-M8	M10
0395-4	160 x 218 x 232	130 x 180	2-M8	M10

NOTE

- The main contactor has a tolerance of ±2 mm.

1.8.8 Dimensions of MD880-40D Snubber Components

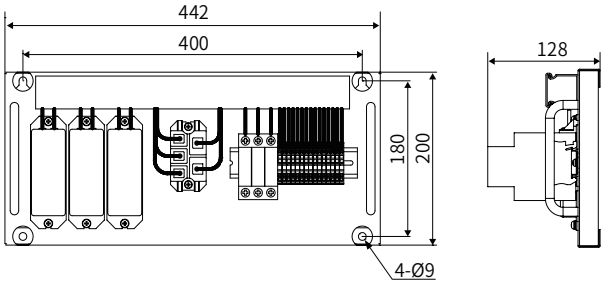


Figure 1-24 Dimensions of the snubber components (400 V) (in mm)

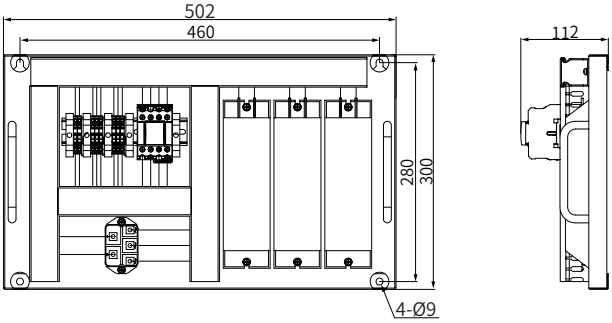


Figure 1-25 Dimensions of the snubber components (690 V) (in mm)

NOTE

- Only external snubber-related cables need to be connected during wiring.

1.9 Layout and Dimensions of Frame Assembly

1.9.1 Layout of BLCL+H8 Frame

Introduction to the frame of active rectifier BLCL+H8

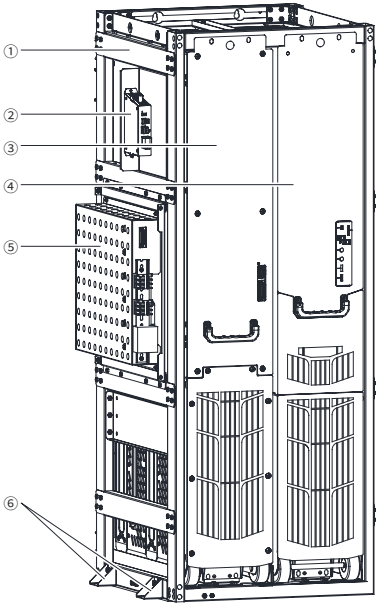


Figure 1-26 Frame of active rectifier BLCL+H8

No.	Remark
①	Frame
②	HSVM-10 synchronous voltage detection module (optional,which needs to be ordered separately)
③	Active rectifier filter module
④	Active rectifier module
⑤	Accessory kit for the active rectifier frame assembly (For details on terminals, see "3.4.1 Connection of BLCL+H8 Frame Assembly".)
⑥	Components that used to fix the equipment during transportation

1.9.2 Dimensions of BLCL+H8 Frame Assembly

Dimensions of the active rectifier BLCL+H8 frame

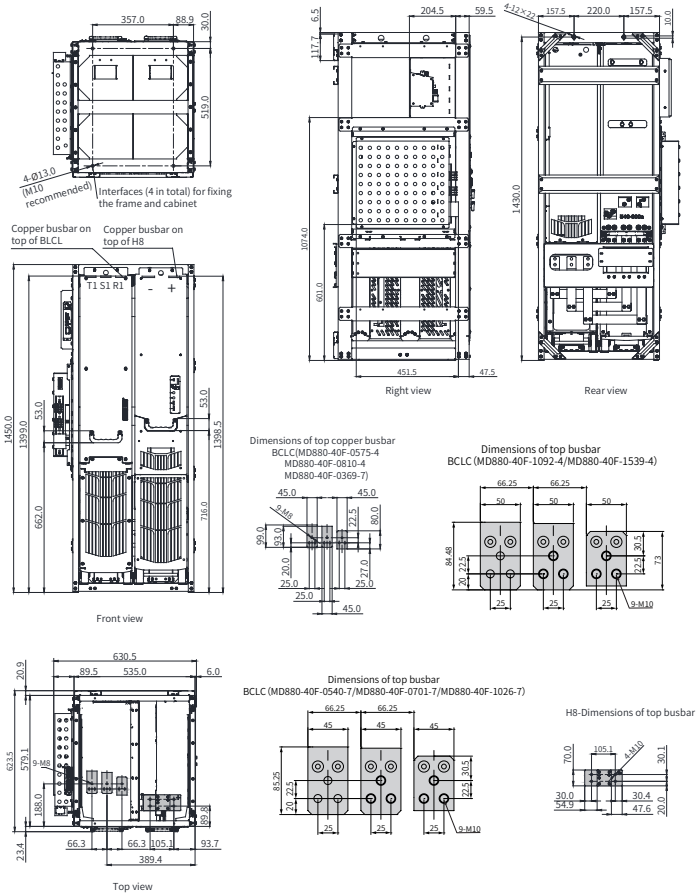


Figure 1-27 Dimensions of the active rectifier BCLC+H8 frame (in mm)

1.9.3 Layout of BLCL+2H8 Frame Assembly

Introduction to the frame of active rectifier BLCL+2H8

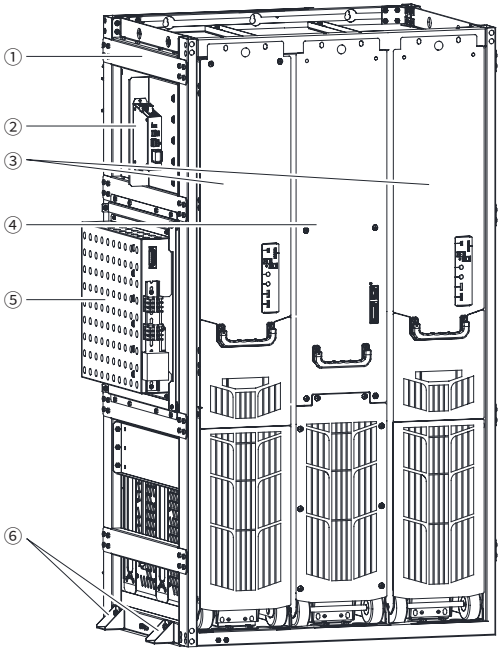


Figure 1-28 Frame of active rectifier BLCL+2H8

No.	Remark
①	Frame
②	HSVM-10synchronous voltage detection module (optional, which need to be ordered separately)
③	Active rectifier module
④	Active rectifier filter module
⑤	Accessory kit for the active rectifier frame assembly (For details on terminals, see "3.4.2 Connection of BLCL+2H8 Frame Assembly".)
⑥	Components that used to fix the equipment during transportation

1.9.4 Dimensions of BLCL+2H8 Frame Assembly

Dimensions of the active rectifier BLCL+2H8 frame

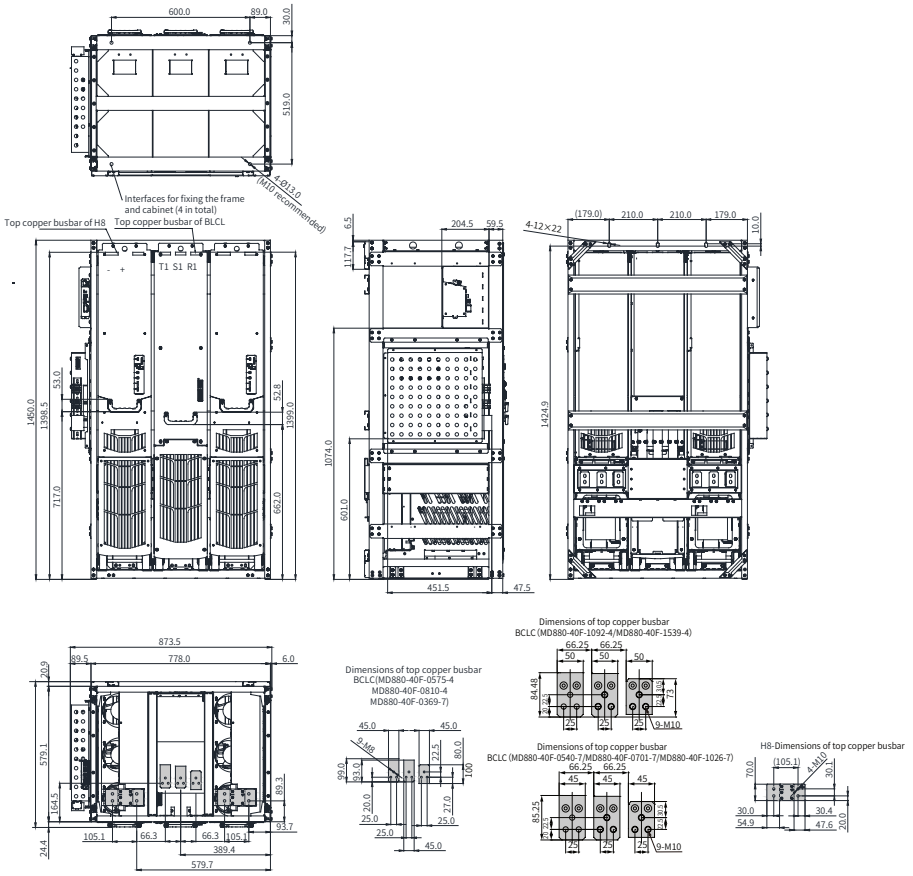


Figure 1-29 Dimensions of the active rectifier BLCL+2H8 frame (in mm)

1.10 Cabinet Layout

1.10.1 Layout of Active Rectifier and Drive System

The following diagram shows the layout of the active rectifier and drive system. The actual model used is determined according to the load current.

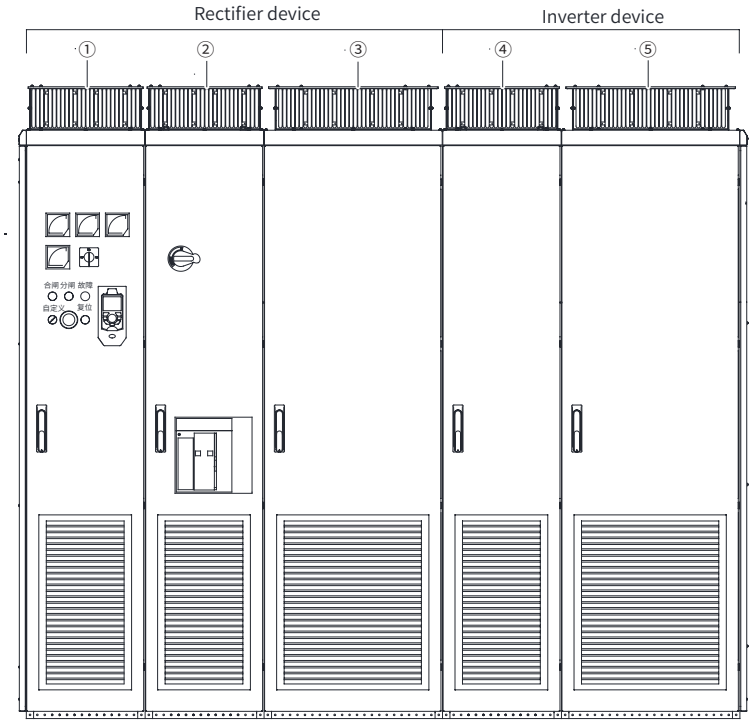


Figure 1-30 Layout of the active rectifier and drive system

No.	Name	Function
①	Auxiliary control cabinet	Includes control power supply, control module, instruments, and control panel.
②	Active rectifier incoming cabinet	Includes the main circuit breaker and pre-charge circuit.
③	Active rectifier cabinet	Includes the active rectifier filter module, active rectifier module, synchronous voltage detection module (HSVM), and fan power supply module.
④	Inverter cabinet 1	Includes different types of inverter power modules.
⑤	Inverter cabinet 2	Includes different types of inverter power modules.

1.10.2 Layout of Auxiliary Cabinet

The auxiliary cabinet is used to accommodate the control devices and auxiliary devices of the rectifier and drive system, including the control circuit power supply transformer, power supply module, HCU control module, HPCU parallel expansion module, and SOP-20-880 operating panel. The structure and dimensions of the cabinet vary with different optional components.

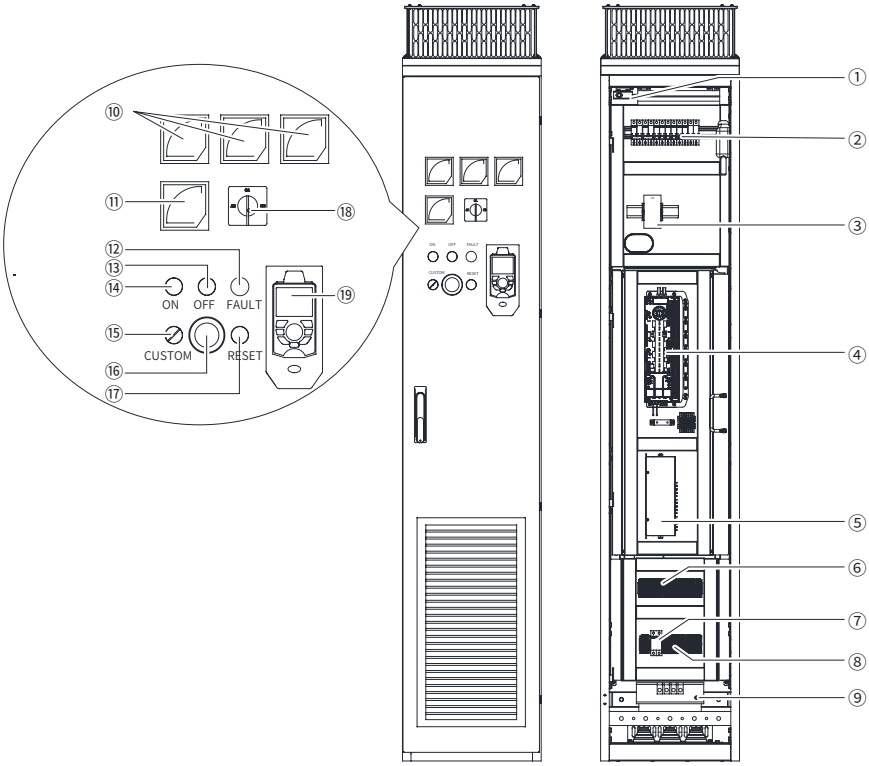


Figure 1-31 Layout of the auxiliary cabinet

No.	Name	Function
①	Door limit switch	Used for lighting purpose.
②	Auxiliary power supply breaker	Used to switch on/off the auxiliary power supply and provide overload and short circuit protection.
③	Power supply module	Used as an internal adapter of auxiliary power supply.
④	HCU control module	Used for active rectifier control.
⑤	HPCU parallel expansion module	Used for parallel expansion control.
⑥	Terminal block	Used to output 24 VDC power supply.

No.	Name	Function
⑦	Maintenance socket	Used to provide 220 VAC power supply.
⑧	Terminal block	Used as input interfaces for external I/O signals.
⑨	Transformer	Used as an auxiliary power transformer.
⑩	AC ammeter	Used to display input current of the main power supply.
⑪	AC voltmeter	Used to display the interphase voltage of the main power supply.
⑫	Fault indicator	Used to display fault status.
⑬	OFF button	Used to switch off the device upon power-off.
⑭	ON button	Used to switch on the device upon power-on.
⑮	Custom	Custom functions
⑯	Emergency stop switch	Used to cut off the main circuit breaker upon emergency.
⑰	Reset button	Used to reset the device after a fault occurs.
⑱	Voltage selector	Used to switch the display of different phase voltage.
⑲	SOP-20-880	Used for rectifier/drive control and parameter display.

1.10.3 Layout of Incoming Cabinet

The active rectifier incoming cabinet is used for connection between the power grid and the active rectifier. The cabinet includes the main circuit breaker and pre-charge resistors. The structure and dimensions of the cabinet vary with the options.

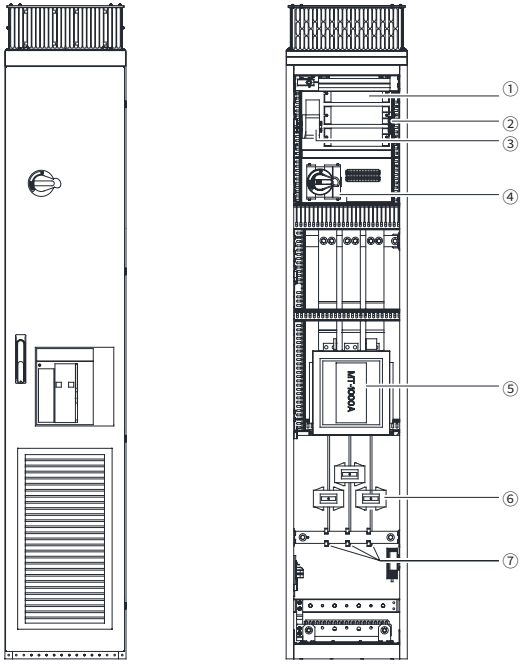


Figure 1-32 Layout of the active rectifier incoming cabinet

No.	Name	Function
①	Pre-charge resistor	Restricts the charging current of the bus capacitor.
②	Pre-charge rectifier bridge	Used in the pre-charge circuit to convert AC input to DC output
③	Pre-charge contactor	Used to switch on/off the pre-charge circuit.
④	Pre-charge circuit fuse switch	Used to switch on/off the pre-charge circuit and provide overload and short circuit protection.
⑤	Frame circuit breaker	Used to switch on/off the main circuit and provide overload and short circuit protection.
⑥	Current transformer	Used to detect the current on the input side.
⑦	AC power input	Copper busbar for R, S, and T cables

1.10.4 Layout of Active Rectifier Cabinet

1) Layout of the active rectifier cabinet (BLCL+H8)

The active rectifier cabinet is mainly comprised of an active rectifier filter module and an active rectifier module. The following figure shows the layout of BLCL+H8 cabinet.

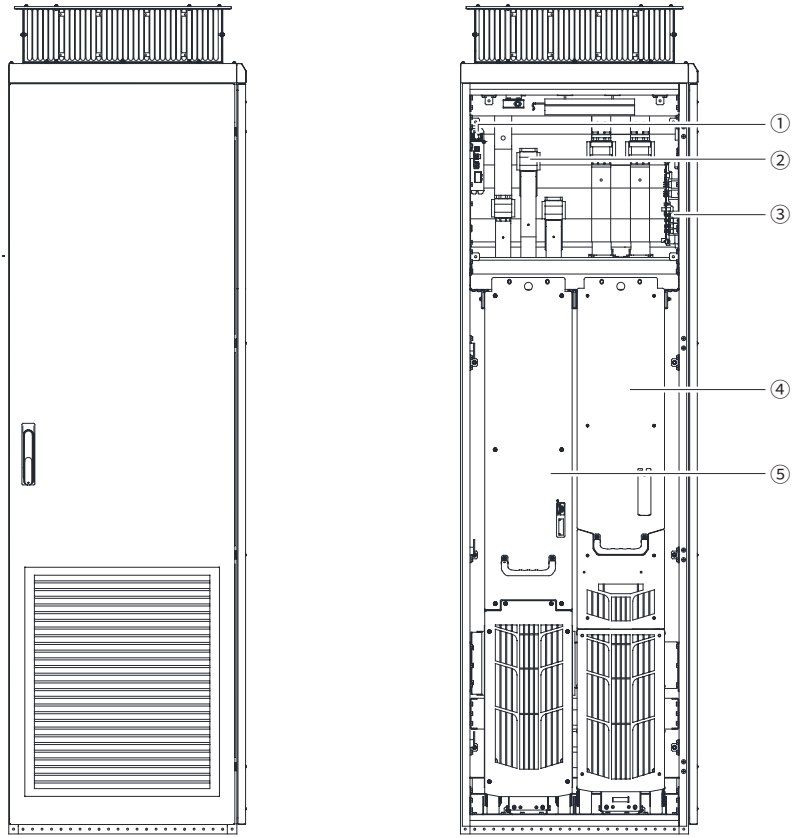


Figure 1-33 Layout of the active rectifier power supply cabinet

No.	Name	Function
①	HSVM synchronous voltage detection module	Used for three-phase AC voltage sampling.
②	AC fuse	Used to provide protection against overload and short circuit at the active rectifier side.
③	Fan power supply	Used to power up the fan of the active rectifier filter module.
④	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑤	Active rectifier filter module	Used as LCL filter at the active rectifier input side.

2) Active rectifier cabinet (BLCL+2H8)

The active rectifier cabinet is mainly comprised of an active rectifier filter module

and an active rectifier module. The following figure shows the layout of BLCL+2H8 cabinet.

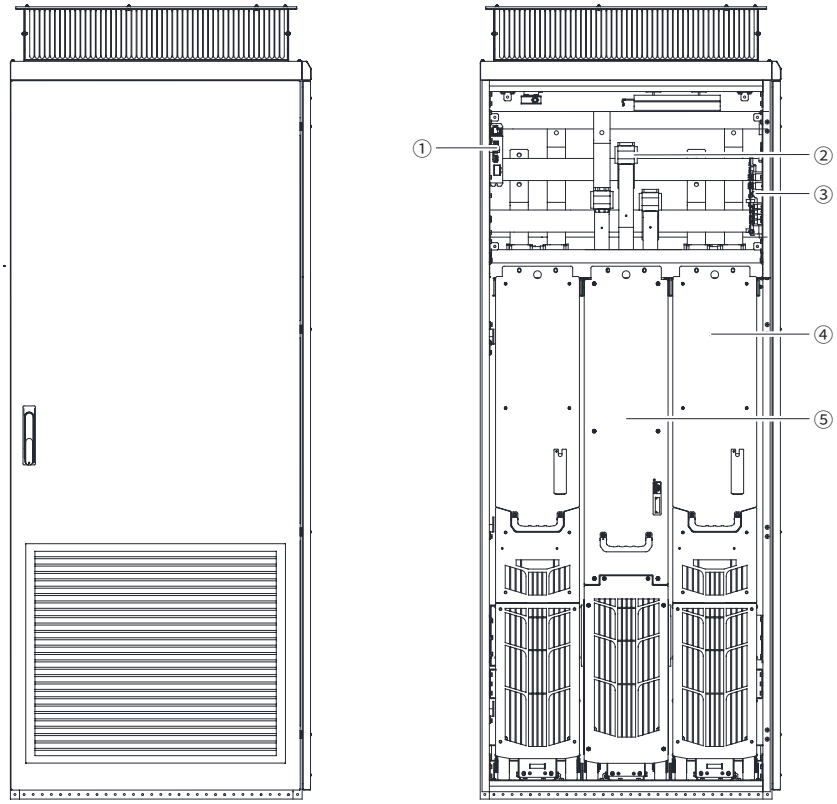


Figure 1-34 Layout of the active rectifier power supply cabinet

No.	Name	Function
①	HSVM synchronous voltage detection module	Used for three-phase AC voltage sampling.
②	AC fuse	Used to provide protection against overload and short circuit at the active rectifier side.
③	Fan power supply	Used to power up the fan of the active rectifier filter module.
④	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑤	Active rectifier filter module	Used as LCL filter at the active rectifier input side.

1.10.5 Layout of the Active Rectifier Integrated Cabinet

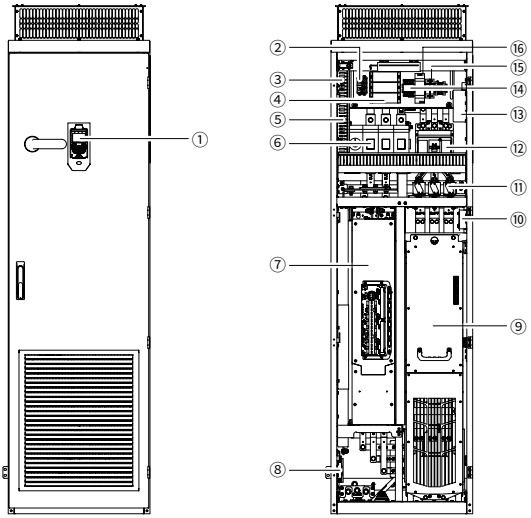


Figure 1-35 Layout of MD880-40D-0395-4+JC active rectifier power supply cabinet (cabinet 1)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Rectifier bridge	Pre-charge rectifier bridge
③	Voltage presence indicator panel	-
④	Aluminum-housed resistor	Pre-charge resistor
⑤	HSVM synchronous voltage detection module	Used for three-phase AC voltage sampling.
⑥	Disconnector	-
⑦	Rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑧	Heater	-
⑨	DLCL active rectifier filter module	Used as LCL filter at the active rectifier input side.
⑩	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑪	AC fuse	Used to provide protection against overload and short circuit at the active rectifier side.
⑫	Main contactor	Used to switch on/off the main control circuit.
⑬	Filter fan power supply	Used to power up the fan of the active rectifier filter module.

No.	Name	Function
⑭	Contactor	Used to switch on/off the pre-charge circuit.
⑮	Circuit breaker	-
⑯	Switched-mode power supply	-

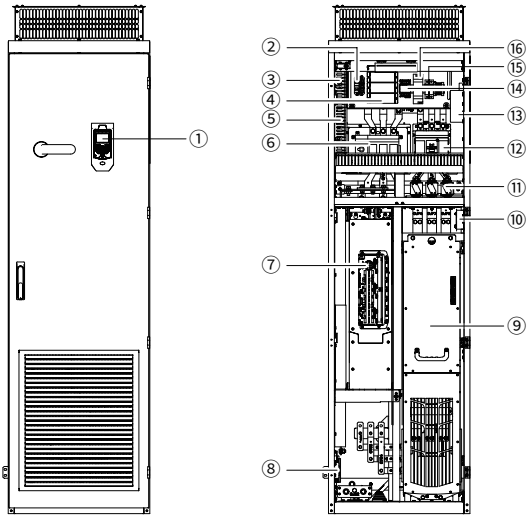


Figure 1-36 Layout of the MD880-40D-0299-4+JC active rectifier power supply cabinet (cabinet 2)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Rectifier bridge	Pre-charge rectifier bridge
③	Voltage presence indicator panel	-
④	Aluminum-housed resistor	Pre-charge resistor
⑤	HSVM synchronous voltage detection module	Used for three-phase AC voltage sampling.
⑥	Disconnector	-
⑦	Rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑧	Heater	-
⑨	DLCL active rectifier filter module	Used as LCL filter at the active rectifier input side.

No.	Name	Function
⑩	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑪	AC fuse	Used to provide protection against overload and short circuit at the active rectifier side.
⑫	Main contactor	Used to switch on/off the main circuit.
⑬	Filter fan power supply	Used to power up the fan of the active rectifier filter module.
⑭	Contactor	Used to switch on/off the pre-charge circuit.
⑮	Circuit breaker	-
⑯	Switched-mode power supply	-

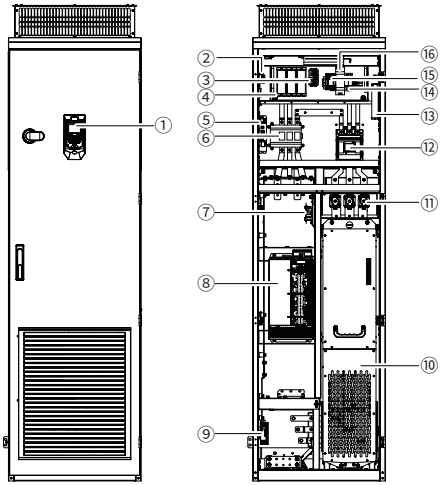


Figure 1-37 Layout of MD880-40D-0149-4+JC or MD880-40D-0183-4+JC active rectifier power supply cabinet (cabinet 3)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Voltage presence indicator panel	Used for the output DC side.
③	Rectifier bridge	Used for rectification of the pre-charge circuit.
④	Aluminum-housed resistor	Pre-charge resistor
⑤	HSVM synchronous voltage detection module	Used for three phase AC voltage sampling.
⑥	Disconnector	-

No.	Name	Function
⑦	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑧	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑨	Heater	-
⑩	Active rectifier filter module	Used as LCL filter at the active rectifier input side.
⑪	AC fuse	Used to provide protection on the AC side of the main circuit.
⑫	Main contactor	Used to switch on/off the main circuit.
⑬	Filter fan power supply	Used to power up the fan of the active rectifier filter module.
⑭	Circuit breaker	-
⑮	Contactor	Used to switch on/off the pre-charge circuit.
⑯	Switched-mode power supply	-

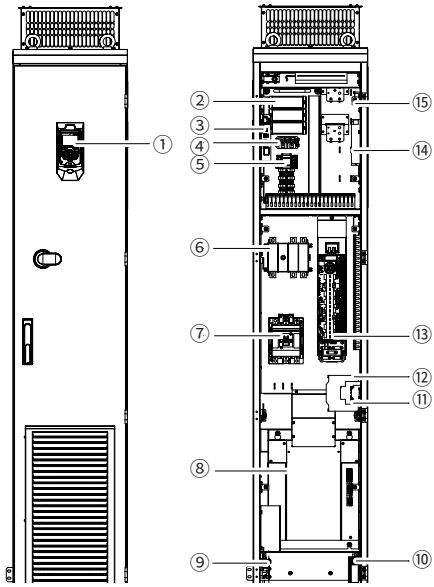


Figure 1-38 Layout of MD880-40D-0094-4+JC active rectifier power supply cabinet (cabinet 4)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Aluminum-housed resistor	Pre-charge resistor

No.	Name	Function
③	HSVM synchronous voltage detection module	For three phase AC voltage sampling
④	Rectifier bridge	Pre-charge rectifier
⑤	Contactor	Used to switch on/off the pre-charge circuit.
⑥	Disconnector (built-in fuse)	Used to protect the pre-charge circuit.
⑦	Main contactor	Used to switch on/off the main circuit.
⑧	Active rectifier filter module	Used as LCL filter at the active rectifier input side.
⑨	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑩	Heater	-
⑪	Circuit breaker	-
⑫	Switched-mode power supply	-
⑬	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑭	Filter fan power supply	Used to power up the fan of the active rectifier filter module.
⑮	Voltage presence indicator panel	Used for output DC side.

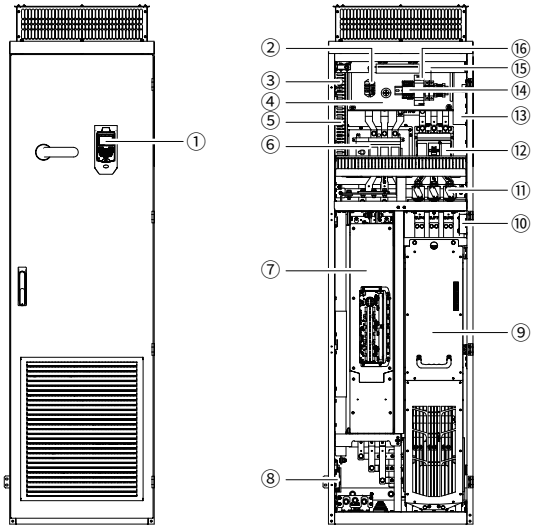


Figure 1-39 Layout of MD880-40M-0243-7+JC active rectifier power supply cabinet (cabinet 5)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Rectifier bridge	Snubber rectifier bridge
③	Voltage presence indicator panel	-
④	Aluminum-housed resistor (back of the sheet metal)	Pre-charge resistor
⑤	HSVM synchronous voltage detection module	Used for three phase AC voltage sampling.
⑥	Disconnector	-
⑦	Rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑧	Heater	-
⑨	DLCL active rectifier filter module	Used as LCL filter at the active rectifier input side.
⑩	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑪	AC fuse	Used to provide protection against overload and short circuit at the active rectifier side.
⑫	Main contactor	Used to switch on/off the main circuit.
⑬	Filter fan power supply	Used to power up the fan of the active rectifier filter module.
⑭	Contactor	Used to switch on/off the snubber control circuit.
⑮	Circuit breaker	-
⑯	Switched-mode power supply	-

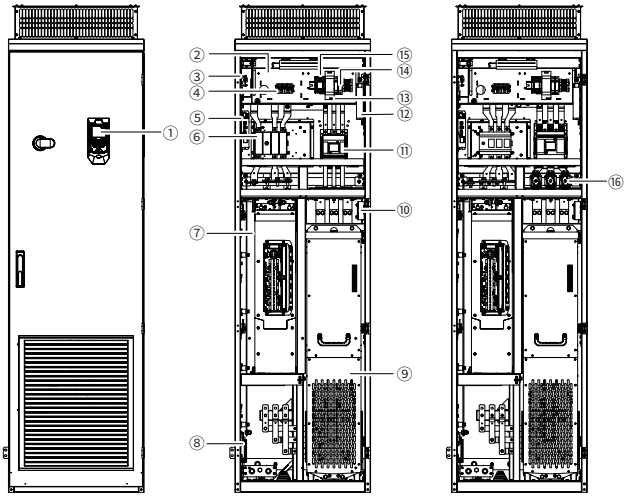


Figure 1-40 Layout of MD880-40M-0089-7+JC or MD880-40M-0173-7+JC active rectifier power supply cabinet (cabinet 6)

No.	Name	Function
①	SOP-20-880 smart operating panel	Connect the control machine or the machine to the PC through the operating panel.
②	Aluminum-housed resistor (back of the sheet metal)	Pre-charge resistor
③	Voltage presence indicator panel	Used for output DC side.
④	Rectifier bridge	Snubber rectifier bridge
⑤	HSVM synchronous voltage detection module	Used for three phase AC voltage sampling.
⑥	Disconnector (built-in fuse in MD880-40F-0089-7 configuration)	-
⑦	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
⑧	Heater	-
⑨	Active rectifier filter module	Used as LCL filter at the active rectifier input side.

No.	Name	Function
⑩	Voltage dependent resistor board	Used to provide protection against lightning strike and overvoltage.
⑪	Main contactor	Used to switch on/off the main circuit.
⑫	Filter fan power supply	Used to power up the fan of the active rectifier filter module.
⑬	Switched-mode power supply	-
⑭	Circuit breaker	-
⑮	Contactor	Used to switch on/off the pre-charge circuit.
⑯	AC fuse(External fuse in MD880-40F-0173-7 configuration)	Used to provide protection on the AC side of the main circuit.

1.11 Derating

1) Ambient temperature-based derating

When the ambient temperature is within 40° C to 50° C, the rated output current of the basic rectifier is derated by 1% for every additional 1° C.

Output current = Rated current x Derating coefficient (k)

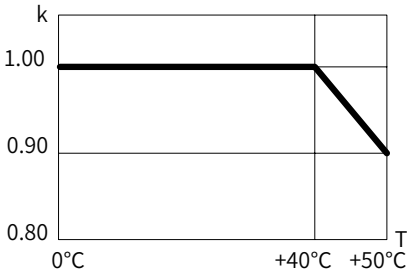


Figure 1-41 Ambient temperature-based derating

2) Altitude-based derating

For altitudes between 1000 m to 4000 m, the output current of the basic rectifier is derated by 1% for every additional 100 m. For altitudes above 4000 m, contact Inovance for technical support.

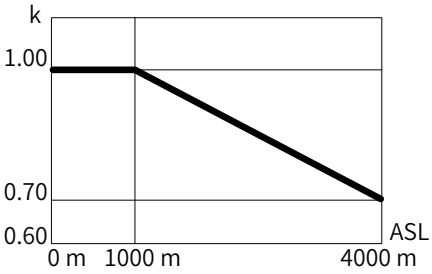


Figure 1-42 Altitude-based derating

1.12 Overload Capacity

For some drive systems where overload may occur, a proper reference load current is necessary for the MD880-40 series active rectifier. 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.

1) Curve in the low overload mode

In the low overload mode, the drive can run at 110% of the rated load (I_{LD}) for 60s continuously.

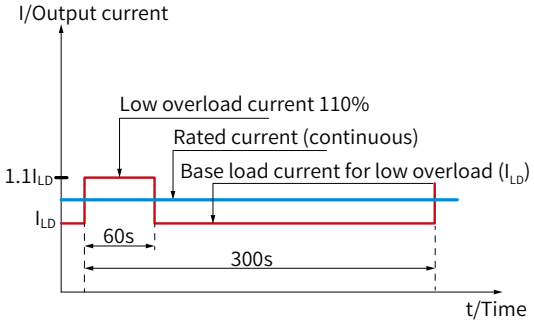


Figure 1-43 Curve in the low overload mode

2) Curve in the high overload mode

In the high overload mode, the drive can run at 150% of the rated load (I_{HD}) for 60s continuously.

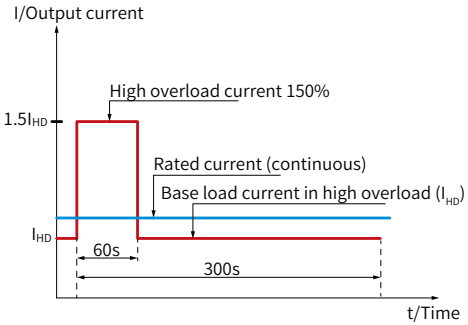


Figure 1-44 Curve in the high overload mode

1.13 Tightening Torque of Screws and Bolts

Table 1-12 Electrical connection

Screw/Bolt	Property class	Max. torque (N·m)
M3	4.8	0.55
M4	4.8	1.2
M5	4.8	2.8
M6	4.8	4.8
M8	4.8	13
M10	4.8	20
M12	4.8	35
M16	4.8	85

Table 1-13 Mechanical connection

Screw/Bolt	Property class	Max. torque (N·m)
M5	4.8	2.8
M6	4.8	4.8
M8	4.8	13

Table 1-14 Insulating spacer connection

Screw/Bolt	Property class	Max. torque (N·m)
M6	4.8	4.8
M8	4.8	13
M10	4.8	20
M12	4.8	35

Table 1-15 Cable connector

Screw/Bolt	Property class	Max. torque (N·m)
M8	4.8	13
M10	4.8	20
M12	4.8	35

1.14 Fuse Model Selection

1) Fuse on the AC side

Table 1-16 Fuse on the AC side

Model of active rectifier frame assembly	Structure	Fuse model (Bussmann)	Fuse model (SINOFUSE)	Quantity	Specification
MD880-40K-0575-4	BLCL+H8	170M6413	RS306-3-S1P-900A690V	3	900 A, 690 V, size: 3, single hole and flush end
MD880-40K-0810-4	BLCL+H8	170M6416	RS306-3-S1P-1250A690V	3	1250 A, 690 V, size: 3, single hole and flush end
MD880-40K-1092-4	BLCL+2H8	170M6413	RS306-3-S1P-900A690V	6	900 A, 690 V, size: 3, single hole and flush end
MD880-40K-1539-4	BLCL+2H8	170M6416	RS306-3-S1P-1250A690V	6	1250 A, 690 V, size: 3, single hole and flush end
MD880-40K-0369-7	BLCL+H8	170M4416	RS306-1-S1P-630A690V	3	630 A, 690 V, size: 3, single hole and flush end
MD880-40K-0540-5-CS	BLCL+H8	170M6413	RS306-3-S1P-900A690V	3	900 A, 690 V size: 3, single hole and flush end
MD880-40K-0810-5-CS	BLCL+H8	170M6416	RS306-3-S1P-1250A690V	3	1250 A, 690 V size: 3, single hole and flush end
MD880-40K-1026-5-CS	BLCL+2H8	170M6413	RS306-3-S1P-900A690V	6	900 A, 690 V size: 3, single hole and flush end
MD880-40K-0540-7	BLCL+H8	170M6413	RS306-3-S1P-900A690V	3	900 A, 690 V, size: 3, single hole and flush end
MD880-40K-0701-7	BLCL+2H8	170M6415	RS306-3-S1P-1100A690V	3	1100 A, 690 V, size: 3, single hole and flush end
MD880-40K-1026-7	BLCL+2H8	170M6413	RS306-3-S1P-900A690V	6	900 A, 690 V, size: 3, single hole and flush end
MD880-40D-0094-4	-	-	RS306-1-W1Z-125A690V	3	125 A, 690 V
MD880-40D-0149-4	-	-	RS306-1-W1Z-200A690V	3	200 A, 690 V
MD880-40D-0183-4	-	-	RS306-1-W1Z-250A690V	3	250 A, 690 V
MD880-40D-0299-4	-	-	RS306-1-W1Z-400A690V	3	400 A, 690 V
MD880-40D-0395-4	-	-	RS306-1-W1Z-550A690V	3	550 A, 690 V

NOTE

- The recommended values in the preceding table are based on the following:
  - The ambient temperature of the device is 40°C without forced air cooling in an altitude of 2000 m. The product is installed individually, with the current-carrying density of the conductor being 1.3 A/mm².
  - If the conditions vary, select the model according to actual conditions.

Table 1-17 Fuse on the AC side (UL-compliant)

Model of active rectifier frame assembly	Structure	Fuse model (Bussmann)	Quantity	Specification
MD880-40K-0540-7	BLCL+H8	170M6413	3	900 A, 690 V, size: 3, single hole and flush end
MD880-40K-1026-7	BLCL+2H8	170M6413	6	900 A, 690 V, size: 3, single hole and flush end

2) Fuse selection on the DC side

Table 1-18 Fuse selection on the DC side

Active rectifier module model	Structure	Fuse on the DC side (Bussmann)	Fuse model (SINOFUSE)	Quantity	Specification
MD880-40M-0575-4	H8	170M6415	RS306-3-S1P-1100A690V	2	1100 A, 690 V Size: 3, single hole and flush end
MD880-40M-0810-4	H8	170M6418	RS306-3-S1P-1500A690V	2	1500 A, 690 V Size: 3, single hole and flush end
MD880-40M-0369-7	H8	170M6545	RS306-3-S5P-700A1250V-D	2	700 A, 1250 V Size: 3, single hole and flush end
MD880-40M-0540-7	H8	170M6548	RS306-3-S5P-1000A1250V-D	2	1000 A, 1250 V Size: 3, single hole and flush end
MD880-40M-0540-5-CS	H8	170M6415	RS306-3-S1P-1100A690V	2	1100 A, 690 V Size: 3, single hole and flush end
MD880-40M-0810-5-CS	H8	170M6418	RS306-3-S1P-1500A690V	2	1500 A, 690 V Size: 3, single hole and flush end
MD880-40D-0094-4	-	-	RS306-1-W1Z-160A690V	2	160 A, 690 V
MD880-40D-0149-4	-	-	RS306-1-W1Z-250A690V	2	250 A, 690 V
MD880-40D-0183-4	-	-	RS306-1-W1Z-315A690V	2	315 A, 690 V
MD880-40D-0299-4	-	-	RS306-1-W1Z-450A690V	2	450 A, 690 V
MD880-40D-0395-4	-	-	RS306-1-W1Z-630A690V	2	630 A, 690 V

1.15 Model Selection for Pre-charge Circuit

Table 1-19 Model selection of pre-charge resistor and rectifier bridge

Voltage class	Rated current	Resistance of pre-charge resistor	Pulse load power	Three-phase rectifier bridge
400 V	575 A to 1539 A	2 Ω	36000 Ws	100 A/1800 V
500 V	540 A to 1026 A	2 Ω	36000 Ws	100 A/1800 V
690 V	369 A to 1026 A	2 Ω	36000 Ws	100 A/1800 V



- The same voltage class share the same configuration.
- To prevent overtemperature of the pre-charge resistor, the interval time between ON operations cannot be shorter than three minutes.

2 Mechanical Installation

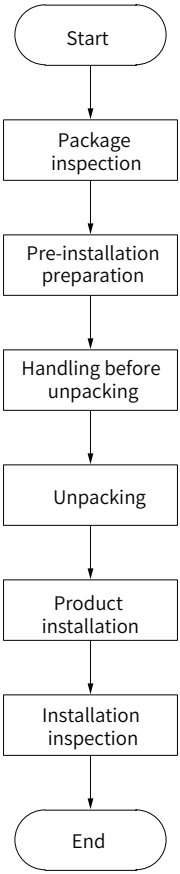


Figure 2-1 Installation flowchart

2.1 Installation Precautions

2.1.1 Transportation and Storage

1) Precautions during transportation

The equipment is heavy and have high center of gravity. The center of gravity has been labeled.

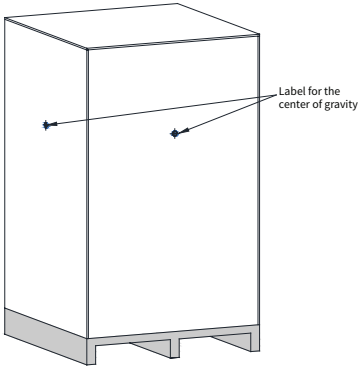


Figure 2-2 Label for center of gravity

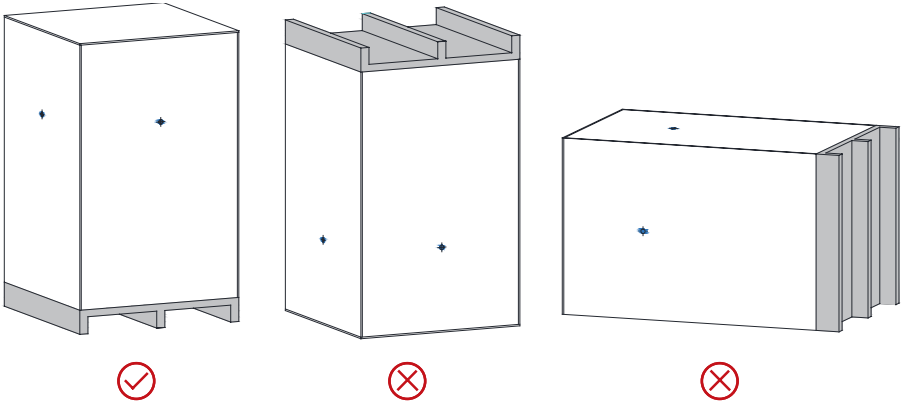


Figure 2-3 Mode of transportation

- Place the equipment on a flat surface that is firm enough to bear the weight of the equipment.
- Due to the heavy load of the equipment, proper lifting tools must be used and operators must be trained professionals.
- The equipment must be transported in the upright position as indicated on the packaging box. Never turn it upside down or place it on its side. Due to the weight and length of the equipment, the equipment can be transported only with the auxiliary hoisting angle iron on the top of the cabinet and the wooden pallet under the cabinet.

- The cabinet must be carried on a wooden pallet when transported with a forklift. Do not remove the cabinet from the pallet during transport.
- When a crane is used to move the equipment, the auxiliary hoisting angle iron must be installed on the equipment.

2) Transportation

Transport the packed product by using the pallet under it.

The cabinet units can be transported with a forklift and crane. The load-carrying capacity of the transportation equipment must be larger than the weight of one set of cabinet units.

Adjust the distance between forklift feet (larger than one half of the length of the cabinet unit) properly.

The lifting strap of the hoist must pass through the pallet under the cabinet, with the relief height lower than or equal to 0.3 m.

- The pallet jack cannot move for a long distance or on a slope.
- When being moved, the equipment needs to be held by persons on left and right sides.

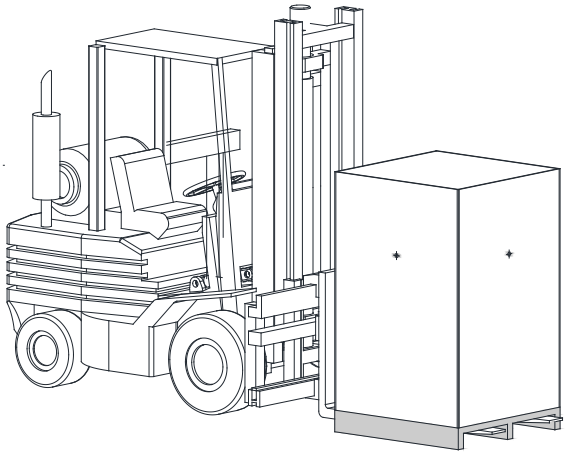


Figure 2-4 Handling with a forklift

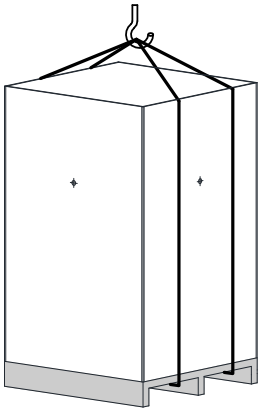


Figure 2-5 Handling with a crane

3) Unpacking inspection

After receiving the equipment, inspect it carefully. Check that you have received all the items specified on the delivery note. Notify the shipping company immediately for any missing components or damage. If necessary, contact Inovance for support.

WARNING

- If the equipment is damaged during transportation, its electrical safety performance may be affected. Do not connect the equipment before a professional high-voltage test is performed.
- Failure to comply may result in property damage, physical injury, or even death.

4) Storage

The cabinet must be stored in a clean and dry room, with temperatures between -40° C and +70° C and temperature variation lower than 1° C/min. If the cabinet is stored for a prolonged period once it has been unpacked, cover it or take other appropriate measures to ensure that it does not become dirty and that it is protected against environmental influences.

For storage of the product, observe the following requirements.

- Store the equipment with the original packing box.
- Do not expose the equipment to environments with moisture, high temperatures, or direct sunlight for a long time.

2.1.2 Mechanical Installation Checklist

WARNING

- To ensure safe and reliable operation, the equipment must be properly installed and commissioned by qualified professionals, taking into account all the warning notices provided.
- In particular, the general and national installation and safety guidelines for high-voltage installation as well as the guidelines relating to the proper use of tools and personal protective equipment must be observed.
- Failure to comply may result in property damage, physical injury, or even death.

Before installation, perform inspection according to the following checklist and tick the corresponding check-boxes for confirmation.

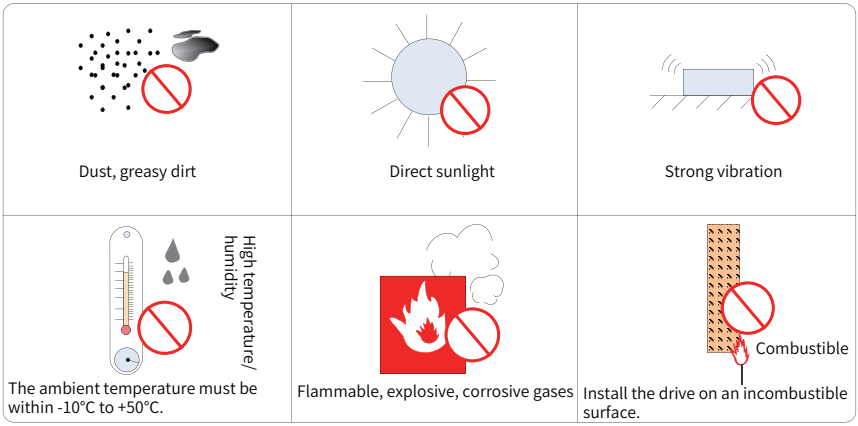
Table 2-1 Checklist for mechanical installation

No.	Item	Compliance
1	The center of gravity is labeled.	☐
2	The packing box is intact and dry.	☐
3	The load-bearing capacity and properties of the ground must fulfill the requirements for installation of the equipment. For details, see "2.2.1 Mounting Environment".	☐
4	The minimum ceiling height requirement for unblocked air passage is fulfilled. Sufficient space is reserved for unblocked air in and air out. Reserve sufficient space for a safe passage when the cabinet door opens. For details, see "2.4.1 Installation Requirements".	☐
5	The enclosure of the cabinet is not deformed, peeled off, or cracked. No water stains exist inside the cabinet.	☐
6	The accessories (options) inside the cabinet are complete.	☐
7	Before the cabinet units are finally installed, the wooden pallets supplied with the transport unit must be removed properly.	☐
8	The cabinet is installed to the specified fixing points. The equipment is connected as specified. For details, see "4) Installation of expansion screws".	☐
9	All contact protection devices (such as the guard plate) inside and outside the cabinet are installed before commissioning.	☐

2.2 Installation Preparation

2.2.1 Mounting Environment

Item	Requirement
Heat dissipation and ventilation	Install the active rectifier module on the surface of a flame-retardant object and mount it vertically to a mounting bracket with screws. The active rectifier module generates a lot of heat when it is running. Reserve enough space for heat dissipation around the cabinet.
Installation location	Install the device in a place meeting the following requirements: a. Flat installation base that can bear the weight of the equipment b. No direct sunlight c. Free from water drops, with RH ⩽ 95% d. No corrosive, inflammable, or explosive gases e. Free from oil dirt, dust and metal powder
Vibration	Keep the device away from vibration sources. For vibration resistance, see "1.5 Technical Data".
Ambient temperature	Derating is required for ambient temperatures higher than 40° C and altitudes above 1000 m. For the derating factor, see "1.11 Derating".
Protective enclosure	The module must be installed in a cabinet that is used in a final system. The final system must be equipped with a fireproof enclosure providing both electrical and mechanical protection. The installation must conform to local and regional laws and regulations, and relevant IEC standards.



2.2.2 Installation Tools

- Wrench or socket wrench (#13, #16, and #18)
- Phillips screwdriver and straight screwdriver (2.5–6 mm)
- Torque wrench

· Crowbar

2.3 Installing Frame Assembly

2.3.1 Installation Clearance of BLCL+H8 Frame Assembly

1) Minimum requirement on cabinet dimensions

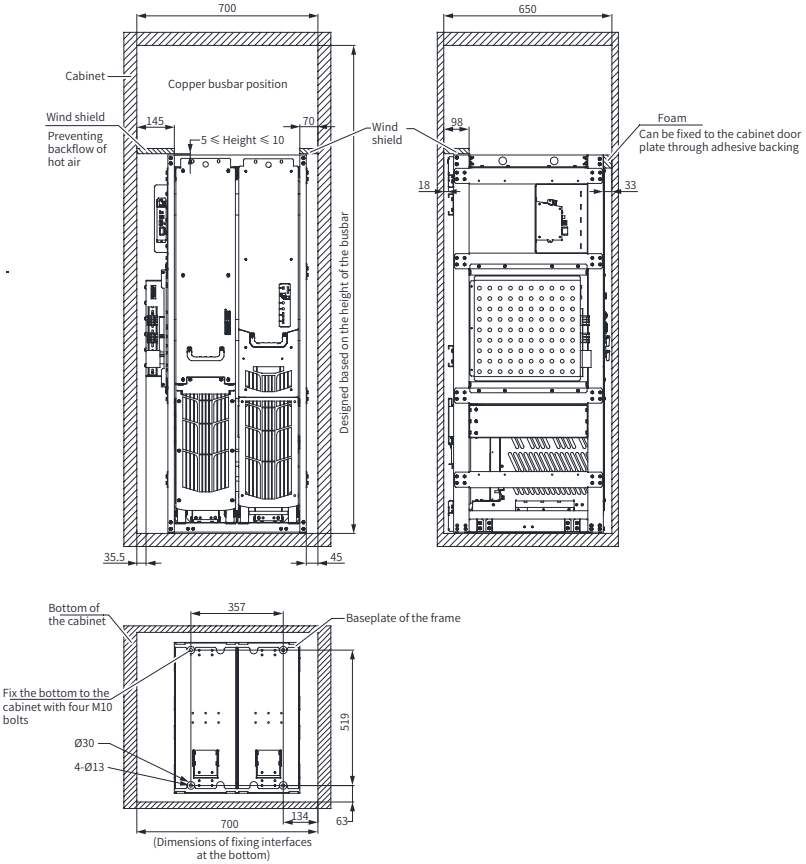


Figure 2-6 Minimum requirement on cabinet dimensions (in mm)

NOTE

- It is recommended to use a standard cabinet with a depth of 800 mm. For a special cabinet, the internal depth must be at least 650 mm.

2) Two beams are required at the bottom of the cabinet so that the frame can be pushed in easily.

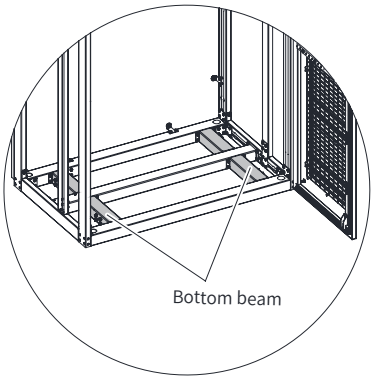


Figure 2-7 Bottom beam

The dimensions are as follows.

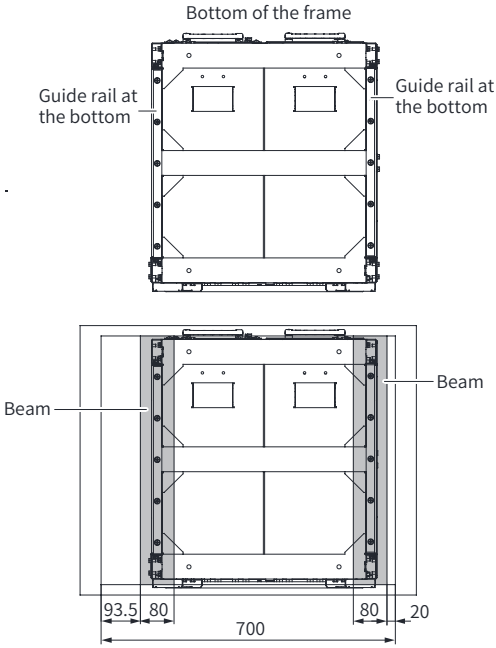


Figure 2-8 Beam dimensions (in mm)

2.3.2 Installing BLCL+H8 Frame Assembly

See the procedure below.

1) Pull the H8 active rectifier module out of the frame (to reduce the weight of the frame assembly).

- Remove the four fixing components (ⓑ).
- Lift the frame onto a flat surface.
- Remove the four M8 bolts (ⓐ) of the H8 module.
- Place the mounting rail (ⓒ) and take out the H8 module.

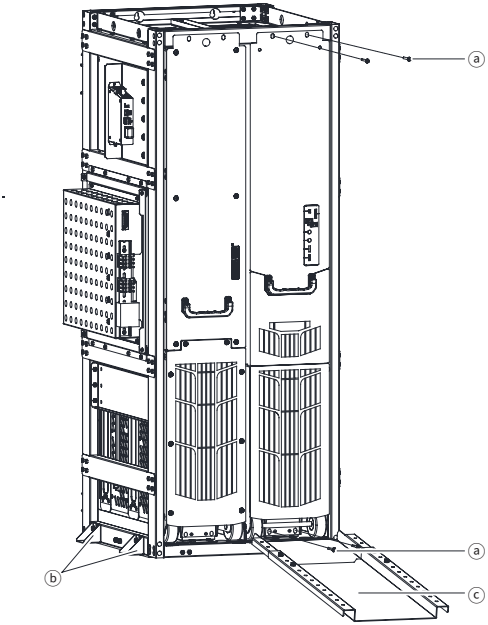


Figure 2-9 Pulling the H8 module out of the frame

2) Lift the frame into the cabinet.

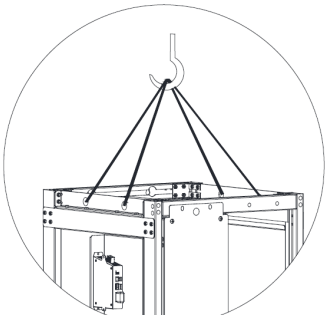


Figure 2-10 Lifting the frame into the cabinet

3) When the bottom of the frame comes into contact with the bottom of the cabinet, manually push the frame to the specified position. Secure the screws on the bottom and top of the frame.

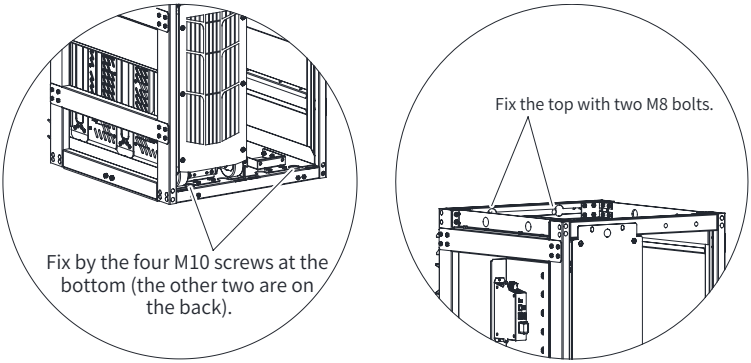


Figure 2-11 Fixing the frame and cabinet

4) Place the guide rail, push the H8 module in, and tighten the four M8 screws that secure the H8 module.

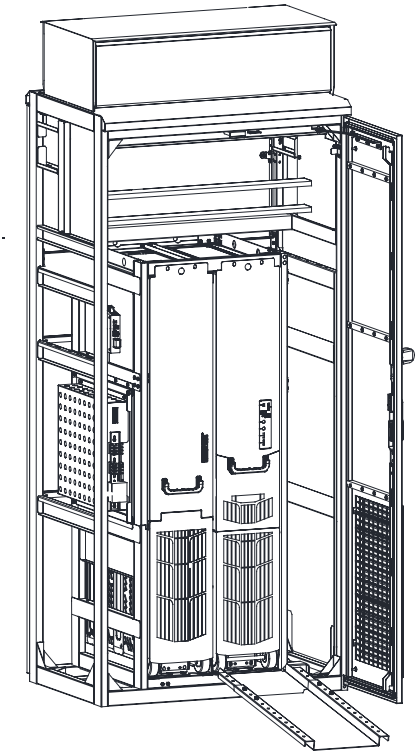


Figure 2-12 Pushing in the H8 module again

2.3.3 Installation Clearance of BLCL+2H8 Frame Assembly

1) Minimum requirement on cabinet dimensions

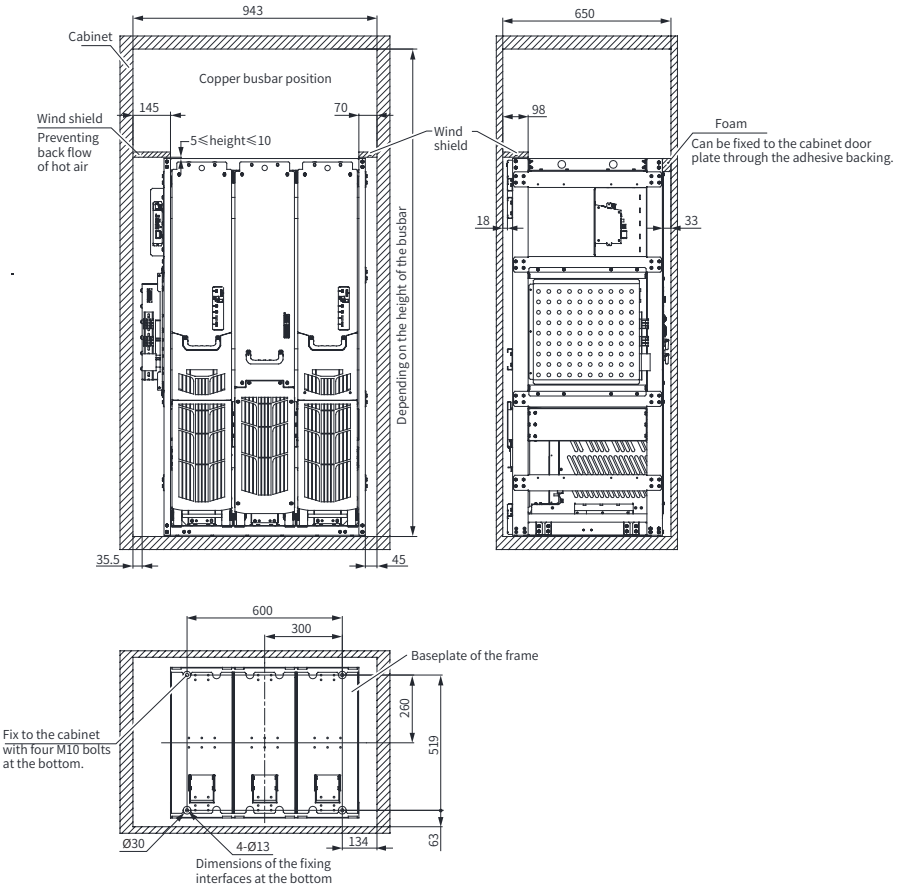
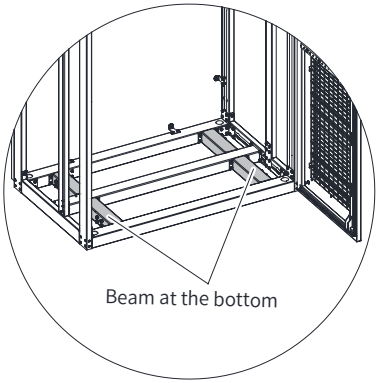


Figure 2-13 Minimum requirement on cabinet dimensions (in mm)

NOTE

- It is recommended to use a standard cabinet with a depth of 800 mm. For a special cabinet, the internal depth must be at least 650 mm.

2) Two beams are required at the bottom of the cabinet so that the frame can be pushed in easily.



The dimensions are as follows.

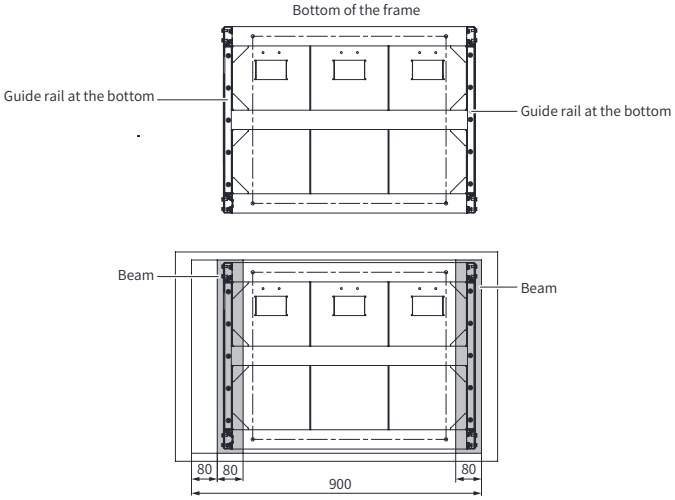


Figure 2-14 Dimensions of bottom beams (unit: mm)

2.3.4 Installing BLCL+2H8 Frame Assembly

See the procedure below.

1) Pull the two H8 active rectifier modules out of the frame (to reduce the weight of the frame assembly).

- Remove the four fixing components (ⓑ).
- Lift the frame onto a flat surface.
- Remove the four M8 bolts (ⓐ) of the H8 module.
- Place the mounting rail (ⓒ) and take out the H8 module.

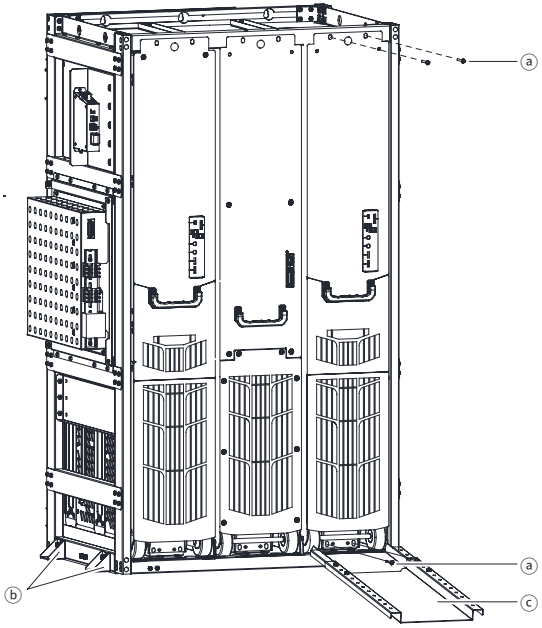


Figure 2-15 Pull the H8 module out of the frame.

2) Lift the frame into the cabinet.

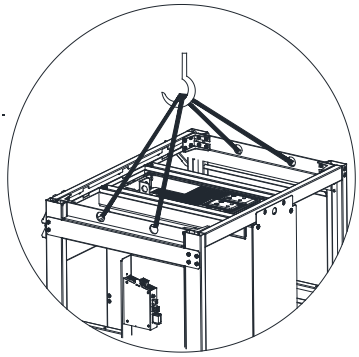


Figure 2-16 Lift the frame into the cabinet

3) When the bottom of the frame comes into contact with the bottom of the cabinet, manually push the frame to the specified position. Tighten the bottom and top screws.

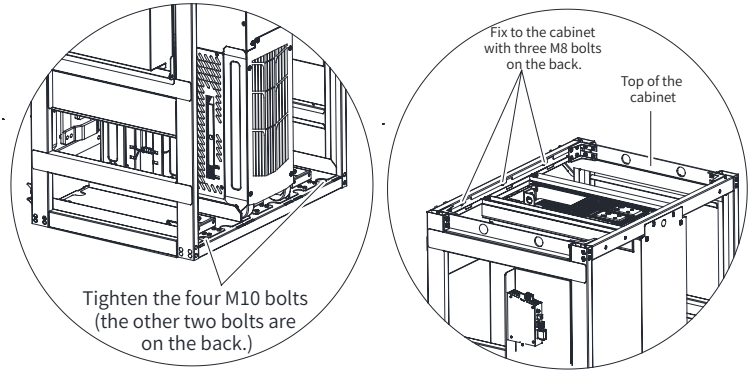


Figure 2-17 Fixing the frame and cabinet

4) Place the guide rail, push the H8 module in, and tighten the four M8 screws that secure the H8 module.

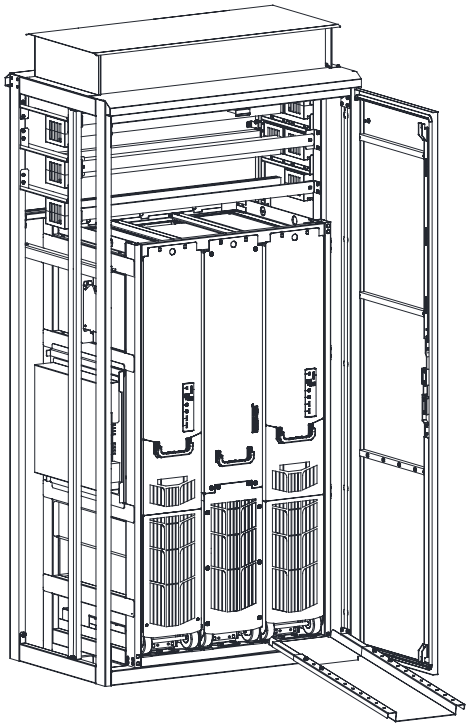


Figure 2-18 Push in the H8 module again.

2.4 Installing the Cabinet

2.4.1 Installation Requirements

1) Clearance on the top of the cabinet

The active rectifier cabinet cannot be installed in environments without any shelter. All cabinets must be installed according to the drawings, with sufficient surrounding space reserved for air flow, door open/close, and maintenance. The passageway for entering the installation foundation and the space for the auxiliary device need to be reserved.

The installation location must be dry and free of dust. The air supplied cannot contain any electrically conductive gas, vapors, or dust. If necessary, use filters to clean the air at the installation site. If the air contains dust, install filter mats in front of the air vents of the cabinet door and the ventilation hood on the top of the cabinet. Cabinet units must comply with IP21.

NOTE

- To complies with IP21, the MD880-40 cabinet must be enclosed by installing a side panel on the left and right sides respectively.

The equipment must be installed with reference to the attached dimension drawing. The distance between the cabinet top and the ceiling is related to the options matching the IP rating of the cabinet, as shown in the following figure.

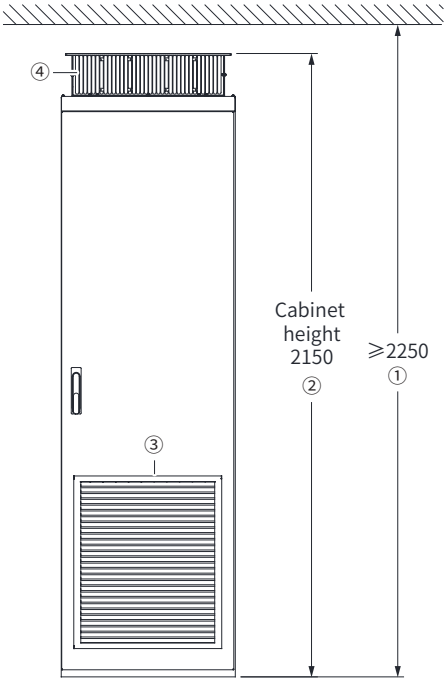


Figure 2-19 Distance between cabinet top and ceiling (IP21)

① Min. height of the ceiling (mm); ② Total height of the cabinet (mm); ③ Air inlet area; ④ Air outlet area

2) Clearance in front of the cabinet

The cooling air for the power unit is drawn in from the front through the ventilation holes or window blinds in the lower part of the cabinet door. The heated air is discharged through the perforated top cover or the window blinds of the ventilation hood.

Cabinet units are allowed to lay against the wall, with the distance between the front of the cabinet and the wall for equipment placement not shorter than 1500 mm. Sufficient space must be reserved for two sides of cabinet units.

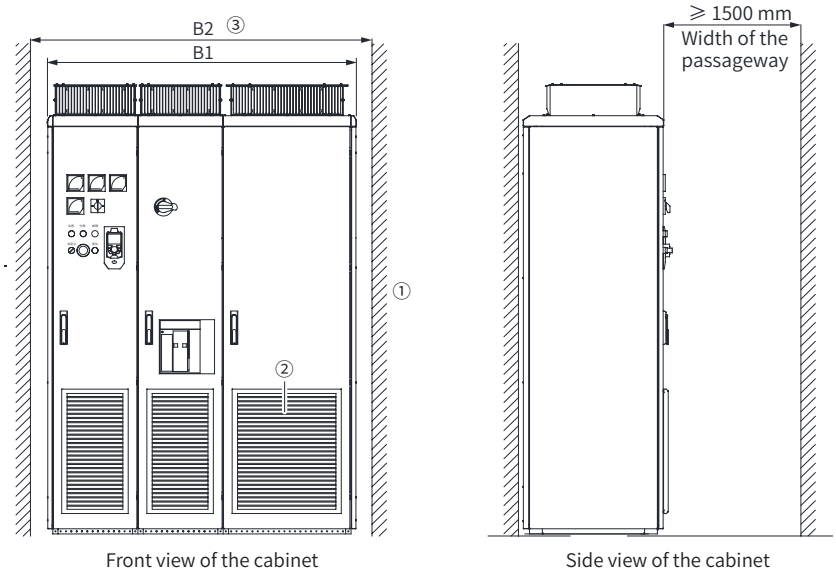


Figure 2-20 Space in front of the cabinet

① Building wall; ② Air inlet area; ③ The space width B2 of the building must be larger than the total cabinet width B1.

NOTE

- Take the front door handle into consideration. Reserve sufficient space to ensure that the front door opens/closes at an angle higher than 90° (maximum door open/close angle is about 100° without obstruction), so that there is sufficient operation space during maintenance.

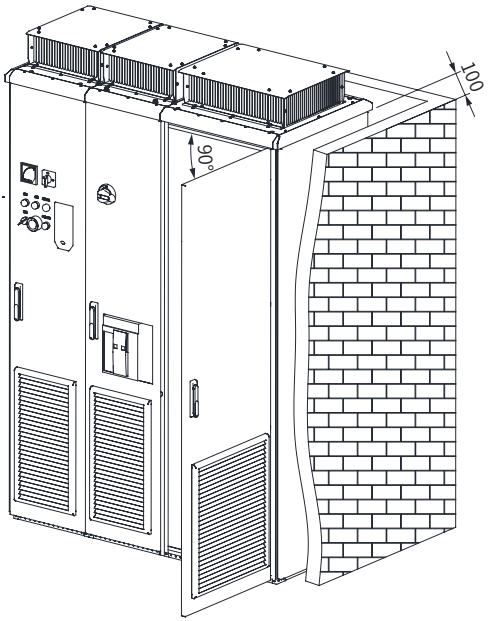


Figure 2-21 Space reserved for door open/close (unit: mm)

3) Requirements on the ground levelness

The installation foundation must be flat and strong enough to bear the weight of the cabinet, so that the following function of the cabinet can be performed properly. Ensure that the door lock works properly during door opening and closing.

When cabinets are connected side by side, ensure that there is no gap between the cabinet and the ground. If the gap is unavoidable (as shown by ① in "Figure 2-22 Requirements on ground"), use a pad (as shown by ② in "Figure 2-22 Requirements on ground") to keep the cabinet horizontal, and use proper fillings (for example, fireproofing mud) to fill the space.

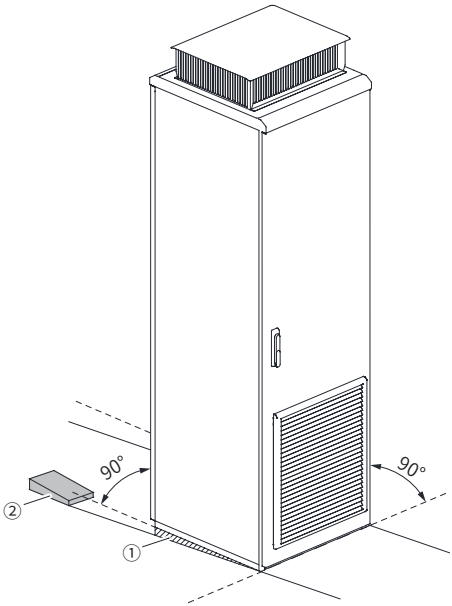


Figure 2-22 Requirements on the installation ground

4) Installation of expansion screws

If the cabinet is installed on the concrete ground, install the expansion screws in the ground at the positions corresponding to the fixing holes of the cabinet.

The procedure for installing the expansion nuts is as follows.

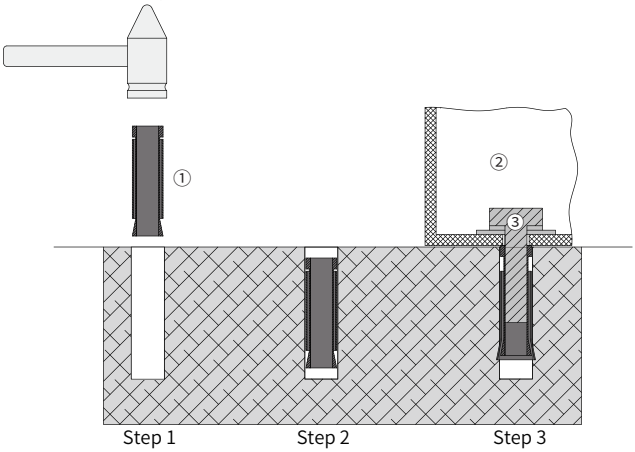


Figure 2-23 Procedure for installing the expansion screw

① Expansion screw; ② Cabinet unit; ③ M12 bolt

Mounting procedure:

1. Drill holes with hole diameter lower than the maximum outer diameter of expansion screw and hole depth higher than the length of expansion screw. The holes must be perpendicular to the ground.

2. The expansion screw consists of a bolt spring enclosure and a screw part. Use a hammer to knock the expansion screw into the hole and ensure that the screw head is below the ground surface, as shown by step 2.

3. After placing the cabinet to the required position, fasten it with M12 bolts. The expansion screw stem will be pulled up, which fixes the cabinet through deforming the spring shell, as shown by step 3.

5) Requirements on foundation

CAUTION

- Lay high-voltage cables and low-voltage cables in different brackets. If they cannot be separated, lay low-voltage cables in fully-enclosed metal ducts.
- The cable trench must be incombustible, smooth, moisture-proof, dust-proof, and protected against intrusion of small animals.
- Failure to comply may result in property damage, physical injury, or even death.

During foundation design, take the following factors into consideration:
a. Inspection space in front of the cabinet modules;
b. Routing of power cables, motor cables, and system control cables

Make sure that the cable trench or cable channel are below the cabinet. The power cables and signal cables must be separated. Otherwise, the device function may be affected. The routing diagram and requirements are shown below.

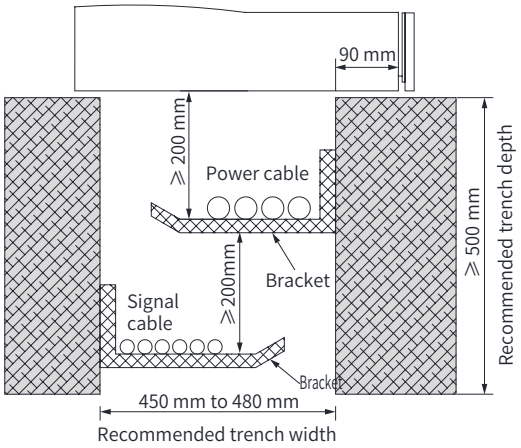


Figure 2-24 Foundation layout

2.4.2 Installation Procedure of the Cabinet

1) Unpacking

Place the packed product onto a flat surface. Use appropriate tools, such as a crowbar, to pry off the crate along the gap at the plate edge. Then, remove the cover plate, side plate, and pallet.

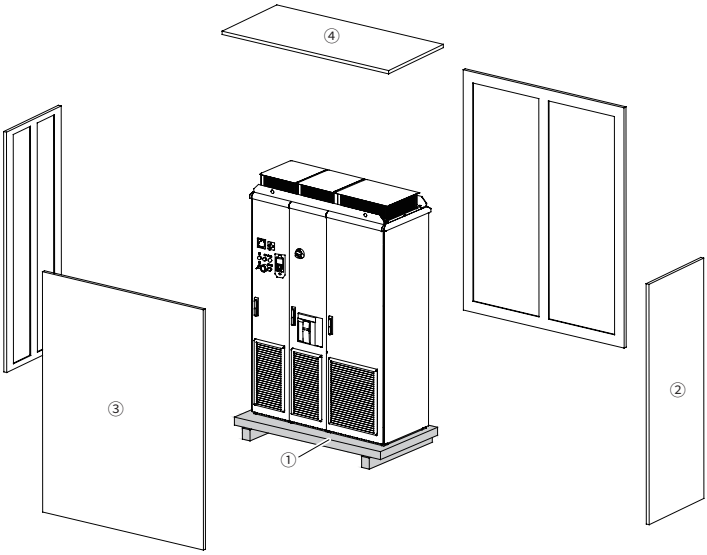


Figure 2-25 Unpacking diagram

① Pallet; ② End plate; ③ Side plate; ④ Cover

NOTE

- During unpacking, put the crowbar into the crate as short as possible to avoid damaging the equipment. Pay attention during unpacking to avoid injury by iron nails.
- When removing the packing materials such as plastic film, do not use sharp tool to avoid scratching the equipment.
- Dispose of the packing materials according to local laws and regulations.

2) Removing the pallet

Before installing the cabinet, remove the screws for fastening the pallet and cabinet, and remove the pallet.
The fastening screws are in the four corners of the cabinet.

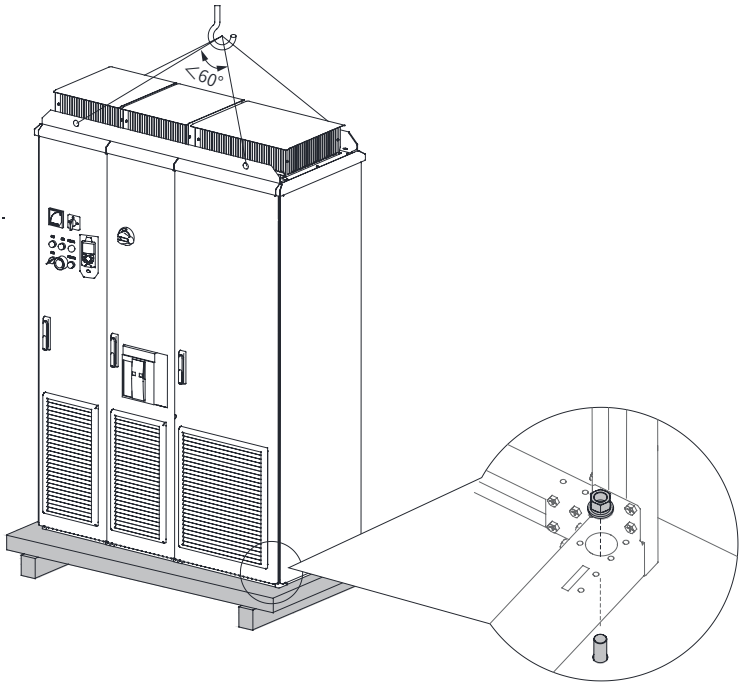


Figure 2-26 Unloading the cabinet from the pallet

3) Handling after unpacking

- Handle the cabinet units through a crane or similar. The load-carrying capacity of the handling equipment must be higher than the weight of one set of the cabinet.
- When the cabinet is being hoisted, the maximum angle of the hoisting rope is 60° .
- Use the auxiliary hoisting angle iron on the top of the cabinet for lifting and handling, with the relief height not higher than 0.3 m.
- Ensure that the cabinet door is locked before handling. The cabinet must be held at both sides by hands during handling.

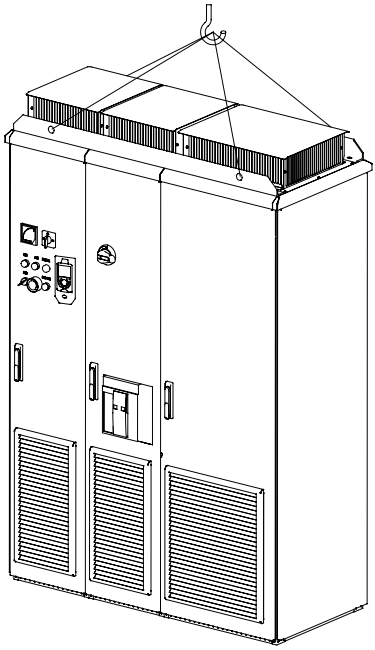


Figure 2-27 Handling after unpacking

Open the cabinet door, align the anchor bolt mounting hole at the bottom of the cabinet with the expansion screw on the ground, fasten the twelve M12 bolts to fix the cabinet (fixing screws locate at four corners of the cabinet), and then close the cabinet door.

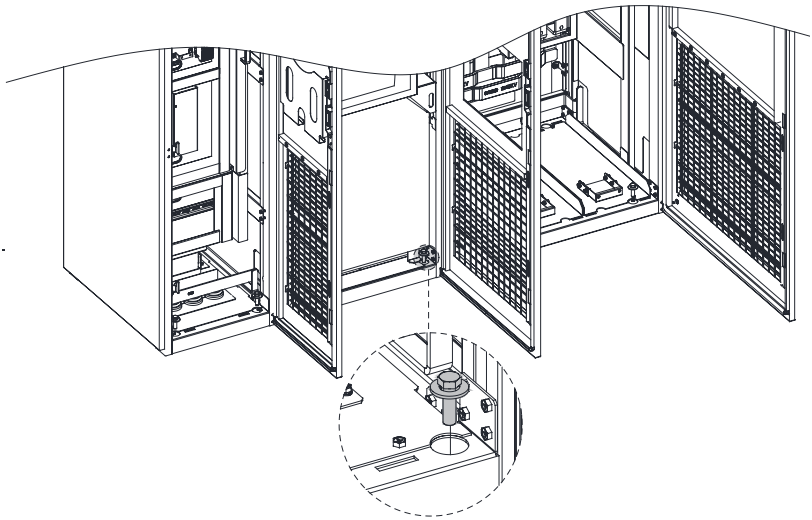
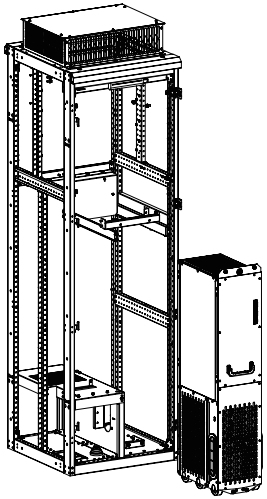


Figure 2-28 Fixing the cabinet

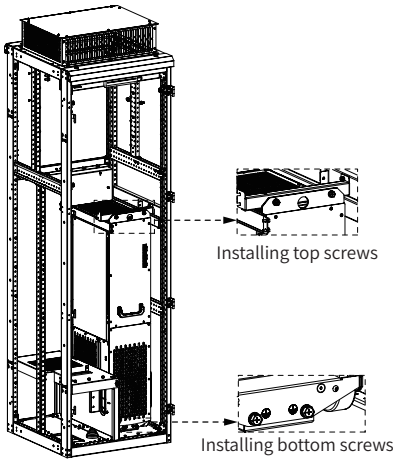
2.4.3 Recommended Installation Instructions for Integrated Products

Integrated product (DLCL):

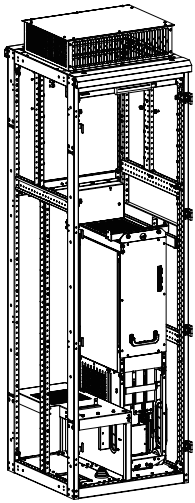
1. Push the module into the cabinet with a fixture.



2. After the module is pushed in place, use a socket wrench with opening size 13 (use an extension bar if necessary) to tighten the four M8x20 screws on the top and bottom of the module at a tightening torque of 13 N·m to fix the module in the cabinet, as shown below.

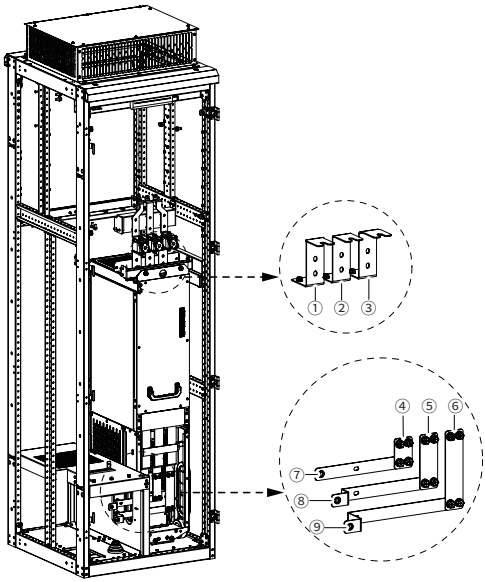


3. Open the lower shield of the filter module, as shown in the following figure.



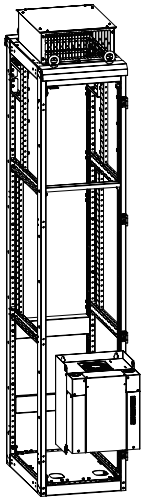
4. Tighten the M8x20 screws in the copper busbars ① , ② , and ③ shown in the following figure through a socket wrench with opening size 13 (use an extension rod if necessary) at a tightening torque of 13 N·m to connect the input copper busbar to the filter. Tighten the M8x20 screws in the copper busbars ④ , ⑤ , and ⑥ shown in the following figure with a socket wrench with opening size 13 (use an extension rod if necessary) at a tightening torque of 13 N·m. Pass the

copper busbars ⑦ , ⑧ , and ⑨ through the coil and tighten the M8x20 screws in copper busbars ④ , ⑤ , and ⑥ using a socket wrench with opening size 13 (use an extension rod if necessary) at a tightening torque of 13 N · m.

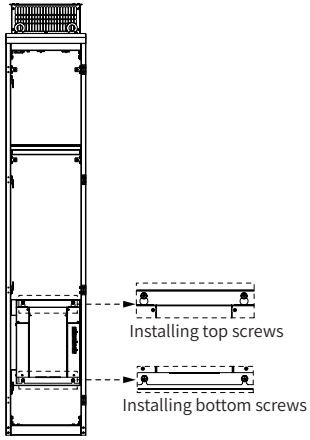


Integrated product (ELCL):

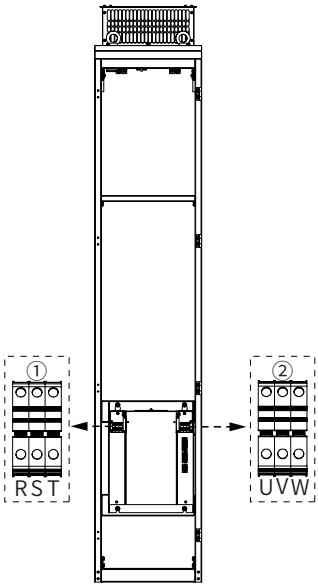
1. Place the module into the cabinet as shown in the figure and move the back to the fixing beam.



2. Secure the four M8x20 screws at the top and bottom of the filter module through a socket wrench with opening size 13 (use an extension bar if necessary) at a tightening torque of 13 N · m to fix the filter module to the cabinet beam.



3. Use a screwdriver to disassemble the upper left and right sheet metal fixing screws of the filter module to expose the terminals. The wiring of the terminals is shown in the following figure. Terminals on the upper left are R, S, and T input terminals of the filter module. Terminals on the upper right are U, V, and W terminals of the filter module.



3 Electrical Installation

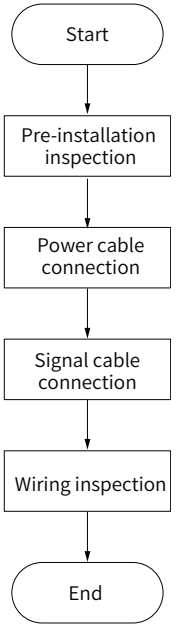


Figure 3-1 Electrical installation flowchart

3.1 Safety Instructions

3.1.1 Safety Precautions Before Installation

Safety precautions before installation



- The equipment is typically used in industrial applications with high voltage. The equipment contains live and rotating components. Therefore, there is a risk of severe injury or significant material damage if the required covers are removed without authorization during operation, if it is used or operated incorrectly, or if it has not been properly maintained.
- Only professional technicians are allowed to perform operations and they must read and comply with safety information provided in this guide.
- When carrying out any kind of work on electrical devices, the following "five safety rules" must always be observed:
  ① Power-off
  ② Make sure that power supply will not be connected again.
  ③ Make sure that the equipment is de-energized, without any residual voltage.
  ④ Make sure that the equipment is reliably grounded.
  ⑤ Cover or isolate the adjacent components that are still live.

3.1.2 Inspection on Electrical Installation

Inspection



- The equipment runs with high voltage. The wiring work must be carried out only after the cabinet is powered off without any residual voltage left.
- Only qualified professionals are allowed to operate the equipment.
- Take caution when operating the equipment disconnected from the power supply as external supply voltage may still be present. The power terminals and control terminals may still be live even when the equipment is stopped.
- The equipment may still be live even 15 min after power-off due to the DC bus capacitor inside. Therefore, ensure that the voltage is lower than 36 V before turning on the equipment.
- Ensure that the motors, cabinets, and other components are installed and connected in accordance with the national technical rules and other applicable regional regulations. Special attention must be paid to regulations concerning cable dimensions, fuses, grounding, shutdown, isolation, and overcurrent protection.
- If a fuse in a branch circuit trips, the fault current may have been cut off. To reduce the risk of fire or an electric shock, check the conductive parts and other components and replace the damaged parts. If any fuse trips, figure out the cause and rectify the fault.

3.1.3 General Precautions

Electrostatic/Optical components
DANGER ◆ The circuit board contains components that are sensitive to static electricity. Wear a grounded wrist strap when operating the circuit board. Do not touch the circuit board unless necessary. CAUTION ◆ Carefully pick and place the optical fiber cables. When removing the optical fiber cable, pull the connector, not the cable itself. Since the optical fiber cable is extremely sensitive to dirt, do not touch the end of the cable with bare hands.

3.1.4 Insulation Inspection of Components

Insulation test has been performed on the main circuit and enclosure of the MD880-40 series active rectifier before delivery. Therefore, do not perform any withstand voltage and insulation resistance tests on the rectifier again.

3.2 EMC-compliant Routing

3.2.1 Routing Requirements

1) Separate routing of signal cables and power cables

When analog signals are used to control the active rectifier remotely, the signal cables and high-voltage circuit cables (power input, AC-DC output, and braking resistor connecting cables) must be routed through different routes with a distance of at least 30 cm. This is to reduce interference generated by the active rectifier and other devices. This requirement also applies to wiring inside the control cabinet.

2) Requirements on analog control signal cables

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.

3) Requirement on power cables

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

4) Requirements on control cables and power supply cables

If the power supply cables and control cables must be cross-connected, ensure

that they are cross-connected at 90 degrees.

3.2.2 Routing Recommendations

1) Route cables that used to transmit different types of signals through different routes. Separate disturbing cables from sensitive cables with a minimum clearance of 30 cm wherever possible. When two types of cables must be cross-connected, they must be cross-connected at 90 degrees to avoid interference.

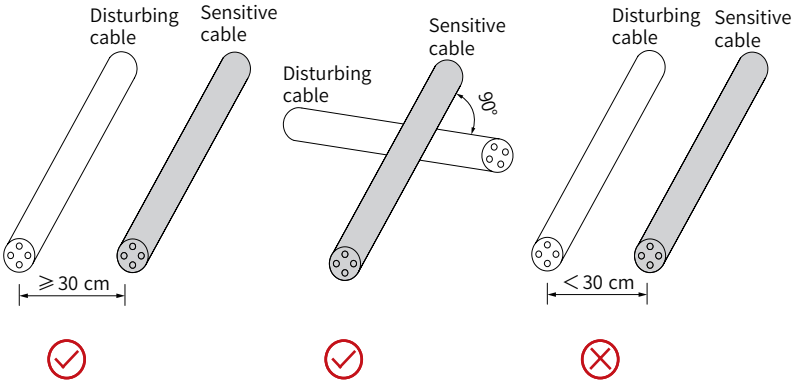


Figure 3-2 Routing of disturbing cables and sensitive cables

2) 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.

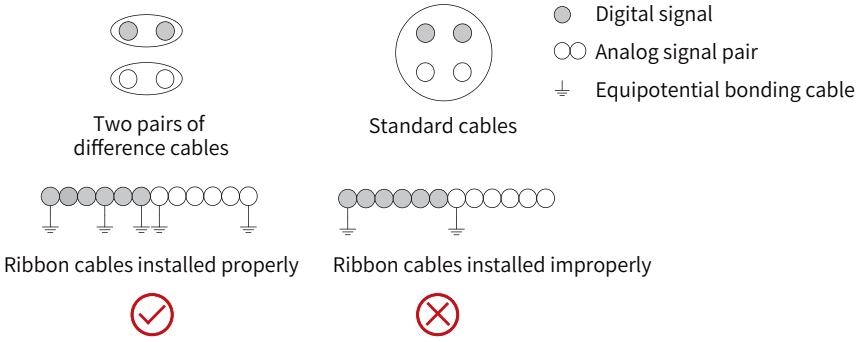


Figure 3-3 Routing of different types of signal cables

3) 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

the cable with conductors shielded, as shown in the following figure.

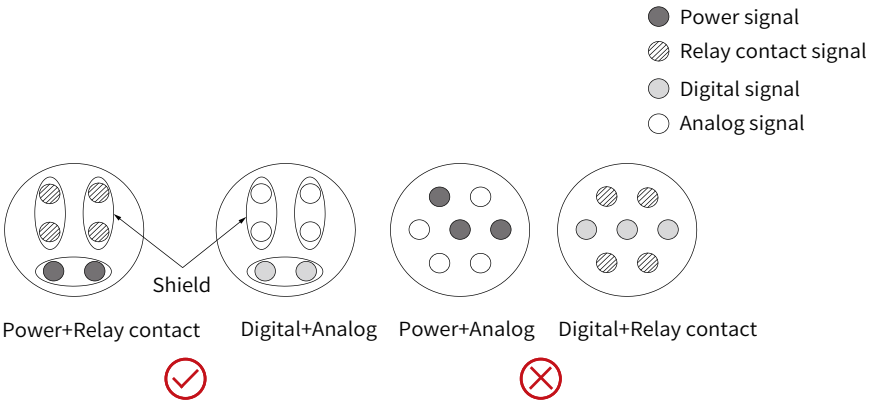


Figure 3-4 Routing of multi-core cables

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

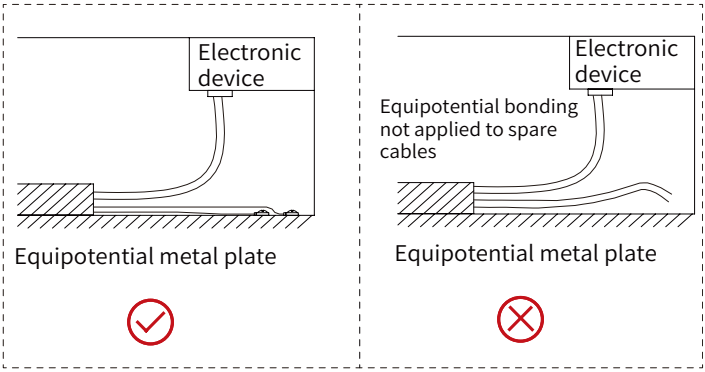


Figure 3-5 Handling of unused cores in a multi-core cable

5) For low-level sensor signals and the relay signals sharing a common line, route two cables as close as possible to prevent a large loop area. For analog signals, use twisted pairs. For digital signals, ensure signal cables are routed close to each other.

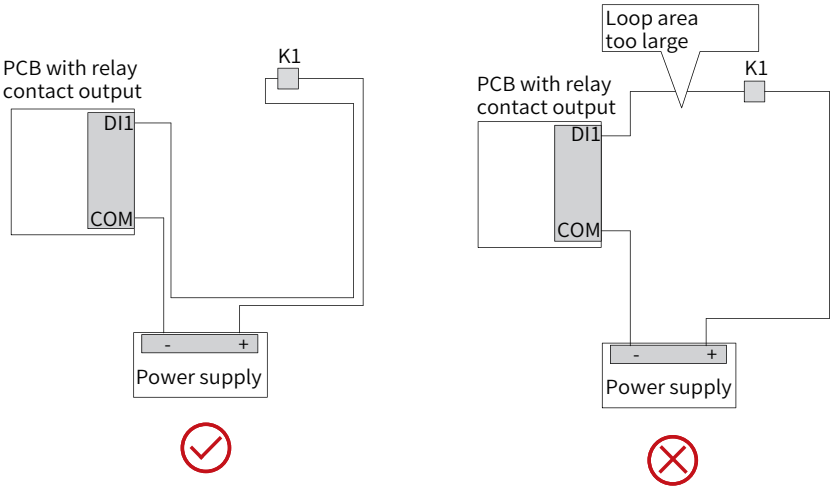


Figure 3-6 Recommended wiring loop area

6) 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.

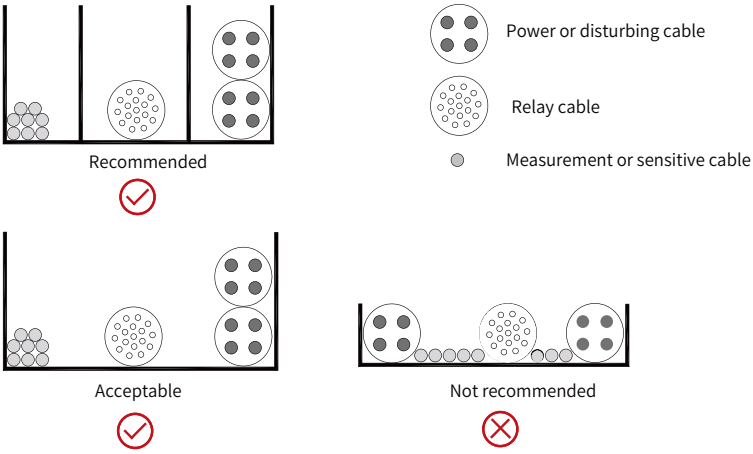


Figure 3-7 Routing of multiple types of cables

7) Keep the unshielded part of the shielded cable as short as possible. Connect the shield to the nearest PE terminal. Note that if the stripped sheath is

too long, the conductor may be prone to signal interference, especially the encoder signals.

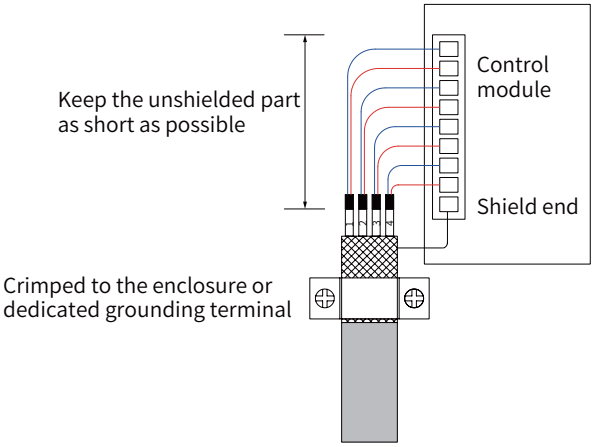


Figure 3-8 Requirements on shielded cable

3.2.3 Connecting Shielded Power Cables

The input power cable and shield inside the active rectifier module must be in large-area contact with the shield plate in the cabinet modules to achieve good EMC effect. See the figure below for the connection method.

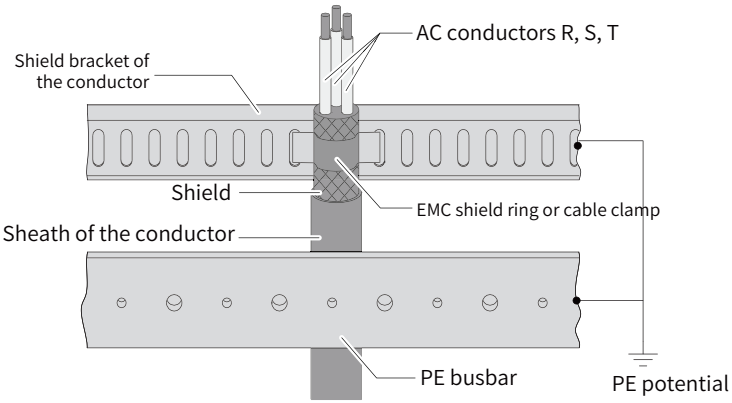


Figure 3-9 Connection of shielded power cables

3.3 Module Connection

3.3.1 Connecting the Active Rectifier Module

The following shows layout of active rectifier module terminals.

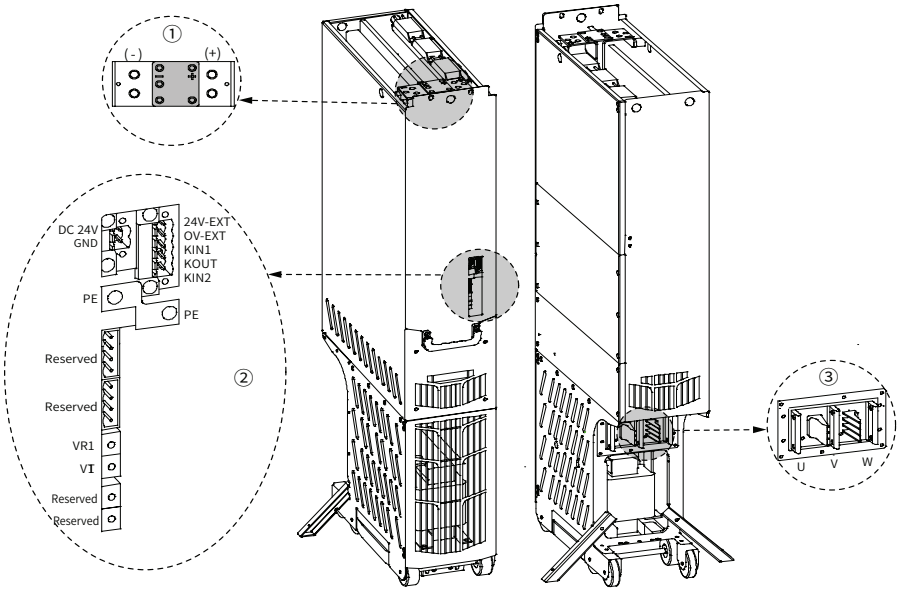


Figure 3-10 Terminals in the active rectifier module (H8)

Table 3-1 Terminal connection parameters of the active rectifier module (H8)

No.	Name	Description
①	(+), (-) DC output	400 V system: 540 VDC to 720 VDC 690 V system: 740 VDC to 975 VDC Connected to the M10/20 N · m copper busbar.
②	Power supply terminal (24 VDC, GND) 5Pin_DIDO terminal Optical fiber terminal (VR1/VT1)	Power supply terminal: Two-conductor twisted pair, single-conductor cable, cross-sectional area: 0.5–2.5 mm^2 5-pin_DIDO terminal: single-conductor cable, cross sectional area: 0.5–2.5 mm^2 Optical fiber terminal: Used for optical fiber connection.
③	U, V, and W AC input	Connected to the cabinet through the quick connector.

3.3.2 Connecting the Active Rectifier Filter Module

The following shows layout of MD880-40K active rectifier filter module terminals.

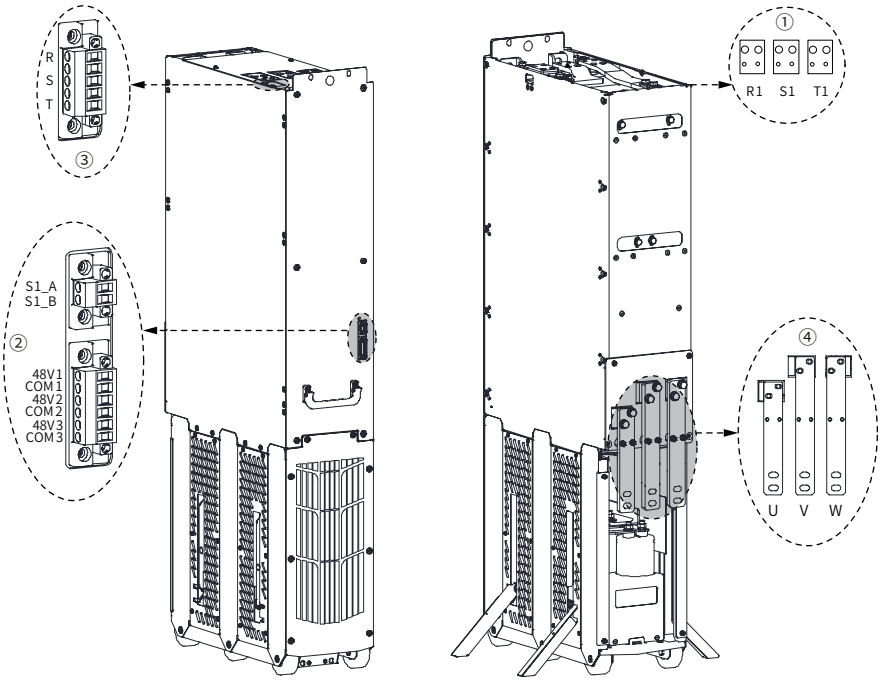


Figure 3-11 Terminals in the active rectifier filter module (BLCL)

Table 3-2 Terminal connection parameters of the active rectifier filter module (BLCL)

No.	Name	Description
①	R1, S1 and T1 (AC input terminals)	-
②	Reactor overtemperature switch (S1_A, S1_B)	-
	48 VDC fan power supply input (48V1) 48 VDC fan power supply input (COM1) 48 VDC fan power supply input (48V2) 48 VDC fan power supply input (COM2) 48 VDC fan power supply input (48V3) 48 VDC fan power supply input (COM3)	Ensure that the polarity is correct.
③	AC voltage detection (R) AC voltage detection (S) AC voltage detection (T)	Connected to the HSVM-10 synchronous voltage detection module in the correct phase sequence.
④	U, V and W (AC output terminals)	-

The following shows layout of MD880-40D active rectifier filter module (DLCL) terminals.

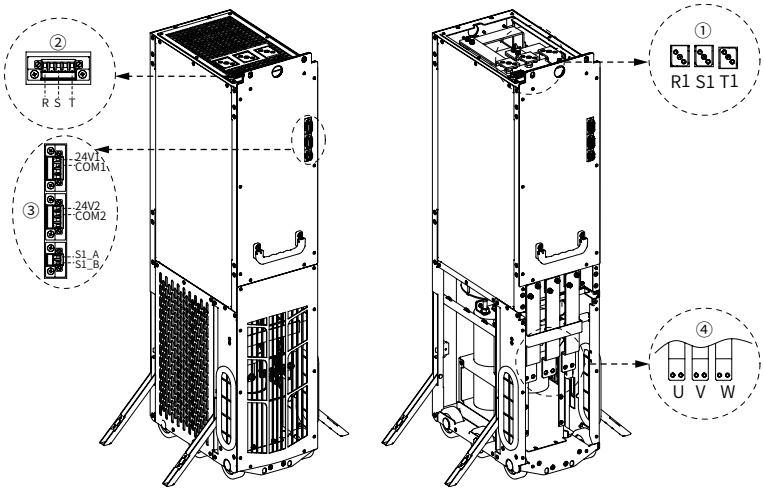


Figure 3-12 Layout of MD880-40D active rectifier filter module (DLCL) terminals

No.	Name	Description
①	R1, S1 and T1 (AC input terminals)	-
②	AC voltage detection (R) AC voltage detection (S) AC voltage detection (T)	Connected to the HSVM-10 synchronous voltage detection module in the correct phase sequence.
③	24 VDC fan power supply input (24V1) 24 VDC fan power supply input (COM1) 24 VDC fan power supply input (24V2) 24 VDC fan power supply input (COM2)	Used together with the switch-mode power supply delivered. Connect 24V1/24V2 to the positive end of the switched-mode power supply. Connect COM1/COM2 to the negative end of the switched-mode power supply.
	Reactor overtemperature switch (S1_A, S1_B)	NC switch, which is disconnected upon reactor overtemperature; Connected to the HCU reactor overtemperature signal feedback terminal, as shown in "Figure 1-8 Electrical wiring diagram of MD880 series PCS integrated products".
④	U, V, and W (AC output terminals)	-

The following shows layout of MD880-40D active rectifier filter module (ELCL) terminals.

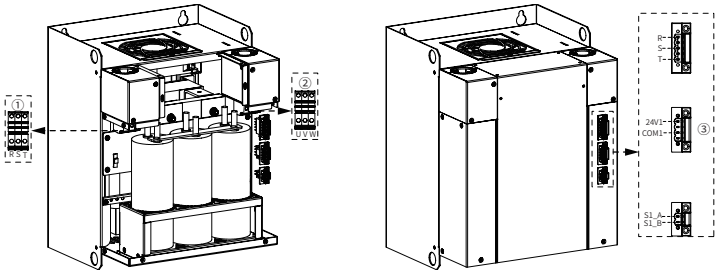


Figure 3-13 Layout of MD880-40D active rectifier filter module (ELCL) terminals

No.	Name	Description
①	R, S, and T (AC input terminals)	-
②	U, V, and W (AC output terminals)	-
③	R, S, and T AC voltage detection interface	Three-phase voltage sampling terminal
	24 VDC fan power supply input (24V1) 24 VDC fan power supply input (COM1)	Used together with the switch-mode power supply delivered. Connect 24V1 to the positive end of the switched-mode power supply. Connect COM1 to the negative end of the switched-mode power supply.
	Reactor overtemperature switch (S1_A, S1_B)	NC switch, which is disconnected upon reactor overtemperature; Connected to the HCU reactor overtemperature signal feedback terminal, as shown in "Figure 1-8 Electrical wiring diagram of MD880 series PCS integrated products".

3.4 Connection of Frame Assembly

3.4.1 Connection of BLCL+H8 Frame Assembly

Diagram of terminals

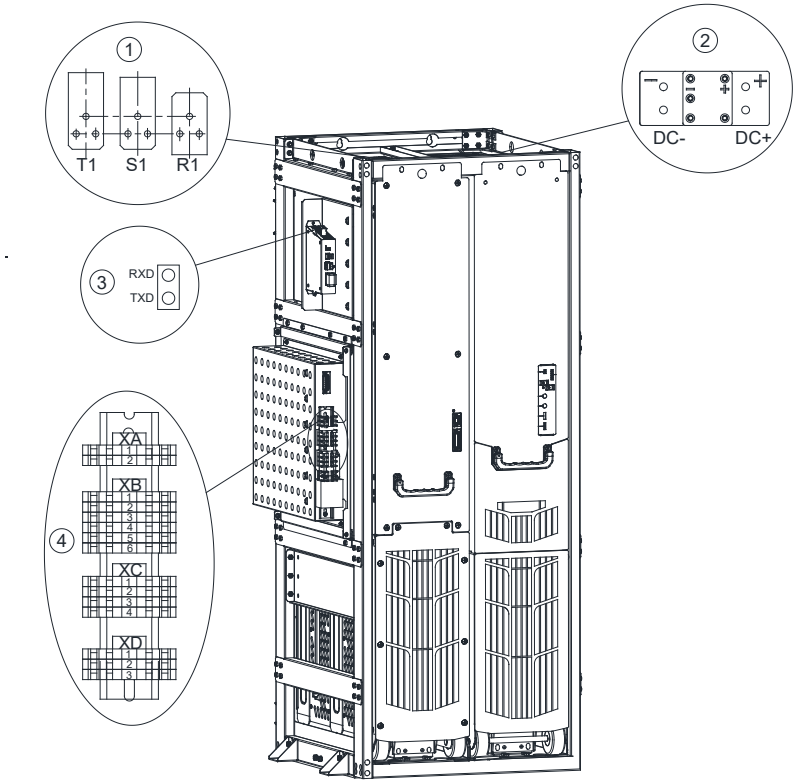


Figure 3-14 Terminal layout of BLCL+H8 frame assembly

Table 3-3 Terminal connection parameters of BLCL+H8 frame assembly

No.	Symbol	Description
①	R1	Three-phase AC input
	S1	
	T1	
②	DC-	DC output
	DC+	

No.	Symbol	Description
③	RXD	Inobus communication protocol, communicating with HCU through HOFM optical fiber expansion module
	TXD	Inobus communication protocol, communicating with HCU through HOFM optical fiber expansion module
④	XA:1	BLCL reactor overtemperature switch S1_A
	XA:2	BLCL reactor overtemperature switch S1_B
	XB:1	External 24 VDC power supply input (24V)
	XB:4	External 24 VDC power supply input (COM)
	XC:1	Pre-charge circuit rectifier bridge output 1DC+
	XC:2	Pre-charge circuit rectifier bridge output 1DC-
	XC:3	Fan power supply board input 2DC+
	XC:4	Fan power supply board input 2DC-
	XD:1	Pre-charge circuit input R2, S2, T2
	XD:2	
	XD:3	

Diagram of electrical connection terminals

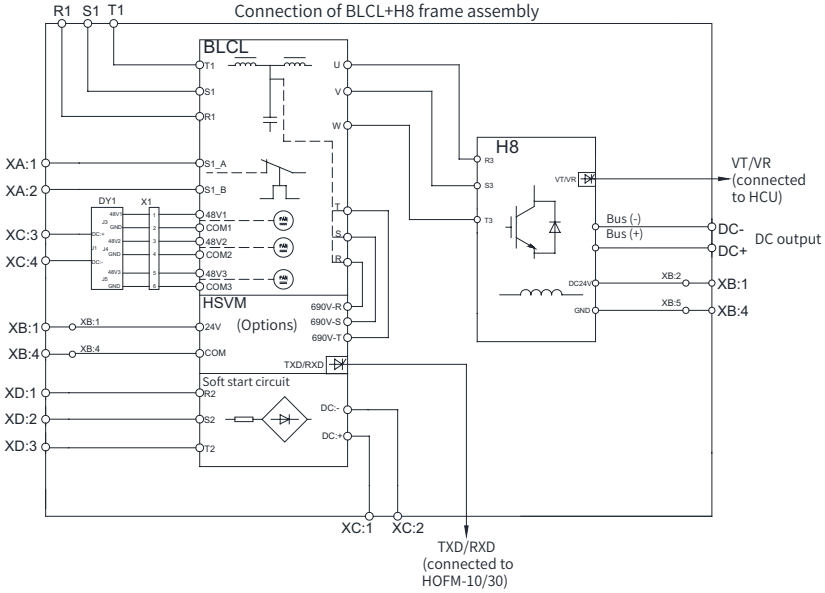


Figure 3-15 Terminal connection of BLCL+H8 frame assembly

3.4.2 Connection of BLCL+2H8 Frame Assembly

Diagram of terminals

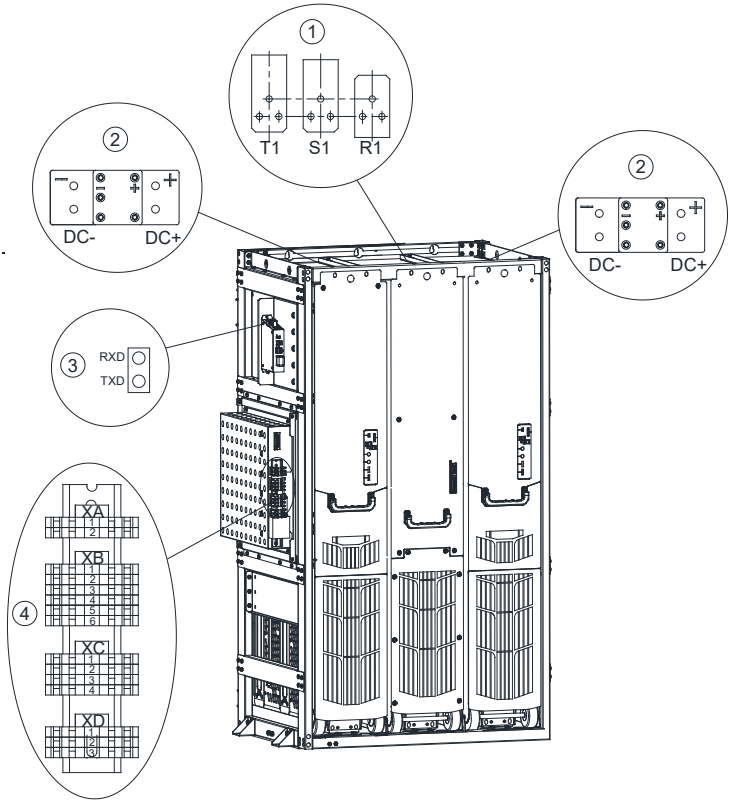


Figure 3-16 Terminal layout of BLCL+2H8 frame assembly

Table 3-4 Terminal connection parameters of BLCL+2H8 frame assembly

No.	Name	Description
①	R1	Three-phase AC input
	S1	
	T1	
②	DC-	DC output
	DC+	
③	RXD	Inobus communication protocol, communicating with HCU through HOFM optical fiber expansion module
	TXD	Inobus communication protocol, communicating with HCU through HOFM optical fiber expansion module

No.	Name	Description
④	XA:1	BLCL reactor overtemperature switch S1_A
	XA:2	BLCL reactor overtemperature switch S1_B
	XB:1	External 24 VDC power supply input (24V)
	XB:4	External 24 VDC power supply input (COM)
	XC:1	Pre-charge circuit rectifier bridge output 1DC+
	XC:2	Pre-charge circuit rectifier bridge output 1DC-
	XC:3	Fan power supply board input 2DC+
	XC:4	Fan power supply board input 2DC-
	XD:1	Pre-charge circuit input (R2, S2, T2)
	XD:2	
	XD:3	

Diagram of electrical connection terminals

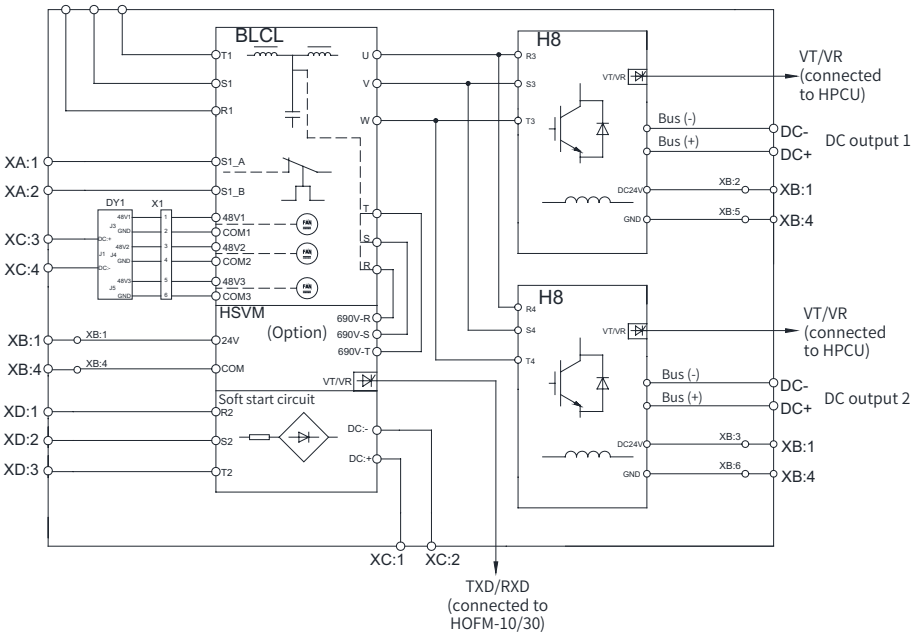


Figure 3-17 Terminal connection of BLCL+2H8 frame assembly

3.5 Connecting the Cabinet

1) Preparation

· Install and secure the cabinet properly.

· Take full safety measures at the installation site.

· Obey the "Five Safety Rules".

2) The input cable is connected to the R/S/T terminals of the input copper busbar of the active rectifier cabinet. The following figure shows the position of the input copper busbar.

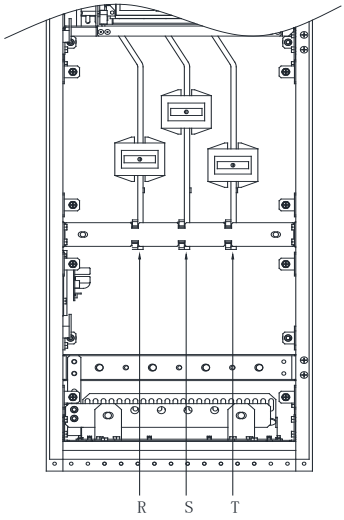


Figure 3-18 Position of the input copper busbar

Connection steps:

1. Open the cabinet and remove the cover protecting the power cable terminal area.

2. Feed the cables into the cabinet from the bottom.

3. Connect the PE cable to the PE bus.

4. Route out the cables upwards to terminals R, S, T on the copper busbar.

5. Connect cables to the copper busbar and secure them in appropriate positions.

6. When shielded power cables are used, fix the shield to the shield plate as instructed by EMC requirements.

3.6 Cable Specifications and Recommendation

Table 3-5 Recommended main circuit cables

Module model	Rated input current (A)	Cable quantity x Cross sectional area (mm^2)	Terminal
U_N: Three-phase 400 V (range: 380 V to 415 V)			
MD880-40K-0575-4	575	3 x 95	OT95-12
MD880-40K-0810-4	810	4 x 95	OT95-12
MD880-40K-1092-4	1092	4 x 120	OT120-12
MD880-40K-1539-4	1539	4 x 240	OT240-12
U_N: Three-phase 500 V (range: 380 V to 500 V)			
MD880-40K-0540-5-CS	540	3 x 95	OT95-12
MD880-40K-0810-5-CS	810	4 x 95	OT95-12
MD880-40K-1026-5-CS	1026	4 x 120	OT120-12
U_N: Three-phase 690 V (range: 525 V to 690 V)			
MD880-40K-0369-7	369	2 x 95	OT95-12
MD880-40K-0540-7	540	3 x 95	OT95-12
MD880-40K-0701-7	701	3 x 120	OT120-12
MD880-40K-1026-7	1026	4 x 120	OT120-12

Table 3-6 Specifications of recommended main circuit cables (UL-compliant)

Module model	Rated input current (A)	Cable quantity and cross-sectional area (AWG)	Terminal
U_N: Three-phase 690 V (range: 525 V to 690 V)			
MD880-40K-0540-7	540	3 x 4/0	OT120-12
MD880-40K-1026-7	1026	4 x 300 kcmil	OT185-12

- Cables recommended in the table are all symmetric 3-conductor shielded cables, which are connected to the three phases of the AC output busbar. The cross sectional area of the PE cable must fulfill the following requirements.
  - When the cross sectional area S ⩽ 16 mm ^{2} , the cross-sectional area of the PE wire = S.
  - When 16 mm^2 < cross sectional area S ⩽ 35 mm^2 , the cross sectional area of the PE wire = 16 mm^2.
  - When the cross sectional area S > 35 mm^2, the cross sectional area of the PE wire = S/2.
- 3 x 120 mm^2 indicates that each phase requires three cables and the cross sectional area is 120 mm^2.
- OT/120-12 indicates the cable is crimped to OT-type terminals, the cross-sectional area is 120 mm^2, and the size of the wiring screw hole is M12.
- The maximum size of the wiring terminal listed in the preceding table cannot be exceeded. Use terminals within the maximum size. Otherwise, mechanical stability and specified electrical clearance cannot be ensured.
- Derating is required when multiple cables of the same specifications are connected in parallel.
- Observe national or regional regulations during selection. The preceding table is based on:
  - Cables with PVC insulation and copper conductor
  - Max. cable surface temperature not exceeding 70°C at an ambient temperature of 40°C (Contact the manufacturer if the ambient temperature exceeds 40°C).
  - Cable installation type E applied (See IEC60204-1.)

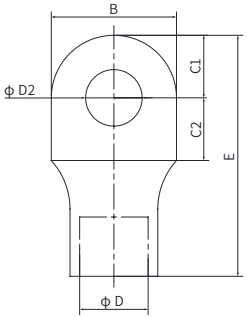


Figure 3-19 Appearance of the terminal

Table 3-7 Maximum dimensions of the terminals

Screw/Bolt	Cross sectional area (mm^2)	D2 (mm)	B (mm)	E (mm)	C1 (mm)	C2 (mm)
M5	6	5.3	10	23.8	5.5	6.0
M6	10	6.4	12.4	27.5	7.0	8.0

Screw/Bolt	Cross sectional area (mm^2)	D2 (mm)	B (mm)	E (mm)	C1 (mm)	C2 (mm)
M6	16	6.4	12.4	31.0	7.0	8.0
M6	25	6.4	14.0	32.0	7.0	8.0
M10	35	10.5	17.5	40.5	10.0	10.5
M10	50	10.5	18.0	43.5	10.5	11.0
M10	70	10.5	21.8	50.0	13.0	13.0
M10	95	10.5	25.0	55.0	13.0	13.0
M12	70	13.0	21.8	50.0	13.0	13.0
M12	95	13.0	25	55	13.0	13.0
M12	120	13.0	28.4	60	14.0	14.0

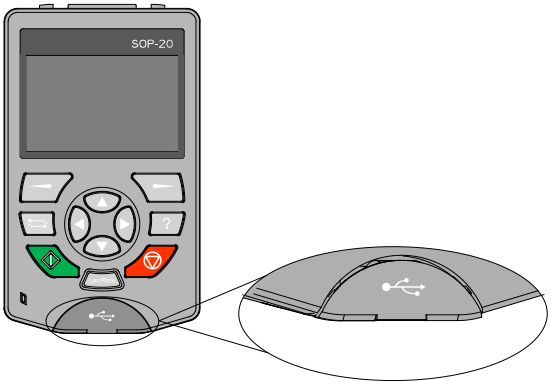
3.7 Connecting the HCU Control Module

For details about how to install the HCU control module and connect the control cable, see "4 HCU Control Module".

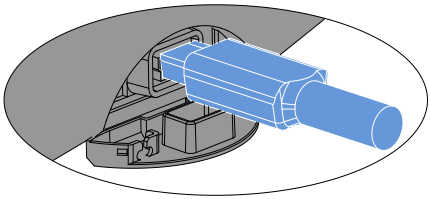
3.8 Connecting SOP-20-880 to PC

The USB mini-B terminal on SOP-20-880 is used to connect to the PC. The USB cable length cannot exceed 3 m. The USB2.0 communication protocol is used between SOP-20-880 and PC.

1) Open the cover of the USB connection terminal.



2) Plug in the USB shielded cable. It is recommended to use cables with ferrite core, as shown below.



3) Connect the cable to PC.

USB relay mode and USB mass storage mode are available when the USB cable is connected to PC.

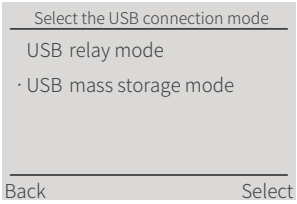


Figure 3-20 USB connection mode

When the USB relay mode is selected, SOP-20-880 is used for interaction between the PC tool and the drive. When the USB mass storage mode is selected, SOP-20-880 can be used as a memory.

3.9 Connecting SOP-20-880 To the Drive

The RJ45 terminal on the back of SOP-20-880 is used to connect to the drive control board through a network cable that compliant with EIA/TIA/568A or 568B standards. For details, see HCU Control Module Hardware Guide. On the control board at the end of a communication network, set the jumper to connect the termination resistor. It is recommended to use the shielded twisted pair cable as the SOP-20-880 bus. The maximum length is 100 m.

Table 3-8 SOP-20-880 bus transmission distance, node quantity, and baud rate

Distance (m)	Baud rate (kbps)	Node quantity	Cross sectional area	Remark
100	1000	32	⩾ 0.5 mm^2	When the relay is available, the maximum number of nodes is 128. When the relay is not available, up to 32 nodes are allowed. When polarity offset is present, the maximum number of nodes is reduced by 4.
50	2000	32	⩾ 0.5 mm^2	
25	4000	32	⩾ 0.5 mm^2	

3.10 Installation Checklist

After completing necessary electrical installation of the cabinet, check the following items. Read all the safety instructions in "Fundamental Safety Instructions" before operating the equipment.

No.	Operation	Compliance	Checked
1	Check the connection between the input power supply and the DC bus and ensure that the correct voltage is supplied.	☐	☐
2	The auxiliary power supply provides the correct voltage.	☐	☐
3	To reduce tension, the input and output power cables must be fixed on the cable fixing rack.	☐	☐
4	Check that the cables are properly connected to the terminals provided with the specified torque.	☐	☐
5	When EMC shielded cables are used, the cable shield is secured to the shield plate in the active rectifier equipment to ensure EMC compliance.	☐	☐
6	For the active rectifier, when the parallel output is connected to the DC bus, ensure that the connection is correct. The cable length must be above the specified minimum length.	☐	☐
7	The date of manufacture can be found on the nameplate of the active rectifier. If the period from the date of manufacture to initial commissioning or the downtime of the power components is shorter than two years, the DC link capacitors do not have to be pre-charged. If the downtime is longer than 2 years, pre-charge the capacitors first.	☐	☐
8	Connect and lay the control cables in accordance with the interface assignment and the shield. To prevent interference, route the control cables and power supply cables through different routes. Cabling and connection must always comply with the relevant EMC guidelines.	☐	☐
9	Check that the control cable (if any) is connected to the corresponding terminal and the terminal is tightened.	☐	☐
10	Check that the input power cable is connected to the corresponding terminals, the phase sequence is correct, and the terminals are tightened.	☐	☐

4 HCU Control Module

The HCU control module controls the active rectifier module through communicating with the active rectifier module using high-speed optical fibers, which is normally installed in the auxiliary control cabinet. Models for active rectifier applications and PCS applications are different. For active rectifiers, the model is HCU-40. For PCS, the model is HCU-40+PCS. For low-power 40D products, the HCU is hung to the module directly through HCU-41, removing the need for optical fiber. Other I/O resources are the same as HCU-40.

The HCU control module must be supplied with an external 24 VDC power supply. Multiple isolated power supplies in the control module are available, which provide isolated digital power supply (24 VD), InoLink communication RS485 isolated power supply, and SOP-20-880 power supply. It can also provide power to the function modules installed on HCU expansion slots. The HCU control module software can be upgraded through a PC or SOP-20-880.

4.1 Components of HCU Control Module

4.1.1 Components of HCU Control Module

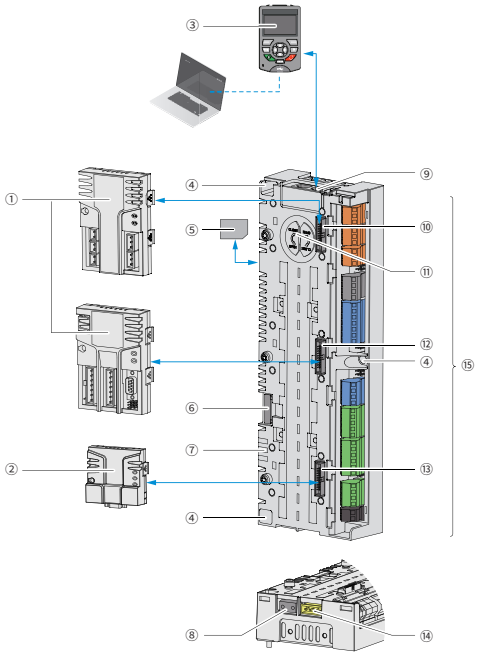


Figure 4-1 HCU components

Table 4-1 Description of HCU functions

No.	Name	Function
①	Function module in size 1	105 mm x 73 mm x 24 mm
②	Function module in size 2	75 mm x 73 mm x 24 mm
③	Smart operating panel	SOP-20-880
④	Fixing hole	Three holes for fixing the HCU
⑤	SD card	Standard pluggable microSD memory card for the HCU with the capacity of 8 GB
⑥	Functional safety slot	For connection of functional safety modules
⑦	Indicators	Power supply, operation, and fault indicators
⑧	Optical fiber communication	Optical fiber communication interface between the HCU and the power unit
⑨	Smart operating panel	Used to connect HCU to SOP-20-880. The two terminals are both RJ45 with identical assignment for easy cascade.
⑩	SLOT1	Function module interface: SLOT1_1, SLOT1_2 and SLOT1_3
⑪	Battery replacement cover	Spare RTC battery cover. The RTC battery is non-rechargeable lithium battery which must be replaced regularly.
⑫	SLOT2	Function module interface: SLOT2_1, SLOT2_2, SLOT2_3
⑬	SLOT3	Function module interface: SLOT3_1
⑭	STO terminal	Reserved
⑮	User terminal	Standard user I/O terminals

NOTE

- The RJ45 terminal of the HCU controller cannot be connected directly to the PC. Otherwise, the PC may be damaged.

4.1.2 LED Indicators

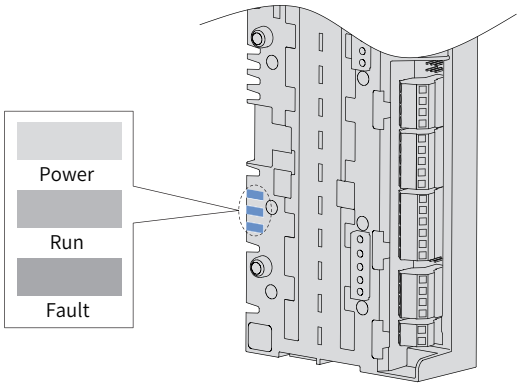


Figure 4-2 Location and assignment of the LED indicator

Table 4-2 Descriptions of the LED indicator

No.	Name	Status	Description
①	Power	Steady ON	The HCU power supply is normal.
		OFF	The HCU is not energized or the power supply is faulty.
②	Run	Steady ON	The power module is operating.
		OFF	The power module is in the stop state.
③	Fault	Steady red	System fault
		Steady yellow	System alarm
		OFF	System OK
		Flashing in red	HCU auxiliary power supply fault (Check whether 24 V power supply is short-circuited or overloaded.)
④	Fault, Run	Flashing in yellow (FAULT) and green (RUN) simultaneously	This HCU is selected by the PC or SOP-20-880, which ends after 10s.
		Flashing alternately in red (FAULT) and green (RUN)	The FPGA of the HCU is abnormal or the external expansion RAM is abnormal.

4.1.3 SD Memory Card

The HCU is equipped with an SD card for saving the black box data and parameters, which helps facilitate monitoring and analysis on power modules. The data is saved on an micro SD memory card to be analyzed by a qualified service technician.

4.1.4 Dimensions and Installation Instructions of the HCU

4.1.4.1 Preparation Before Installation

DANGER

- Before installing or removing the HCU, the cabinet must be powered off for more than 15 minutes. The HCU input power supply must be disconnected to avoid damage to the HCU control module caused by live installation or disassembly.
- When installing or removing a function module on the HCU, ensure that the HCU input power supply is disconnected to avoid damage to the HCU or function module that caused by live installation or disassembly.
- Protect the HCU module from falling or shock to avoid damage to the module.
- Do not disassemble the HCU module. Otherwise, the module may be damaged.
- Do not fasten with excessive tightening torque to avoid damage to the terminal.

1) Installation tools

PH2 Phillips screwdriver

2) Tightening torque for screws and screw fasteners

The following tightening torque applies to the screws used for installing the HCU.

Screw	Tightening torque
M4	1.2 N·m

4.1.4.2 Outline Dimensions

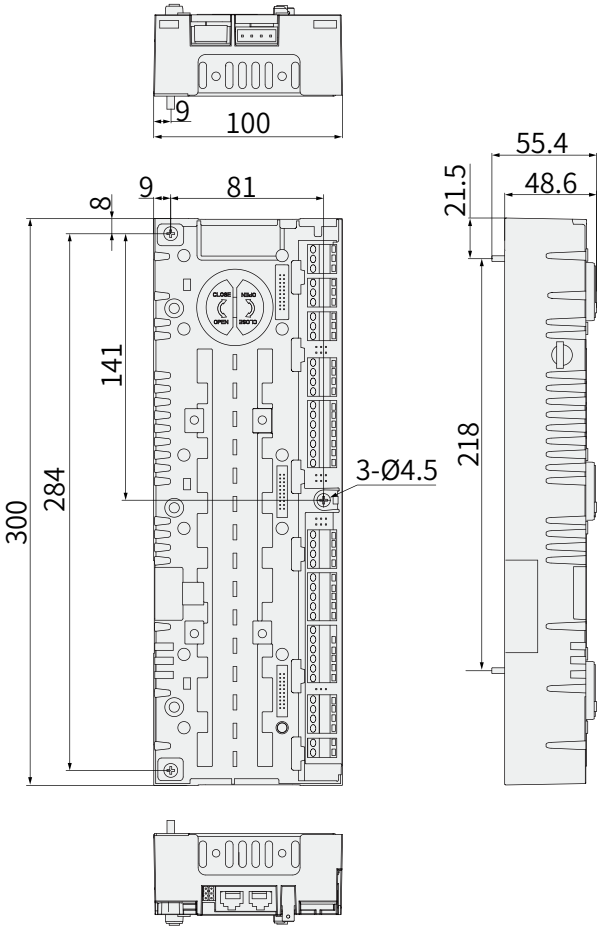


Figure 4-3 Dimensions of the HCU (in mm)

4.1.4.3 Installation Clearance

For easy installation of the HCU, reserve certain space as shown below. The HCU must be mounted on a conductive metal surface and the entire conductive bottom of the HCU must be bonded properly to the mounting surface.

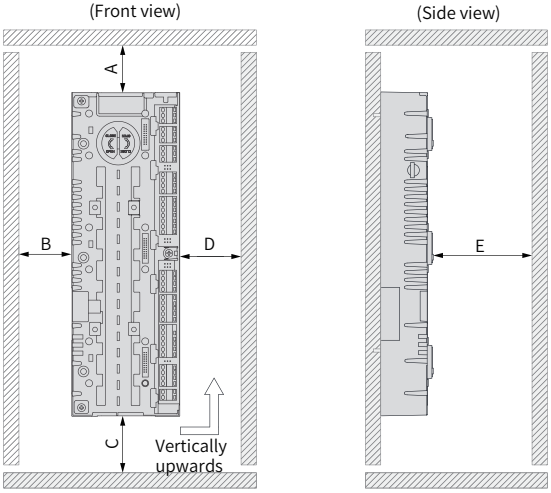


Figure 4-4 Installation clearance (in mm)

A	B	C	D	E
⩾ 100	⩾ 30	⩾ 100	⩾ 50	⩾ 100

4.1.4.4 Installation Procedure

1. Align the HCU vertically to the two positioning holes on the metal mounting plate.
2. Tighten the HCU mounting screws (three M4 screws) with a PH2 Phillips screwdriver as shown below.

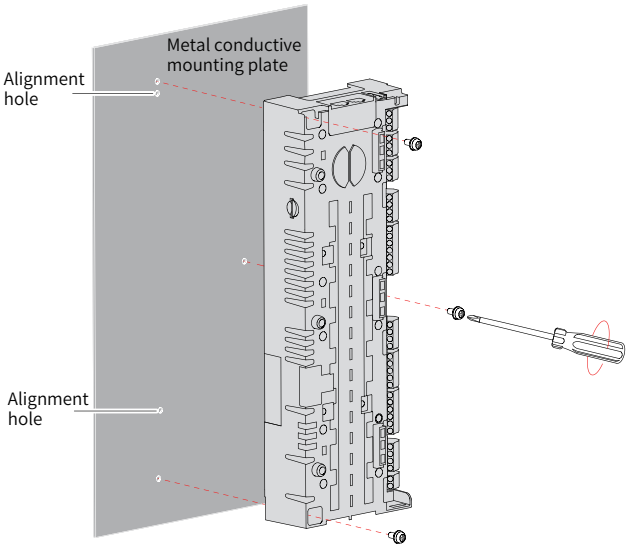


Figure 4-5 Installing the HCU

3. Connect the HCU and drive module optical fiber.

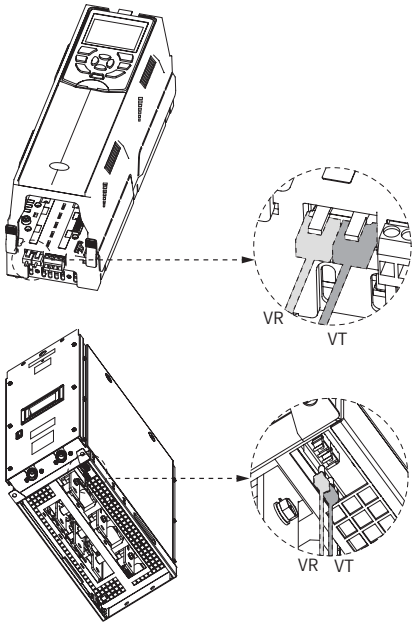


Figure 4-6 Connecting the HCU and drive module optical fiber

◆ Grounding inside the cabinet

The assembly plate of the HCU must be a bare metal plate and reliably grounded.

The HCU enclosure is grounded to the cabinet enclosure through the screws on the mounting surface.

4.1.4.5 Handling of HCU Mask

In actual applications, the drive is equipped with a HCU mask as standard. In this case, if the HCU interface is configured externally, the mask wiring needs to be knocked out, as shown below.

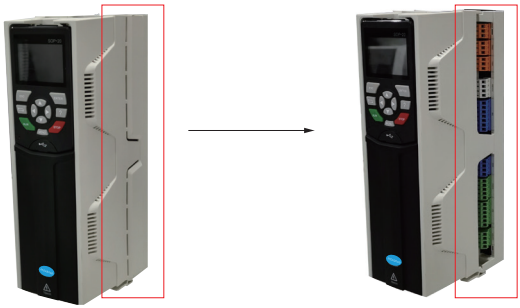


Figure 4-7 Handling the HCU mask

4.1.5 Overview of HCU Control Module Interfaces

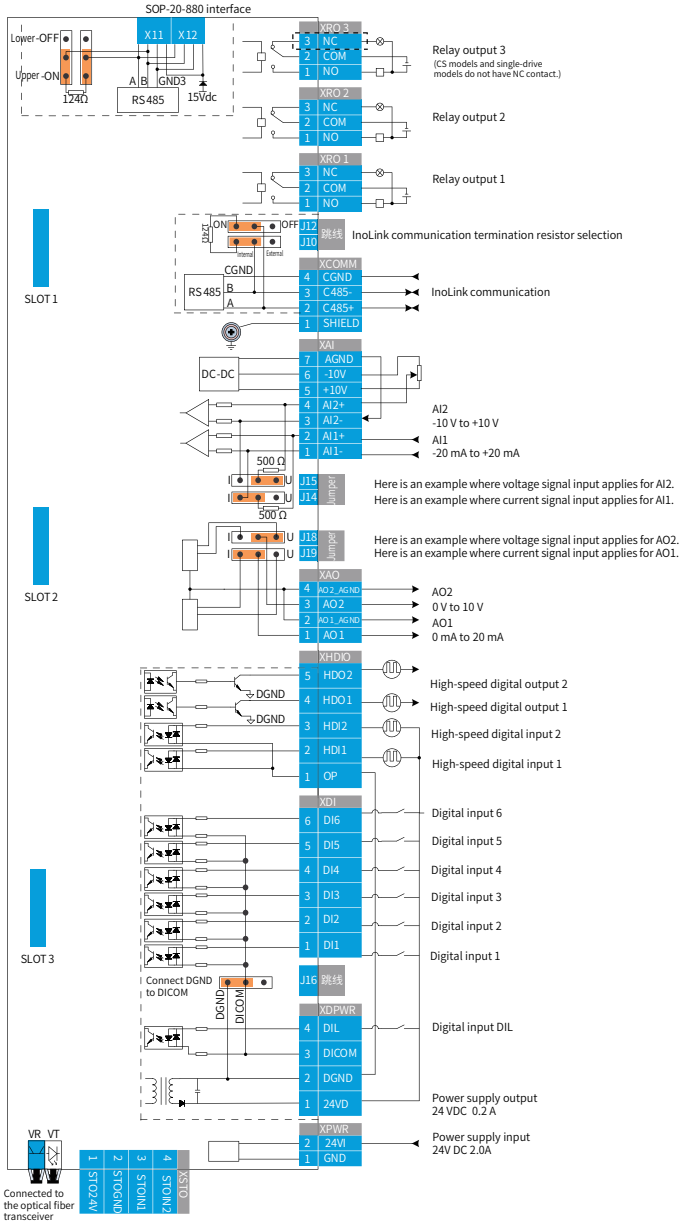


Figure 4-8 Overview of HCU interface circuits

4.1.5.1 Standard Terminals

Table 4-3 Description of standard HCU terminals

Component	Terminal	Function
Input power supply	XPWR: 24VI	HCU power supply
Digital power supply output	XDPWR: 24 VD	Digital output power supply that isolated from XPWR
Digital input	XDI: DI1 to DI6, DIL	Input type: relay contact, NPN or PNP
High-speed digital input	XHDIO: HDI1, HDI2	Input type: NPN or PNP
High-speed digital output	XHDIO: HDO1, HDO2	Output type: open collector
Analog output	XAO: AO1, AO2	Output type: current output or voltage output, as selected by jumper
Analog input	XAI: AI1, AI2	Input type: current input or voltage input, as selected by jumper
Relay output	XRO1, XRO2, XRO3	Relay output: NO, NC and COM No NC contact for CS model or single-drive XRO3
InoLink communication	XCOMM	High-speed RS485, with termination resistor selected by jumper
RJ45 terminal	X11, X12	For communication with the SOP-20-880 (These two terminals have the same assignment for easy cascading of multiple HCUs with cables shorter than 3 m.)
Inodrive communication	Optical fiber or DB15	Optical interface: Optical fiber; electrical interface: DB15
SD card	SD	Self-eject card holder, SD card capacity: 8 G
RTC battery	BAT	Replace the non-rechargeable lithium-ion battery regularly.

4.1.5.2 Description of HCU-40 Wiring Terminals

Table 4-4 Default I/O Terminal Configuration of HCU-40

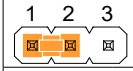
No.	Terminal	Function	Remark
①	XRO1	Main circuit breaker control signal	N/A
②	XRO2	Fault output signal	Default function, configurable
③	XRO3	Auxiliary contactor control signal	N/A
④	DI1	Reserved	Configurable
⑤	DI2	Switch-on signal upon power-on	Default function, configurable
⑥	DI3	Main circuit breaker close feedback signal	N/A
⑦	DI4	Reserved	Configurable

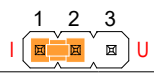
No.	Terminal	Function	Remark
⑧	DI5	Switch-off signal upon power-off	Default function, configurable
⑨	DI6	Fault reset signal	Default function, configurable
⑩	HDI1	LCL temperature switch signal	N/A
⑪	DIL	Emergency stop	Default function, configurable

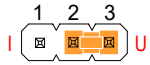
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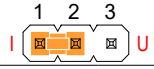
- To modify the default configuration, see MD880 (LC)-40 Series Active Rectifier Function Guide.

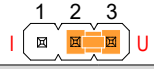
4.1.5.3 Description of HCU Control Module Interfaces

Interface	Name	Function	Cable specifications
XPWR: Input power supply terminal			
①	GND	24.0 VDC±10%, 2.0 A	Dual-conductor twisted pair cables are recommended. Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
②	24VI		
XDPWR: DIL terminal			
①	24VD	Power supply for DI, HDI and HDO 24.0 VDC±10%, 0.2 A	Twisted pair cable, single-conductor cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2 Note: The 24 VD load cannot exceed 0.2 A.
②	DGND	24VD ground	
③	DICOM	DI common output, which can be connected to DGND through jumper J16	
④	DIL	Digital interlock or common DI with identical technical data as common DIs	
Jumper J16: power supply selection			
		If 1 and 2 are shorted, the DI is powered by 24 VD internal power supply.	
		If 2 and 3 are shorted, the DI is powered by an external power supply.	
XDI: DI terminal			
①	DI1	24 V logic level: "0" < 5 V; "1" > 15 V Rin: 2.0 kΩ Input type: NPN/PNP, relay contact Hardware filter: 0.04 ms Imax: 15 mA	Single-conductor cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
②	DI2		
③	DI3		
④	DI4		
⑤	DI5		
⑥	DI6		
XHDIO: HDIO input terminal			

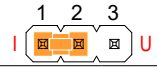
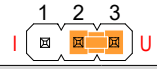
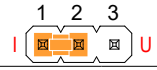
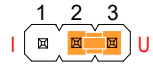
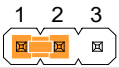
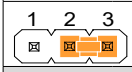
<table>
<tr><th>Interface</th><th>Name</th><th>Function</th><th>Cable specifications</th></tr>
<tr><td>①</td><td>OP</td><td>HDI common terminal</td><td rowspan="5">Cross-sectional area:
0.5 mm^2 to 2.5 mm^2
Shielded twisted pair cables are recommended.
HDO and DGND twisted pair
HDI and OP twisted pair</td></tr>
<tr><td>②</td><td>HDI1</td><td rowspan="2">Input type: NPN, PNP
24 V logic level: "0" < 5 V; "1" > 15 V
Rin: 2.0 kΩ
Input voltage range: 0 VDC to 30 VDC
Input frequency range: 0 kHz to 100 kHz
Max. load of HDI: 15 mA</td></tr>
<tr><td>③</td><td>HDI2</td></tr>
<tr><td>④</td><td>HDO1</td><td rowspan="2">Output type: OC
Output frequency range: 0 kHz to 100 kHz
Max. load of HDO: Imax: 20 mA
Output voltage range: 0 VDC to 26.4 VDC</td></tr>
<tr><td>⑤</td><td>HDO2</td></tr>
<tr><td colspan="4">XAO: AO</td></tr>
<tr><td>①</td><td>AO1</td><td rowspan="4">AO1 output range:
0 mA to 20 mA,Rload ⩽ 500 Ω
0 V to 10 V, Rload ⩾ 10 kΩ
AO2 output range:
0 mA to 20 mA, Rload ⩽ 500 Ω
0 V to 10 V, Rload ⩾ 10 kΩ
Resolution: 11 bit + sign bit
Accuracy: 2% (full range)</td><td rowspan="4">Cross-sectional area:
0.5 mm^2 to 2.5 mm^2
Shielded twisted pair cables are recommended.
AO1 and AO1_AGND twisted pair
AO2 and AO2_AGND twisted pair</td></tr>
<tr><td>②</td><td>AO1_ AGND</td></tr>
<tr><td>③</td><td>AO2</td></tr>
<tr><td>④</td><td>AO2_ AGND</td></tr>
<tr><td colspan="4">Jumper J19: Current or voltage signal selection for AO1</td></tr>
<tr><td colspan="4">

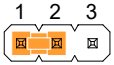
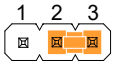
AO1 current signal output applies when 1 and 2 are shorted.</td></tr>
<tr><td colspan="4">

AO1 voltage signal output applies when 2 and 3 are shorted.</td></tr>
<tr><td colspan="4">Jumper J18: current and voltage signal selection for AO2</td></tr>
<tr><td colspan="4">

AO2 current signal output applies when 1 and 2 are shorted.</td></tr>
<tr><td colspan="4">

AO2 voltage signal output applies when 2 and 3 are shorted.</td></tr>
<tr><td colspan="4">XAI: AI</td></tr>
<tr><td>1</td><td>AI1-</td><td rowspan="4">Current input: -20 mA to +20mA, Rin: 500 Ω
Voltage input: -10 V to +10 V; Rin: 200 kΩ
Differential input, input range: ±30 V
Sampling interval per channel: 0.25 ms
Hardware filter: 0.25 ms
Resolution: 11 bit + sign bit
Error: 1% of full range</td><td rowspan="7">Cross-sectional area:
0.5 mm^2 to 2.5 mm^2
Use two dual-conductor shielded twisted pairs when using two AIs.
Use one four-conductor shielded twisted pair cable for one AI under the reference voltage.</td></tr>
<tr><td>2</td><td>AI1+</td></tr>
<tr><td>3</td><td>AI2-</td></tr>
<tr><td>4</td><td>AI2+</td></tr>
<tr><td>5</td><td>+10 V</td><td rowspan="3">+10V: +10 V±1%
-10V: -10 V±1%
Rload: 1 kΩ to 10 kΩ</td></tr>
<tr><td>6</td><td>-10 V</td></tr>
<tr><td>7</td><td>AGND</td></tr>
<tr><td colspan="4">Jumper J14: Current or voltage signal input selection for AI1</td></tr>
</table>

Interface	Name	Function	Cable specifications
		AI1 current signal input applies when 1 and 2 are shorted.	
		AI1 voltage signal input applies when 2 and 3 are shorted.	
Jumper J15: Current and voltage signal selection for AI2			
		AI2 current signal input applies when 1 and 2 are shorted.	
		AI2 voltage signal input applies when 2 and 3 are shorted.	
XCOMM: InoLink RS485 terminal			
1	SHIELD	RS485 bus, 5 V standard level Termination resistor of the bus: 124 Ω Maximum communication rate: 5 Mbps Maximum number of nodes: 16 (without repeater) Maximum transmission distance: 40 m	Four-conductor shielded twisted pair cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
2	C485+		
3	C485-		
4	CGND		
Jumpers J10 and J12: RS485 termination resistor selection. To connect the termination resistor, J10 and J12 must be in the same status.			
		When 1 and 2 are shorted, the termination resistor is connected.	
		When 2 and 3 are shorted, the termination resistor is disconnected.	
XRO1: Output terminal of relay 1			
1	RO1_NO	Output type: passive NO and NC contacts Contact parameters: 250 VAC/30 VDC, 2 A	Single-conductor cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
2	RO1_ COM		
3	RO1_NC		
XRO2: Output terminal of relay 2			
1	RO2_NO	Output type: passive NO and NC contacts Contact parameters: 250 VAC/30 VDC, 2 A	Single-conductor cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
2	RO2_ COM		
3	RO2_NC		
XRO3: Output terminal of relay 3			
1	RO3_NO	Output type: passive NO and NC contacts Contact parameters: 250 VAC/30 VDC, 2 A	Single-conductor cable Cross-sectional area: 0.5 mm^2 to 2.5 mm^2
2	RO3_ COM		
3	RO3_NC		
X11, X12: RS485 terminal for communication with the SOP-20-880			

Interface	Name	Function	Cable specifications
1, 2, 7	NC	RS485 bus, 5 V standard level Termination resistor of the bus: 124 Ω Maximum communication rate: 4 Mbps Maximum number of nodes: 32 (without repeater) Maximum transmission distance: 100 m	Standard network cable
3, 8	GND3		
4	A		
5	B		
6	15V3	15V3: 15 V±15%	
Jumpers J12 and J15: Termination resistor selection (J12 and J15 must be in the same status for the jumper to be active.)			
 When 1 and 2 are shorted, the termination resistor is connected.			
 When 2 and 3 are shorted, the termination resistor is disconnected.			
VR, VT: Optical fiber transceiver			
1	VR	Receives optical fiber communication signals.	Optical fiber type: plastic optical fiber (POF)
2	VT	Transmits optical fiber communication signals.	

4.1.6 Function Application of HCU

4.1.6.1 Function Module

The HCU can be used together with other function modules to expand its functions.

Table 4-5 Description of HPCU functions

No.	Name	Model	Function	Connection method with HCU	Dimensions (W x H x D) (mm)
1	I/O module	HIO-10	Two AI inputs Two AO outputs Two DIOs One relay output	SLOT	73 x 24 x 105
2	PROFIBUS-DP module	HDP-10	PROFIBUS-DP bus adaption	SLOT	73 x 24 x 75
3	CAN bus module	HCAN-10	CANopen bus adaptation	SLOT	73 x 24 x 75
		HCAN-30	CAN2.0 bus adaption	SLOT	73 x 24 x 75
4	Optical fiber expansion module	HOFM-10	One pair of 50 M optical fibers	SLOT	73 x 24 x 75
		HOFM-30	Three pairs of 50 M optical fibers	SLOT	73 x 24 x 75
5	Modbus-RTU module	HMBA-10	Modbus-RTU bus adaption	SLOT	73 x 24 x 75
6	EtherCAT module	HETC-10	EtherCAT bus adaption	SLOT	73 x 24 x 75
7	EtherNet module	HETN-10	EtherNet commissioning module	SLOT	73 x 24 x 75

No.	Name	Model	Function	Connection method with HCU	Dimensions (W x H x D) (mm)
8	PROFINET I/O module	HPFN-10	PROFINET IO industrial Ethernet adaption	SLOT	73 x 24 x 75
		HPFN-20	PROFINET IRT industrial Ethernet adaption	SLOT	73 x 24 x 75
9	Modbus TCP module	HMBT-10	Modbus TCP industrial Ethernet adaption	SLOT	73 x 24 x 75
10	Parallel control module	HPCU-40	2 to 4 paralleled modules supported	Optical fiber	86 x 40 x 232
		HPCU-60	2 to 6 paralleled modules supported	Optical fiber	86 x 40 x 232
		HPCU-A0	2 to 10 paralleled modules supported	Optical fiber	86 x 40 x 232
11	Function expansion module	HESD-10	One expansion slot	Optical fiber	75 x 70 x 105
12	Synchronous voltage detection module	HSVM-10	Three-phase AC input voltage detection	Optical fiber	100 x 30 x 150
		HSVM-20	DC voltage detection module (supports one voltage channel and two current channels)	Optical fiber	100 x 30 x 150
13	Digital gateway commissioning monitoring module	HGW-10	Centralized commissioning and operation data collection supported	Network cable	100 x 50 x 180
14	Smart operating panel	SOP-20-880	HMI operating panel	RS485	100 x 30 x 150
15	Optical fiber router module	HOFR-50	Data exchange of 2 to 5 HCU controllers (master-slave communication through optical fiber)	Optical fiber	86 x 40 x 232
16	Pulse-by-pulse current limit module	HCBC-A0	Pulse-by-pulse current limit control for parallel power modules	Optical fiber	86 x 40 x 232



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

4.1.6.2 Slot Expansion Application

- Different function modules are available in the HCU application. The function modules are installed directly in the slots of the HCU.
- The HCU only has three slots. When more modules are needed, install HOFM and HESD expansion modules. Each HESD can be connected to one function module.

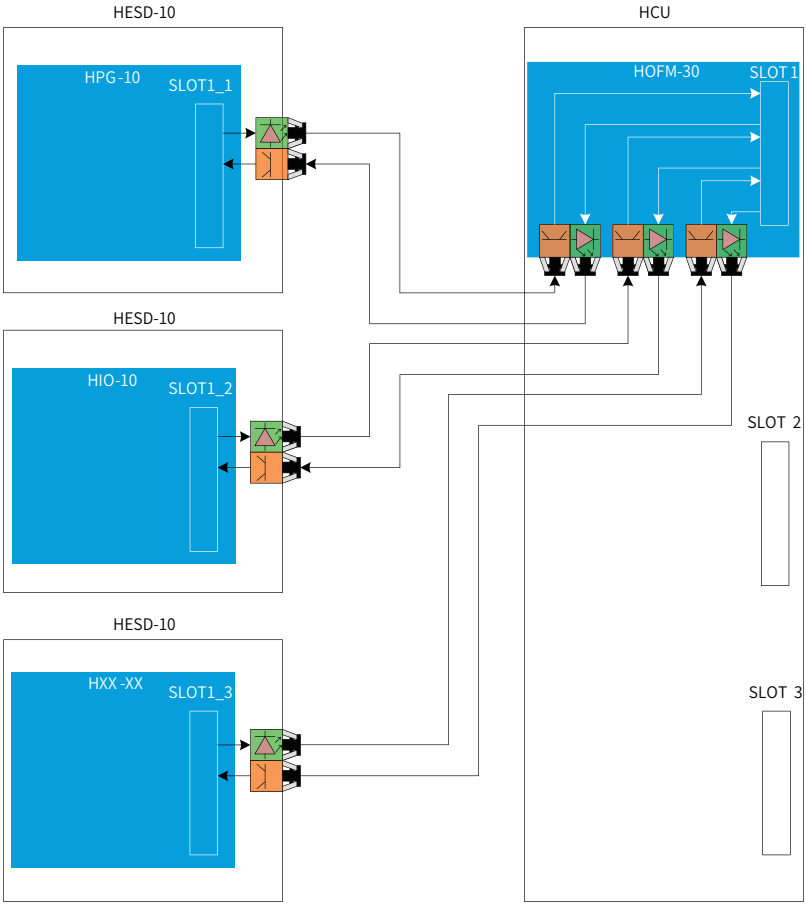


Figure 4-9 Overview of HCU interface circuits

When installing function modules to the three slots, observe the following principles.

- Function modules are directly installed in SLOT1, SLOT2, and SLOT3 (addresses SLOT1_1, SLOT2_, and SLOT3_1).
- SLOT1 and SLOT2 can be used with the HOFM-30 module to expand up to three slots. The addresses are SLOT1_1, SLOT1_2, SLOT1_3 or SLOT2_1, SLOT2_2, and SLOT2_3. SLOT3 does not support slot expansion.
- In this case, the HESD module is not allowed to install another HOFM optical fiber expansion module.

4.1.6.3 Temperature Detection with AI and AO

AI and AO can be used together to detect the temperature sensor signal. They are generally used for motor temperature detection from either one PT100 sensor or two and three PT100 sensors connected in series.

In this case, select constant current output for the AO and voltage signal input for the AI. Temperature sensors PT100, PT1000, and KTY84 are supported.

Do not directly ground both ends of the cable shield. Ground one end and left the other end unconnected, or ground one end directly and ground the other end through a capacitor in series.

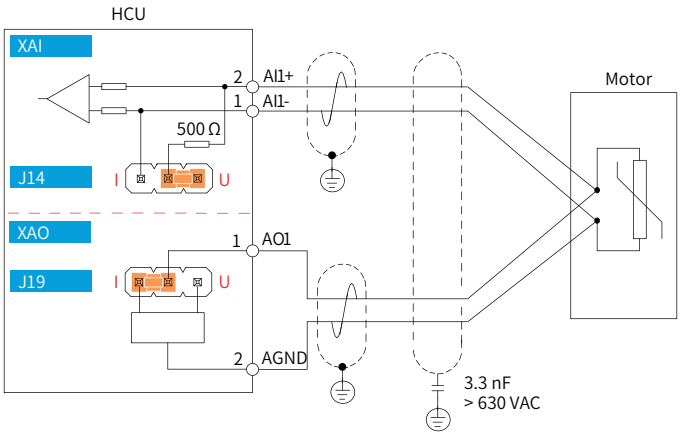


Figure 4-10 Temperature detection with the AI and AO

4.1.6.4 InoLink Communication Bus Function Application

When information exchange is required between several drives in the system, use an InoLink bus.

The parameters of the InoLink bus are as follows:

- Communication baud rate: 5 Mbps
- Maximum number of nodes: 16

Use shielded twisted pair cables for wiring. To achieve the best communication quality and prevent electromagnetic interference, use high-quality cables, such as PROFIBUS-DP cables. Keep the cables as short as possible the link length below 40 m to avoid entanglement or proximity to power cables.

If an HCU is at the end of the InoLink link, it must be equipped with a termination resistor, and the J10 and J12 jumpers must be set to the ON position.

The RS485 link topology of the InoLink bus is as follows.

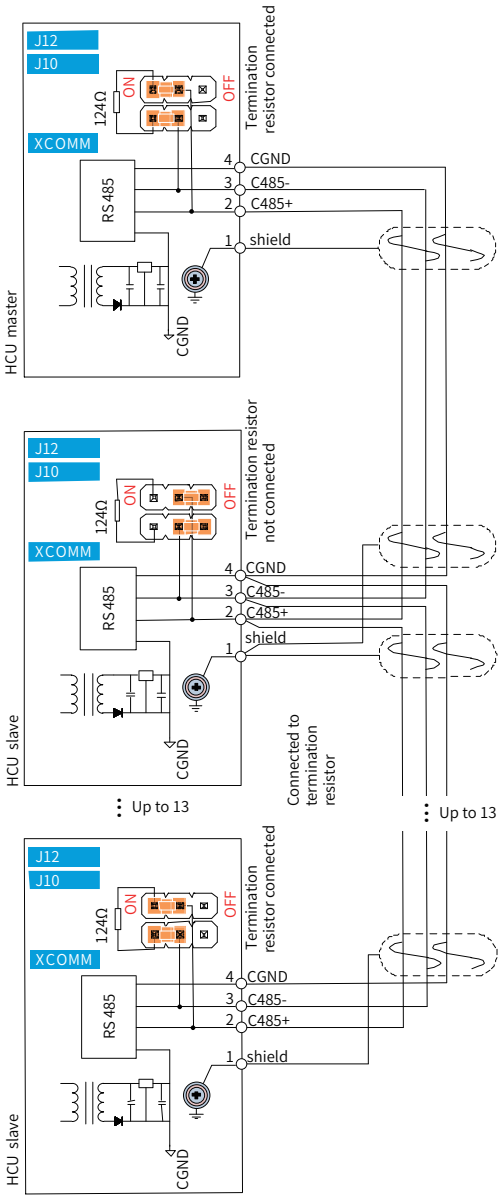


Figure 4-11 Example of connection application

4.2 Parallel Control Module HPCU

The parallel control module HPCU serves to receive drive and control signals sent from the HCU through communication and transmits such signals to each power module synchronously. Meanwhile, it uploads the current, voltage, and status data sent from the power module to the HCU and controls synchronization, current sharing, reset, and start/stop operations of power modules connected in parallel.

Select HPCU-40 (4-parallel module), HPCU-60 (6-parallel module), or HPCU-A0 (10-parallel module) depending on the system requirements.

4.2.1 Standard Terminals of HPCU

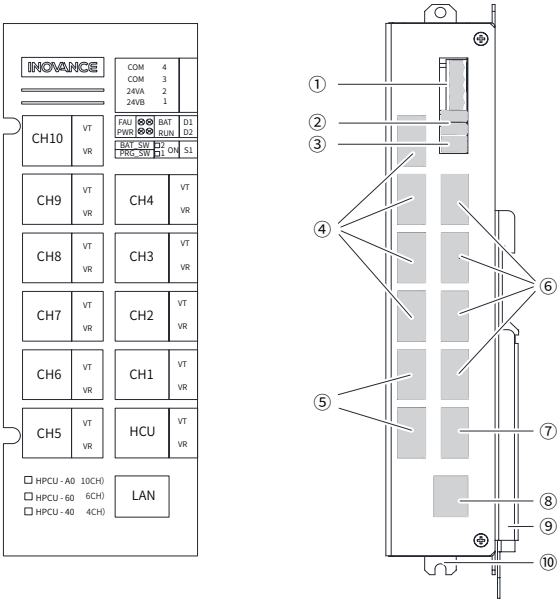


Figure 4-12 Diagram of the HPCU parallel control module

No.	Name	Terminal	Description	Function
①	Input power supply	COM 4	GND	External power supply of HPCU X1 terminal: 5.08 mm clearance, 4-pin black pluggable terminal Twisted pair Cross sectional area: 0.5 mm^2 to 2.5 mm^2
		COM 3	GND	
		24VA 2	24 VDC	
		24VB 1	24 VDC	

No.	Name	Terminal	Description	Function
②	LED indicator	PWR	Steady green	The HPCU power supply is normal.
			OFF	The HPCU is not energized or the power supply is faulty.
		RUN	Steady green	The power module is operating.
			OFF	The power module is in the stop state.
		FAU	Steady red	System fault
			OFF	System OK
②	LED indicator	BAT	Reserved	-
			Reserved	-
③	DIP switch S1	BAT_SW	Reserved	-
		PRG_SW	Reserved	-
④	Optical fiber transceiver	CH7 to CH10	Parallel module channels 7–10	VT: 50 M, transmitting optical fiber communication signals VR: 50 M, receiving optical fiber communication signals Optical fiber type: plastic optical fiber (POF) Channels available in HPCU-40: CH1 to CH4 Channels available in HPCU-60: CH1 to CH6 Channels available in HPCU-A0: CH1 to CH10
⑤		CH5 to CH6	Parallel module channels 5 to 6	
⑥		CH1 to CH4	Parallel module channels 1 to 4	
⑦		HCU	Communication between HPCU and HCU	
⑧	-	LAN	Commissioning terminal	Connected to PC.
⑨	Guide rail groove	-	Used in guide rail installation.	-
⑩	Mounting hole	-	4 mounting holes	-

4.2.2 LED Indicators

Table 4-6 Description of the LED indicators

No.	Name	Status	Function
①	PWR	Steady green	The HPCU power supply is normal.
		OFF	The HPCU is not energized or the power supply is faulty.
②	RUN	Steady green	The power module is operating.
		OFF	The power module is in the stop state.
③	FAU	Flashing in red	System fault
		OFF	System OK
④	BAT	Reserved	-
		Reserved	-

4.2.3 Electrical Connection of HPCU

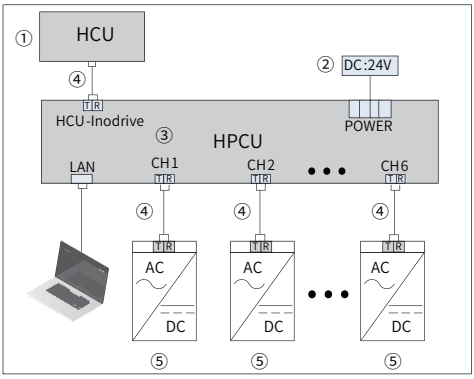


Figure 4-13 Electrical connection of HPCU

Table 4-7 Description of HPCU components

No.	Name	No.	Name
①	HCU control module	④	Optical fiber communication
②	External 24 V power supply	⑤	Basic rectifier module
③	Parallel control module HPCU	-	-

5 Maintenance and Inspection

5.1 Overview

This section describes the following:

- Cautions on maintenance and inspection:
- Periodical maintenance and inspection of components
- Replacement of components

Necessary safety measures must be taken before maintenance and inspection.

Safety instructions
DANGER ◆ Note that the active rectifier module is energized with high voltage, and all wiring work must be carried out with power off. ◆ Before maintenance and inspection, power off the module, wait for 15 minutes and confirm that the voltage of the module is lower than 36 VDC. Failure to comply can result in personal injury due to the residual voltage in the capacitor. ◆ When the external power supply is connected, hazardous voltage are still present in the cabinet and modules even if the main breaker is open. Ensure that no voltage is present before operation. ◆ Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals. ◆ Mount and wire the equipment according to national standards, industry standards, and local safety codes. ◆ Handle heavy equipment or equipment with high center of gravity with care. Improper lifting or handling may result in death, serious personal injuries, or major property loss. ◆ Be aware of the possibly residual rotation of the cooling fan.

5.2 Precautions on Cleaning

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

Pay attention to the following:

1) Dust accumulation

The dusts inside the cabinet and modules can only be removed by professionals regularly (at least once a year) according to relevant safety regulations. A brush and vacuum cleaner must be used to clean the dust. For positions that cannot be

easily reached, use dry compressed air (max. 1 bar) for cleaning.

2) Ventilation

Always keep the ventilation openings of the cabinet and modules unobstructed and ensure that the cooling fan is functioning properly.

5.3 Precautions on Inspection

During inspection, take measures to ensure normal operation of equipment and rectify device faults.

1) Tools needed

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

- Wrench or socket wrench, with opening size 6
- Wrench or socket wrench with opening size 8
- Wrench or socket wrench, with opening size 10
- Wrench or socket wrench with opening size 12
- Torque wrench
- PH1 and PH2 Phillips screwdriver
- A socket wrench equipped with two extension rods is recommended.

2) Service life of components

To ensure long-term normal operation of active rectifiers, perform regular maintenance on the electronic components according to their service life. The service life of the electronic components is affected by the operating environment. The following tables lists the replacement interval of these components for your reference.

Table 5-1 Replacement interval of components

Name	Standard service life
DC fan	5 year
Electrolytic capacitor	8 years
Printed circuit board	8 to 10 years

3) Tightening torque of screws

Observe the following tightening torque when tightening the connector of conductive parts (connection among DC bus interfaces, motor interfaces and busbars), non-conductive parts (grounding terminals and protective grounding terminals), and common steel connectors.

Table 5-2 Tightening torque for current-carrying components

Screw/Bolt	Grounding terminals, protective grounding terminals, and steel-made terminals (N·m) (able to conduct fault current)	Current busbar of plastic box (N·m) (able to conduct operating current)
M2.5	0.3	0.3
M3	0.55	0.55
M4	1.2	1.2
M5	2.8	2.8
M6	4.8	4.8
M8	13	13
M10	20	20
M12	35	35

4) Cable terminals and fasteners

Regularly check whether the cable terminals and screw terminals are secured properly. If not, re-tighten them. Check the routing errors and replace damaged components promptly.

NOTE

- The actual maintenance cycle is determined by the mounting environment and operating conditions of the equipment.

5.4 Replacement of Components

5.4.1 Replacing the Filter Screen

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.
- Before removing the filter screen, power off the equipment to prevent the fan from intaking contaminated air from outside. When using a fan that powered up by an external power supply, beware of the inertia of the fan or disconnect the external power supply.
- If the dirty filter screen is not replaced timely, devices in the cabinet may stop due to high temperature.

1) Removing the filter screen

If IP42 air inlet kit is used for the cabinet, clean the air inlet based on the following procedure.

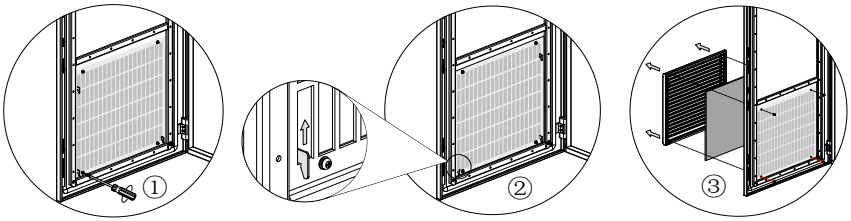


Figure 5-21 Removing the filter screen

① Power off the cabinet and cut off the fan power supply.

② Open the cabinet front door and remove the four M4 screws that used to fix the window blind.

③ Lift up the window blind and remove it.

④ Remove the filter screen from the window blind and clean (or replace) it.

2. Installing the filter screen

Observe the preceding procedure, but in the reverse order.

① Install the filter screen (cleaned or new) into the blinds.

② Insert the window blind into the reserved hole.

③ Use screws to secure the window blind again from the inner side of the front door.

Follow the preceding steps for all the filter screens that need to be replaced.

5.4.2 Replacing DC Fan of the Active Rectifier Module

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

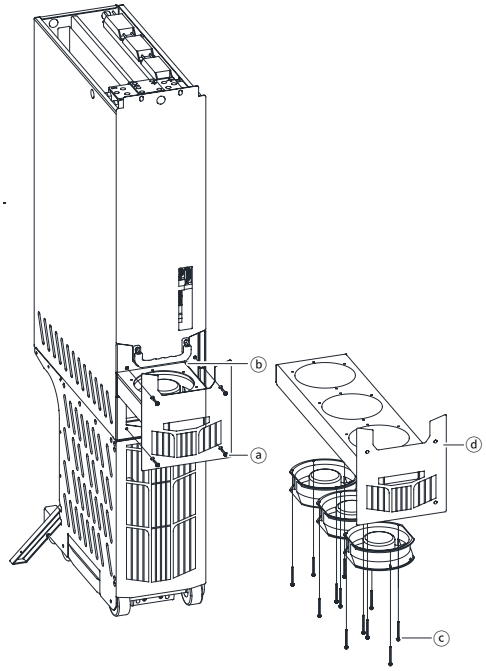


Figure 5-22 Replacing the fan of the active rectifier module

The following shows the replacement procedure.

① Disconnect the DC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door and use a screwdriver to remove the four M5 screws (ⓐ) from the fan assembly (ⓓ).

③ Unplug the power supply cable of the fan when pulling the fan components out from the front of the module.

④ Unscrew the twelve M4 screws (ⓒ) from the fan and remove the fan.

⑤ Install a new fan of the same specifications.

NOTE

- The air flows from bottom to top. Install the fan in the direction indicated by the arrow marked on the fan.
- Do not pinch the power cable of the fan during installation.
- Each fan is fixed by four M4 screws (ⓒ).

5.4.3 Replacing DC Fan of the Active Rectifier Filter Module

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

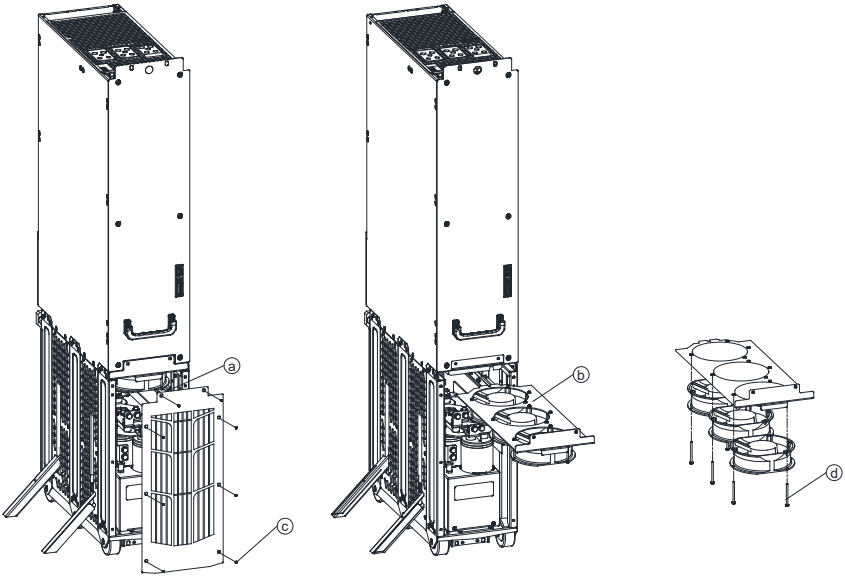


Figure 5-23 Replacing the fan of the active rectifier filter module

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door and use a screwdriver to remove the eight M5 screws (ⓒ) from the panel and remove the panel.

③ Disconnect the fan from the module (ⓐ).

④ Pull out the fan components (ⓑ).

⑤ Unscrew the twelve M4 screws (ⓓ) from the fan and remove the fan.

Note: Each fan is fixed by four M4 screws (ⓓ).

⑥ Install a new fan and fan components in the same procedure, but in the reverse order.

⑦ Wire the fan to the power supply module and install the panel.

NOTE

- The air flows from bottom to top. Install the fan in the direction indicated by the arrow marked on the fan.
- Do not pinch the power cable of the fan during installation.

Replacing the fan of the active rectifier filter module (DLCL)

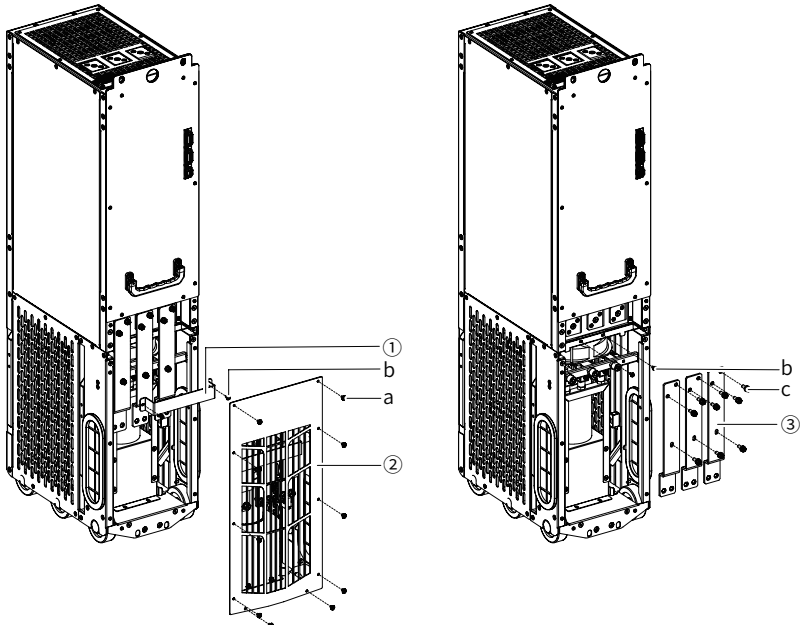


Figure 5-24 Replacement (1) of the fan of the active rectifier filter module (DLCL)

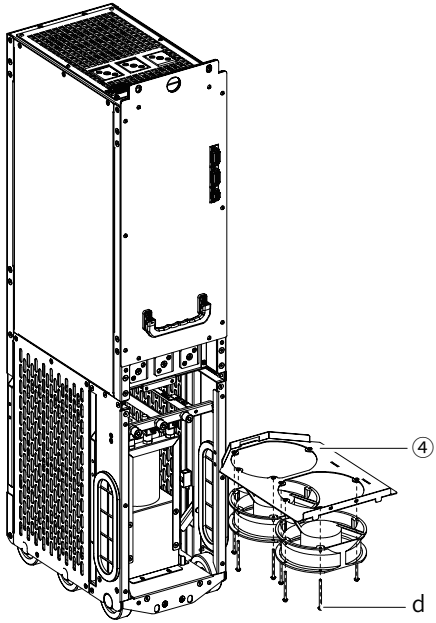


Figure 5-25 Replacement (2) of the fan of the active rectifier filter module (DLCL)

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door and use a screwdriver to remove the ten M4 screws (a) from the panel and remove the panel (②).

③ Continue to use a screwdriver to remove the two M4 screws (b) that secure the PC board and remove the PC board (①).

④ Remove the nine M6 SEMS screws (c) holding the copper busbar with a screwdriver and remove the output copper busbar (③).

⑤ Remove the two M4 SEMS screws (b) that secure the fan sheet metal components.

⑥ Disconnect the fan from the module.

⑦ Pull out the fan components (④).

⑧ Unscrew the eight M4 screws (d) from the fan and remove the fan.

NOTE

- Each fan is fixed by four M4 screws (d).

⑨ Re-fix the fan components and connect the fan components to the power

supply module.

⑩ Install the copper busbar, PC board, and panel according to the corresponding procedure.

Replacing the fan of the active rectifier filter module (ELCL)

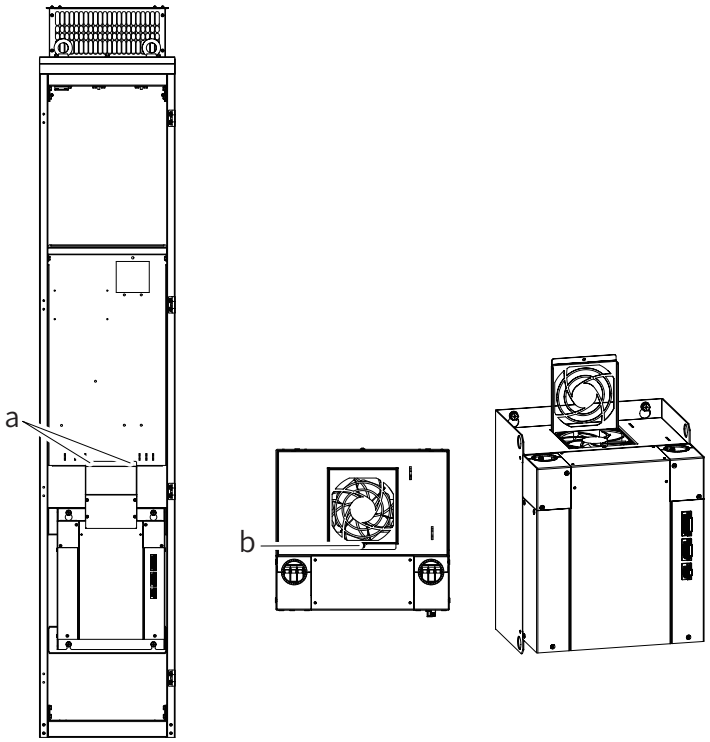


Figure 5-26 Replacing the fan of the active rectifier filter module (ELCL)

① Disconnect the DC power supply of the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door, remove the two M4 fixing screws of the fan cover on the top of the module with a screwdriver, and remove the air duct cover (a).

③ Use a screwdriver to remove one fixing screw on the top cover, turn the cover over, unplug the power cable of the fan, and remove the fan (b).

5.4.4 Replacing the Frame Accessory Kit

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

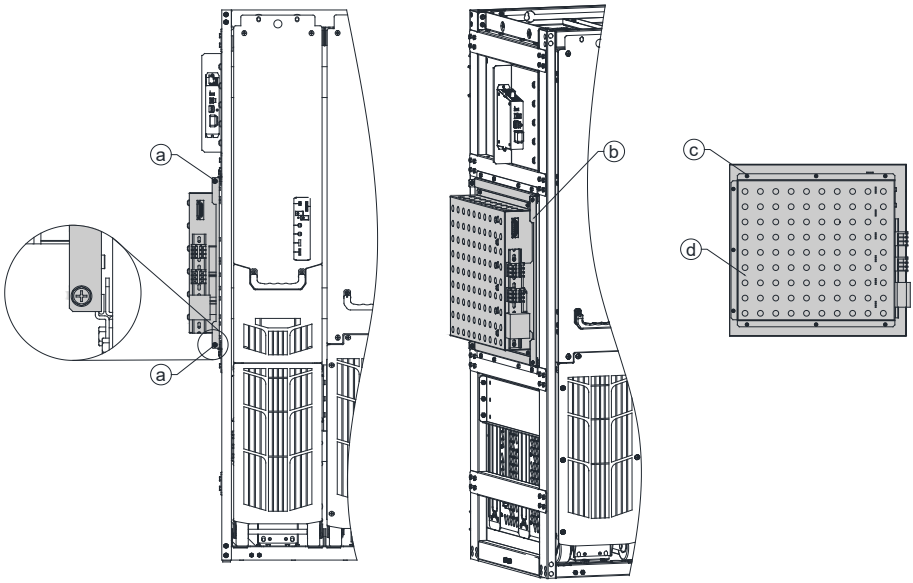


Figure 5-27 Replacing the frame accessory kit

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Disconnect all wiring terminals connected to the accessory kit.

③ Use a screwdriver to remove the two M6 screws (ⓐ) in the front.

④ Pull the bending edge of the sheet metal (ⓑ) to take out the accessory kit.

⑤ Use a screwdriver to remove the nine M4 screws (ⓒ) securing the accessory kit cover, remove the accessory kit cover (ⓓ), service the internal components, and connect corresponding cables.

⑥ Install the accessory kit in the same procedure, but in the reverse order.

⑦ Wire cables properly.

5.4.5 Replacing the Fan Power Supply

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

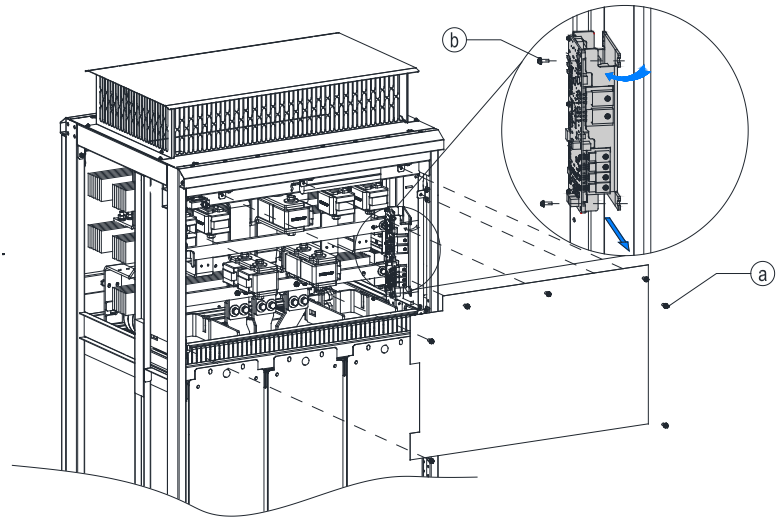


Figure 5-28 Replacing the fan power supply

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door.

③ Loosen the screw (ⓐ) on the upper cover of the cabinet and remove the cover.

④ Pull out the terminal of the fan power supply.

⑤ Remove the two screws (ⓑ) on the power supply and take out the power supply. Install a new power supply in the same procedure, but in the reverse order.

⑥ Re-connect the power supply terminals.

⑦ Tighten the cover and close the cabinet door.

- Do not damage the fastening screws. Tighten screws that used to fix the power supply with 1.2 N · m.
- Do not drop screws into the module.

5.4.6 Replacing HSVM-10

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

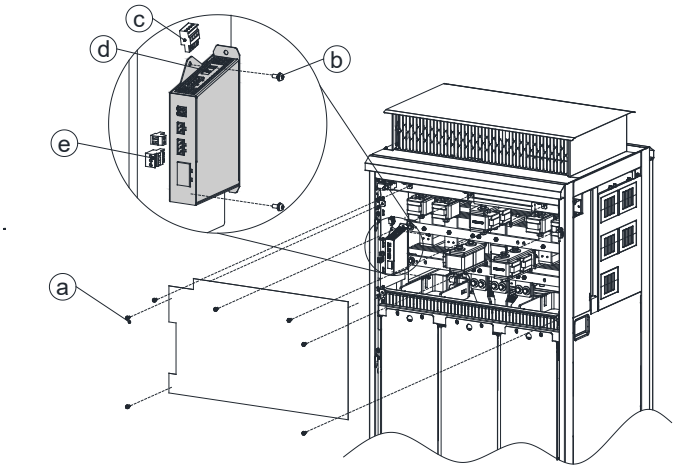


Figure 5-29 Replacing the HSVM-10 module

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door.

③ Loosen the screw (ⓐ) on the upper cover of the cabinet and remove the cover.

④ Pull out the optical fiber (ⓓ) on the top of the HSVM-10.

⑤ Pull out the 24 V power supply terminal (ⓒ) on the top of the HSVM-10.

⑥ Pull out the three-phase AC voltage detection terminal (ⓔ) in the front of HSVM-10.

⑦ Remove the two M4 screws (ⓑ) on the HSVM-10 and take out HSVM-10. Be careful not to drop the screws inside the module.

⑧ Install a new HSVM-10 module in the same procedure, but in the reverse order.

⑨ Tighten the cover and close the cabinet door.

NOTE

● Do not damage the fixing screws. Tighten the screws that used to fix the HSVM-10 module with a tightening torque of 1.2 N · m.

5.4.7 Replacing the Lightning Protection Board

WARNING

◆ Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

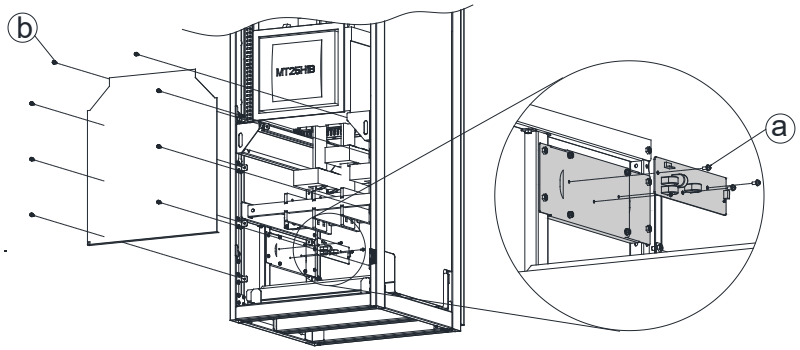


Figure 5-30 Replacing the lightning protection board

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and the disconnector of the charging circuit. Ensure that the equipment carries no residual voltage.

② Open the cabinet door.

③ Loosen the screws (ⓑ) on the lower cover of the cabinet and remove the cover.

④ Disconnect the lightning protection board terminal and remove the fixing screws (ⓐ).

⑤ Replace with a new lightening protection board in the same procedure,

but in the reverse order.

⑥ Re-connect the terminals.

⑦ Tighten the cover and close the cabinet door.

NOTE

- Do not damage the fastening screws: Tighten the fastening screws with 1.2 N · m.
- The MD880 cabinet lightning protection board VDR and EMC screws are not installed by default (applicable to the IT power grid). If TT or TN power grid is used on site, install VDR and EMC screws.

5.4.8 Replacing the Fuse

WARNING

◆ Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.

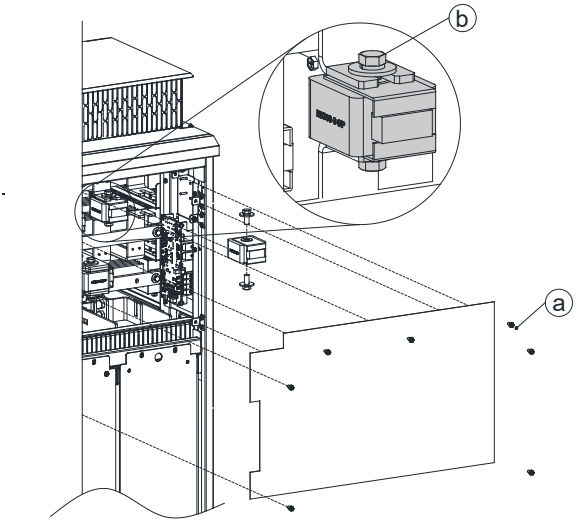


Figure 5-31 Replacing the fuse

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and the fuse switch of the pre-charge circuit. Ensure that the equipment carries no residual voltage.

② Open the cabinet door.

③ Loosen the screw (ⓐ) on the upper cover of the cabinet and remove the cover.

④ Loosen the fuse nut (ⓑ) and pull out the fuse together with the bolt. Note: do not loosen the bolt completely to prevent the bolt from falling into the module.

⑤ Remove the bolt and check the condition of the fuse. If the fuse burns out, replace all the fuses and tighten the bolt. The recommended torque is up to 35 N · m.

⑥ Install the cover in the same procedure, but in the reverse order and close the cabinet door.

5.4.9 Replacing the Active Rectifier Module

WARNING

- Component replacement can be performed by professionals only. Before maintenance and inspection, read the safety instructions in "Fundamental Safety Instructions". Failure to comply may result in personal injury or equipment damage.
- Due to the heavy weight and the high center of gravity of the module, take enough care during operation. Improper operation may cause the module to fall down.
- When removing the module, carefully pull the module out of the cabinet along the ramp plate. When holding the handle, step on the module base with one foot to prevent the module from falling backwards.
- When installing the module, push the module back into the cabinet along the ramp plate. Keep your fingers away from the edge of the module front panel to prevent them from getting stuck between the module and the cabinet. In addition, step on the module base with one foot to prevent the module from falling backwards.
- Do not tilt the module or place the module on a tilted floor.

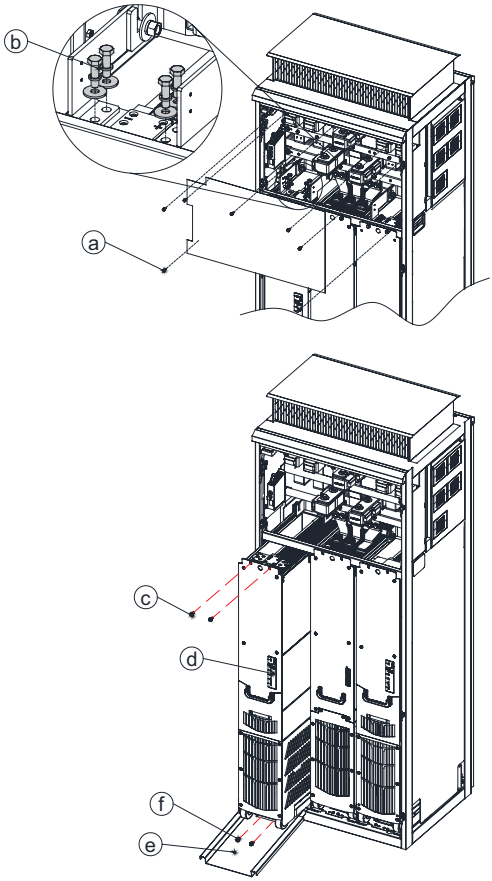


Figure 5-32 Replacing the active rectifier module

The following shows the replacement procedure.

① Disconnect the AC power supply from the drive cabinet and ensure that the equipment carries no residual voltage.

② Open the cabinet door.

③ Loosen the screw (ⓐ) on the upper cover of the cabinet and remove the cover.

④ Disconnect the two DC busbars at the top of the module (ⓑ). Do not drop the screws into the module.

⑤ Remove the cover (ⓓ) on the optical fiber terminal in the front of the module and pull out the optical fiber cable.

⑥ Remove the two M8 screws (ⓕ) that used to fix the module base to the

cabinet base.

⑦ Fixing the mounting rail (ⓔ) of the module: Pull up the module mounting rail from the cabinet base to make the base hook enter the mounting rail hole.

⑧ Remove the two M8 screws (ⓒ) that fix the top of the module to the cabinet frame.

⑨ Carefully pull the module out from the cabinet along the rail. When holding the handle, step on the module base with one foot to prevent the module from falling backwards.

⑩ Replace with a new module in the same procedure, but in the reverse order. Mind your fingers. Step on the module base with one foot to prevent the module from falling backwards.

⑪ Re-connect the optical fiber cable and tighten the cover.

⑫ Remove the mounting rail and close the cabinet door.

NOTE

- Do not damage the fastening screws. Tighten the fastening screws of the module with a tightening torque of 13 N · m and those of the DC busbars with a tightening torque of 20 N · m.

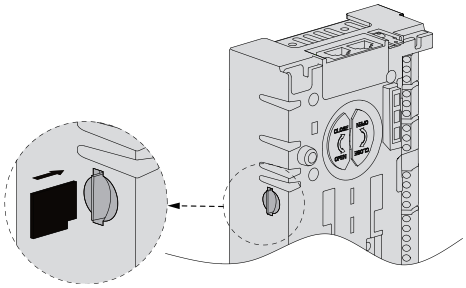
5.4.10 Maintenance on the HCU Control Module

1) Replacing the memory card

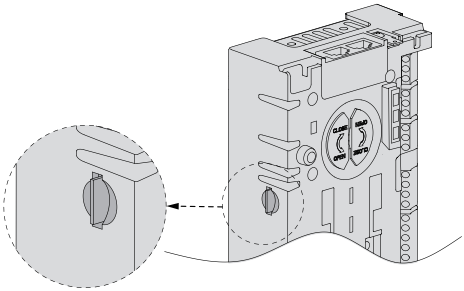
After replacing the HCU control module, you can keep present parameter setpoints by inserting the original SD card from the faulty module to the new module. See the following procedure for details.

① Press the SD memory card once to eject it and pull it straight out.

② Push the SD memory card into the card slot in the direction shown below.



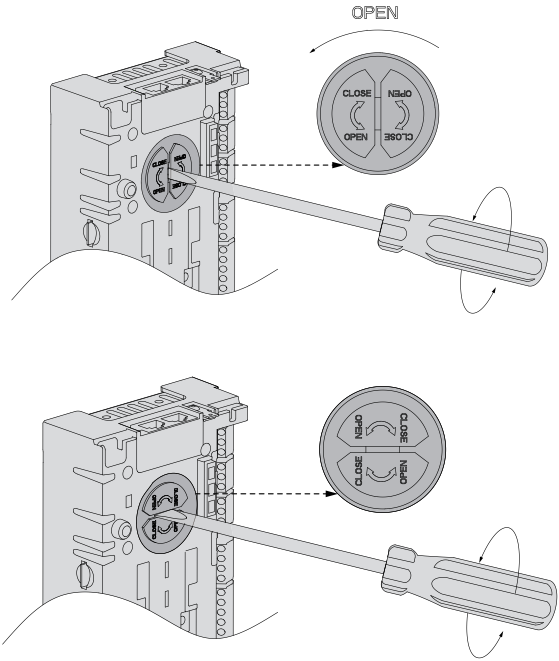
③ Ensure the SD memory card is pushed in place. Otherwise, an exception can occur due to poor contact.



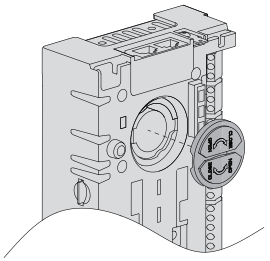
2) Replace the battery.

To replace the battery, do as follows:

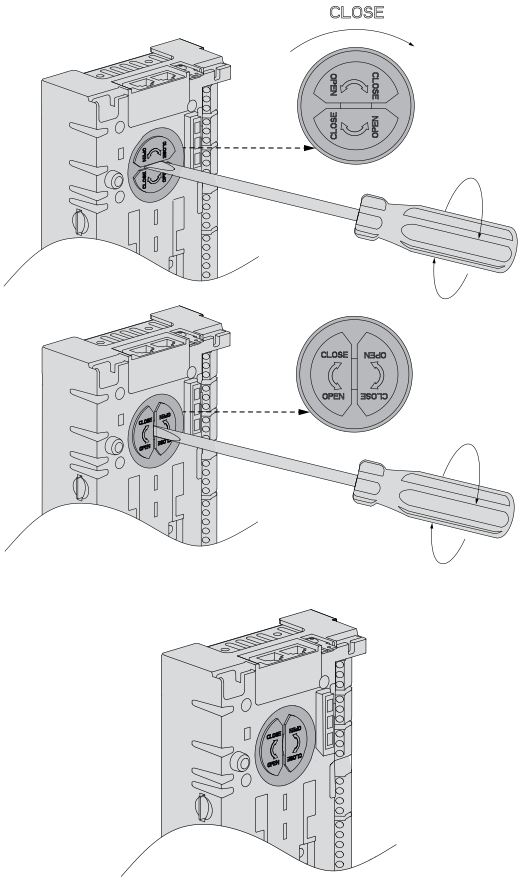
① Turn the battery cover 90° counterclockwise with a #2 straight screwdriver until the cover is released.



② Remove the cover. Press one side of the battery with the screwdriver, and remove the battery. Then install a new battery.



③ Close the cover and turn it 90° clockwise to secure it.

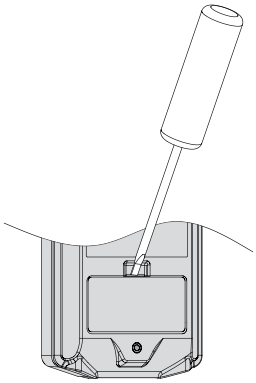


④ Dispose of retired batteries in accordance with local rules or applicable laws.

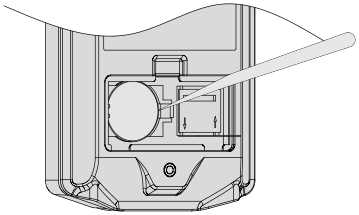
5.4.11 Replacing the Battery of SOP-20-880

The following shows the replacement procedure.

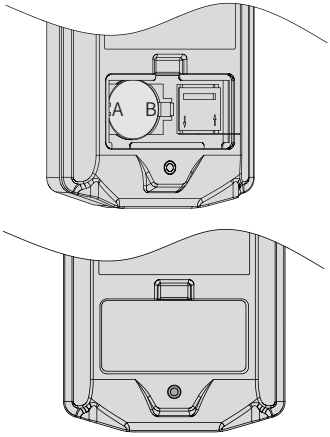
① Use a straight screwdriver or fingers to open battery rear cover, as shown below.



② Take out the battery with tweezers or a slotted screwdriver.



③ Place the battery into the clip (side A) first and then press the other end (side B) of the battery.



④ Install the battery cover with a tool or your finger.

6 Ordering Instructions

6.1 Item Number

This chapter lists the models and item numbers of the active rectifier products.

Figure 6-1 Ordering instructions for MD880-40D series active rectifier

Item number	Remark
MD880-40D-0094-4+JC	"+JC" indicates that the LCL filter is integrated into a module. The shipping list includes the active rectifier power module, LCL filter module, pre-charge module, control module, and voltage detection module, which are shipped as loose parts.
MD880-40D-0149-4+JC	
MD880-40D-0183-4+JC	
MD880-40D-0299-4+JC	
MD880-40D-0395-4+JC	
MD880-40D-0089-7+JC	
MD880-40D-0173-7+JC	
MD880-40D-0243-7+JC	

Figure 6-2 Ordering instructions for MD880-40D series PCS products

Item number	Remark
MD880-40D-0071-7+JC+PCS	"+JC" indicates that the LCL filter is integrated into a module. The shipping list includes PCS power module, LCL filter module, pre-charge module, DC hall components, and control detection unit, which are shipped as loose parts.
MD880-40D-0138-7+JC+PCS	
MD880-40D-0194-7+JC+PCS	

Figure 6-3 Ordering instructions for MD880-40K series active rectifier products

Model MD880-40-...	Frame	Item number	Quantity	Remark
0575-4	BLCL+H8	1. MD880-40K-0575-4	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module
0810-4	BLCL+H8	1. MD880-40K-0810-4	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module

Model MD880-40-...	Frame	Item number	Quantity	Remark
1092-4	BLCL+2H8	1. MD880-40K-1092-4	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
1539-4	BLCL+2H8	1. MD880-40K-1539-4	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
2185-4	2 x (BLCL+2H8)	1. MD880-40K-1092-4	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
3078-4	2 x (BLCL+2H8)	1. MD880-40K-1539-4	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
4617-4	3 x (BLCL+2H8)	1. MD880-40K-1539-4	3	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-60	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module

Model MD880-40-...	Frame	Item number	Quantity	Remark
0540-5-CS	BLCL+H8	1. MD880-40K-0540-5-CS	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module
0810-5-CS	BLCL+H8	1. MD880-40K-0810-5-CS	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module
1026-5-CS	BLCL+2H8	1. MD880-40K-1026-5-CS	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
1539-5-CS	2 x (BLCL+H8)	1. MD880-40K-0810-5-CS	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
2052-5-CS	2 x (BLCL+2H8)	1. MD880-40K-1026-5-CS	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module

Model MD880-40-...	Frame	Item number	Quantity	Remark
2309-5-CS	3 x (BLCL+H8)	1. MD880-40K-0810-5-CS	3	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
3078-5-CS	3 x (BLCL+2H8)	1. MD880-40K-1026-5-CS	3	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
3848-5-CS	4 x (BLCL+2H8)	1. MD880-40K-1026-5-CS	4	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
4617-5-CS	5 x (BLCL+2H8)	1. MD880-40K-1026-5-CS	5	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-60	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
0369-7	BLCL+H8	1. MD880-40K-0369-7	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module

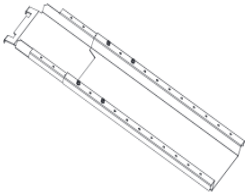
Model MD880-40-...	Frame	Item number	Quantity	Remark
0540-7	BLCL+H8	1. MD880-40K-0540-7	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HOFM-10	1	Optical fiber expansion module
		4. HSVM-10	1	Synchronous voltage detection module
0701-7	BLCL+2H8	1. MD880-40K-0701-7	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
1026-7	BLCL+2H8	1. MD880-40K-1026-7	1	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
1402-7	2 x (BLCL+2H8)	1. MD880-40K-0701-7	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module

Model MD880-40-...	Frame	Item number	Quantity	Remark
2052-7	2 x (BLCL+2H8)	1. MD880-40K-1026-7	2	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-40	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
3078-7	3 x (BLCL+2H8)	1. MD880-40K-1026-7	3	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-60	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
4104-7	4 x (BLCL+2H8)	1. MD880-40K-1026-7	4	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-A0	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module
5130-7	5 x (BLCL+2H8)	1. MD880-40K-1026-7	5	Active rectifier frame assembly
		2. HCU-40	1	Active rectifier controller
		3. HPCU-A0	1	Parallel expansion module
		4. HOFM-10	1	Optical fiber expansion module
		5. HSVM-10	1	Synchronous voltage detection module



- To purchase PCS products, replace HCU-40 with HCU-40+PCS. In addition, options such as HSVM-20, HOFM-10 optical fiber expansion card, DC Hall components, and DC snubber components can be used together with the PCS. Contact Inovance for details.

When the H8 power module is installed in the cabinet or replaced for maintenance, use the mounting guide rail to make it easier for the module to be pushed in or pulled out of the cabinet, . For details, see "5.4.9 Replacing the Active Rectifier Module". For the item number of the mounting guide rail (standard for the cabinet, which can also be purchased separately), see the following table.

Product model	Item number	Applicable model	Picture
Mounting rail	20181140	All models with structure being T2 or H8	

6.2 Shipping List

Figure 6-4 Shipping list of 40K frame assembly

Type	BLCL+H8		BLCL+2H8	
	Name	Quantity	Name	Quantity
Frame assembly	Frame	1	Frame	1
	Active rectifier filter module (BLCL)	1	Active rectifier filter module (BLCL)	1
	Active rectifier module (H8)	1	Active rectifier module (H8)	2
	Pre-charge circuit - Pre-charge resistor (included in the accessory kit)	3	Pre-charge circuit - Pre-charge resistor (included in the accessory kit)	3
	Pre-charge circuit - Rectifier bridge (included in the accessory kit)	1	Pre-charge circuit - Rectifier bridge (included in the accessory kit)	1
	LCL fan power supply board (included in the accessory kit)	1	LCL fan power supply board (included in the accessory kit)	1
Accessories in the shipping list	5 m optical fiber	2	5 m optical fiber	4
	Warranty card	1	Warranty card	1
	Certificate of conformity	1	Certificate of conformity	1
	Shipping list	1	Shipping list	1
	Hexagon head bolt	Several	Hexagon head bolt	Several

For the shipping list of 40D products and PCS products, see "1.7 Electrical Principles and Wiring".

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