INOVANCE

Maintenance Guide

SLIM LINE Series Control Cabinet

User Guide

Data code 19011454 A00

Preface

Thank you for purchasing the SLIM LINE series control system.

By 2019, over 2 million elevator controllers/control cabinets produced by INOVANCE, an elevator brand owned by Inovance, have been put into use around the world. Based on such extensive practices and the application experience in different regions, we developed the SLIM LINE control system to meet the new requirements of global market.

This guide introduces the inspection, maintenance, and cabinet removal of the control system.

Read this guide carefully before using the product, and keep it properly for future maintenance reference.

Notes
◆ For illustration purpose, the drawings in this user guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified before using the product, and perform operations following the instructions.
◆ The drawings in this guide are for illustration only. Actual products may vary.
◆ The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the guide.
◆ If the user guide is damaged or lost, order a replacement from your agent or the customer service center of Inovance.
◆ Contact the customer service center of Inovance if you have any problems during use.

Contents

Revision History

Date	Version	Change Description
November 2020	A00	First release.

Safety Instructions

Safety Precautions

1) Before using the product, read the safety instructions thoroughly and comply with them during operations.

2) To ensure the safety of humans and equipment, follow the signs on the product and all the safety instructions in this guide.

3) "CAUTION", "WARNING", and "DANGER" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.

4) Use this product according to the designated environmental requirements. Damage caused by improper usage is not covered by warranty.

5) Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions

indicates that failure to comply with the notice will result in severe personal injuries or even death.

indicates that failure to comply with the notice may result in severe personal injuries or even death.

indicates that failure to comply with the notice may result in minor personal injuries or damage to the equipment.

Safety Instructions

Power-on

DANGER

- Before power-on, make sure that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Before power-on, make sure that the power supply meets equipment requirements to prevent equipment damage or even a fire.
- At power-on, unexpected operations may be triggered on the equipment. Therefore, stay away from the equipment.
- After power-on, do not open the cabinet door and protective cover of the equipment. Failure to comply will result in an electric shock.
- Do not touch any wiring terminals at power-on. Failure to comply will result in an electric shock.
- Do not remove any part of the equipment at power-on. Failure to comply will result in an electric shock.

Operation

DANGER

- Do not touch any wiring terminals during operation. Failure to comply will result in an electric shock.
- Do not remove any part of the equipment during operation. Failure to comply will result in an electric shock.
- Do not touch the equipment shell, fan, or resistor for temperature detection. Failure to comply will result in heat injuries.
- Signal detection must be performed by only professionals during operation. Failure to comply will result in personal injuries or equipment damage.

WARNING

- Prevent metal or other objects from falling into the device during operation. Failure to comply may result in equipment damage.
- Do not start or stop the equipment using the contactor. Failure to comply may result in equipment damage.

Maintenance

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not maintain the equipment at power-on. Failure to comply will result in an electric shock.
- Before maintenance, cut off all equipment power supplies and wait at least 10 minutes.

WARNING

- Perform daily and periodic inspection and maintenance for the equipment according to maintenance requirements and keep a maintenance record.

Repair

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not repair the equipment at power-on. Failure to comply will result in an electric shock.
- Before inspection and repair, cut off all equipment power supplies and wait at least 10 minutes.

WARNING

- Require repair services according to the product warranty agreement.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment according to the replacement guide.
- Do not operate damaged equipment. Failure to comply may result in worse damage.
- After the equipment is replaced, perform wiring inspection and parameter settings again.

Disposal
 ◆ Dispose of retired equipment by following local regulations or standards. Failure to comply may result in property damage, personal injuries, or even death. ◆ Recycle retired equipment by following industry waste disposal standards to avoid environmental pollution.

Other Instructions

1) Requirements for the main air switch

Install a circuit breaker on the front end of the power supply side (L, N) of the control cabinet to prevent such faults as short circuit and overload from occurring on the back-end load. For a three-phase 380 V or single-phase 220 VAC system, the rated current of the circuit breaker cannot be smaller than 32 A. A circuit breaker with rated current above the rated input current of the control cabinet is recommended.

2) Requirements for the residual current device (RCD)

Install an RCD with rated action current not greater than 30 mA in the car top lighting and shaft lighting circuits for protection.

3) High leakage current warning

The equipment generates high leakage current during running. Ground the equipment reliably before connecting it to the input power supply. Grounding must comply with local regulations and related IEC standards.

4) Motor insulation test

Perform the insulation test when the motor is used for the first time, when it is reused after being stored for a long time, or in a regular inspection, to prevent the control cabinet from being damaged due to the poor insulation of motor windings. The motor must be disconnected from the control cabinet during the insulation test. A 500 V megger is recommended for the test. Ensure that the measured insulation resistance is not smaller than 5 MΩ.

5) Motor thermal protection

Set the motor overload protection parameters properly or install a thermal relay for the motor for protection.

6) Disposal

The electrolytic capacitors inside the control cabinet and on the PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as industrial waste.

7) Inspection of peripheral cables

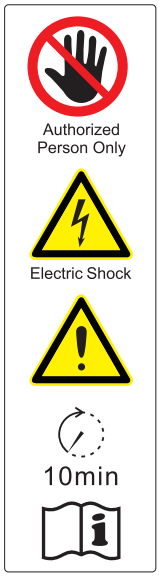
Ensure the diameter and voltage resistance of power cables and control power cables meet the requirements. Connect the input and output cables separately to avoid danger caused by cable mixing and insulation damage.

Run the signal cables and power cables separately. Use shielded twisted pairs (STPs) as analog signal cables, and ensure that the shielded cables are reliably grounded at one end.

Safety Signs

For safe equipment operations and maintenance, comply with the safety signs on the equipment, and do not damage or remove the safety labels.

The following table describes the safety signs.

Safety Sign	Description
	◆ Only professionals are allowed to open the cabinet door. ◆ High voltage! ◆ Before maintenance, cut off all power supplies and wait 10 minutes. ◆ Before using the product, read this document (especially safety instructions) carefully.

1 Inspection and Maintenance

1.1 Daily Maintenance

As an important part of the elevator system, the control cabinet must be inspected and maintained following national laws and regulations and industrial requirements.

CAUTION	
	◆ Never perform wiring at power-on. Failure to comply will result in an electric shock. ◆ Before inspection, cut off all the equipment power supplies. After disconnecting the input power supply of the control cabinet, do not perform further operations until the power indicator is off because residual voltage exists in the DC capacitor. Wait for the specified interval before next power-on. ◆ Never modify the wiring, disconnect cables, or remove optional cards when the control cabinet is running. Failure to comply will result in an electric shock. ◆ The grounding terminal of the motor must be grounded. Otherwise, you will suffer an electric shock when touching the motor housing. ◆ Inspection, maintenance, and repair can only be performed by qualified electrical personnel.

WARNING	
	◆ Never run the control cabinet with the protective cover removed. ◆ For illustration, the drawings in this document are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified before using this product, and perform operations following the instructions. ◆ Tighten the screw terminals based on the specified tightening torque to prevent the cable connections from overheating after becoming loose. Failure to comply will result in a fire. ◆ Make sure that the input voltage of the main circuit is within the allowable range. Incorrect input voltage will affect the normal running of the control cabinet.

1.1.1 Daily Inspection Items

☑	No.	Inspection Item
☐	1	Whether abnormal noise exists when the motor is running.
☐	2	Whether the motor vibrates excessively during running.
☐	3	Whether the installation environment of the control cabinet changes.
☐	4	Whether the control cabinet overheats.
☐	5	Whether the electrical components inside the control cabinet work properly.
☐	6	Whether there is condensation on the control cabinet.
☐	7	Whether the screws inside the control cabinet become loose.
☐	8	Whether abnormal noise exists in the contactors inside the control cabinet when the elevator is running.

1.1.2 Daily Cleaning Items

☑	No.	Cleaning Item
☐	1	Clean the control cabinet periodically.
☐	2	The IP rating of the control cabinet is IP20. Protect the control cabinet from water and dust while cleaning.
☐	3	Remove the dust on the surface of the control cabinet to prevent it from entering the control cabinet.

1.2 Periodic Maintenance

Perform periodic maintenance on the items that are difficult to check during daily maintenance and running.

1.2.1 Periodic Inspection Items

☑	No.	Item
☐	1	Whether the screws become loose.
☐	2	Whether the terminals have arc signs.
☐	3	Whether the electrical components work properly.
☐	4	Whether any internal cable is exposed.
☐	5	Charge the batteries in the battery box once every six months.

1.2.2 Replacement of Quick-Wear Parts

The quick-wear parts in the control cabinet mainly include the fuse, air switch, fan, advance door opening (ADO) board, and PG card. Additional fuse is provided in the control cabinet to prevent damage to the fuse in case of an emergency.

The service life of the air switch and contactor are 2 to 3 years and that of the fan is 7 years if they are used at an ambient temperature of 70°C. You can regularly replace the quick-wear parts according to their service life and the actual working condition.

2 Cabinet Removal

2.1 List of Serviceable Parts

NOTE

◆ Electrical component models and brands are for reference only and are subject to change without notice.

Table 2-1 List of serviceable parts

Cabinet	No.	Component Name	Model
Monitoring cabinet	①	Door plate	-
	②	Air switch	CDB6i4D32 (380V)/ PT2.5 RD-3209512/ PT 2.5 BU-3209523
	③	Lightning protection board	MCTC-OPB-N1, MCTC-OPB-N2
	④	Socket and residual current device (RCD)	EA9X310, Ex9NLE-S 1PN C6 30mA
	⑤	Operating board	-
	⑥	Fuse	50CTT4AH250V, 50CTT2AH250V, 50CF-063H
	⑦	Monitoring board	MCTC-MB-N1
	⑧	Interface board	MCTC-KCB-N1
	⑨	ADO board	MCTC-SCB
Drive cabinet	①	Door plate	-
	②	Protective cover	-
	③	Insulation barrier and PG card	MCTC-PG-E
	④	Main control board (MCB)	MCTC-MCB-N1
	⑤	Power supply board B	MCTC-PCB-N2
	⑥	Power supply board A	MCTC-PCB-N1
	⑦	Drive module	-
	⑧	Fan	SA240515BSCRR001
	⑨	Terminal block	TR20-01-8P-BCM25 (380 V)
	⑩	Transformer	KLK-NICE9000V-4007-P-I-T1
	⑪	Contactors	Ex9CS12D01 3P24VDC+AX4510 (SW) Ex9CS09D01 3PDC24V (BY) Ex9CS06D 4P-22DC24V (FX)

2.2 Tools

No.	Tool	No.	Tool	No.	Tool	No.	Tool
①	Phillips screwdriver	③	Multimeter	⑤	Torque screwdriver	⑦	Hex socket
②	Cutting plier	④	Tweezer	⑥	Cable tie	-	

2.3 Removing the Monitoring Cabinet

2.3.1 Door Plate

Removal procedure:

❶ Unlock the door lock using the triangle key.

❷ Pull the bottom of the door plate outwards. Release the top of the plate from the tab when the angle between the plate and the cabinet is about 30°.

❸ Remove the door plate.

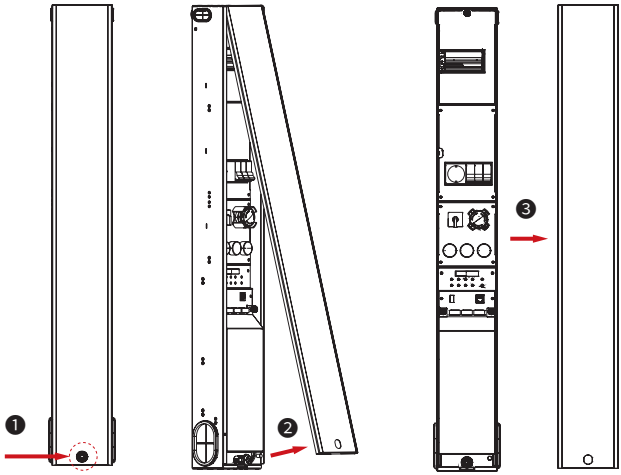


Figure 2-1 Steps to remove the door plate of the monitoring cabinet

2.3.2 Air Switch

Removal procedure:

❶ Loosen the captive screw on the air switch cover and remove the cover.

❷ Disconnect the switch cable, unlock the switch lock, and then remove the air switch.

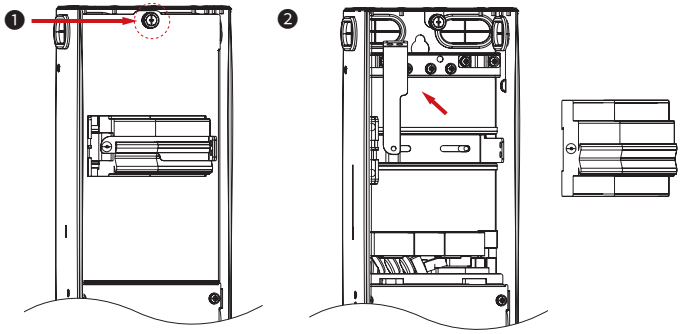


Figure 2-2 Steps to remove the air switch

2.3.3 Lightning Protection Board

Removal procedure:

❶ Remove the socket cover by unfastening the four M4x8 screws on the cover.

❷ Disconnect the plug-in terminals.

❸ Unfasten the four M4x8 retaining screws on the lightning protection board, and then remove the board.

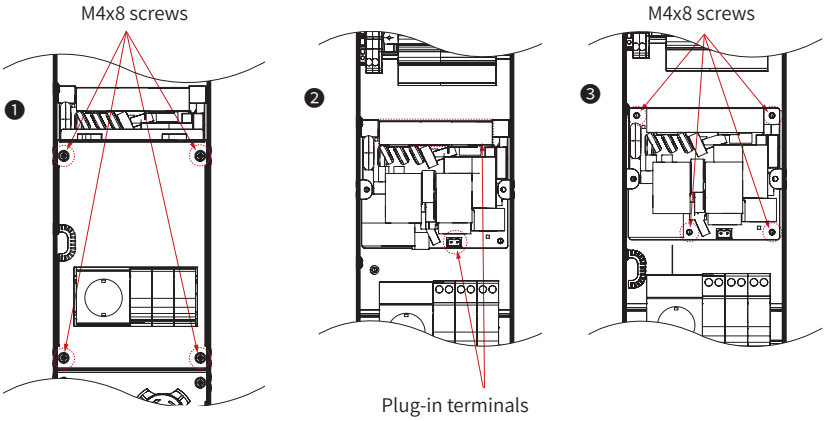


Figure 2-3 Steps to remove the lightning protection board

2.3.4 Socket and RCD

Removal procedure:

❶ Remove the socket cover by unfastening the four M4x8 screws on the cover.

❷ Disconnect the locking cables at two ends of the socket and RCD.

❸ Remove the socket and RCD.

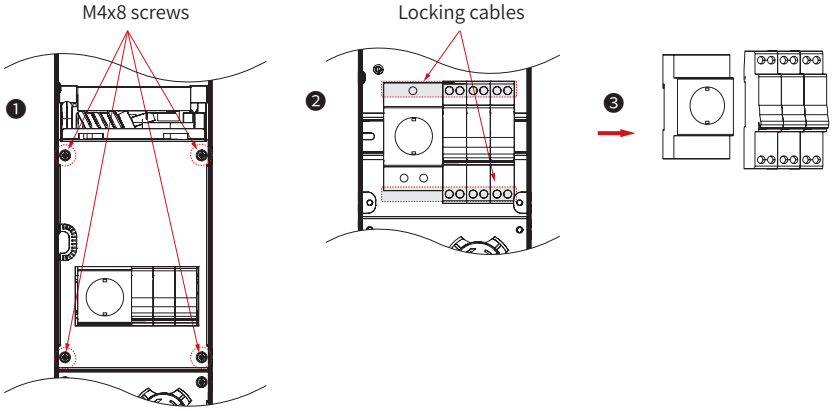


Figure 2-4 Steps to remove the socket and RCD

2.3.5 Operating Board

Removal procedure:

❶ Remove the operating board by unfastening the four M4x8 screws on the board.

❷ Turn the operating board around, and then remove the buttons and disconnect the cables.

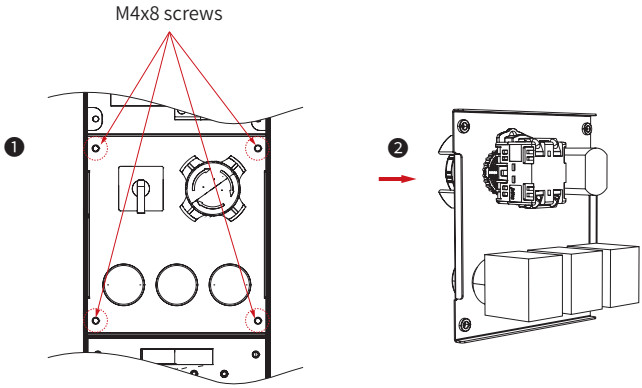


Figure 2-5 Steps to remove the operating board

2.3.6 Fuse

Removal procedure:

❶ Remove the interface cover by unfastening the two captive screws on the cover.

❷ Remove the fuse cover with your fingers or a tweezer and replace the fuse.

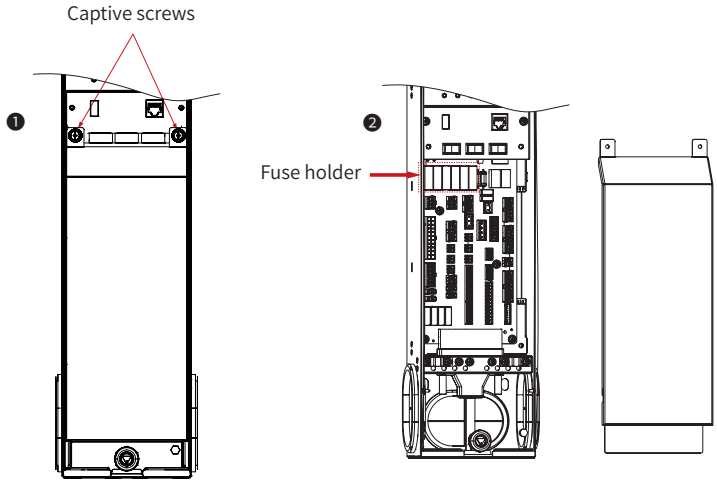


Figure 2-6 Steps to remove the fuse

2.3.7 Monitoring Board

Removal procedure:

❶ Remove the monitoring cover by unfastening the four M4x8 screws on the cover.

❷ Unfasten the four M4x8 retaining screws on the monitoring board, pull up the hard-wired terminal, and remove the monitoring board.

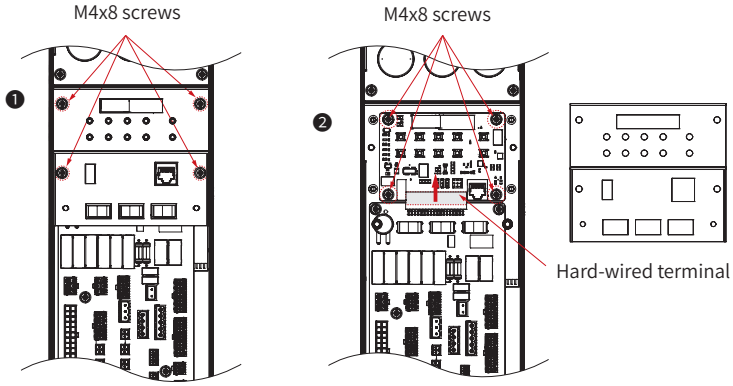


Figure 2-7 Steps to remove the monitoring board

2.3.8 Interface Board

Removal procedure:

❶ Remove the monitoring cover by unfastening the four M4x8 screws on the cover.

❷ Disconnect the plug-in terminal and remove the six M4x8 screws on the interface board.

❸ Pull the hard-wired terminal downwards and remove the interface board.

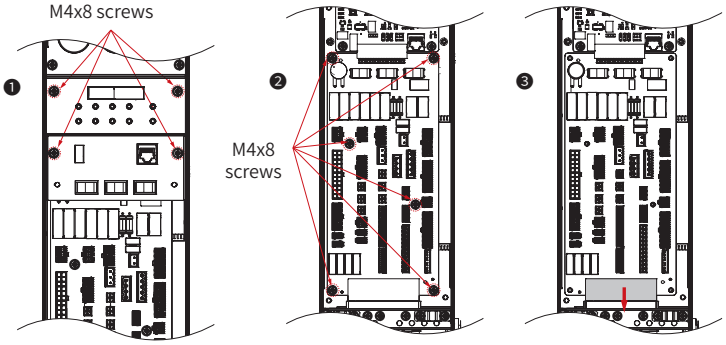


Figure 2-8 Steps to remove the interface board

2.3.9 ADO Board

Removal procedure:

❶ Disconnect the plug-in terminal on the interface board and remove the four M4x8 screws on the bracket of the interface board.

❷ Remove the interface board components following the arrow direction.

❸ Disconnect the plug-in terminal on the ADO board, unfasten the four M4x8 screws, and remove the ADO board.

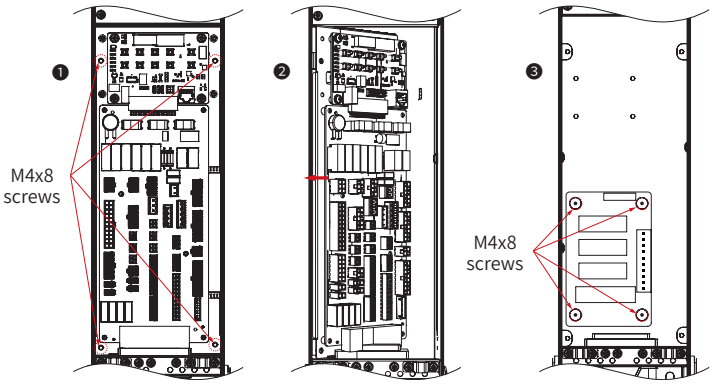


Figure 2-9 Steps to remove the ADO board

2.4 Removing the Drive Cabinet

2.4.1 Door Plate

Removal procedure:

❶ Unlock the door lock using the triangle key.

❷ Pull the bottom of the door plate outwards. Release the top of the plate from the tab when the angle between the plate and the cabinet is about 30° .

❸ Remove the door plate.

NOTE

◆ A grounding cable is used to connect the bottom of the cabinet door and the drive cabinet. After opening the cabinet door, place the door plate as close to the cabinet as possible to prevent the grounding cable from breaking.

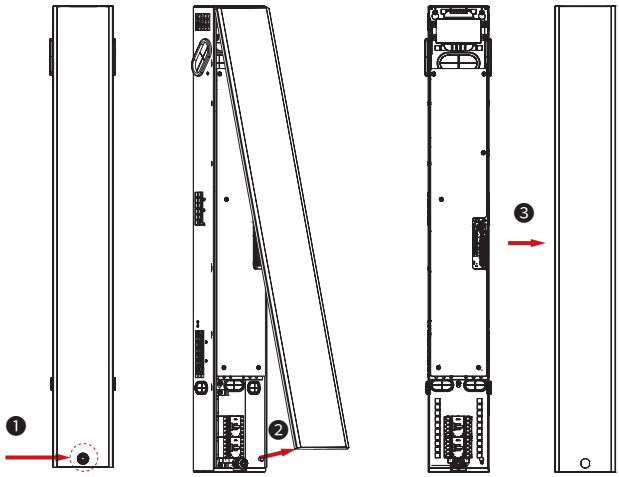


Figure 2-10 Steps to remove the door plate of the drive cabinet

2.4.2 Protective Cover

Removal procedure:

❶ Unfasten the six M4x8 screws.

❷ Remove the protective cover.

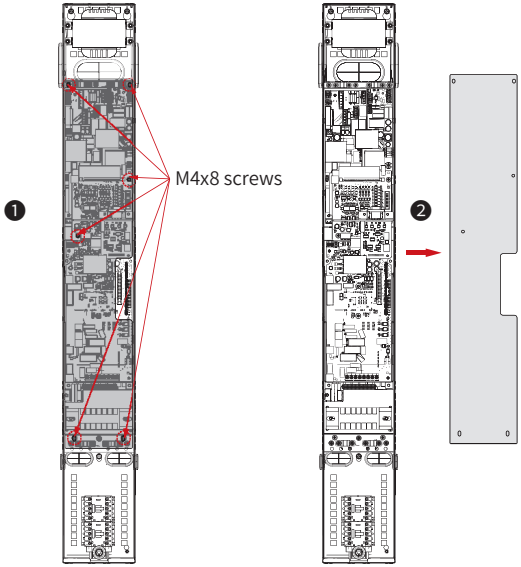


Figure 2-11 Steps to remove the protective cover

2.4.3 Insulation Barrier and PG Card

Removal procedure:

❶ Unfasten the two M3x10 screws.

❷ Remove the insulation barrier.

❸ Pull up the PG card (the plug-in terminal is on the drive board).

NOTE

- The insulation barrier must be reinstalled for heat dissipation.
- Insert or remove the PG card carefully to prevent the terminals from being damaged.

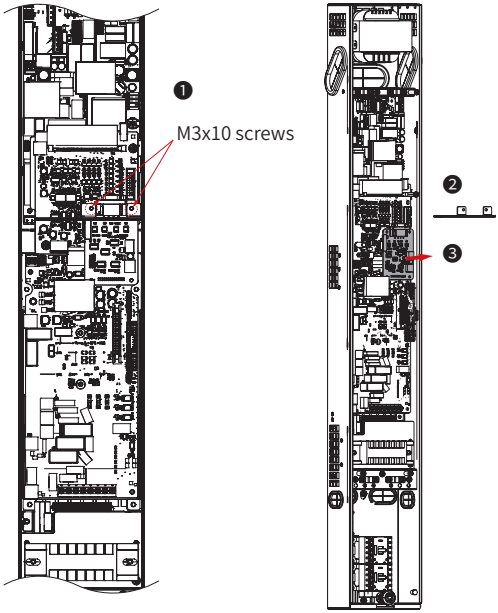


Figure 2-12 Steps to remove the insulation barrier and PG card

2.4.4 MCB

Removal procedure:

❶ Remove the two M4x8 screws and two M4 hex head cap screws.

❷ Pull up the MCB.

❸ Remove the insulation sheet on the MCB.

NOTE

◆ Keep the insulation sheet carefully because it must be reinstalled.

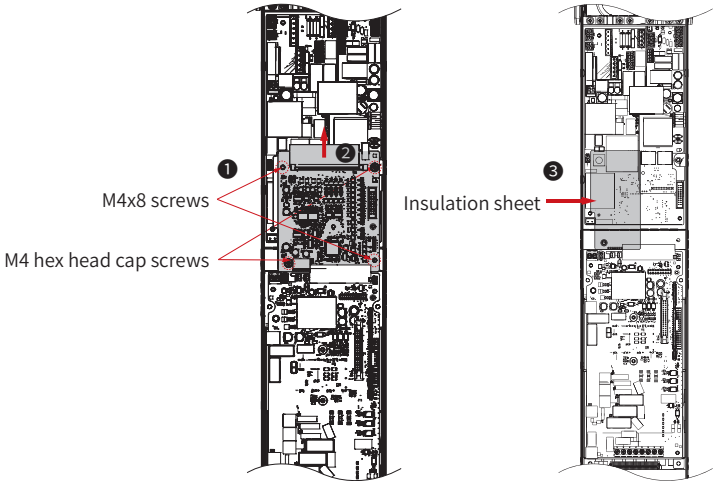


Figure 2-13 Steps to remove the MCB

2.4.5 Power Supply Board B

Removal procedure:

❶ Unfasten the three M3x10 screws, pull up the hard-wired terminal, and remove the power supply board B.

❷ Remove the electrical insulation paper of the power supply board.

NOTE

◆ Keep the electrical insulation paper carefully because it must be put back again.

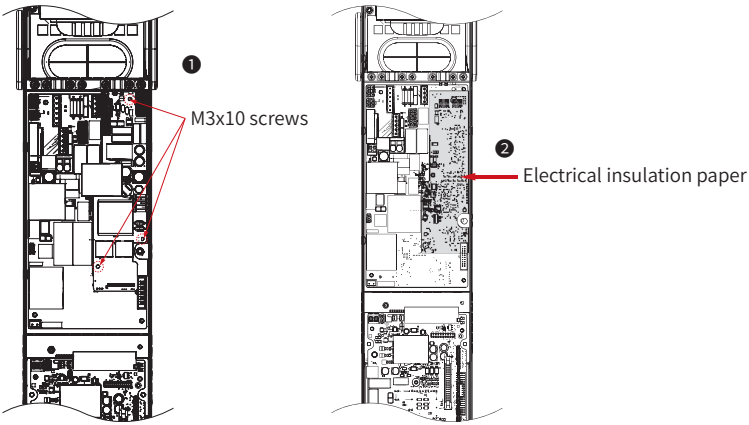


Figure 2-14 Steps to remove the power supply board B

2.4.6 Power Supply Board A

Removal procedure:

❶ Pull out the cable terminal on the power supply board A, and unfasten the five M4x8 screws and one M5 hex head cap screw.

❷ Remove the power supply board A.

NOTE

◆ The silicone pad under the power supply board A needs not to be removed. Before installing the power supply board, make sure that it is in the position shown in the following figure.

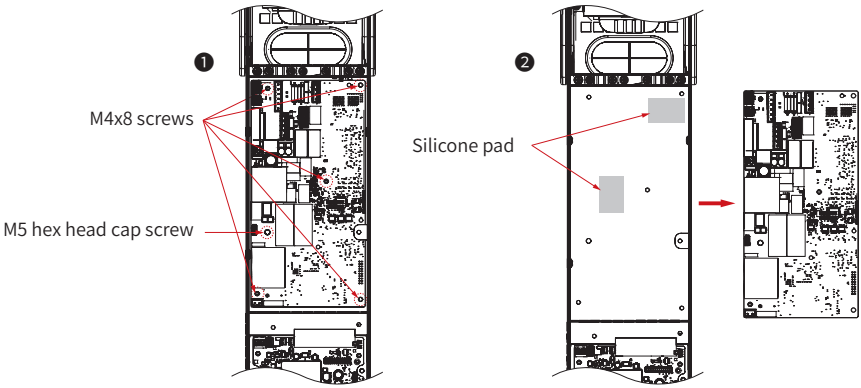


Figure 2-15 Steps to remove the power supply board A

2.4.7 Drive Module

Removal procedure:

❶ Unfasten the four M4x8 screws.

❷ Remove the drive module.

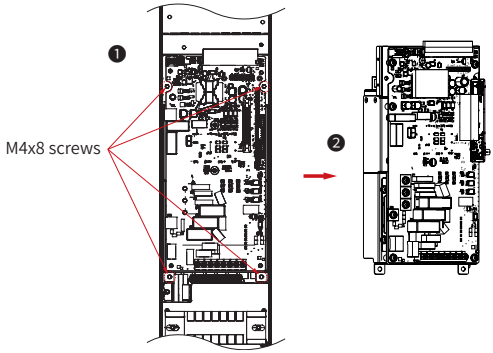


Figure 2-16 Steps to remove the drive module

2.4.8 Fan

NOTE

◆ The fan of the drive cabinet is located on the top of the drive module.

Removal procedure:

❶ Take out the drive module and disconnect the fan cable.

❷ Unfasten the four M4x25 screws and remove the fan.

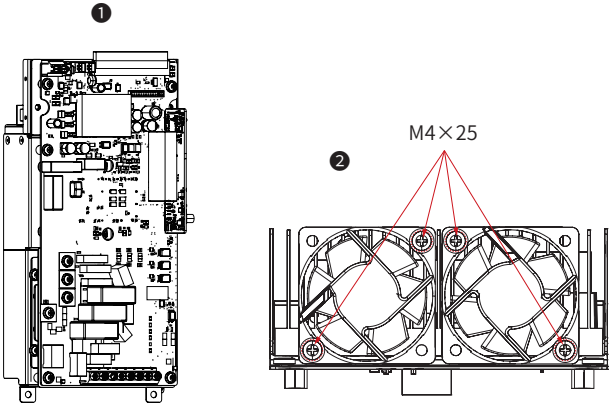


Figure 2-17 Steps to remove the fan

2.4.9 Terminal Block

Remove the terminal block by disconnecting the terminal block cable and unfastening the two M4 retaining nuts.

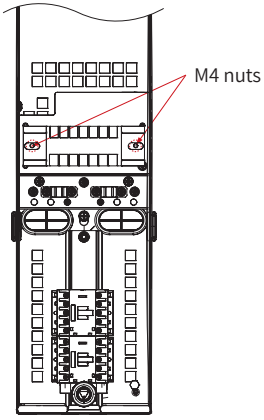


Figure 2-18 Steps to remove the terminal block

2.4.10 Transformer

Removal procedure:

❶ Unfasten the four M4 retaining nuts.

❷ Remove the transformer.

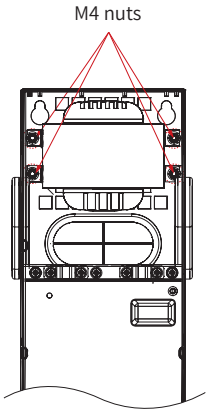


Figure 2-19 Steps to remove the transformer

2.4.11 Contactors

Removal procedure:

❶ Disconnect the contactor cables.

❷ Remove the contactors from guide rails by pushing them to the right.

NOTE

◆ As shown in the following figure, the contactors from the top to the bottom are the shorting motor stator contactor, brake contactor, and RUN contactor respectively.

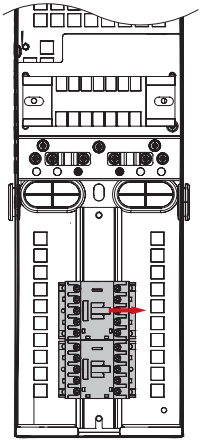


Figure 2-20 Steps to remove the contactors

2.4.12 AC Reactor

Removal procedure:

❶ Unfasten the four M4 retaining nuts.

❷ Remove the AC reactor.

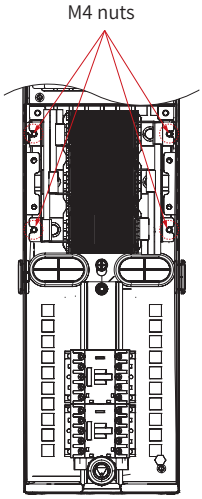


Figure 2-21 Steps to remove the AC reactor in 380 V drive cabinet

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