INOVANCE

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MD500-PLUS Series General-Purpose AC Drive

Hardward Guide

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

Data code 19011578 B02

Preface

Introduction

The MD500-PLUS series AC drive is a general-purpose high-performance current vector control AC drive. It is designed to control and regulate the speed and torque of three-phase AC asynchronous motors and permanent magnet synchronous motors. It can be used to drive textile machines, paper machines, wire drawing machines, machine tools, packaging machines, food machines, fans, water pumps, and other automated production equipment.

This guide describes the system composition, technical specifications, components, dimensions, options (including mounting accessories, cables, and peripheral electrical devices), expansion cards, routine maintenance and repair, certifications, and standards of the AC drive.

More Documents

Document	Data Code	Description
MD500-PLUS Series General-Purpose AC Drive Quick Installation and Commissioning Guide	19011581	This guide describes the installation, wiring, commissioning, troubleshooting, parameters, and fault codes of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Hardware Guide	19011578	This guide describes the system composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), expansion cards, routine maintenance and repair, certifications, and standards of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Installation Guidance	19011582	This guide describes the installation dimensions, space design, specific installation steps, wiring requirements, routing requirements, option installation requirements, and troubleshooting of common EMC-related problems.
MD500-PLUS Series General-Purpose AC Drive Commissioning Guide	19011579	This guide describes the commissioning tools, commissioning flows, and specific commissioning steps, troubleshooting, fault codes, and parameters of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Software Guide	19011580	This guide describes function applications, communication, fault codes, and parameters of the AC drive.

Revision History

Date	Version	Revision
September 2022	B02	Update the preface. Update the fundamental safety instructions. Added information of the MD500-PN2, MD500-EN1, MD500-EM1, MD38PG4D, MD-SI-DP1, and MD38PC1 cards and updated the appearance of the MD38TX1 card in section "5.1 Option List". Updated the MD500-AZJ-A1T1 mounting bracket and its hole dimension in section "5.2.1 Through-Hole Mounting Bracket". Updated the cable selection in section "5.3.1 Main Circuit Cable". Added dimension information of 80 A AC input reactors in section "5.4.2 AC Input Reactor". Updated the installation dimension table of 124 A to 1100 A output reactors in section "5.4.7 Output Reactor". Added information of the MD500-PN2, MD500-EN1, MD500-EM1, MD38PG4D, MD-SI-DP1, and MD38PC1 cards and updated the appearance of the MD38TX1 card in section "6 Extension Cards". Made minor corrections.
November 2021	B01	Deleted the MD38PC1 user programmable card. Updated the front cover and back cover.
May 2021	B00	Made minor corrections. Added single-phase 200 V to 240 V models and three-phase 200 V to 240 V models. Added J9 to the control board.
November 2020	A04	Made minor corrections. Updated the version.
July 2020	A00	First release

Document Acquisition

This user guide is not delivered along with the product. You can obtain the PDF version of this document by the following method:

Log in to Inovance's website (*www.inovance.com*), choose Support > Download, search by keyword, and then download the PDF file.

Warranty

Under the condition of normal use, if the product is faulty or damaged, Inovance provides the warranty service within the warranty period (specified in the order).

Within the warranty period, maintenance will also be charged for the damage caused in the following situations:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use
- Damage caused by out-of-range applications

- Damage caused by force majeure (such as natural disaster, earthquake, and lightning strike) and the secondary damage caused thereof

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

Table of Contents

Product Model

Table –1 Relationship between product structures and models

Structure	Product Model (Three-Phase 380 V to 480 V)	Product Model (Three-Phase 200 V to 240 V)	Product Model (Single-Phase 200 V to 240 V)
T1	MD500T0.4GB-PLUS MD500T0.7GB-PLUS MD500T1.1GB-PLUS MD500T1.5GB-PLUS MD500T2.2GB-PLUS MD500T3.0GB-PLUS	MD500-2T0.4GB-PLUS MD500-2T0.7GB-PLUS MD500-2T1.1GB-PLUS MD500-2T1.5GB-PLUS	-
T2	MD500T3.7GB-PLUS MD500T5.5GB-PLUS	MD500-2T2.2GB-PLUS MD500-2T3.7GB-PLUS	MD500-2S0.4GB-PLUS MD500-2S0.7GB-PLUS MD500-2S1.5GB-PLUS MD500-2S2.2GB-PLUS
T3	MD500T7.5GB-PLUS MD500T11GB-PLUS	MD500-2T5.5GB-PLUS	-
T4	MD500T15GB-PLUS	MD500-2T7.5GB-PLUS	-
T5 (without the DC reactor)	MD500T18.5G(B)-PLUS MD500T22G(B)-PLUS	MD500-2T11G(B)-PLUS	-
T5 (with the DC reactor)	MD500T18.5G(B)-T-PLUS MD500T22G(B)-T-PLUS	-	-
T6	MD500T30G(B)-PLUS MD500T37G(B)-PLUS	MD500-2T15G(B)-PLUS MD500-2T18.5G(B)-PLUS	-
T7	MD500T45G(B)-PLUS MD500T55G(B)-PLUS	MD500-2T22G(B)-PLUS MD500-2T30G(B)-PLUS	-
T8	MD500T75G(B)-PLUS MD500T90G-PLUS MD500T110G-PLUS	MD500-2T37G(B)-PLUS MD500-2T45G-PLUS MD500-2T55G-PLUS	-
T9	MD500T132G-PLUS MD500T160G-PLUS	MD500-2T75G-PLUS	-
T10 (without the AC output reactor)	MD500T200G-PLUS MD500T220G-PLUS	MD500-2T90G-PLUS MD500-2T110G-PLUS	-
T10 (with the AC output reactor)	MD500T200G-L-PLUS MD500T220G-L-PLUS	-	-
T11 (without the AC output reactor)	MD500T250G-PLUS MD500T280G-PLUS	MD500-2T132G-PLUS	-
T11 (with the AC output reactor)	MD500T250G-L-PLUS MD500T280G-L-PLUS	-	-
T12 (without the AC output reactor)	MD500T315G-PLUS MD500T355G-PLUS MD500T400G-PLUS MD500T450G-PLUS	MD500-2T160G-PLUS MD500-2T200G-PLUS	-
T12 (with the AC output reactor)	MD500T315G-L-PLUS MD500T355G-L-PLUS MD500T400G-L-PLUS MD500T450G-L-PLUS	-	-

Structure	Product Model (Three-Phase 380 V to 480 V)	Product Model (Three-Phase 200 V to 240 V)	Product Model (Single-Phase 200 V to 240 V)
T13 (without the auxiliary power distribution cabinet)	MD500T500G-PLUS MD500T560G-PLUS MD500T630G-PLUS	-	-
T13 (with the auxiliary power distribution cabinet)	MD500T500G-A-PLUS MD500T560G-A-PLUS MD500T630G-A-PLUS	-	-

Fundamental Safety Instructions

Safety Precautions

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

Safety Levels and Definitions

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

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

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

General Safety Instructions

- 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.

Unpacking
 • Do not install the equipment if you find damages, 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 by following the unpacking sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries 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 injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- 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 injuries or equipment damage.

Caution

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries 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 injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

Danger

- The equipment must be operated only by professionals with electrical knowledge.

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an 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 onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

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

Wiring

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment, and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply will result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply will result in an electric shock.

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, 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 an electric shock or equipment damage.

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

Power-on

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

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

Operation

- The equipment must be operated only by professionals. Failure to comply will result in death or personal injuries.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.

- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off 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 will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

- Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair

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

Warning

- Require repair services according to the product warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries, or equipment damage.
- When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe 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 injuries, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Labels

For safe equipment 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 in death, personal injuries, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock.

1 Product Information

1.1 Features

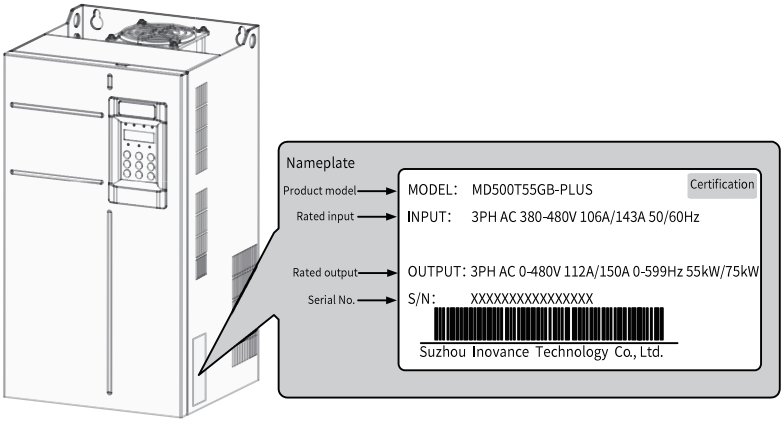
The MD500-PLUS series is a general-purpose high-performance current vector AC drive. It controls and regulates the speed and torque of three-phase AC asynchronous motors and permanent magnet synchronous motors.

Figure 1-1 Product appearance

This product has the following characteristics:

1. Drives three-phase AC asynchronous motors and permanent magnet synchronous motors.
2. Enhances drive performance to enable synchronous and asynchronous motors to deliver 150% torque output at zero speed without an encoder, simplifying the drive and control process.
3. Integrates the tension control technique that keeps constant tension when the roll diameter changes. The technique is widely applied in winding and unwinding of wire drawing machines, coating machines, printers, and paper making machines.
4. Supports the VVC algorithm to simplify and stabilize the synchronous motor control, especially at high speed.
5. Upgraded based on MD500, MD500E, MD290, and MD330 and compatible with MD500 options, including PG cards, communication cards, I/O expansion card, and bracket.

1.2 Nameplate and Model



MD500 T 55 G B - PLUS

Code	Product Model
MD500	AC drive series

Code	Voltage Level
T	Three phase 380-480 V
2T	Three phase 200-240 V
2S	Single phase 200-240 V

Code	Power Level (kW)
0.4	0.4
...	...
630	630

Code	Applicable Motor
G	Heavy overload model

Code	Reactor
/	For details, see this guide.
-T	With the DC reactor; applicable to T5 models
-L	With the AC output reactor; applicable to T10 to T12 models
-A	With the auxiliary distribution cabinet; applicable to T13 models

Code	Braking Unit
/	For details, see this guide.
B	With the braking unit

Figure 1-2 Nameplate and model

Note

- For three-phase 380 V to 480 V AC drives, reactors are not available for T1 to T4 models, while DC reactors are optional for T5 models and standard for T6 models and above.
- For three-phase 380 V to 480 V AC drives, braking units are standard for T1 to T4 models and optional for T5 to T8 models.

2 Components

2.1 Overview

The AC drive supports the following structures:

- Plastic structure for T1 to T6 models
- Sheet metal structure for T7 to T13 models

2.2 Components of T1 to T6 Models

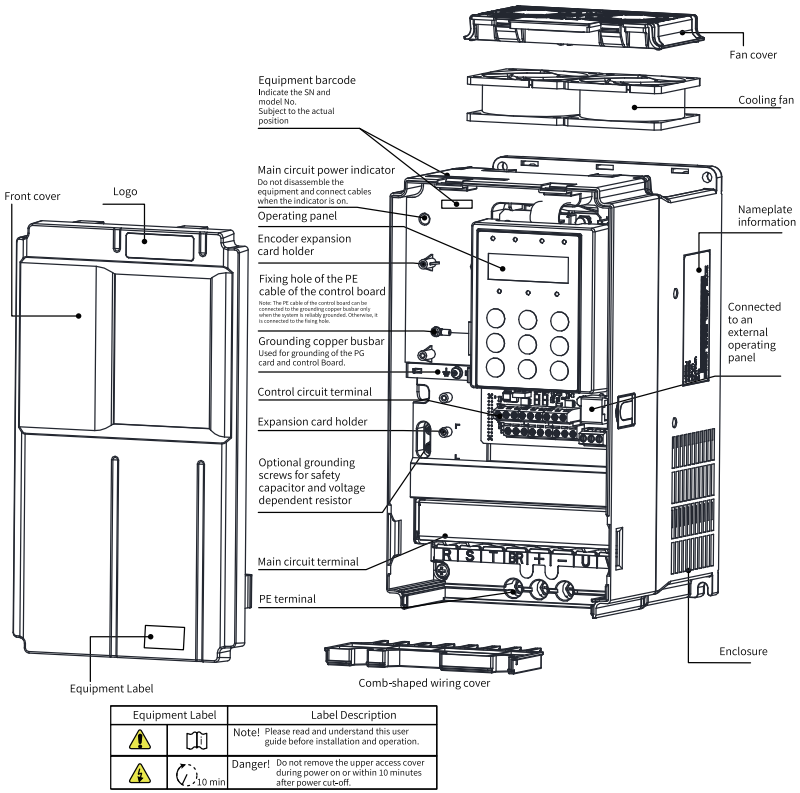
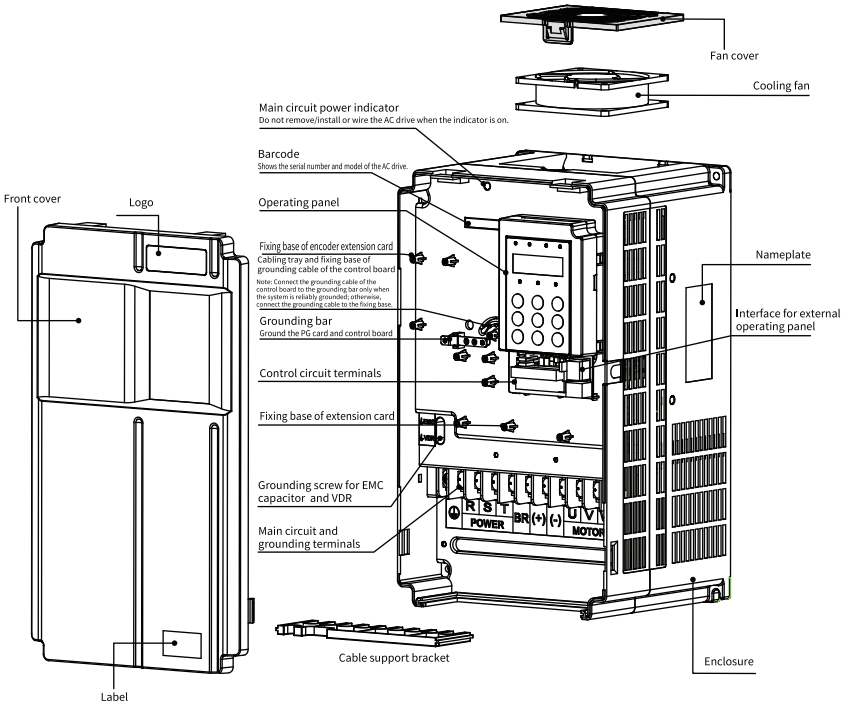


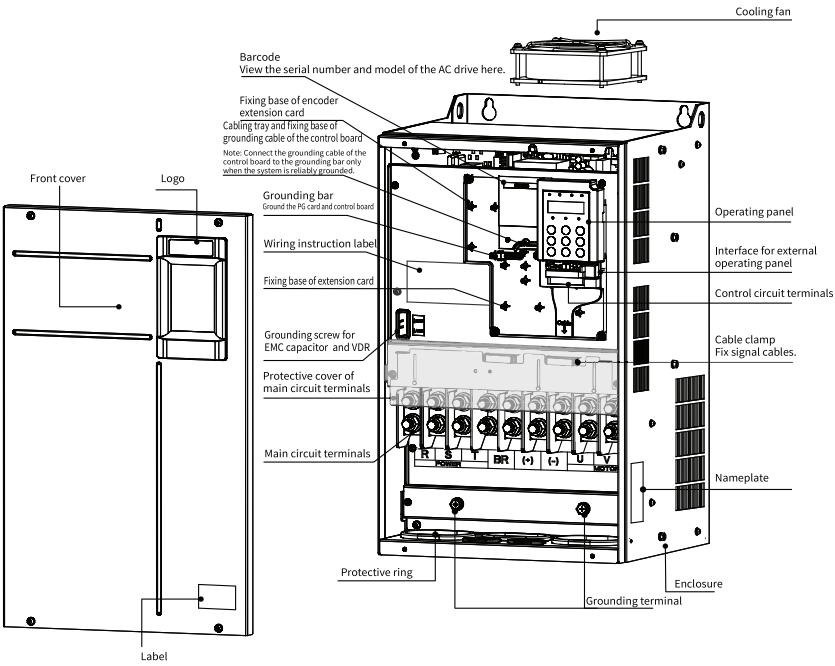
Figure 2-1 Components of T1 to T4 models



Label		Description
		Caution! Read the user guide before installation and operation.
	10min	Danger! Do not remove the upper cover while the power is on or within 10 minutes after the power is turned off.

Figure 2-2 Components of T5 to T6 models

2.3 Components of T7 to T9 Models



Label		Description
⚠	📖	Caution! Read the user guide before installation and operation.
⚠	10min	Danger! Do not remove the upper cover while the power is on or within 10 minutes after the power is turned off.

Figure 2-3 Components of T7 to T9 models

Note

The quantity and layout of cooling fans vary with models.

- T7 models have one cooling fan at the top.
- T8 models have two cooling fans at the top.
- T9 models have two cooling fans at the bottom.

2.4 Components of T10 to T12 Models

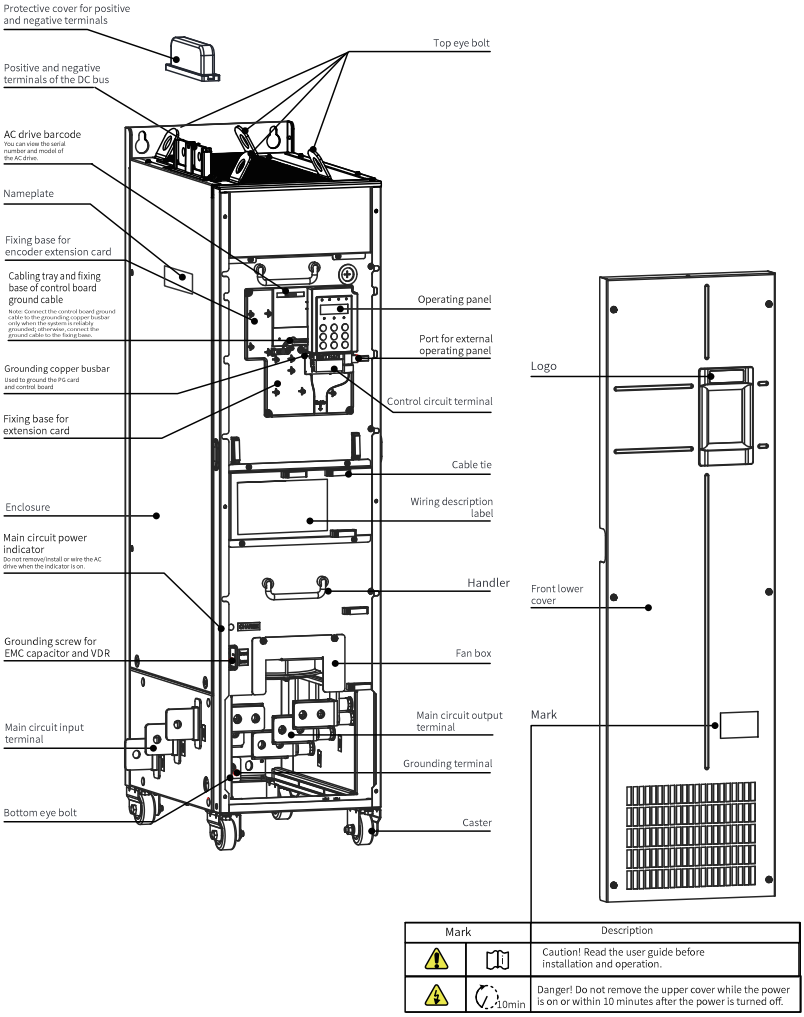


Figure 2-4 Components of T10 to T12 models (without AC output reactor)

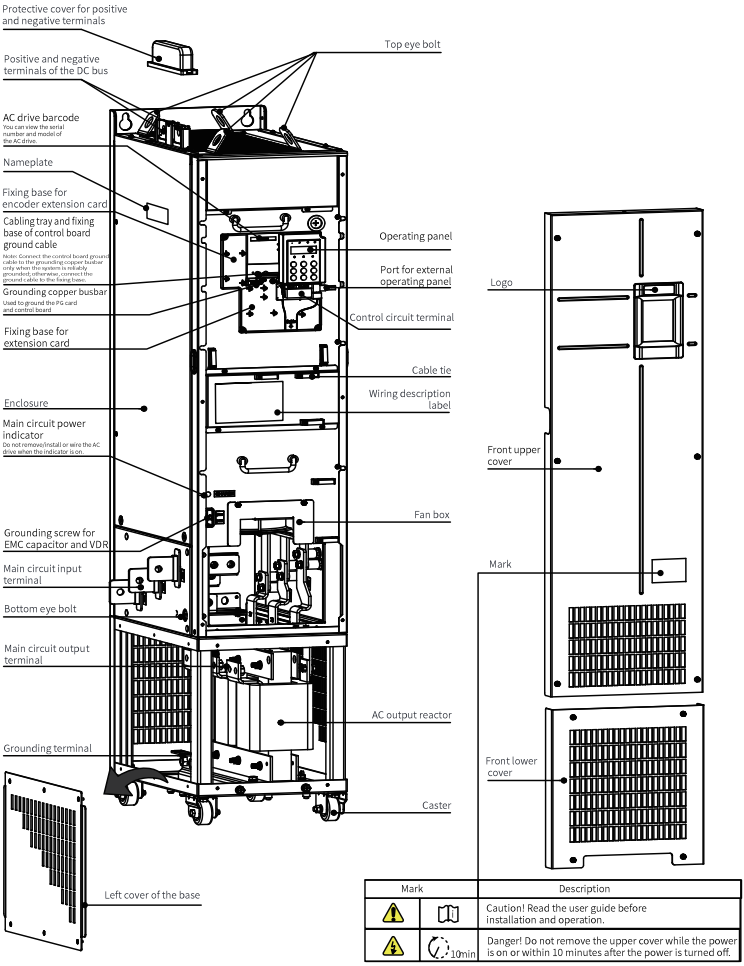


Figure 2-5 Components of T10 to T12 models (with AC output reactor)

2.5 Components of T13 Models

T13 models are available in two structures: models with a standard cabinet and models with an auxiliary power distribution cabinet in addition to the standard cabinet. For components of each structure, see *"Figure 2–6 Components of standard cabinet" on page 21* and *"Figure 2–7 Components of standard cabinet with auxiliary power distribution cabinet" on page 21*.

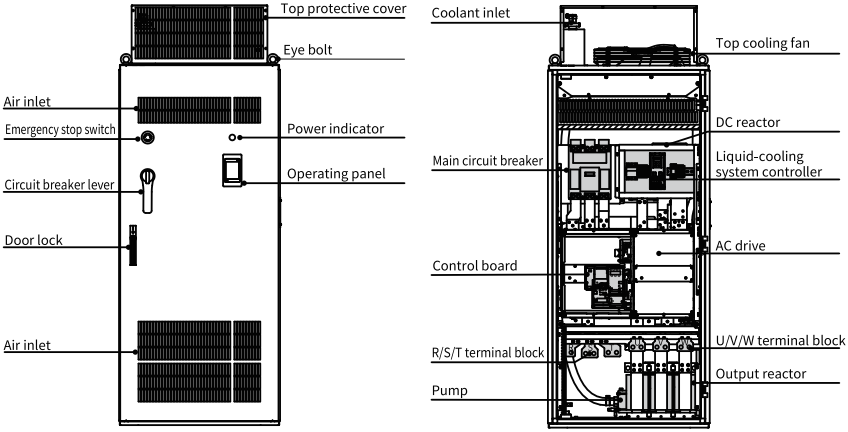


Figure 2-6 Components of standard cabinet

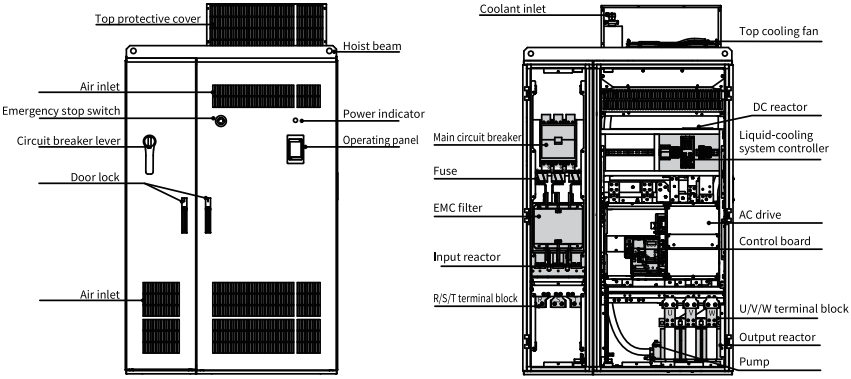


Figure 2-7 Components of standard cabinet with auxiliary power distribution cabinet

3 System Architecture

3.1 System Composition

When the AC drive is used to control asynchronous motors, you must install a variety of electrical devices on the input and output sides of the AC drive to ensure system safety and stability. The following figure shows the system connection diagram.

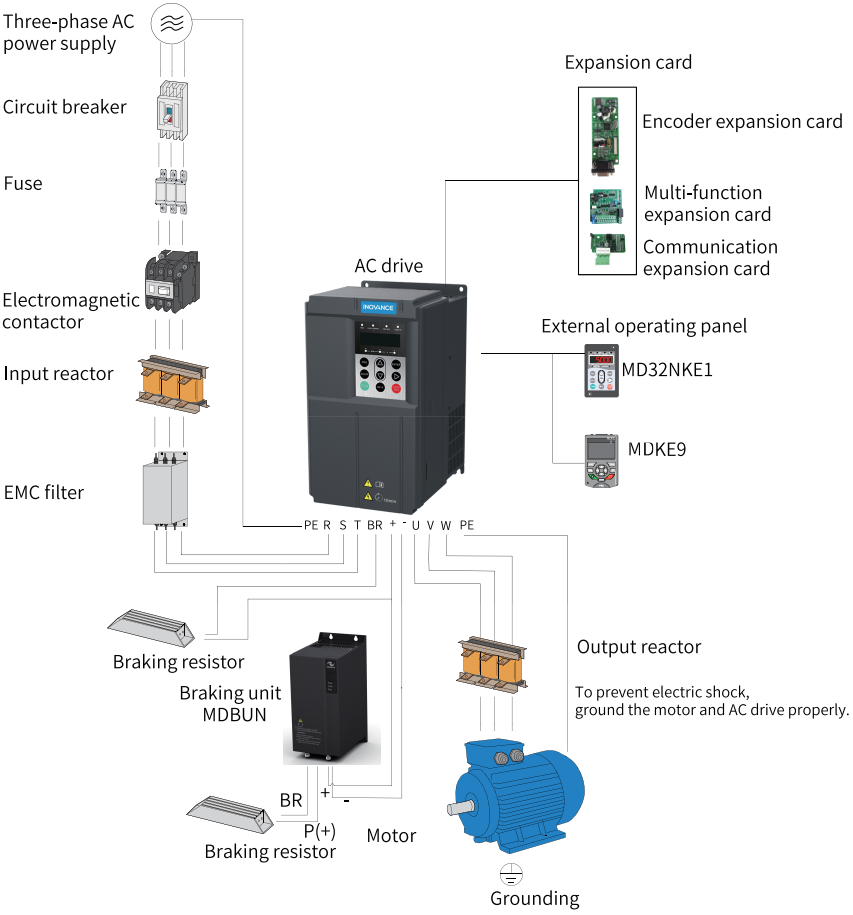


Figure 3-1 System composition

Table 3–1 Usage description of peripheral electrical devices

Name	Installation Location	Function
Circuit breaker	Input side of the drive	It is installed between the power supply and the AC drive input side. Short circuit breaker: It cuts off the power supply when overcurrent occurs on downstream devices to prevent accidents. Earth leakage circuit breaker (ELCB): The drive may generate high-frequency leakage current during running. To prevent electric shock which may cause a fire, select a proper ELCB based on actual applications.
Fuse	Input side of the drive	It provides protection in case of short circuit and protects downstream semiconductor components.
Contactor	Input side of the drive	It is used to power on or power off the AC drive. However, do not use the contactor to power on or power off the AC drive frequently (time interval must be longer than one hour), or use it to directly start the AC drive.
AC input reactor	Input side of the drive	It eliminates high-order harmonics and improves the power factor on the input side.
EMC filter	Input side of the drive	It reduces the conducted and radiated interference generated by the drive to the outside.
Simple filter	Input side of the drive	It reduces the conducted and radiated interference generated by the drive to the outside.
Braking resistor	Input side of the drive	For AC drive models containing letter B, the braking resistor is optional. The braking resistor consumes regenerative energy generated during motor deceleration.
Braking unit	Input side of the drive	For models not containing letter B, use the braking unit MDBUN of Inovance and the recommended braking resistor. The braking unit consumes regenerative energy generated during motor deceleration.
Active front end (AFE) unit	Input side of the drive	An AFE is an optional unit used to feed the energy generated by the motor during braking back to the main grid. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE units feature energy saving, low noise, low harmonics pollution, and high power factor.
DC reactor	Output side of the drive	It is optional for T5 models, and standard for T6 models and above. The DC reactor has the following functions: • Improves the power factor on the input side. • Improves the efficiency and thermal stability of the AC drive. • Eliminates high-order harmonics on the input side and reduces the conduction and radiation interference generated from the AC drive to the outside.
Output reactor	Output side of the drive	It is used to ensure motor insulation and prolong the service life of the motor.
Magnetic ring and ferrite clamp	Output side of the drive	It reduces interference to the outside and the bearing current.
	Signal cable	It improves the anti-interference performance of signals.
Motor	Output side of the drive	Use an appropriate motor based on recommendations.

Name	Installation Location	Function
External operating panel	Connecting the J11 Interface via the Exit Keyboard Interface	The external LED operating panel MD32NKE1 and LCD operating panel MDKE9 are supported.
Note: For selection of peripheral electrical devices, see "Options".		

3.2 Electrical Wiring Diagram

"Figure 3–3 " on page 26 shows a typical wiring method.

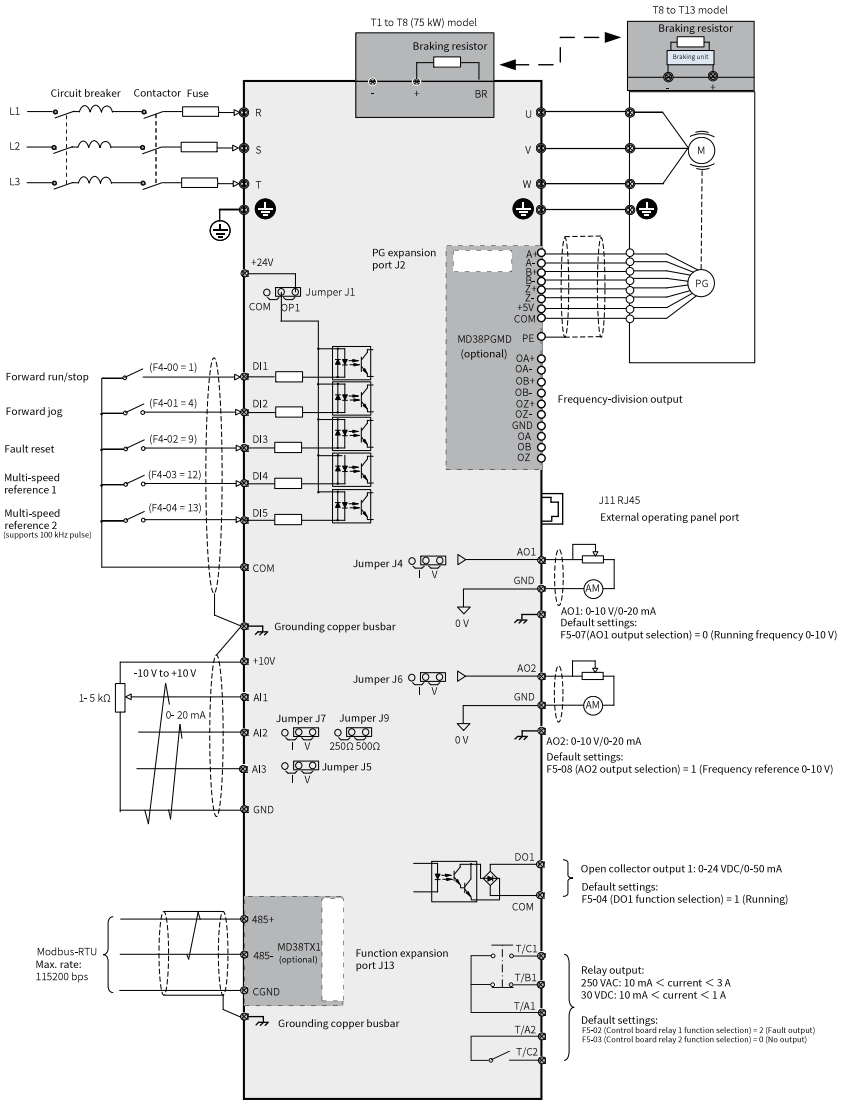


Figure 3-2 Standard wiring (three-phase 380 V to 480 V)

Note

Wiring for T1 to T8 (75 kW) models (with "B") and T8 to T13 models (without "B") is different at the double-headed arrow in the figure.

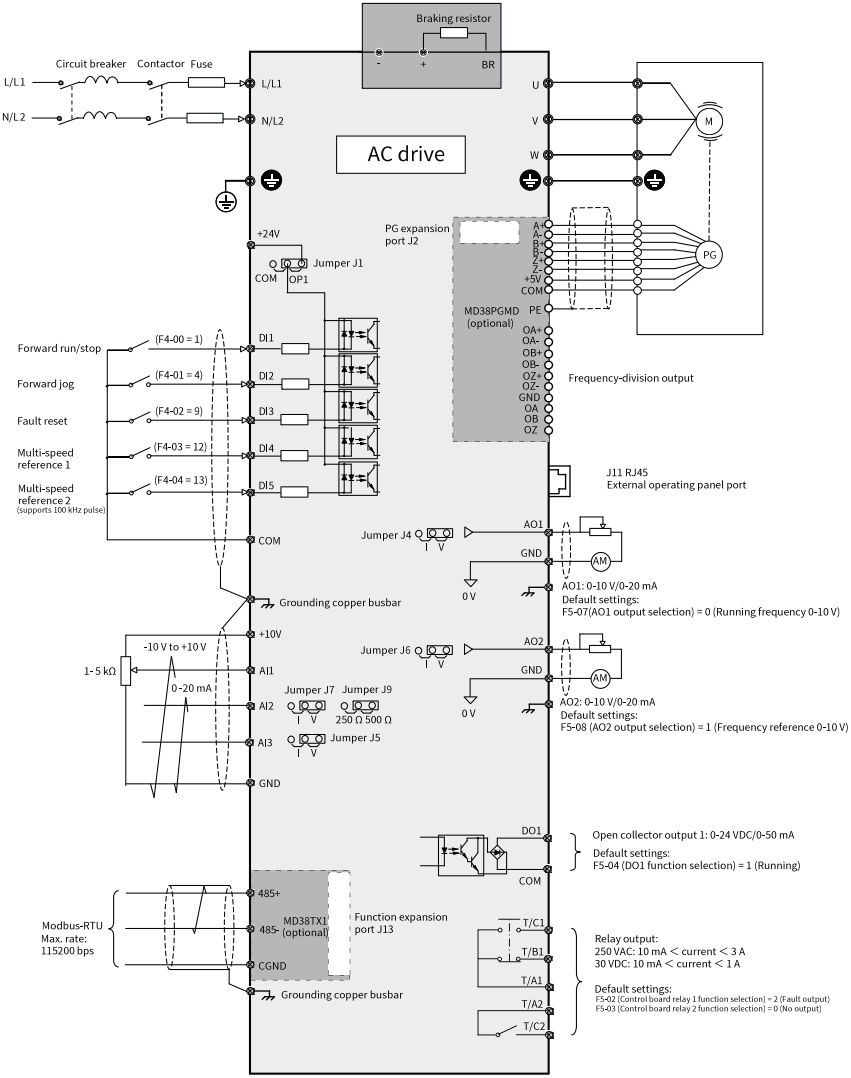


Figure 3-3 Standard wiring (single-phase 200 V to 240 V)

T13 models

"Figure 3–3 " on page 26 shows the standard wiring of the cabinet, and *"Figure 3–4 " on page 27* shows the electrical connection in the cabinet.

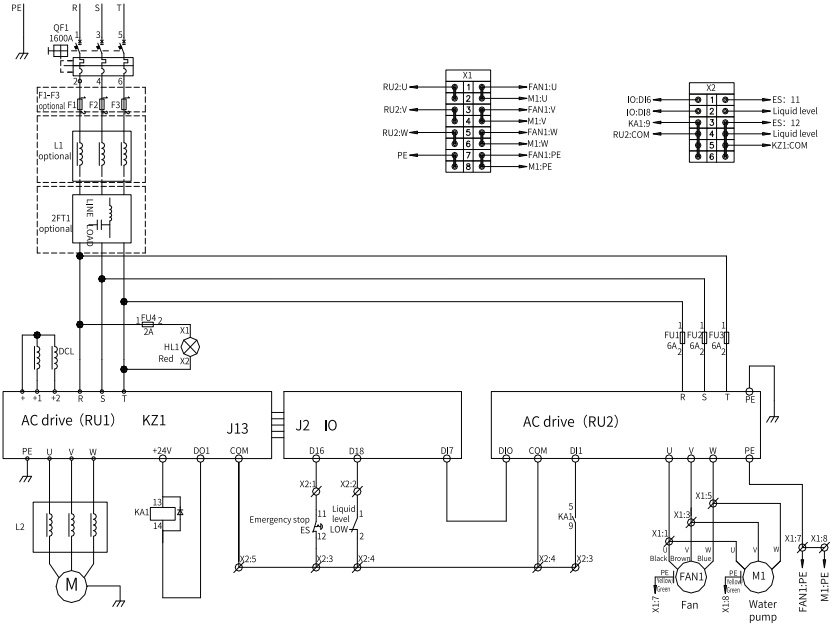


Figure 3-4 Electrical connection in the cabinet (T13 models)

3.3 Main Circuit Terminals

T1 to T9 models

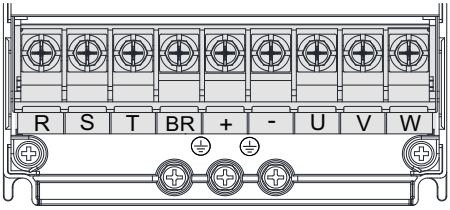


Figure 3-5 Main circuit terminal arrangement of T1 to T4 models

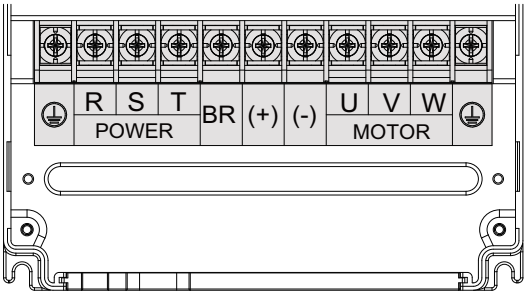


Figure 3-6 Main circuit terminal arrangement of T5 to T8 models

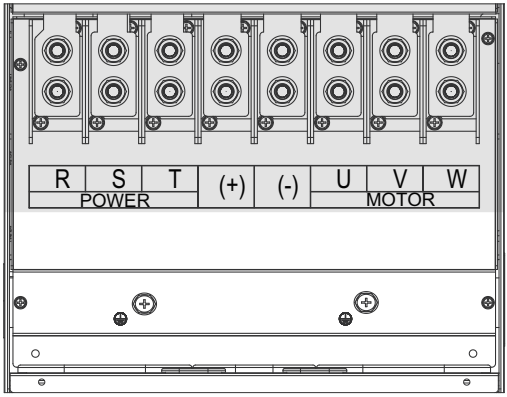


Figure 3-7 Main circuit terminal arrangement of T9 models

Table 3–2 Description of main circuit terminals

Terminal Screenprint	Terminal Name	Function Description
R, S, T	Three-phase power input terminals	The terminals are used to connect to the three-phase AC input power supply.
(+), (-)	Positive and negative terminals of the DC bus input	The terminals are used to connect to the common DC busbar. In addition, for T9 models and above, the terminals are used to connected to the external braking unit.
(+), BR	Braking resistor terminal	The terminals are used to connect to the braking resistor for T8 models and below.

Terminal Screenprint	Terminal Name	Function Description
U, V, W	Output terminals	The terminals are used to connect to the three-phase motor.
	Grounding terminal (PE)	The terminal is used for protective grounding.

T10 to T12 models

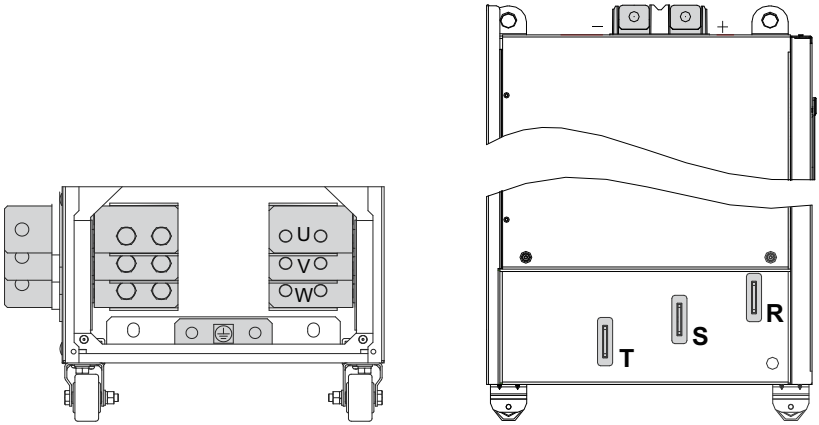


Figure 3-8 Main circuit terminal arrangement of T10 to T12 models

Table 3–3 Description of main circuit terminals

Terminal Screenprint	Terminal Name	Function Description
R, S, T	Three-phase power input terminals	The terminals are used to connect to the three-phase AC input power supply.
+, -	Positive and negative terminals of the DC bus input	The terminals are used to connect to the common DC bus and external braking unit.
U, V, W	Output terminals	The terminals are used to connect to the three-phase motor.
	Grounding terminal (PE)	The terminal is used for protective grounding.

T13 models

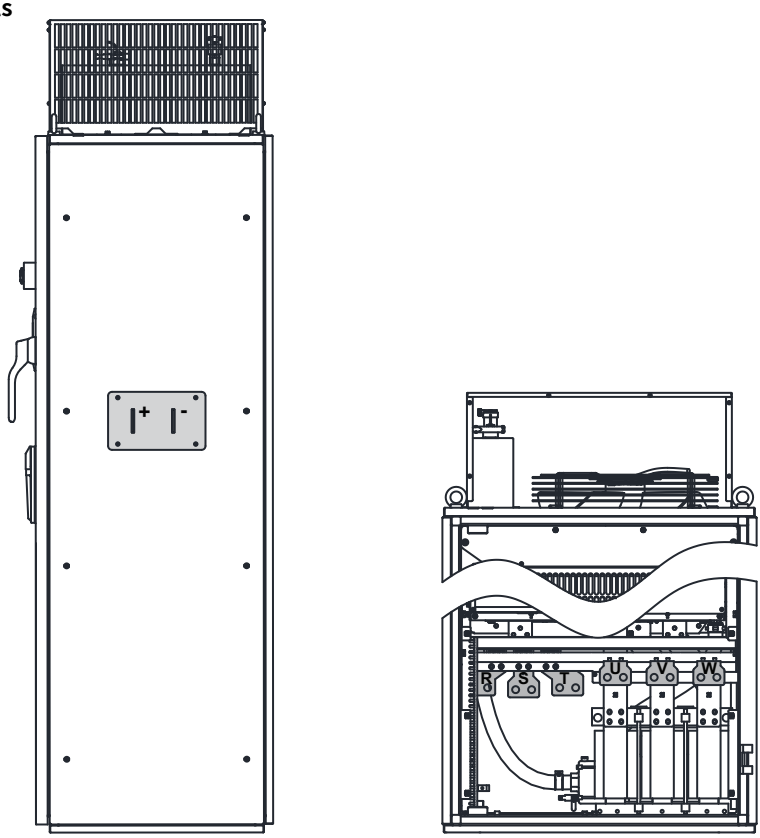


Figure 3-9 Main circuit terminal arrangement of T13 models

Table 3–4 Description of main circuit terminals

Terminal Screenprint	Terminal Name	Function Description
R, S, T	Three-phase power input terminals	The terminals are used to connect to the three-phase AC input power supply.
+, -	Positive and negative terminals of the DC bus input	The terminals are used to connect to the common DC bus and external braking unit.
U, V, W	Output terminals	The terminals are used to connect to the three-phase motor.
⏚	Grounding terminal (PE)	The terminal is used for protective grounding.

3.4 Control Circuit Terminals

"Figure 3–10 " on page 31 shows the arrangement of control circuit terminals.

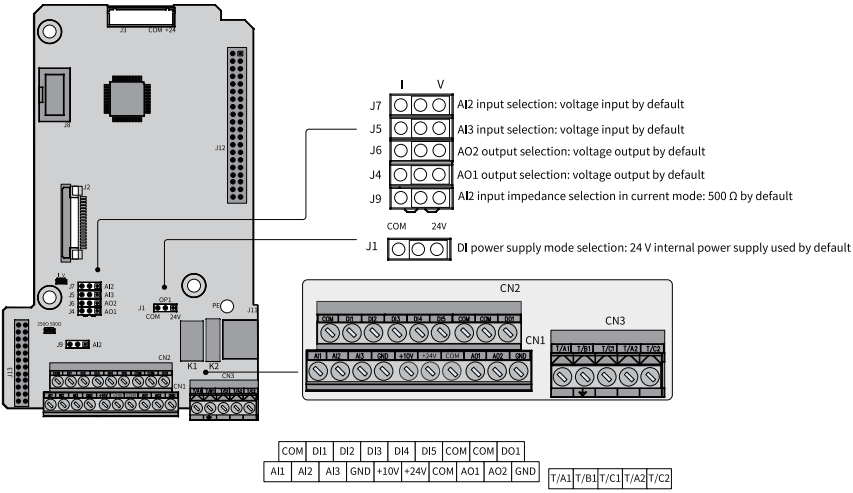


Figure 3-10 Arrangement of control circuit terminals

Table 3–5 Description of control circuit terminals

Type	Terminal Screenprint	Terminal Name	Function Description
Power supply	+10V-GND	External +10 V power supply	The terminal is used to provide 10 V power supply to external devices. The maximum output current is 10 mA. Generally, it is used as the power supply for an external potentiometer with a resistance range of 1 kΩ to 5 kΩ.
	+24V-COM	External +24 V power supply	The terminal is used to provide +24 V power supply to external devices. Generally, it is used to power the DI/DO and external sensor. The maximum output current is 200 mA. 。
Analog input (AI)	AI1-GND	AI1	Input voltage range: -10 VDC to +10 VDC Input impedance: 22 kΩ
	AI2-GND	AI2	Input range: –10 VDC to +10 VDC or 0 mA to 20 mA, which is determined by the J7 jumper on the control board Input impedance: 22 kΩ for voltage input, or 250 Ω or 500 Ω for current input (determined by the J9 jumper)
	AI3-GND	AI3	Input range: –10 VDC to +10 VDC or 0 mA to 20 mA, which is determined by the J5 jumper on the control board Input impedance: 22 kΩ for voltage input and 500 Ω for current input AI3 supports inputs of PT100, PT1000, KTY-84-130, and PTC130 temperature sensors, which can be switched over by the F9-56.
Digital input	DI1- COM	DI1	The DIs feature photocoupler isolation. The input frequency is below 100 Hz. The J1 jumper on the control board can be used to switch between an external power supply and an internal power supply. Input impedance: 1.39 kΩ Voltage range with effective level input: 9–30 V The DI5 can act as a high-speed pulse input channel with a maximum input frequency of 100 kHz and the input impedance of 1.03 kΩ.
	DI2-COM	DI2	
	DI3-COM	DI3	
	DI4-COM	DI4	
	DI5-COM	DI5	

Type	Terminal Screenprint	Terminal Name	Function Description
Analog output	AO1-GND	AO1	The terminal supports voltage output or current output, which is selected by the J4 jumper on the control board. The maximum load resistance is 500 Ω. Output voltage range: 0 V to 10 V Output current range: 0 mA to 20 mA
	AO2-GND	AO2	The terminal supports voltage output or current output, which is selected by the J6 jumper on the control board. The maximum load resistance is 500 Ω. Output voltage range: 0 V to 10 V Output current range: 0 mA to 20 mA
Digital output	DO1-COM	DO1	The terminal features photocoupler isolation and bipolarity open collector output. Output voltage range: 0 V to 24 V Output current range: 0 mA to 50 mA The DO can be used for high-speed pulse output with the maximum frequency of 100 kHz by setting the F4-41.
Relay output	T/A1-T/B1	Normally closed (NC) terminal	Driving capacity of the contact: 250 VAC, 3 A, COSø = 0.4 30 VDC, 1 A
	T/A1-T/C1	Normally open (NO) terminal	
	T/A2-T/C2	NO terminal	
Auxiliary inter face	J13	Function expansion card port	It is the 28-conductor port to connect the standard RS-485 communication card and other optional cards, such as the bus card.
	J2	PG card port	The port is used to connect the resolver and differential encoder.
	J11	External operating panel port	The port is used to connect the external operating panel.
Jumper	J1	Power supply mode for the DI	The internal 24 V power supply is used by default.
	J4	AO1 output selection	Voltage output (default) or current output
	J6	AO2 output selection	Voltage output (default) or current output
	J5	AI3 input selection	Voltage input (default) or current input
	J7	AI2 input selection	Voltage input (default) or current input
	J9	Input impedance for the AI2 in current input mode	250 Ω or 500 Ω

4 AC Drive Dimensions

4.1 T1 to T9 Models

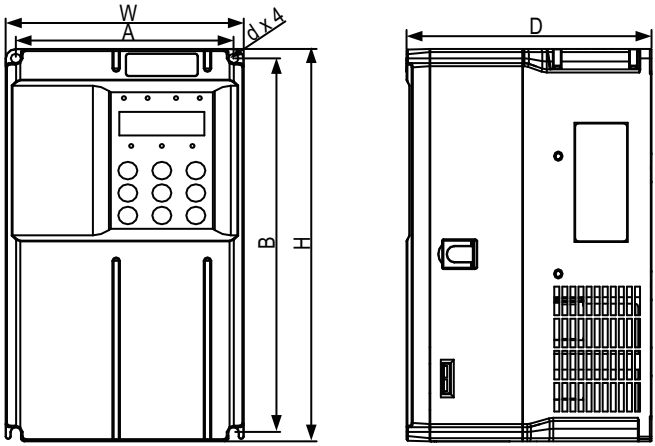


Figure 4-1 Dimension drawing of T1 to T4 models

Table 4–1 Dimensions of T1 to T4 models

Structure	Mounting Hole mm (in.)		Outline Dimensions mm (in.)				Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D		
T1	119 (4.7)	189 (7.5)	200 (7.9)	-	130 (5.1)	152 (6.0)	Ø5 (0.2)	1.6 (3.5)
T2	119 (4.7)	189 (7.5)	200 (7.9)	-	130 (5.1)	162 (6.4)	Ø5 (0.2)	2.0 (4.4)
T3	128 (5.0)	238 (9.4)	250 (9.9)	-	140 (5.5)	170 (6.7)	Ø6 (0.2)	3.3 (7.3)
T4	166 (6.5)	266 (10.5)	280 (11.0)	-	180 (7.1)	170 (6.7)	Ø6 (0.2)	4.3 (9.5)

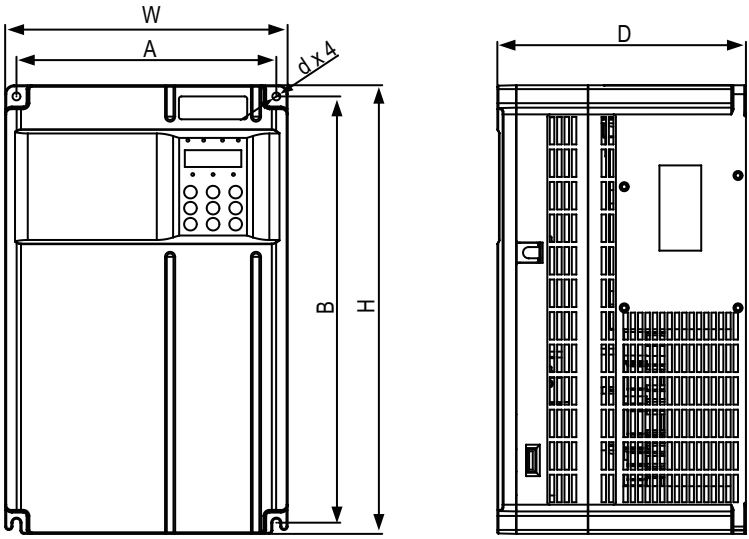


Figure 4-2 Dimension drawing of T5 to T6 models

Table 4–2 Dimensions of T5 to T6 models

Structure	Mounting Hole mm (in.)		Outline Dimensions mm (in.)				Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D		
T5 (without DC reactor)	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	192 (7.6)	Ø6 (0.2)	7.6 (16.8)
T5 (with DC reactor)	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	192 (7.6)	Ø6 (0.2)	10.0 (22.0)
T6	230 (9.1)	380 (15.0)	400 (15.8)	-	250 (9.9)	220 (8.7)	Ø7 (0.3)	17.5 (38.6)

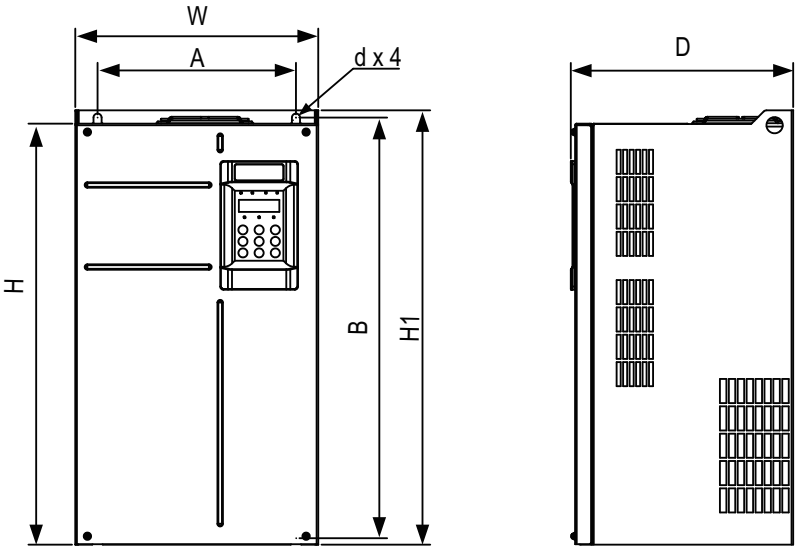


Figure 4-3 Dimension drawing of T7 to T9 models

Table 4–3 Dimensions of T7 to T9 models

Structure	Mounting Hole mm (in.)		Outline Dimensions mm (in.)				Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D		
T7	245 (9.7)	523 (20.6)	525 (20.7)	542 (21.4)	300 (11.8)	275 (10.8)	Ø10 (0.4)	35 (77.2)
T8	270 (10.6)	560 (22.1)	554 (21.8)	580 (22.9)	338 (13.3)	315 (12.4)	Ø10 (0.4)	51.5 (113.5)
T9	320 (12.6)	890 (35.1)	874 (34.4)	915 (36.1)	400 (15.8)	320 (12.6)	Ø10 (0.4)	85 (187.4)

4.2 T10 to T12 Models (Without AC Output Reactor)

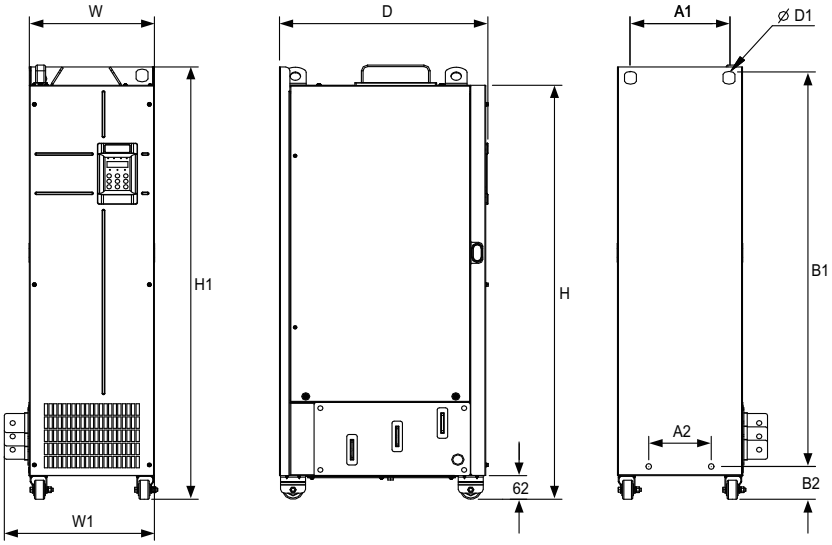


Figure 4-4 Dimension drawing of T10 to T12 models (without AC output reactor)

Table 4–4 Dimensions of T10 to T12 models (without AC output reactor)

Structure	Mounting Hole Spacing mm (in.)				Outline Dimensions mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	H	H1	W	W1	D	D1	
T10	240 (9.5)	150 (5.9)	1035 (40.8)	86 (3.4)	1086 (42.8)	1134 (44.7)	300 (11.8)	360 (14.2)	500 (19.7)	ϕ13 (0.5)	110 (242.5)
T11	225 (8.9)	185 (7.3)	1175 (46.3)	97 (3.8)	1248 (49.2)	1284 (50.6)	330 (13.0)	390 (15.4)	545 (21.5)	ϕ13 (0.5)	155 (341.7)
T12	240 (9.5)	200 (7.9)	1280 (50.4)	101 (4.0)	1355 (53.4)	1405 (55.4)	340 (13.4)	400 (15.8)	545 (21.5)	ϕ16 (0.6)	185 (407.9)

4.3 T10 to T12 Models (with AC Output Reactor)

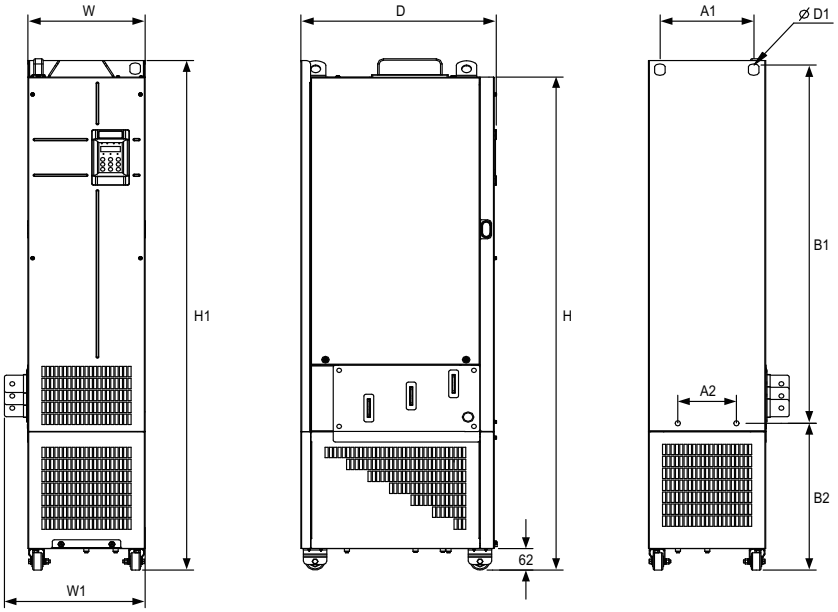


Figure 4-5 Dimension drawing of T10 to T12 models (with AC output reactor)

Table 4–5 Dimensions of T10 to T12 models (with AC output reactor)

Structure	Mounting Hole Spacing mm (in.)				Outline Dimensions mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	H	H1	W	W1	D	D1	
T10	240 (9.5)	150 (5.9)	1035 (40.8)	424 (16.7)	1424 (56.1)	1472 (58.0)	300 (11.8)	360 (14.2)	500 (19.7)	ϕ13 (0.5)	160 (352.7)
T11	225 (8.9)	185 (7.3)	1175 (46.3)	435 (17.1)	1586 (62.5)	1622 (63.9)	330 (13.0)	390 (15.4)	545 (21.5)	ϕ13 (0.5)	215 (474.0)
T12	240 (9.5)	200 (7.9)	1280 (50.4)	432 (17.0)	1683 (66.3)	1733 (68.3)	340 (13.4)	400 (15.8)	545 (21.5)	ϕ16 (0.6)	245 (540.1)

4.4 Overall Dimensions of T13 Models (Without Auxiliary Power Distribution Cabinet)

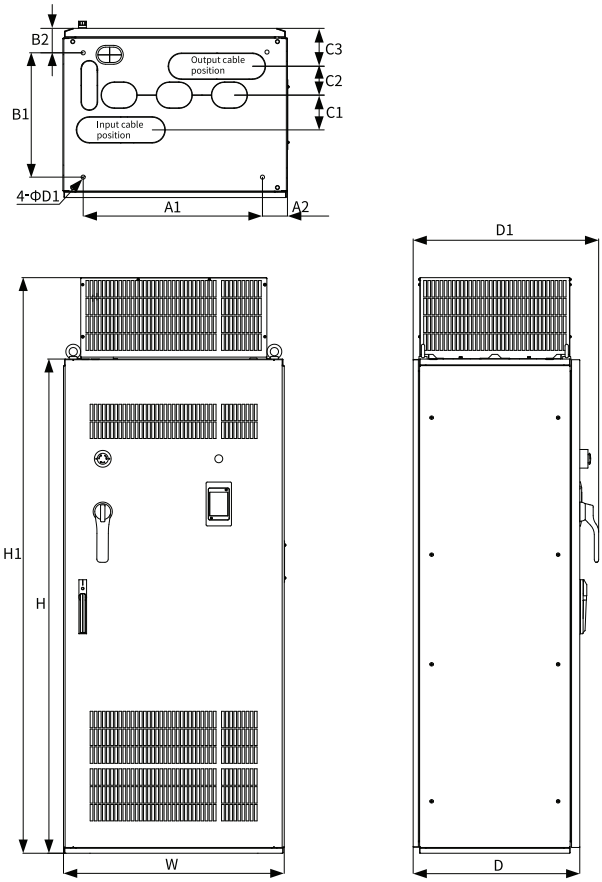


Figure 4-6 Outline dimensions and mounting dimensions of T13 models (without auxiliary power distribution cabinet)

Table 4–6 Outline dimensions and mounting dimensions of T13 models (without auxiliary power distribution cabinet)

Size	Mounting Hole Spacing mm (in.)							Outline Dimension mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	C1	C2	C3	H	H1	W	D	D1	D1	
T13	660 (26.0)	73.5 (2.9)	450 (17.7)	85 (3.3)	125 4.9	104 (4.1)	136 (5.4)	1800 (70.9)	2100 (82.7)	805 (31.7)	610 (24.0)	680 (26.8)	15 (0.6)	530 (1168.4)

4.5 T13 Models (with Auxiliary Power Distribution Cabinet)

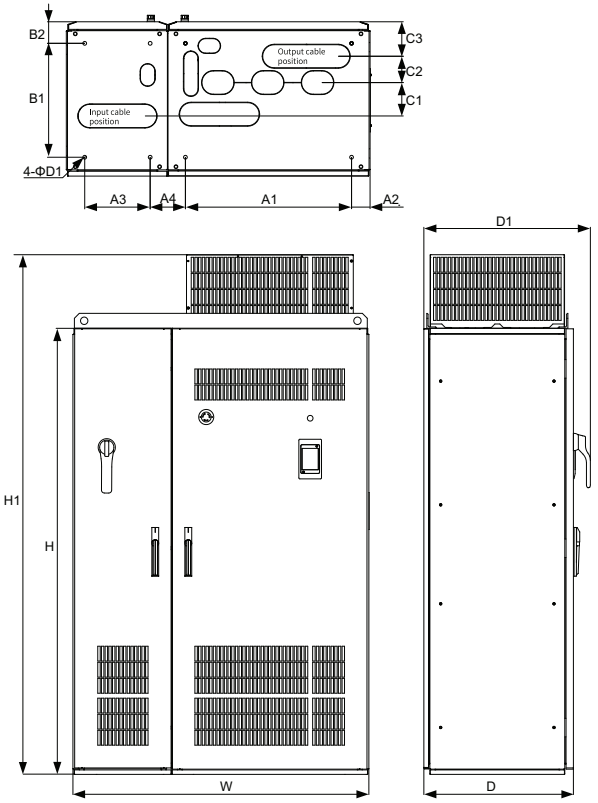


Figure 4-7 Outline dimensions and mounting dimensions of T13 models (with auxiliary power distribution cabinet)

Table 4–7 Outline dimensions and mounting dimensions of T13 models (with auxiliary power distribution cabinet)

Structure	Mounting Hole Spacing mm (in.)									Dimension Drawing mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A1	A2	A3	A4	B1	B2	C1	C2	C3	H	H1	W	D	D1	D1	
T13	660 (26.0)	73.5 (2.9)	260 (10.2)	140 (5.5)	450 (17.7)	85 (3.3)	132 (5.2)	104 (4.1)	136 (5.4)	1800 (70.9)	2100 (82.7)	1205 (47.5)	610 (24.0)	680 (26.8)	15 (0.6)	730 (1609.4)

5 Options

5.1 List of options

The following table describes peripherals and options including braking units, function modules, and external operating panels. For details on how to use the peripherals and options, see related user guide. If any of the following peripheral and option is needed, specify it in your order.

Table 5–1 List of options

Name		Model	Order No.	Applicable AC Drive Model	Description
Braking component	External braking unit[1]	MDBUN-60-T	01013133	All models	60 A 380 VAC series
		MDBUN-60-5T	0101AR57	All models	60 A 480 VAC series
		MDBUN-90-T	01013126	All models	90 A 380 VAC series
		MDBUN-90-5T	0101AR58	All models	90 A 480 VAC series
		MDBUN-200-T	01040104	All models	200 A 380 VAC series
		MDBUN-200-5T	01040160	All models	200 A 480 VAC series
	Built-in braking unit	AC drive model with the model name containing letter "B"	/	T1 to T8 (75 kW)	For T1 to T4 models (three-phase 380 V to 480 V), the built-in braking unit is standard; for T5 to T8 models (three-phase 380 V to 480 V, 75 kW), the built-in braking unit is optional.

Name		Model	Order No.	Applicable AC Drive Model	Description
Expansion card	I/O expansion card 1	MD38IO1	01013098	T4 to T13 models	The following terminals can be added: five DIs, one relay output terminal, and one DO. Modbus and CANlink are supported.
	I/O expansion card 2	MD38IO2	01013103	All models	Three DIs can be added.
	I/O expansion card 3	MD38IO3	01040051	All models	The following can be added: three DIs, one RS-485 communication signal isolation input terminal, and one NO relay output terminal.
	RS-485 communication card	MD38TX1	01013112	All models	Modbus communication card with the isolation function
	CANlink communication card	MD38CAN1	01013100	All models	CANlink communication card
	CANopen communication card	MD38CAN2	01013102	All models	CANopen communication card
	PROFIBUS DP communication card	MD-SI-DP1	01040172	All models	PROFIBUS DP communication card
	PROFIBUS DP communication card	MD38DP2	01013144	T4 to T13 models	PROFIBUS DP communication card
	PROFINET communication card	MD500-PN1	01040098	All models	PROFINET communication card
	PROFINET communication card	MD500-PN2	01040198	All models	PROFINET communication card
	EtherCAT communication card	MD500-ECAT	01040113	All models	EtherCAT communication card
	MD500-EN1 communication card	MD500-EN1	01040167	All models	Ethernet/IP communication card
	Modbus TCP communication card	MD500-EM1	01040201	All models	Modbus TCP communication card
	User programmable card	MD38PC1	01013104	T4 to T13 models	User programmable expansion card Compatible with H1U series PLCs of Inovance

Name		Model	Order No.	Applicable AC Drive Model	Description
Expansion card	Resolver interface card	MD38PG4	01013081	All models	Applicable to the resolver; excitation frequency: 10 kHz; with the DB9 interface To meet the MD38PG4 requirements, the excitation input DC resistance of the resolver must be greater than 17 Ω. Failure to comply may result in MD38PG4 exceptions. Select a resolver with a maximum of four pole pairs. Otherwise, the MD38PG4 card will be overloaded.
	MD38PGMD multi-function encoder card	MD38PGMD	01013147	All models	The card is an encoder interface card with the optional multiplied frequency division output function and supports 5 V or 15 V power supply. The card supports differential input, collector input, and push-pull input, as well as differential output and collector output; therefore, it can be used to connect to different encoders and supports A/B phase input of the host controller.
	Resolver frequency division encoder card	MD38PG4D	01040008	Applicable to T4 and T7 models and above	The MD38PG4D card is a PG card specially developed for resolvers. Featuring differential frequency division, it is suitable for various applications such as machine tool electric master axis, master-slave control, and synchronous control.
	23-bit PG card	ES510-PG-CT1	01320007	All models	Applicable to 23-bit encoders of Inovance; with a DB9 interface

Name		Model	Order No.	Applicable AC Drive Model	Description
Mounting accessory	Through-hole mounting bracket	MD500-AZJ-A1T1	01040072	T1	It is used for through-hole mounting and applicalbe only to T1 to T9 models.
		MD500-AZJ-A1T2	01040073	T2	
		MD500-AZJ-A1T3	01040074	T3	
		MD500-AZJ-A1T4	01040075	T4	
		MD500-AZJ-A1T5	01040001	T5	
		MD500-AZJ-A1T6	01040002	T6	
		MD500-AZJ-A1T7	01040003	T7	
		MD500-AZJ-A1T8	01040004	T8	
		MD500-AZJ-A1T9	01040005	T9	
	Grounding bracket for cable shield	MD500-AZJ-A2T1	01040085	T1	The accessory is used for re-fixing the power cable and stable grounding of the shield in 360°. It is applicable only to T1 to T9 models.
		MD500-AZJ-A2T2	01040088	T2	
		MD500-AZJ-A2T3	01040083	T3	
		MD500-AZJ-A2T4	01040082	T4	
		MD500-AZJ-A2T5	01040081	T5	
		MD500-AZJ-A2T6	01040086	T6	
		MD500-AZJ-A2T7	01040087	T7	
		MD500-AZJ-A2T8	01040084	T8	
		MD500-AZJ-A2T9	01040089	T9	
Mounting accessory	Guide rail	MD500-AZJ-A3T10	01040009	T10 to T12 models	The accessory is used for installing the AC drive in a cabinet. For T10 models and models above T10, it is recommended that a guide rail be used to push the AC drive into the cabinet.
	Conduit box	MD500-NEMA1-T1	01040108	T1 to T2	Models requiring UL Type 1 enclosures are equipped with conduit boxes. The conduit box is optional and needs to be purchase (applicable to T6 models and models below T6).
		MD500-NEMA1-T3	01040109	T3	
		MD500-NEMA1-T4	01040110	T4	
		MD500-NEMA1-T5	01040111	T5	
		MD500-NEMA1-T6	01040112	T6	
Cable	Main circuit cable	Lugs manufactured by Suzhou Yuanli are recommended. Refer to the main circuit cable section for lug selection.			It is recommended that the input and output main circuit cables, and power cables use symmetrical shielded cables. Compared with four-conductor cables, symmetrical shielded cables can reduce electromagnetic radiation in the whole transmission system.
	Control circuit cable	All control circuit cables must be shielded cables. Use a separate shielded cable for each type of analog signal. It is recommended that digital signal cables use shielded twisted pair (STP) cables.			

Name		Model	Order No.	Applicable AC Drive Model	Description
Operating Panel	External LED operating panel	MD32NKE1	01013061	All models	External LED operating panel
	External LCD operating panel	MDKE9	01040037	All models	The external LCD operating panel supports parameter copying and English or Chinese display.
	Extension cable	MDCAB	01013008	All models	Standard eight-conductor, three-meter network cable for the external operating panel, which can be connected to the MD32NKE1, MD32KC, and MDCP
		MDCAB-1.5	15048471	All models	External operating panel cable with the length of 1.5 meters

Note

For details on models and specifications of other peripheral electrical components, such as input reactors, EMC filters, output reactors, and fuses, see the section of peripheral electrical components.

5.2 Option Installation

5.2.1 Through-hole Mounting Bracket

The through-hole mounting bracket is an optional part that needs to be purchased separately.

Bracket model and applicable AC drive structure

Table 5–2 Bracket model and applicable AC drive structure

Model of Through-hole Mounting Bracket	AC Drive Structure
MD500-AZJ-A1T1	T1
MD500-AZJ-A1T2	T2
MD500-AZJ-A1T3	T3
MD500-AZJ-A1T4	T4
MD500-AZJ-A1T5	T5
MD500-AZJ-A1T6	T6
MD500-AZJ-A1T7	T7
MD500-AZJ-A1T8	T8
MD500-AZJ-A1T9	T9

Dimensions of the bracket and mounting hole

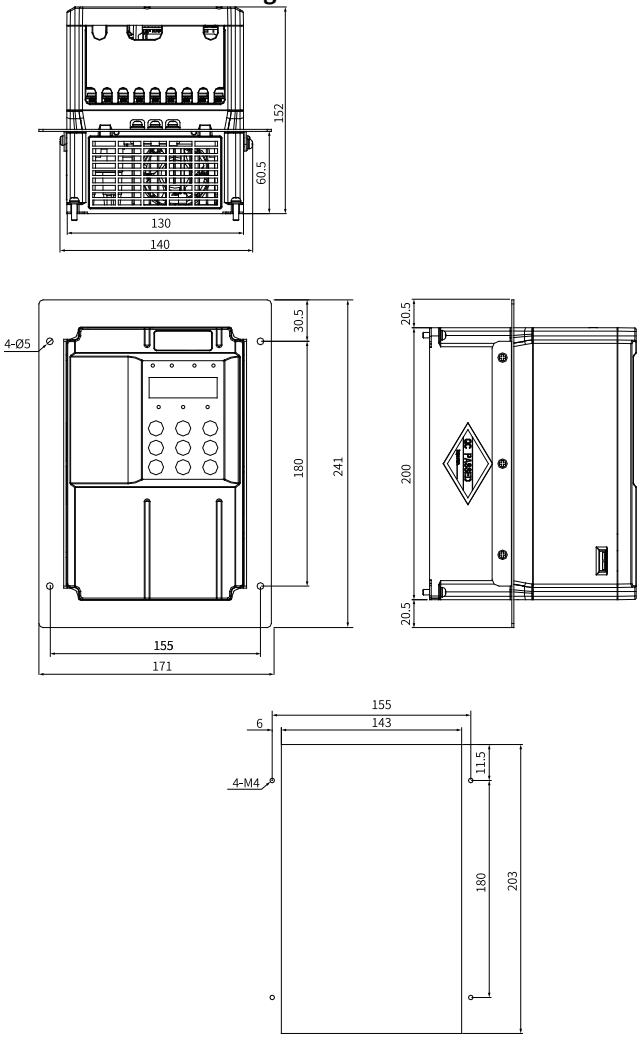


Figure 5-1 Dimensions of the MD500-AZJ-A1T1 bracket and mounting hole

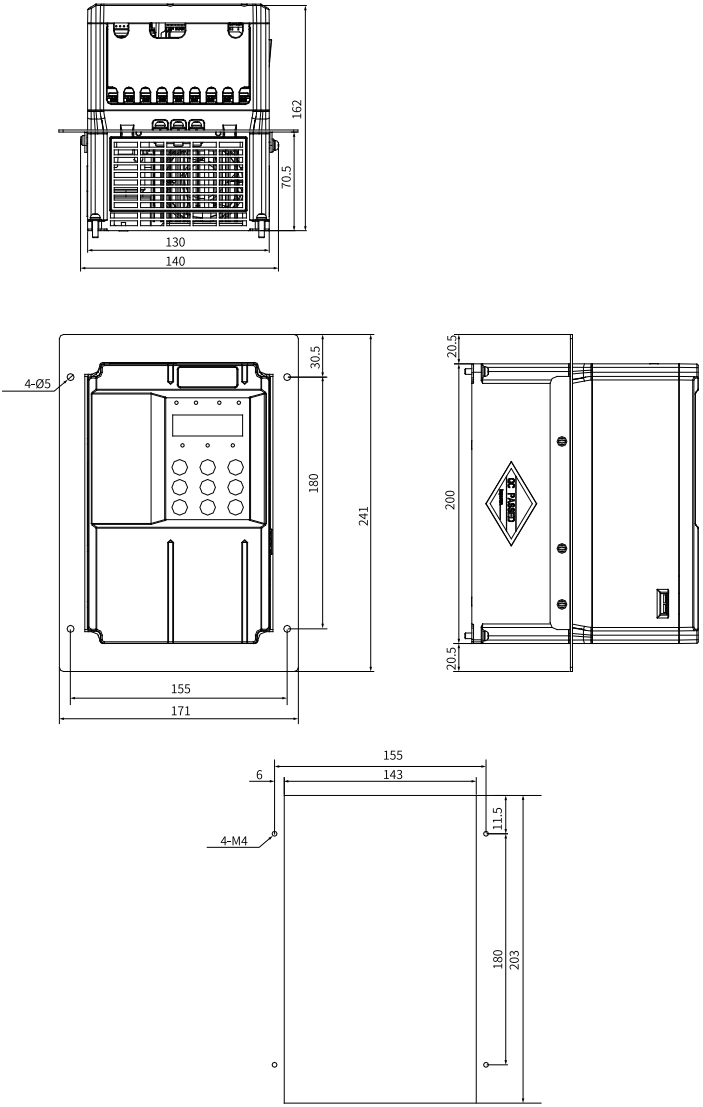


Figure 5-2 Dimensions of the MD500-AZJ-A1T2 bracket and mounting hole

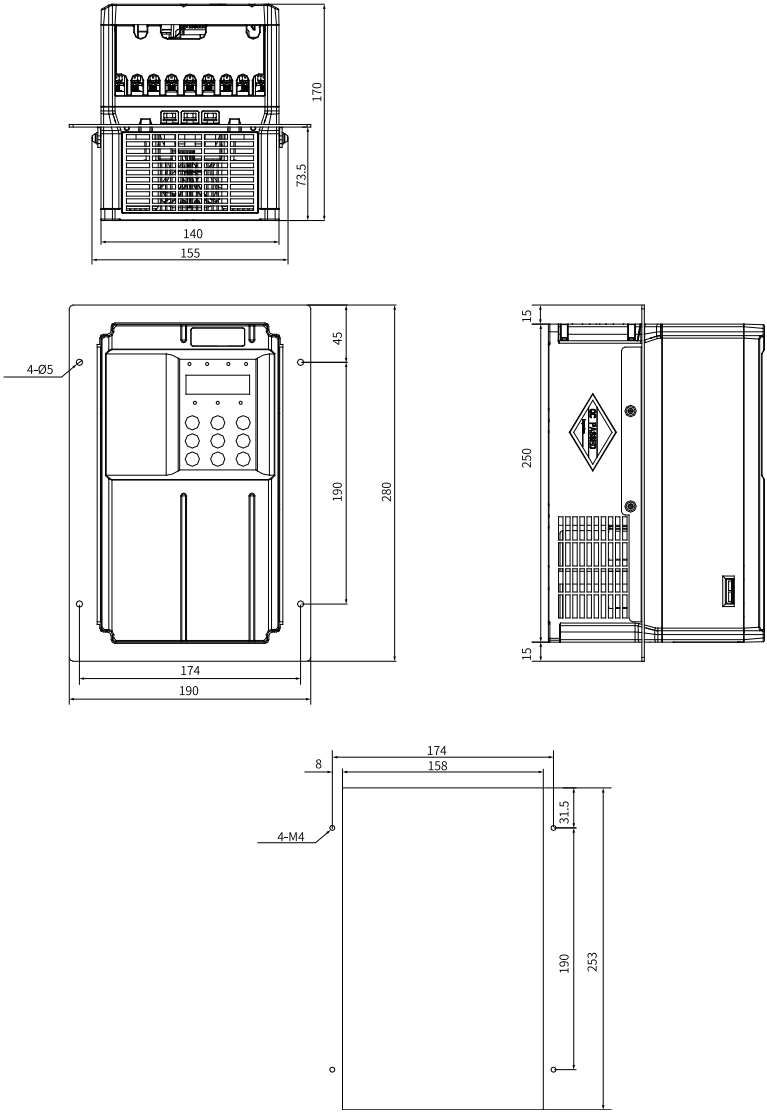


Figure 5-3 Dimensions of the MD500-AZJ-A1T3 bracket and mounting hole

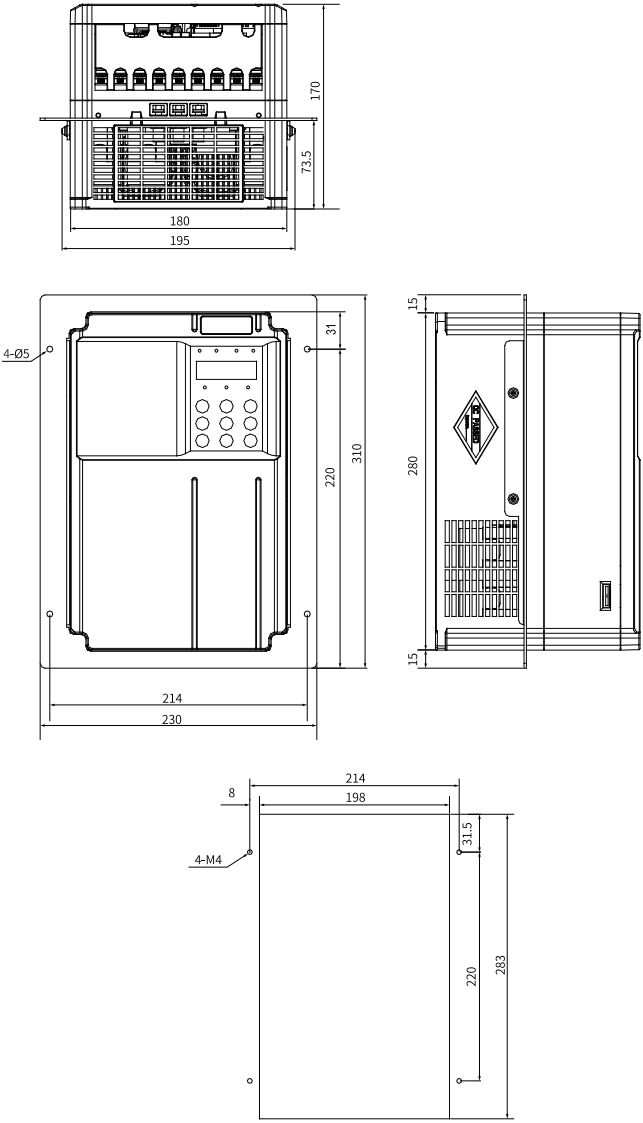


Figure 5-4 Dimensions of the MD500-AZJ-A1T4 bracket and mounting hole

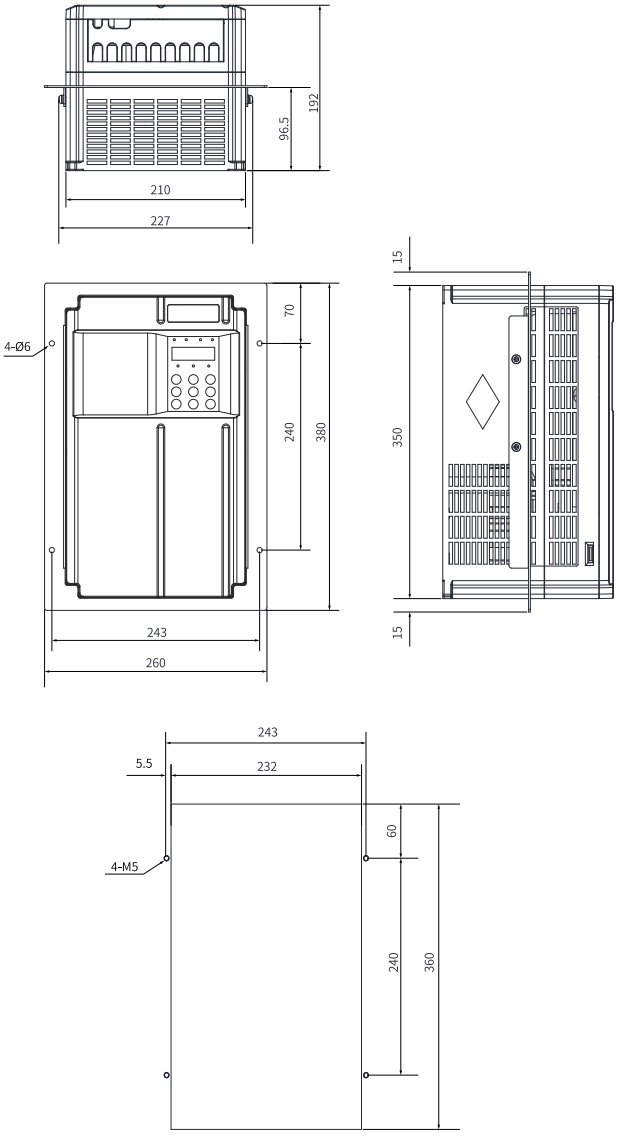


Figure 5-5 Dimensions of the MD500-AZJ-A1T5 bracket and mounting hole

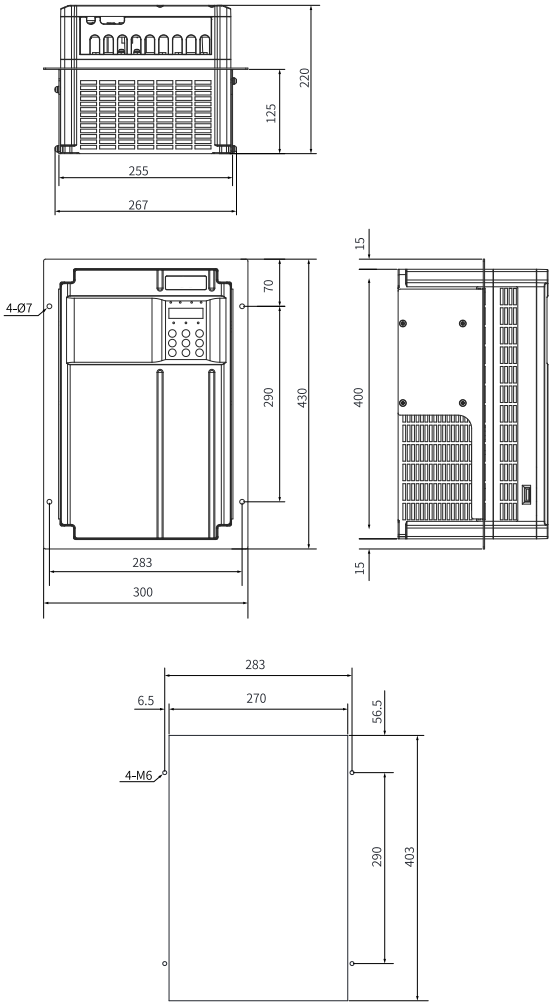


Figure 5-6 Dimensions of the MD500-AZJ-A1T6 bracket and mounting hole

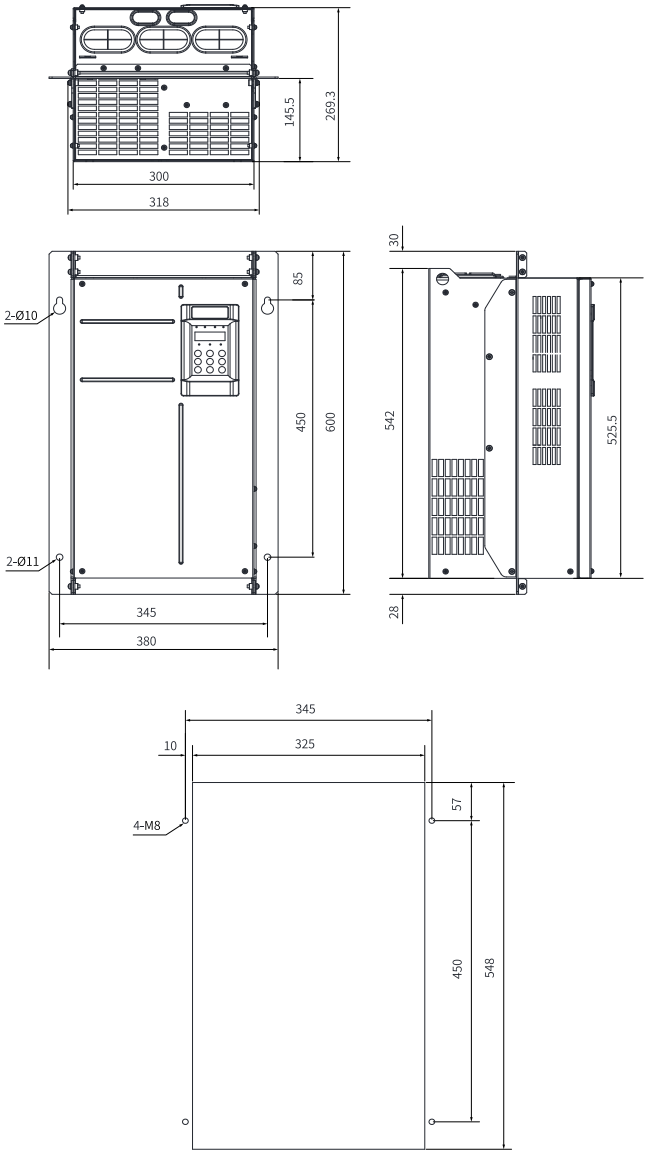


Figure 5-7 Dimensions of the MD500-AZJ-A1T7 bracket and mounting hole

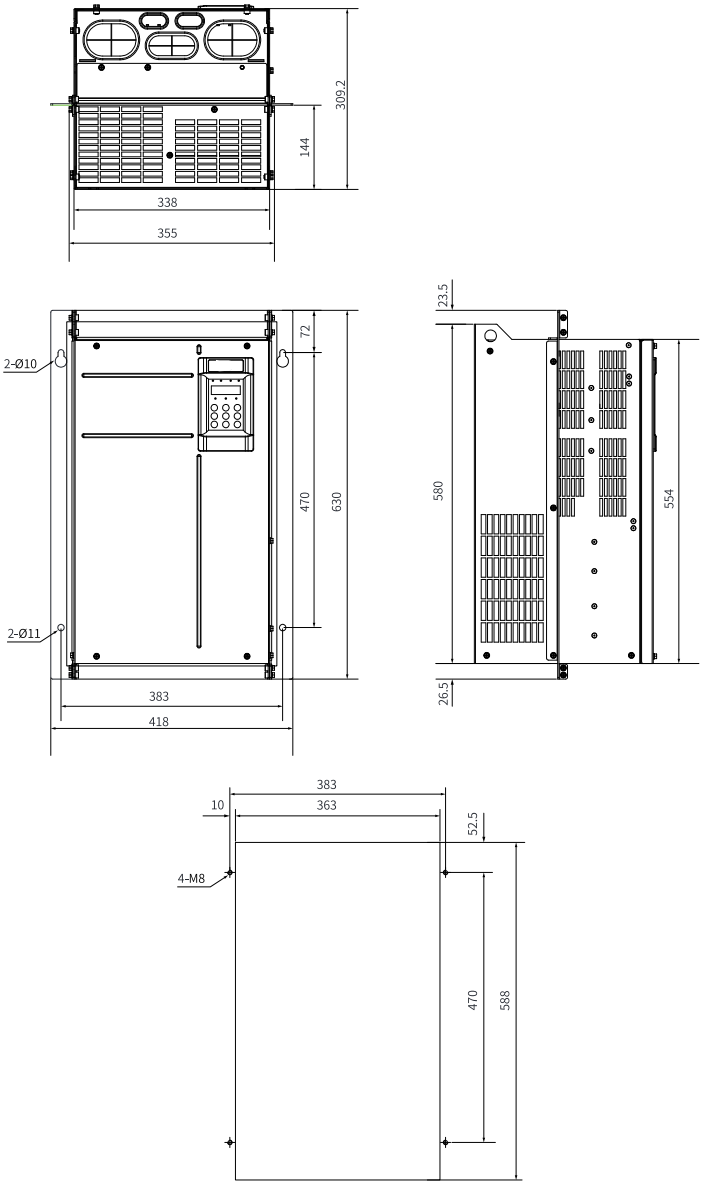


Figure 5-8 Dimensions of the MD500-AZJ-A1T8 bracket and mounting hole

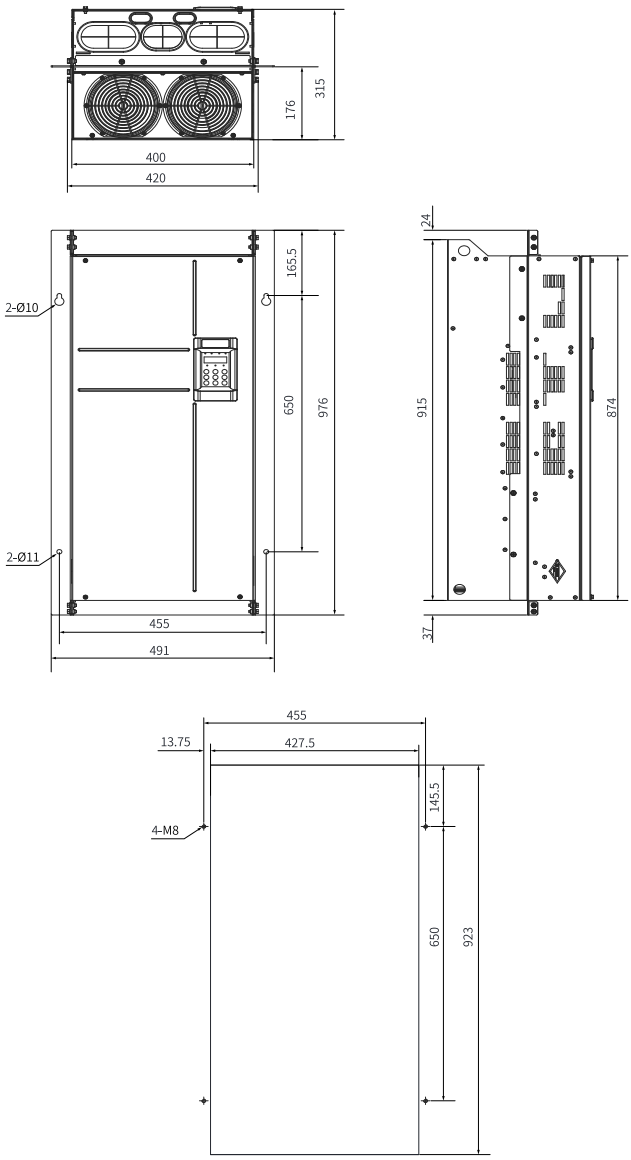


Figure 5-9 Dimensions of the MD500-AZJ-A1T9 bracket and mounting hole

5.2.2 Bottom Mounting Bracket

The bottom mounting bracket is standard for T10 to T12 models. When the AC drive is installed in a cabinet, a bottom mounting bracket is required for fixing the AC drive to

the cabinet rack base. The dimensions of bottom mounting bracket depend on the power rating, weight, and size of the AC drive, as shown in the following figures.

A 600 mm cabinet is delivered with the AC drive. If you need an 800 mm cabinet, contact Inovance.

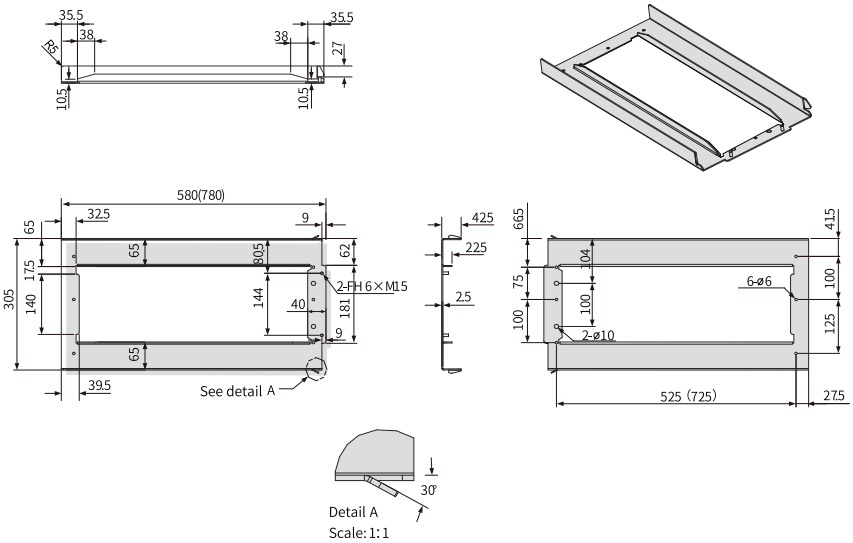


Figure 5-10 Dimensions of bottom mounting bracket for T10 models (mm)

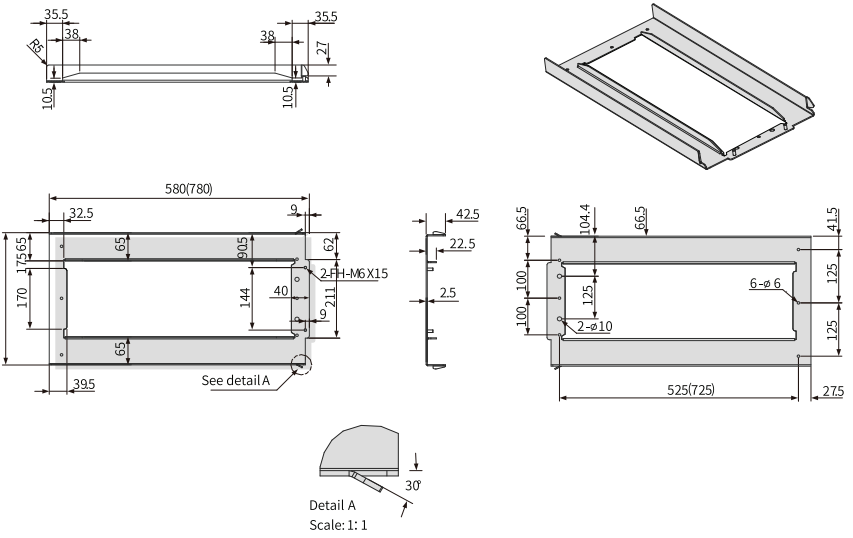


Figure 5-11 Dimensions of bottom mounting bracket for T11 models (mm)

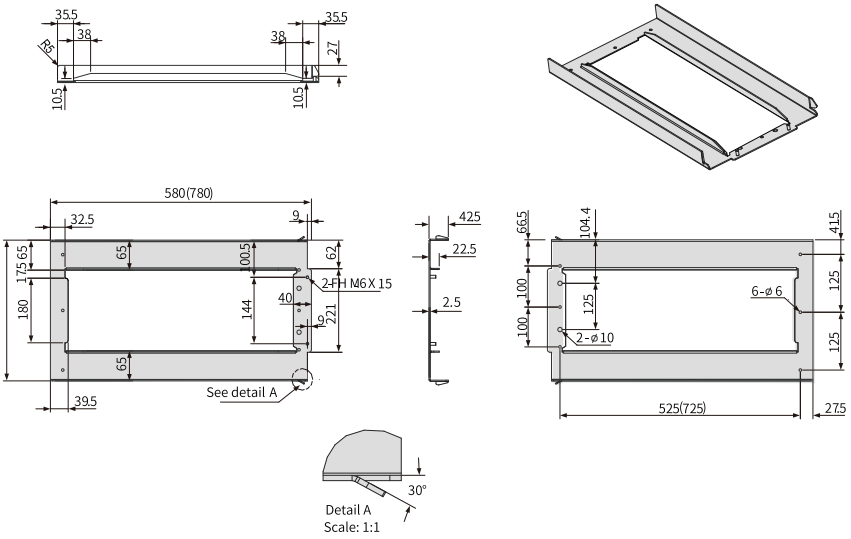


Figure 5-12 Dimensions of bottom mounting bracket for T12 models (mm)

Note

- The bottom installation bracket applies to the PS standard cabinet, which is classified into two types: 800 mm (width) x 600 mm (depth) and 800 mm (width) x 800 mm (depth). The size described in the figure applies to the PS standard cabinet with 800 mm (width) x 800 mm (depth).
- The bottom installation bracket for T10 to T12 models applies only to the PS standard cabinet with 800 mm (width) x 600 mm (depth). To apply to the PS standard cabinet with 800 mm (width) x 800 mm (depth), contact Inovance.

5.2.3 Guide Rail

For details of the guide rail, see *Operation Instructions for MD500-AZJ-A3T10 Guide Rail*.

5.2.4 Conduit Box

T1 to T6 models are equipped with the conduit box to reach the enclosure protection degree of UL Type 1. The conduit box needs to be purchased. The following table lists conduit box models.

Conduit box model

Table 5–3 Conduit box model and applicable AC drive structure

Conduit Box Model	Applicable AC Drive Structure
MD500–NEMA1–T1	T1
	T2
MD500–NEMA1–T3	T3
MD500–NEMA1–T4	T4
MD500–NEMA1–T5	T5
MD500–NEMA1–T6	T6

AC drive overall dimensions

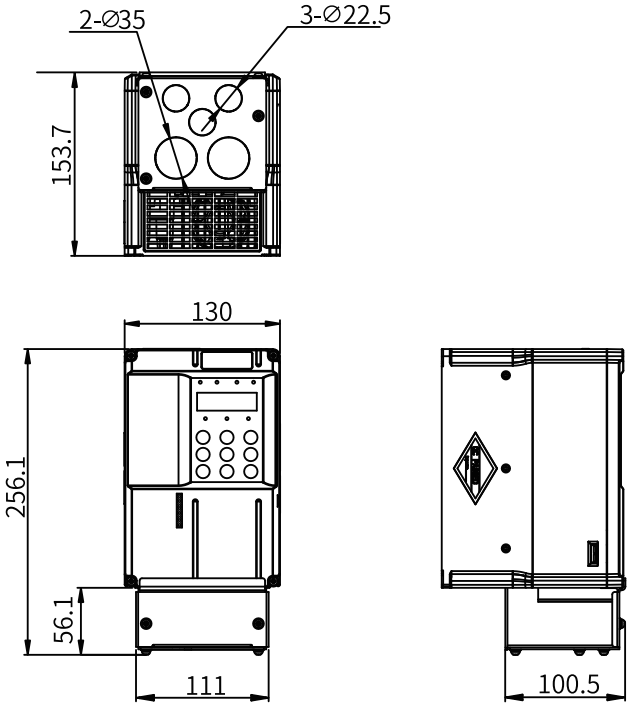


Figure 5-13 Overall dimensions of T1 models (with conduit box)

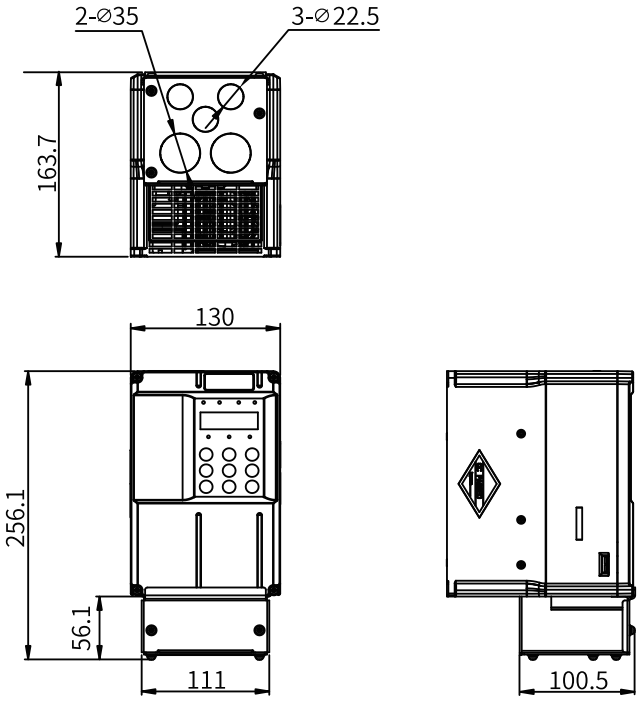


Figure 5-14 Overall dimensions of T2 models (with conduit box)

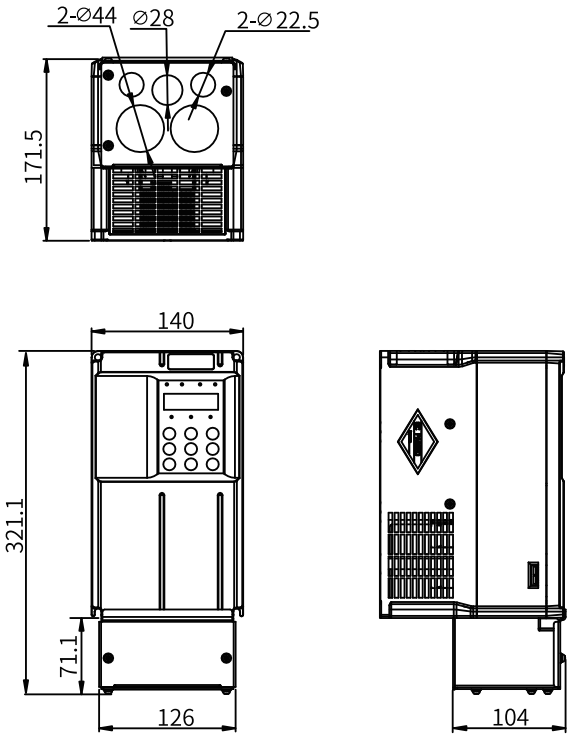


Figure 5-15 Overall dimensions of T3 models (with conduit box)

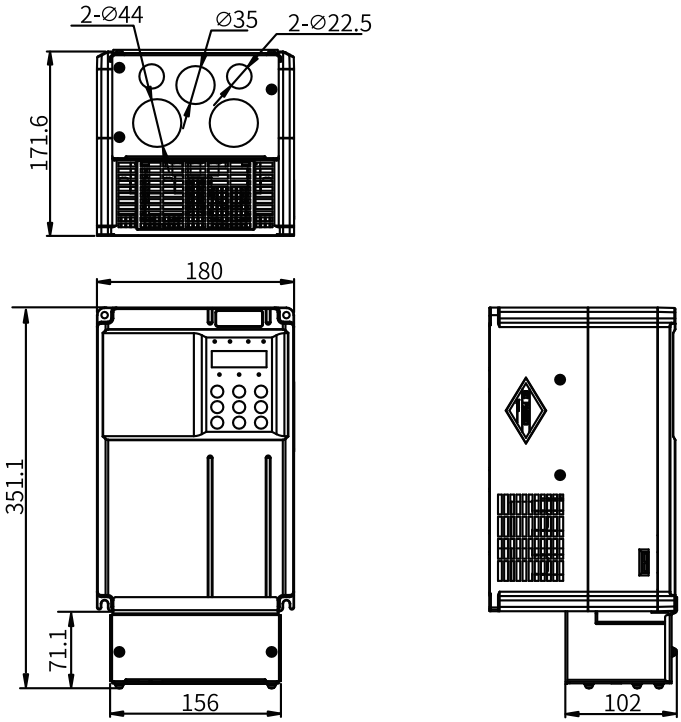


Figure 5-16 Overall dimensions of T4 models (with conduit box)

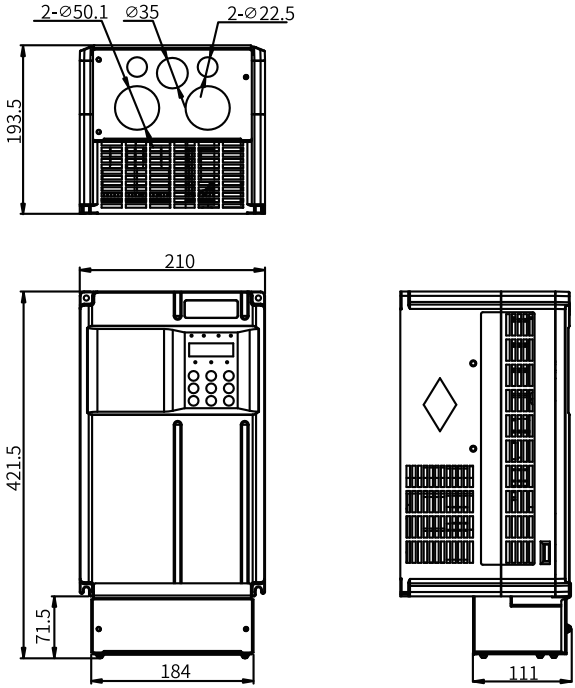


Figure 5-17 Overall dimensions of T5 models (with conduit box)

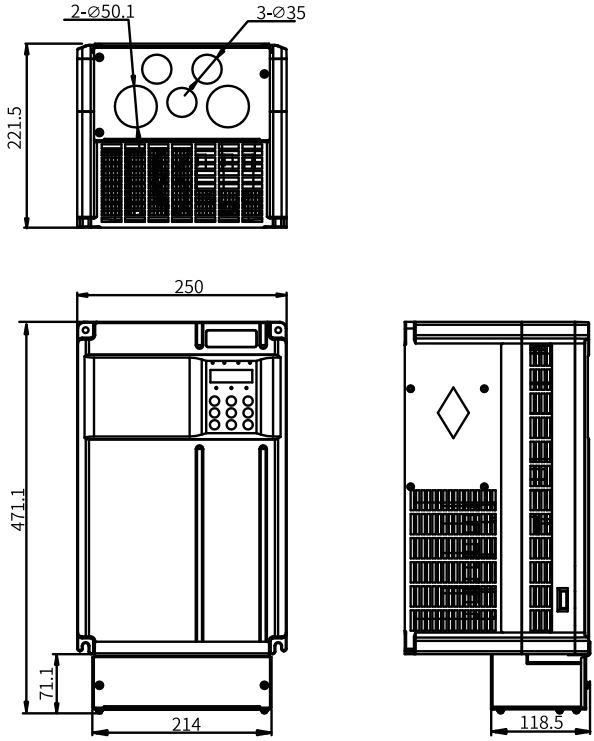


Figure 5-18 Overall dimensions of T6 models (with conduit box)

5.3 Cables

5.3.1 Main Circuit Cable

Power cable selection requirements

For selection of power cables, follow regulations required by local countries or regions. Select the power cable based on the following requirements:

- Compliant with EN 60204-1 and IEC 60364-5-52
- PVC cable with copper conductors
- Working properly when the ambient temperature is equal to or lower than 40°C and the cable surface temperature is equal to or lower than 70°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Sysmetric cable with copper-braided shield

If the recommended cable specifications for peripheral devices or optional parts exceed the applicable cable specification range, contact Inovance.

To comply with the EMC standards, use shielded cables. The shielded cables are divided into three-conductor cables and four-conductor cables, as shown below. If the conductivity of the three-conductor cable shield cannot meet requirements, add an independent PE cable. Alternatively, use a four-conductor shielded cable with one conductor as the PE cable. To suppress radio frequency interference effectively, use the coaxial copper braid as the cable shield. To enhance the shielding and conductivity performance, ensure that the braided density is greater than 90%.

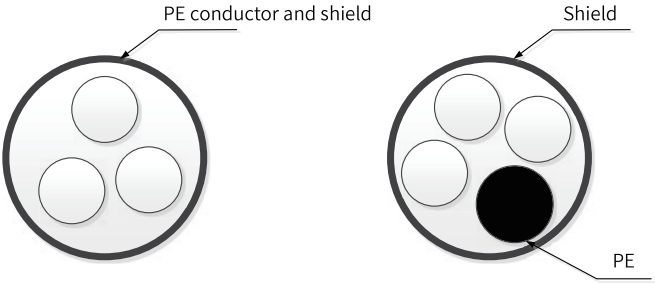


Figure 5-19 Recommended power cables

Recommended cables

Table 5–4 Cable selection (three-phase 380 V to 480 V)

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw	Tightening Torque N·m (lb.in)
			Recommended Cable ($mm^{2)}$	Cable Lug Model	Recommended Cable ($mm^{2)}$	Cable Lug Model		
T1	MD500T0.4GB-PLUS	1.8	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD500T0.7GB-PLUS	2.4	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	
	MD500T1.1GB-PLUS	3.7	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	
	MD500T1.5GB-PLUS	4.6	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	
	MD500T2.2GB-PLUS	6.3	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	
	MD500T3.0GB-PLUS	9.0	3 x 1	TNR1.25-4	1	TNR1.25-4	M4	
T2	MD500T3.7GB-PLUS	11.4	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	M4	
	MD500T5.5GB-PLUS	16.7	3 x 2.5	TNR2‐4	2.5	TNR2‐4	M4	
T3	MD500T7.5GB-PLUS	21.9	3 x 4	TNR3.5‐5	4	TNR3.5-5	M5	2.8 (24.8)
	MD500T11GB-PLUS	32.2	3 x 6	TNR5.5‐5	6	TNR5.5-5	M5	
T4	MD500T15GB-PLUS	41.3	3 x 10	GTNR8‐5	10	GTNR8-5	M5	
T5	MD500T18.5G(B)-PLUS	49.5	3 x 10	GTNR10-6	10	GTNR10-6	M6	4.8 (42.5)
	MD500T18.5G(B)-T-PLUS	43.4	3 x 10	GTNR10-6	10	GTNR10-6	M6	
	MD500T22G(B)-PLUS	59.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	
	MD500T22G(B)-T-PLUS	51.3	3 x 16	GTNR16-6	Sixteen	GTNR16-6	M6	
T6	MD500T30G(B)-PLUS	57.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	
	MD500T37G(B)-PLUS	69.0	3 x 25	GTNR25-6	16	GTNR16-6	M6	
T7	MD500T45G(B)-PLUS	89.0	3 x 35	GTNR35-8	16	GTNR16-8	M8	13.0 (115.2)
	MD500T55G(B)-PLUS	106.0	3 x 50	GTNR50-8	25	GTNR25-8	M8	

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw	Tightening Torque N·m (lb.in)
			Recommended Cable (mm^2)	Cable Lug Model	Recommended Cable (mm^2)	Cable Lug Model		
T8	MD500T75G(B)-PLUS	139.0	3 x 70	GTNR70-12	35	GTNR35-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD500T90G-PLUS	164.0	3 x 95	GTNR95-12	50	GTNR50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD500T110G-PLUS	196.0	3 x 120	GTNR120-12	70	GTNR70-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
T9	MD500T132G-PLUS	240.0	3 x 150	BC150-12	95	BC95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
	MD500T160G-PLUS	287.0	3 x 185	BC185-12	95	BC95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
T10	MD500T200G(-L)-PLUS	365.0	2 x (3 x 120)	BC120-12	120	BC120-12	M12	35.0 (310.1)
	MD500T220G(-L)-PLUS	410.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	
T11	MD500T250G(-L)-PLUS	441.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	
	MD500T280G(-L)-PLUS	495.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	
T12	MD500T315G(-L)-PLUS	565.0	2 x (3 x 185)	B C185‐16	185	B C185‐16	M16	85.0 (753.1)
	MD500T355G(-L)-PLUS	617.0	2 x (3 x 185)	B C185‐16	185	B C185‐16	M16	
	MD500T400G(-L)-PLUS	687.0	2 x (3 x 240)	BC240-16	240	B C240-16	M16	
T13	MD500T500G(-A)-PLUS	838.1	4 x (3 x 150)	BC240-16	2 x 150	BC 150‐16	M16	180 (1592.9)
	MD500T560G(-A)-PLUS	949.6	4 x (3 x 185)	BC 185‐16	2 x 185	BC 185‐16	M16	
	MD500T630G(-A)-PLUS	1043.5	4 x (3 x 240)	BC 240-16	2 x 240	BC 240-16	M16	

Table 5–5 Cable selection (three-phase 380 V to 480 V) (with UL certification)

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw
			Cable (AWG/mil)[2]	Cable Lug Model	Cable (AWG/kcmil)[2]	Cable Lug Model	
T1	MD500T0.4GB-PLUS	1.8	16	TLK1.25-4	18	TLK1.25-4	M4
	MD500T0.7GB-PLUS	2.4	16	TLK1.25-4	18	TLK1.25-4	M4
	MD500T1.1GB-PLUS	3.7	16	TLK1.25-4	18	TLK1.25-4	M4
	MD500T1.5GB-PLUS	4.6	16	TLK1.25-4	18	TLK1.25-4	M4
	MD500T2.2GB-PLUS	6.3	16	TLK1.25-4	18	TLK1.25-4	M4
	MD500T3.0GB-PLUS	9.0	16	TLK1.25-4	18	TLK1.25-4	M4
T2	MD500T3.7GB-PLUS	11.4	16	TLK1.25-4	16	TLK1.25-4	M4
	MD500T5.5GB-PLUS	16.7	14	TLK2‐4	14	TLK2‐4	M4
T3	MD500T7.5GB-PLUS	21.9	12	TLK3.5‐5	12	TLK3.5‐5	M5
	MD500T11GB-PLUS	32.2	8	TLK10‐5	8	TLK10‐5	M5
T4	MD500T15GB-PLUS	41.3	6	TLK16‐5	6	TLK16‐5	M5
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	49.5	6	TLK16-6	6	TLK16-6	M6
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	59.0	4	TLK25-6	6	TLK16-6	M6
T6	MD500T30G(B)-PLUS	57.0	4	TLK25-6	6	TLK16-6	M6
	MD500T37G(B)-PLUS	69.0	2	TLK35-6	6	TLK16-6	M6
T7	MD500T45G(B)-PLUS	89.0	2	TLK35-8	6	TLK16-8	M8
	MD500T55G(B)-PLUS	106.0	1/0	TLK50-8	4	TLK25-8	M8
T8	MD500T75G(B)-PLUS	139.0	3/0	TLK95-12	1/0	TLK50-8	M12 (main power)
							M8 (grounding)
	MD500T90G-PLUS	164.0	3/0	TLK95-12	1/0	TLK50-8	M12 (main power)
							M8 (grounding)
	MD500T110G-PLUS	196.0	300	TLK150-12	3/0	TLK95-8	M12 (main power)
							M8 (grounding)
T9	MD500T132G-PLUS	240.0	350	TLK185-12	3/0	TLK95-10	M12 (main power)
							M10 (grounding)
	MD500T160G-PLUS	287.0	450	TLK240-12	250	TLK120-10	M12 (main power)
							M10 (grounding)
T10	MD500T200G(-L)-PLUS	365.0	4 x 1/0	TLK50-12	2 x 1/0	TLK50-12	M12
	MD500T220G(-L)-PLUS	410.0	4 x 1/0	TLK50-12	2 x 1/0	TLK50-12	M12

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw
			Cable (AWG/mil)<2>	Cable Lug Model	Cable (AWG/kcmil)<2>	Cable Lug Model	
T11	MD500T250G(-L)-PLUS	441.0	4 x 1/0	TLK50-12	2 x 1/0	TLK50-12	M12
	MD500T280G(-L)-PLUS	495.0	4 x 2/0	TLK70-12	2 x 2/0	TLK70-12	M12
T12	MD500T315G(-L)-PLUS	565.0	4 x 3/0	TLK95-16	2 x 3/0	TLK95-16	M16
	MD500T355G(-L)-PLUS	617.0	4 x 250	TLK120-16	2 x 250	TLK120‐16	M16
	MD500T400G(-L)-PLUS	687.0	4 x 250	TLK120-16	2 x 250	TLK120‐16	M16

Table 5–6 Cable selection (three-phase 200 V to 240 V)

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw	Tightening Torque N·m (lb.in)
			Cable (mm^2)<1>	Cable Lug Model	Cable (mm^2)<1>	Cable Lug Model		
T1	MD500-2T0.4GB-PLUS	2.4	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD500-2T0.7GB-PLUS	4.6						
	MD500-2T1.1GB-PLUS	6.3						
	MD500-2T1.5GB-PLUS	9.0	3 x 1	TNR1.25-4	1	TNR1.25-4	M4	1.2 (10.6)
T2	MD500-2T2.2GB-PLUS	11.4	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	M4	1.2 (10.6)
	MD500-2T3.7GB-PLUS	16.7	3 x 2.5	TNR2‐4	2.5	TNR2‐4	M4	1.2 (10.6)
T3	MD500-2T5.5GB-PLUS	32.2	3 x 6	TNR5.5-5	6	TNR5.5-5	M5	2.8 (24.8)
T4	MD500-2T7.5GB-PLUS	41.3	3 x 10	TNR8-5	10	TNR8-5	M5	2.8 (24.8)
T5	MD500-2T11G(B)-PLUS	59.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
T6	MD500-2T15G(B)-PLUS	57.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
	MD500-2T18.5G(B)-PLUS	69.0	3 x 25	GTNR25-6	16	GTNR16-6	M6	4.8 (42.5)
T7	MD500-2T22G(B)-PLUS	89.0	3 x 35	GTNR35-8	16	GTNR16-8	M8	13.0 (115.2)
	MD500-2T30G(B)-PLUS	106.0	3 x 50	GTNR50-8	25	GTNR25-8	M8	13.0 (115.2)

Structure	AC Drive Model	Rated Input Current A	RST/UVW		Grounding Cable		Screw	Tightening Torque N·m (lb.in)
			Cable (mm^2)<1>	Cable Lug Model	Cable (mm^2)<1>	Cable Lug Model		
T8	MD500-2T37G(B)-PLUS	139.0	3 x 70	GTNR70-12	35	GTNR35-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD500-2T45G-PLUS	164.0	3 x 95	GTNR95-12	50	GTNR50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD500-2T55G-PLUS	196.0	3 x 120	GTN R120-12	70	GTNR70-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
T9	MD500-2T75G-PLUS	287.0	3 x 185	GTN R185-12	95	GTNR95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
T10	MD500-2T90G-PLUS	365.0	2 x (3 x 120)	GTN R120-12	120	GTNR120-12	M12	35.0 (310.1)
	MD500-2T110G-PLUS	410.0	2 x (3 x 150)	GTN R150-12	150	GTN R150-12	M12	35.0 (310.1)
T11	MD500-2T132G-PLUS	441.0	2 x (3 x 150)	GTN R150-12	150	GTN R150-12	M12	35.0 (310.1)
T12	MD500-2T160G-PLUS	565.0	2 x (3 x 185)	GTN R185-16	185	GTN R185-16	M16	85.0 (753.1)
	MD500-2T200G-PLUS	687.0	2 x (3 x 240)	GTN R240-16	240	GTN R240-16	M16	85.0 (753.1)

Table 5–7 Cable selection (single-phase 200 V to 240 V)

Structure	AC Drive Model	Rated Input Current	RST/UVW			Grounding Cable		Screw	Tightening Torque N · m (lbf · in.)
			Input Cables (mm^2)	Output Cables (mm^2)	Cable Lug Model	Cable (mm^2)	Cable Lug Model		
T2	MD500-2S0.4GB-PLUS	5.4	0.75	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD500-2S0.7GB-PLUS	8.2	1	3 x 1	TN R1.25-4	0.75	TNR1.25-4		
	MD500-2S1.5GB-PLUS	14	1.5	3 x 1.5	TN R1.25-4	1.5	TNR1.25-4		
	MD500-2S2.2GB-PLUS	23	4	3 x 4	TN R3.5‑4	2.5	TN R3.5‑4		

Table 5–8 Cable selection (single-phase 200 V to 240 V) (with UL certification)

Structure	AC Drive Model	Rated Input Current A	RST/UVW			Grounding Cable		Screw
			Input Cables (AWG/mil)<2>	Output Cables (AWG/mil)<2>	Cable Lug Model	Cable (AWG/mil)<2>	Cable Lug Model	
T2	MD500-2S0.4GB-PLUS	5.4	18	18	TL K0.75 - 4	18	TL K0.75 - 4	M4
	MD500-2S0.7GB-PLUS	8.2	18	18	TLK1.25-4	18	TLK1.25-4	
	MD500-2S1.5GB-PLUS	14	16	16	TLK1.25-4	16	TLK1.25-4	
	MD500-2S2.2GB-PLUS	23	12	12	TLK3.5-4	12	TLK3.5-4	

Note

<1>: Chinese standards applicable; 3 x 10: one three-conductor cable; 2 x (3 x 95): two three-conductor cables; <2>: American standards applicable; 5: 5AWG; 1/0: 0AWG; 2/0: 00AWG; 3/0: 000AWG; 4/0: 0000AWG; 2 x 250: two 250 kcmil cables.

Recommended cable lug

The recommended lugs are the TNR, GTNR, and BC series lugs of Suzhou Yuanli. The lugs with UL certifications are TLK and SQNBS series lugs of KST.

Table 5–9 Appearances, models, and dimensions of TNR series lugs (unit: mm)

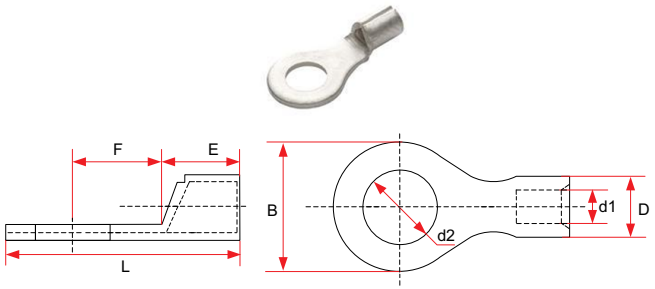
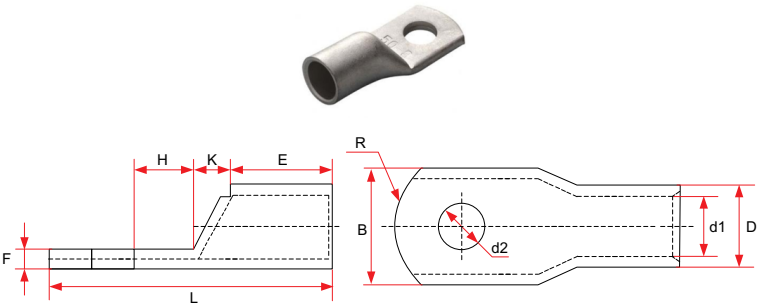
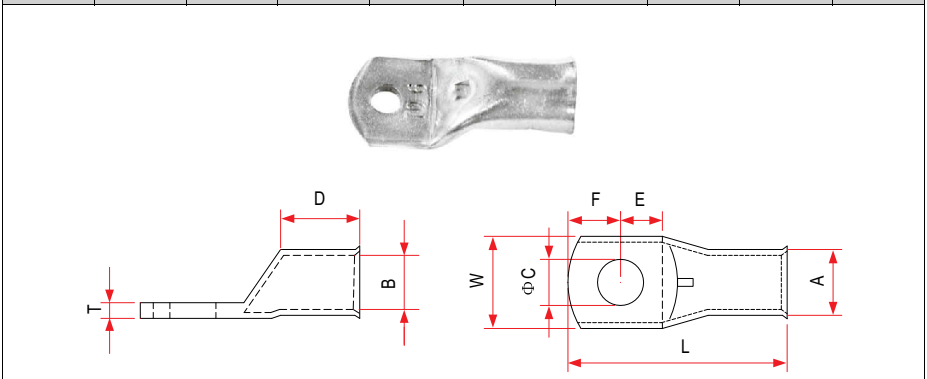
Model	Specification		D	d1	E	F	B	d2	L	Current (A)	Crimping Tool
	AWG/MCM	mm^2									
											
TNR0.75-4	22-16	0.25-1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8 AK-1M
TNR1.25-4	22-16	0.25-1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	

Table 5–10 Appearances, models, and dimensions of GTNR series cable lug (unit: mm)

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
											
GTNR1.5-5	4.0	2.2	5.0	5.0	2.0	8.0	5.3	1.0	16.0	5	
GTNR2.5-4	4.5	2.9	7.0	5.0	2.0	8.0	4.3	1.0	18.0	5	
GTNR2.5-5	4.5	2.9	7.0	6.0	2.0	8.0	5.3	1.0	20.0	7	
GTNR2.5-6	4.5	2.9	7.0	6.0	2.0	10.2	6.4	0.8	20.0	7	
GTNR4-5	5.2	3.6	7.0	6.0	2.0	10.0	5.3	1.0	20.0	7	RYO-8
GTNR4-6	5.2	3.6	7.0	6.0	2.0	10.0	6.4	1.0	20.0	7	YYT-8
GTNR6-5	6.0	4.2	9.0	6.0	3.0	10.0	5.3	1.2	23.0	7	RYO-14
GTNR6-6	6.0	4.2	9.0	7.5	3.0	10.0	6.4	1.2	26.0	7	
GTNR6-8	6.0	4.2	9.0	7.5	3.0	12.0	8.4	1.0	26.0	7	
GTNR10-6	7.0	5.0	9.0	8.0	3.5	12.4	6.4	1.3	26.5	7	
GTNR10-8	7.0	5.0	9.0	8.0	3.5	12.4	8.4	1.3	27.5	7	
GTNR16-6	7.8	5.8	12.0	8.0	4.0	12.4	6.4	1.3	31.0	7	
GTNR16-8	7.8	5.8	12.0	8.0	4.0	12.4	8.4	1.3	31.0	7	
GTNR25-6	9.5	7.5	12.0	8.0	4.5	14.0	6.4	2.0	32.0	10	
GTNR25-8	9.5	7.5	12.0	9.0	4.5	15.5	8.4	1.6	34.0	10	CT-38
GTNR25-10	9.5	7.5	12.0	10.5	4.5	17.5	10.5	1.4	37.0	10	CT-100
GTNR35-6	11.4	8.6	15.0	9.0	5.0	15.5	6.4	2.8	38.0	10	
GTNR35-8	11.4	8.6	15.0	9.0	5.0	15.5	8.4	2.8	38.0	10	
GTNR35-10	11.4	8.6	15.0	10.5	5.0	17.5	10.5	2.5	40.5	10	
GTNR50-8	12.6	9.6	16.0	11.0	6.0	18.0	8.4	2.8	43.5	10	
GTNR50-10	12.6	9.6	16.0	11.0	6.0	18.0	10.5	2.8	43.5	10	
GTNR70-8	15.0	12.0	18.0	13.0	7.0	21.0	8.4	2.8	50.0	14	
GTNR70-10	15.0	12.0	18.0	13.0	7.0	21.0	10.5	2.8	50.0	14	CT-100
GTNR70-12	15.0	12.0	18.0	13.0	7.0	21.0	13.0	2.8	50.0	14	
GTNR95-10	17.4	13.5	20.0	13.0	9.0	25.0	10.5	3.9	55.0	14	
GTNR95-12	17.4	13.5	20.0	13.0	9.0	25.0	13.0	3.9	55.0	14	

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
GTNR120-12	19.8	15.0	22.0	14.0	10.0	28.0	13.0	4.7	60.0	16	RYC-150
GTNR120-16	19.8	15.0	22.0	16.0	10.0	28.0	17.0	4.7	64.0	16	
GTNR150-12	21.2	16.5	26.0	16.0	11.0	30.0	13.0	4.7	69.0	24	
GTNR150-16	21.2	16.5	26.0	16.0	11.0	30.0	17.0	4.7	69.0	24	
GTNR185-16	23.5	18.5	32.0	17.0	12.0	34.0	17.0	5.0	78.0	24	
GTNR240-16	26.5	21.5	38.0	20.0	14.0	38.0	17.0	5.5	92.0	24	
GTNR240-20	26.5	21.5	38.0	20.0	14.0	38.0	21.0	5.5	92.0	24	

Table 5–11 Appearance, models, and dimensions of BC series cable lugs (unit: mm)

Model	A	B	W	E	D	L	T	C	F
									
120-8	19.0	15.0	27.2	16.5	27.0	73.0	4.0	8.5	16.5
120-10								10.5	
120-12								12.8	
120-14								14.7	
120-16								16.7	
120-20				18.8				20.7	14.3
150-8	21.0	16.5	30.0	16.5	27.0	78.0	4.5	8.5	16.5
150-10								10.5	
150-12								12.8	
150-14								14.7	
150-16								16.7	
150-20				18.8				20.7	14.3

Model	A	B	W	E	D	L	T	C	F
185-10	23	18.5	33.5	16.5	30	82	4.5	10.5	16.5
185-12								12.8	
185-14								14.7	
185-16								16.7	
185-20				18.8				20.7	14.3
240-10	26	21	37.7	18.0	32.0	88.0	5.0	10.5	17.0
240-12								12.8	
240-14								14.7	
240-16								16.7	
240-20								20.7	
300-10	28.0	23.0	41.0	18.0	37.0	97.0	5.0	10.5	17.0
300-12								12.8	
300-14								14.7	
300-16								16.7	
300-20								20.7	

5.3.2 Selection of Control Circuit Cables

Note

Wire the control circuit cable according to EN 60204-1.

To prevent peripheral interference and noise, shielded cables are recommended for I/O signal cables. Connect both ends of the shield to the equipment 360 degrees using signal shield support. Separate shielded cables should be used for different analog signals, and shielded twisted pair cables are recommended for digital signal cables.

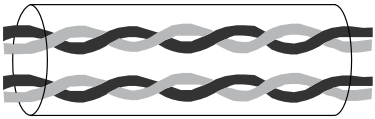


Figure 5-20 Shielded twisted pair cable

5.4 Peripheral Electrical Devices

5.4.1 Fuse, Contactor, and Circuit Breaker

Caution

To avoid electric shocks, do not resume power supply to the product or operate peripherals immediately after a fuse burns or a circuit breaker trips. Instead, wait at least a period of time specified on the product warning label before further operations. Failure to comply may result in product damage, several injuries, or even death.

To comply with EN 61800-5-1 and UL 61800-5-1 standards, install a fuse/circuit breaker on the input side to prevent accidents caused by short circuit in the internal circuit.

The following table describes the recommended fuses and circuit breakers, and the recommended manufacturer is Bussmann.

Table 5–12 Selection of fuses, contactors, and circuit breakers (three phase 380-480 V)

Structure	Model	Fuse Bussmann UL certification		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD500T0.4GB-PLUS	5	FWP-5B	9	4
	MD500T0.7GB-PLUS	10	FWP-10B	9	6
	MD500T1.1GB-PLUS	10	FWP-10B	9	6
	MD500T1.5GB-PLUS	10	FWP-10B	9	10
	MD500T2.2GB-PLUS	15	FWP-15B	12	13
	MD500T3.0GB-PLUS	20	FWP-20B	16	16
T2	MD500T3.7GB-PLUS	30	FWP-30B	26	25
	MD500T5.5GB-PLUS	40	FWP-40B	26	32
T3	MD500T7.5GB-PLUS	60	FWP-60B	38	50
	MD500T11GB-PLUS	70	FWP-70B	50	63
T4	MD500T15GB-PLUS	70	FWH-70B	50	63
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	100	FWH-100B	65	80
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	125	FWH-125B	80	80
T6	MD500T30G(B)-PLUS	125	FWH-125B	80	100
	MD500T37G(B)-PLUS	150	FWH-150B	95	160
T7	MD500T45G(B)-PLUS	200	FWH-200B	115	160
	MD500T55G(B)-PLUS	250	FWH-250A	150	250

Structure	Model	Fuse Bussmann UL certification		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T8	MD500T75G(B)-PLUS	275	FWH-275A	170	250
	MD500T90G-PLUS	325	FWH-325A	205	250
	MD500T110G-PLUS	400	FWH-400A	245	400
T9	MD500T132G-PLUS	500	FWH-500A	300	400
	MD500T160G-PLUS	600	FWH-600A	410	500
T10	MD500T200G(-L)-PLUS	800	FWH-800A	475	630
	MD500T220G(-L)-PLUS	800	FWH-800A	620	800
T11	MD500T250G(-L)-PLUS	1000	170M5016	620	800
	MD500T280G(-L)-PLUS	1000	170M5016	620	800
T12	MD500T315G(-L)-PLUS	1400	170M6017	800	1000
	MD500T355G(-L)-PLUS	1400	170M6017	800	1000
	MD500T400G(-L)-PLUS	1400	170M6017	1000	1250
T13	MD500T500G(-A)-PLUS	1400A	-	-	-
	MD500T560G(-A)-PLUS	1600A	-		
	MD500T630G(-A)-PLUS	1800A	-		
Note: The circuit breaker is configured in the T13 cabinet.					

Table 5–13 Selection of fuses, contactors, and circuit breakers (three phase 200–240 V)

Structure	Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD500-2T0.4GB-PLUS	10	FWP-10B	9	6
	MD500-2T0.7GB-PLUS	10	FWP-10B	9	10
	MD500-2T1.1GB-PLUS	15	FWP-15B	12	13
	MD500-2T1.5GB-PLUS	20	FWP-20B	16	16
T2	MD500-2T2.2GB-PLUS	30	FWP-30B	26	25
	MD500-2T3.7GB-PLUS	40	FWP-40B	26	32
T3	MD500-2T5.5GB-PLUS	70	FWP-70B	50	63
T4	MD500-2T7.5GB-PLUS	70	FWH-70B	50	63
T5	MD500-2T11G(B)-PLUS	125	FWH-125B	80	80
T6	MD500-2T15G(B)-PLUS	125	FWH-125B	80	100
	MD500-2T18.5G(B)-PLUS	150	FWH-150B	95	160
T7	MD500-2T22G(B)-PLUS	200	FWH-200B	115	160
	MD500-2T30G(B)-PLUS	250	FWH-250A	150	250
T8	MD500-2T37G(B)-PLUS	275	FWH-275A	170	250
	MD500-2T45G-PLUS	325	FWH-325A	205	250
	MD500-2T55G-PLUS	400	FWH-400A	245	400
T9	MD500-2T75G-PLUS	600	FWH-600A	410	500

Structure	Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T10	MD500-2T90G-PLUS	600	FWH-600A	410	500
	MD500-2T110G-PLUS	700	FWH-700A	410	630
T11	MD500-2T132G-PLUS	800	FWH-800A	475	630
T12	MD500-2T160G-PLUS	1000	170M5016	620	800
	MD500-2T200G-PLUS	1400	170M6017	800	1000

Table 5–14 Selection of fuses, contactors, and circuit breakers (single phase 200-240 V)

Structure	Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T2	MD500-2S0.4GB-PLUS	10	FWP-10B	9	10
	MD500-2S0.7GB-PLUS	15	FWP-15B	12	13
	MD500-2S1.5GB-PLUS	20	FWP-20B	16	16
	MD500-2S2.2GB-PLUS	30	FWP-30B	30	32

Note

See "Requirements on Protective Devices" in section “UL/cUL Certification" for requirements on fuses and circuit breakers of UL-compliant drives.

5.4.2 AC Input Reactor

An AC input reactor is an option used to eliminate harmonics of the input current. Therefore, install an external AC input reactor if the application environment requires reduction of harmonics.

If an AC input reactor is required for models with the power over 200 kW, reserve sufficient installation space in the cabinet for the reactor.

Models and dimensions (Inovance)

Recommended AC input reactor manufacturers and models are listed in the following tables.

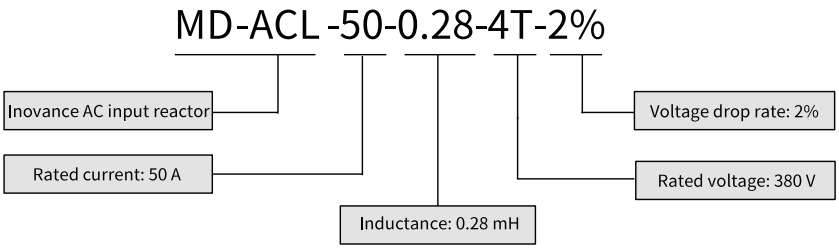


Figure 5-21 AC input reactor model

Table 5–15 Selection of Inovance AC input reactors (three-phase 380 V to 480 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Power Consumption (W)
T1	MD500T0.4GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T0.7GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T1.1GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T1.5GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T2.2GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T3.0GB-PLUS	MD-ACL-10-5-4T	5	50
T2	MD500T3.7GB-PLUS	MD-ACL-15-3-4T	3	50
	MD500T5.5GB-PLUS	MD-ACL-15-3-4T	3	50
T3	MD500T7.5GB-PLUS	MD-ACL-40-1.45-4T	1.45	100
	MD500T11GB-PLUS	MD-ACL-40-1.45-4T	1.45	100
T4	MD500T15GB-PLUS	MD-ACL-50-1.2-4T	1.2	150
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	MD-ACL-60-0.24-4T-2%	0.24	-
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD500T30G(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
	MD500T37G(B)-PLUS	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD500T45G(B)-PLUS	MD-ACL-120-0.12-4T-2%	0.12	-
	MD500T55G(B)-PLUS	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD500T75G(B)-PLUS	MD-ACL-200-0.07-4T-2%	0.07	-
	MD500T90G-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
	MD500T110G-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD500T132G-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
	MD500T160G-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD500T200G(-L)-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
	MD500T220G(-L)-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
T11	MD500T250G(-L)-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
	MD500T280G(-L)-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Power Consumption (W)
T12	MD500T315G(-L)-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-
	MD500T355G(-L)-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-
	MD500T400G(-L)-PLUS	MD-ACL-1000-0.014-4T-2%	0.014	-
T13	MD500T500G(-A)-PLUS	GH-MVT504ZG-L2	0.022	-
	MD500T560G(-A)-PLUS	GH-MVT634ZG-L3	0.018	
	MD500T630G(-A)-PLUS	GH-MVT634ZG-L3	0.018	
Note: For T13 models with the model name containing "-A", the input reactor is standard.				

Table 5–16 Selection of Inovance AC input reactors (three-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T0.7GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T1.1GB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T1.5GB-PLUS	MD-ACL-10-5-4T	5	50
T2	MD500-2T2.2GB-PLUS	MD-ACL-15-3-4T	3	50
	MD500-2T3.7GB-PLUS	MD-ACL-15-3-4T	3	50
T3	MD500-2T5.5GB-PLUS	MD-ACL-40-1.45-4T	1.45	100
T4	MD500-2T7.5GB-PLUS	MD-ACL-50-1.2-4T	1.2	150
T5	MD500-2T11G(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD500-2T15G(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
	MD500-2T18.5G(B)-PLUS	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD500-2T22G(B)-PLUS	MD-ACL-120-0.12-4T-2%	0.12	-
	MD500-2T30G(B)-PLUS	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD500-2T37G(B)-PLUS	MD-ACL-200-0.07-4T-2%	0.07	-
	MD500-2T45G-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
	MD500-2T55G-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD500-2T75G-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD500-2T90G-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
	MD500-2T110G-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
T11	MD500-2T132G-PLUS	MD-ACL-660-0.021-4T-2%	0.028	-
T12	MD500-2T160G-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
	MD500-2T200G-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-

Dimensions

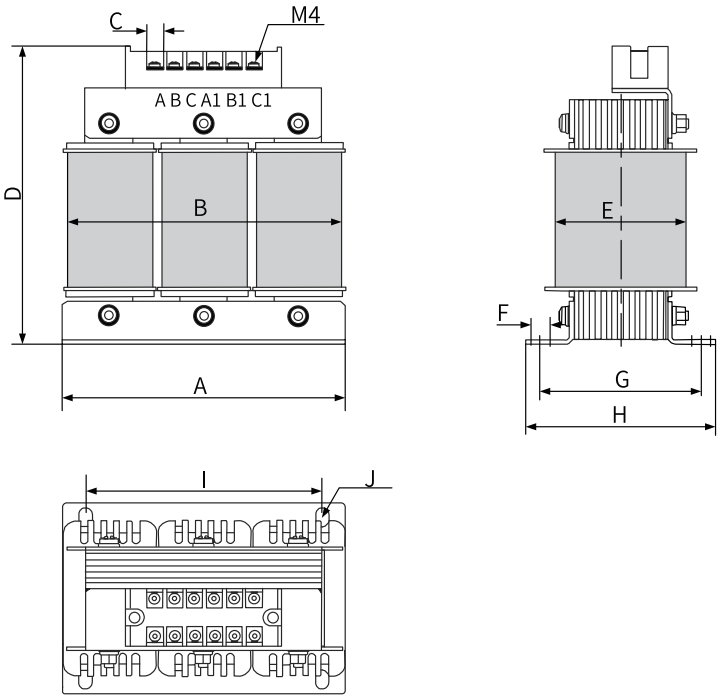


Figure 5-22 Dimensions of 10 A/15 A AC input reactors

Table 5–17 Dimensions of 10 A/15 A AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J
10	150 ± 2	155	8	160	80	10	85 ± 2	100 ± 2	125 ± 1	Φ7 x 10
15	150 ± 2	155	8	160	80	10	85 ± 2	100 ± 2	125 ± 1	Φ7 x 10

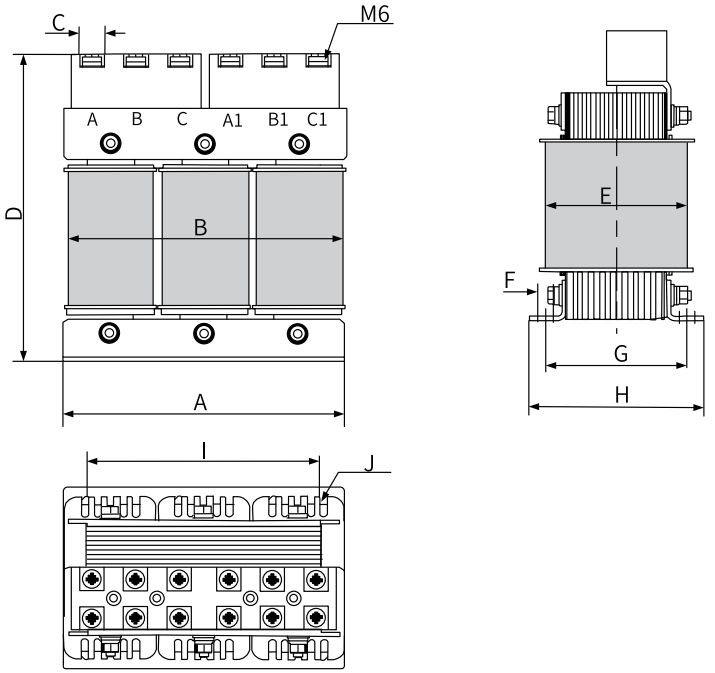


Figure 5-23 Dimensions of 40 A/50 A (1.2 mH) AC input reactors

Table 5–18 Dimensions of 40 A/50 A (1.2 mH) AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J
40	180 ± 2	185	16	200	105	10	95 ± 2	117 ± 2	150 ± 1	Φ7 x 10
50	200 ± 2	210	16	230	110	10	115 ± 2	130 ± 2	170 ± 1	Φ7 x 10

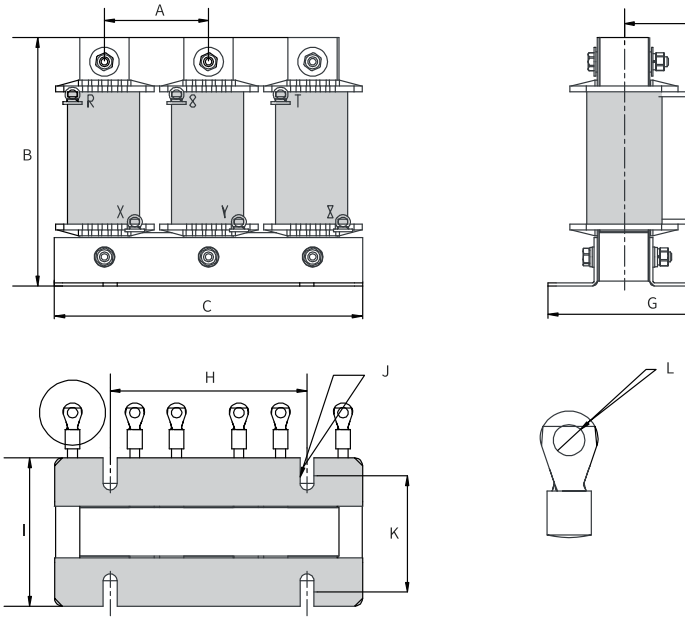


Figure 5-24 Dimensions of 50 A (0.28 mH)/60 A AC input reactors

Table 5–19 Dimensions of 50 A (0.28 mH)/60 A AC input reactors (mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
50	64	160	195	80 ± 10	75 ± 5	35 ± 5	135	120 ± 1	92 ± 2	Φ8.5 x 20	72 ± 2	Φ6.4
60	64	160	195	80 ± 10	75 ± 5	35 ± 5	135	120 ± 1	92 ± 2	Φ8.5 x 20	72 ± 2	Φ6.4

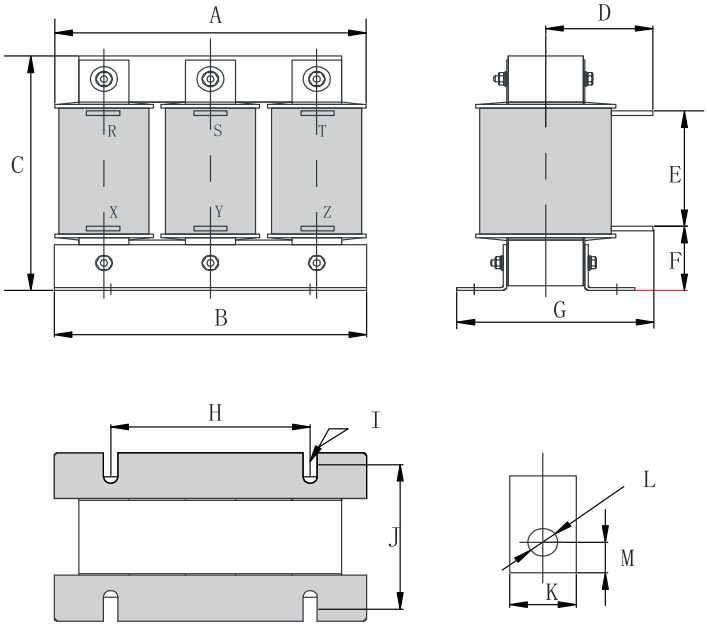


Figure 5-25 Dimensions of 80-120 A AC input reactors

Table 5–20 Dimensions of 80-120 A AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
80	195	188 ± 1	160	-	-	-	150	120 ± 1	Φ8.5 x 20	72 ± 2	-	-	-
90	195	188 ± 1	160	-	-	-	150	120 ± 1	Φ8.5 x 20	72 ± 2	-	-	-
120	195	188 ± 1	160	78 ± 10	79 ± 5	40 ± 5	135	120 ± 1	Φ8.5 x 20	92 ± 2	20	Φ9	10

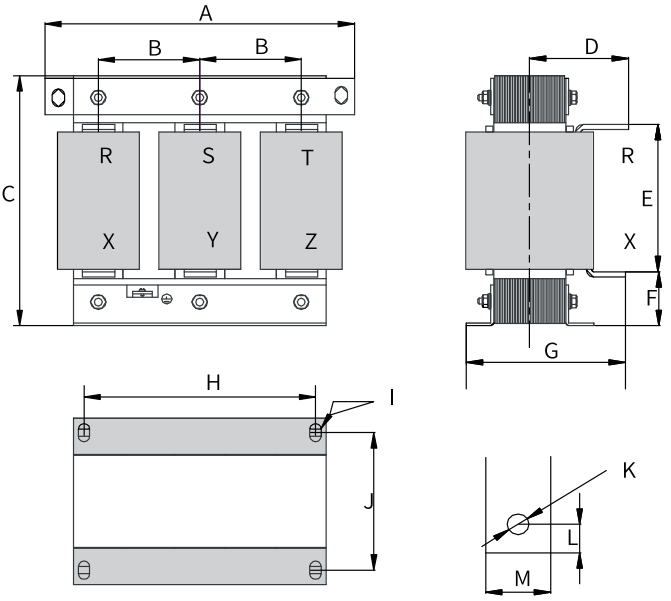


Figure 5-26 Dimensions of 150-330 A AC input reactors

Table 5–21 Dimensions of 150-330 A AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81 ± 5	230	92 ± 10	145 ± 5	38 ± 5	155	182 ± 1	Φ11 x 18	76 ± 2	Φ11	13	25
200	250	81 ± 5	230	102 ± 10	145 ± 5	40 ± 5	175	182 ± 1	Φ11 x 18	96 ± 2	Φ11	13	25
250	250	81 ± 5	260	102 ± 10	160 ± 5	50 ± 5	175	182 ± 1	Φ11 x 18	96 ± 2	Φ11	13	25
330	290	95 ± 5	275	107 ± 10	160 ± 5	60 ± 5	180	214 ± 1	Φ11 x 18	100 ± 2	φ12	15	30

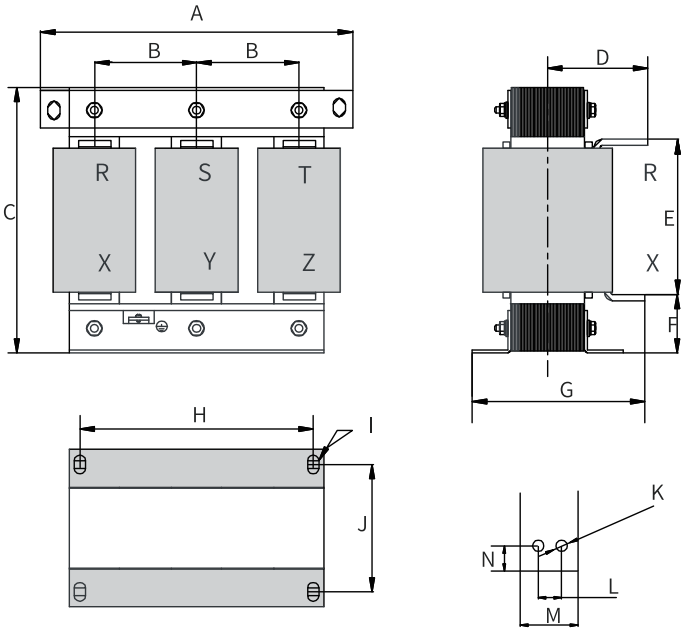


Figure 5-27 Dimensions of 490 A/660 A AC input reactors

Table 5–22 Dimensions of 490 A/660 A AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
490	320	106 ± 5	305	137 ± 10	198 ± 5	60 ± 5	220	243 ± 1	Φ12 x 20	122 ± 2	ϕ12	22	50	23
660	320	106 ± 5	305	145 ± 10	203 ± 5	50 ± 5	240	243 ± 1	Φ12 x 20	137 ± 2	ϕ12	22	50	23

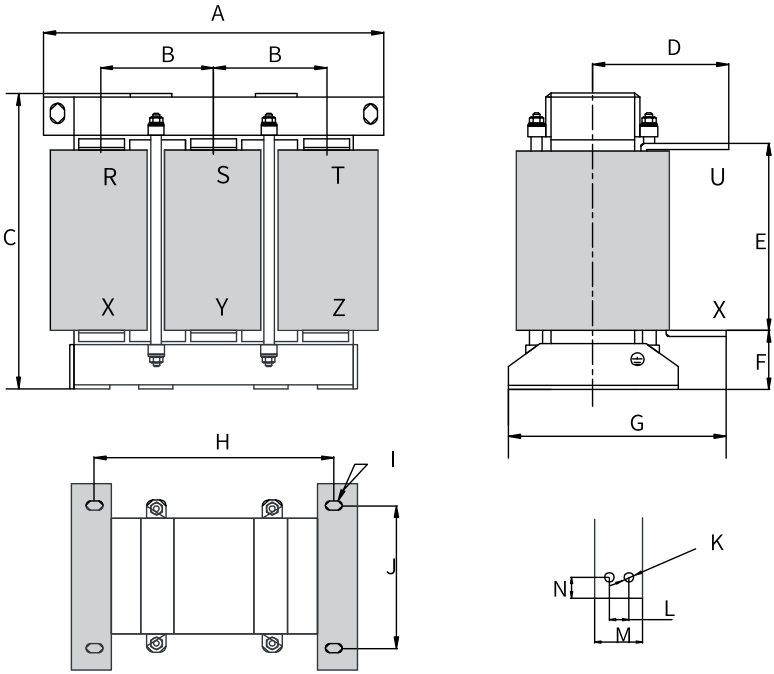


Figure 5-28 Dimensions of 800 A/1000 A AC input reactors

Table 5–23 Dimensions of 800 A/1000 A AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
800	385	123 ± 5	390	142 ± 10	238 ± 5	70 ± 5	250	260 ± 2	Φ12 x 20	175 ± 1	ϕ12	22	50	23
1000	385	123 ± 5	390	142 ± 10	238 ± 5	70 ± 5	250	260 ± 2	Φ12 x 20	175 ± 1	ϕ12	22	50	23

Note

The dimensions of AC input reactors provided here are for reference only. Actual dimensions may vary with models.

Models and dimensions (Schaffner)

Table 5–24 Selection of Schaffner AC input reactors (three-phase 380 V to 480 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Power Consumption (W)
T1	MD500T0.4GB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500T0.7GB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500T1.1GB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T1.5GB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T2.2GB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T3.0GB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
T2	MD500T3.7GB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
	MD500T5.5GB-PLUS	RWK 3044-18-89-E0XXX	1.67	103
T3	MD500T7.5GB-PLUS	RWK 3044-24-89-E0XXX	1.22	106
	MD500T11GB-PLUS	RWK 3044-35-92-E0XXX	0.83	151
T4	MD500T15GB-PLUS	RWK 3044-48-92-E0XXX	0.61	172
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	RWK 3044-59-92-E0XXX	0.5	206
T6	MD500T30G(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500T37G(B)-PLUS	RWK 3044-72-99-E0XXX	0.41	294
T7	MD500T45G(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
	MD500T55G(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
T8	MD500T75G(B)-PLUS	RWK 3044-140-99-E0XXX	0.2	399
	MD500T90G-PLUS	RWK 3044-180-99-E0XXX	0.17	456
	MD500T110G-PLUS	RWK 3044-210-99-E0XXX	0.14	553
T9	MD500T132G-PLUS	RWK 3044-260-99-E0XXX	0.11	593
	MD500T160G-PLUS	RWK 3044-320-99-E0XXX	0.092	747
T10	MD500T200G(-L)-PLUS	RWK 3044-400-99-E0XXX	0.073	1055
	MD500T220G(-L)-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD500T250G(-L)-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
	MD500T280G(-L)-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD500T315G(-L)-PLUS	RWK 3044-570-99-E0XXX	0.052	1181
	MD500T355G(-L)-PLUS	RWK 3044-640-99-E0XXX	0.046	1116
	MD500T400G(-L)-PLUS	RWK 3044-800-99-E0XXX	0.037	1280
T13	MD500T500G(-A)-PLUS	RWK 3044-1000-99-E0XXX	0.029	1167
	MD500T560G(-A)-PLUS	RWK 3044-1000-99-E0XXX	0.029	1167
	MD500T630G(-A)-PLUS	-	-	-
Note: For T13 models with the model name containing “-A”, the input reactor is standard.				

Table 5–25 Selection of Schaffner AC input reactors (three-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500-2T0.7GB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500-2T1.1GB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500-2T1.5GB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
T2	MD500-2T2.2GB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
	MD500-2T3.7GB-PLUS	RWK 3044-18-89-E0XXX	1.67	103
T3	MD500-2T5.5GB-PLUS	RWK 3044-35-92-E0XXX	0.83	151
T4	MD500-2T7.5GB-PLUS	RWK 3044-48-92-E0XXX	0.61	172
T5	MD500-2T11G(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
T6	MD500-2T15G(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500-2T18.5G(B)-PLUS	RWK 3044-72-99-E0XXX	0.41	294
T7	MD500-2T22G(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500-2T30G(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
T8	MD500-2T37G(B)-PLUS	RWK 3044-140-99-E0XXX	0.2	399
	MD500-2T45G-PLUS	RWK 3044-180-99-E0XXX	0.17	456
	MD500-2T55G-PLUS	RWK 3044-210-99-E0XXX	0.14	553
T9	MD500-2T75G-PLUS	RWK 3044-320-99-E0XXX	0.092	747
T10	MD500-2T90G-PLUS	RWK 3044-400-99-E0XXX	0.073	1055
	MD500-2T110G-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD500-2T132G-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD500-2T160G-PLUS	RWK 3044-570-99-E0XXX	0.052	1181
	MD500-2T200G-PLUS	RWK 3044-800-99-E0XXX	0.037	1280

5.4.3 EMC Filter

Overview

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the EMC filter listed in the following table.

For 132 kW to 400 kW AC drives, built-in filters can meet requirements of EN 618003 C3. Therefore, external filters are not required.

Table 5–26 Standard EMC filter model and appearance

Filter Model		Appearance
Schaffner series	FN 2090 series	
	FN 3258 series	
	FN 3359 series	
Jianli series	TH series	
	EBK5 series	

Models and dimensions of Schaffner filters

Table 5–27 Selection of Schaffner filters (three-phase 380 V to 480 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T1	MD500T0.4GB-PLUS	FN 3258-7-44	3.8
	MD500T0.7GB-PLUS	FN 3258-7-44	3.8
	MD500T1.1GB-PLUS	FN 3258-7-44	3.8
	MD500T1.5GB-PLUS	FN 3258-7-44	3.8
	MD500T2.2GB-PLUS	FN 3258-7-44	3.8
	MD500T3.0GB-PLUS	FN 3258-16-44	6.1
T2	MD500T3.7GB-PLUS	FN 3258-16-44	6.1
	MD500T5.5GB-PLUS	FN 3258-30-44	11.8
T3	MD500T7.5GB-PLUS	FN 3258-30-44	11.8
	MD500T11GB-PLUS	FN 3258-42-44	15.7
T4	MD500T15GB-PLUS	FN 3258-42-44	15.7
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	FN 3258-55-44	25.9
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	FN 3258-75-44	31.2
T6	MD500T30G(B)-PLUS	FN 3258-75-44	32.2
	MD500T37G(B)-PLUS	FN 3258-75-44	32.2
T7	MD500T45G(B)-PLUS	FN 3258-100-44	34.5
	MD500T55G(B)-PLUS	FN 3258-130-44	43.1
T8	MD500T75G(B)-PLUS	FN 3258-180-44	58.3
	MD500T90G-PLUS	FN 3258-180-44	58.3
	MD500T110G-PLUS	FN 3359-250-28	49
T9	MD500T132G-PLUS	FN 3359-250-28	49
	MD500T160G-PLUS	FN 3359-320-99	19
T10	MD500T200G(-L)-PLUS	FN 3359-400-99	29
	MD500T220G(-L)-PLUS	FN 3359-600-99	44
T11	MD500T250G(-L)-PLUS	FN 3359-600-99	44
	MD500T280G(-L)-PLUS	FN 3359-600-99	44
T12	MD500T315G(-L)-PLUS	FN 3359-600-99	44
	MD500T355G(-L)-PLUS	FN 3359-800-99	39
	MD500T400G(-L)-PLUS	FN 3359-800-99	39
T13	MD500T500G(-A)-PLUS	FN 3359-1000-99	60
	MD500T560G(-A)-PLUS	FN 3359-1000-99	60
	MD500T630G(-A)-PLUS	FN 3359-1600-99	131
Note: T13 models with the model name containing -A are equipped with the built-in EMC filter 1600EBK1-60-HV.			

Table 5–28 Selection of Schaffner filters (three-phase 200 V to 240 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	FN 3258-7-44	3.8
	MD500-2T0.7GB-PLUS	FN 3258-7-44	3.8
	MD500-2T1.1GB-PLUS	FN 3258-7-44	3.8
	MD500-2T1.5GB-PLUS	FN 3258-16-44	6.1
T2	MD500-2T2.2GB-PLUS	FN 3258-16-44	6.1
	MD500-2T3.7GB-PLUS	FN 3258-30-44	11.8
T3	MD500-2T5.5GB-PLUS	FN 3258-42-44	15.7
T4	MD500-2T7.5GB-PLUS	FN 3258-42-44	15.7
T5	MD500-2T11G(B)-PLUS	FN 3258-75-44	31.2
T6	MD500-2T15G(B)-PLUS	FN 3258-75-44	31.2
	MD500-2T18.5G(B)-PLUS	FN 3258-75-44	31.2
T7	MD500-2T22G(B)-PLUS	FN 3258-100-44	34.5
	MD500-2T30G(B)-PLUS	FN 3258-130-44	43.1
T8	MD500-2T37G(B)-PLUS	FN 3258-180-44	58.3
	MD500-2T45G-PLUS	FN 3258-180-44	58.3
	MD500-2T55G-PLUS	FN 3359-250-28	49
T9	MD500-2T75G-PLUS	FN 3359-320-99	19
T10	MD500-2T90G-PLUS	FN 3359-400-99	29
	MD500-2T110G-PLUS	FN 3359-600-99	44
T11	MD500-2T132G-PLUS	FN 3359-600-99	44
T12	MD500-2T160G-PLUS	FN 3359-600-99	44
	MD500-2T200G-PLUS	FN 3359-800-99	39

Table 5–29 Selection of Schaffner filters (single-phase 200 V to 240 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T2	MD500-2S0.4GB-PLUS	FN 2090-8-06	-
	MD500-2S0.7GB-PLUS	FN 2090-12-06	-
	MD500-2S1.5GB-PLUS	FN 2090-20-08	-
	MD500-2S2.2GB-PLUS	FN 2090-30-08	-

The following figure shows the dimensions of FN 3258 series filters (50-180 A).

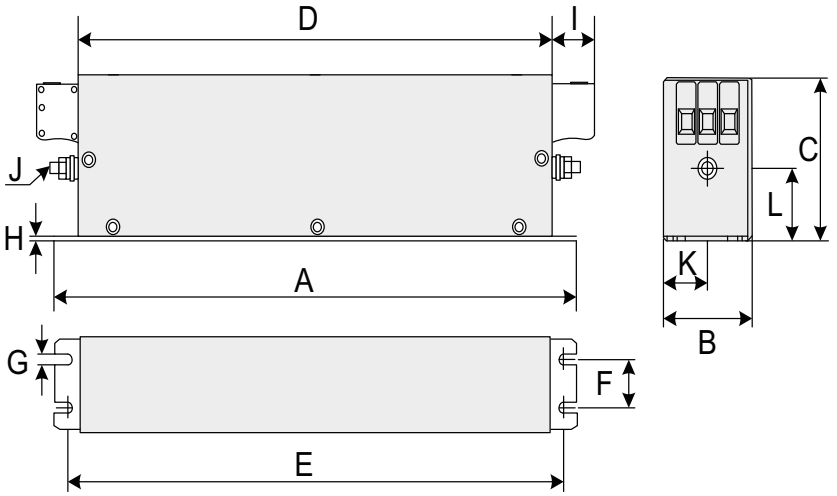


Figure 5-29 Dimensions of FN 3258 series filters (50-180 A)

Table 5–30 Dimensions of FN 3258 series filters (50-180 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
7	190	40	70	160	180	20	4.5	1	22	M5	20	29.5
16	250	45	70	220	235	25	5.4	1	22	M5	22.5	29.5
30	270	50	85	240	255	30	5.4	1	25	M5	25	39.5
42	310	50	85	280	295	30	5.4	1	25	M6	25	37.5
55	250	85	90	220	235	60	5.4	1	39	M6	42.5	26.5
75	270	80	135	240	255	60	6.5	1.5	39	M6	40	70.5
100	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
130	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
180	380	120	170	350	365	102	6.5	1.5	51	M10	60	47

The following figure shows the dimensions of FN 3359 series filters (150-250 A).

150A~250A

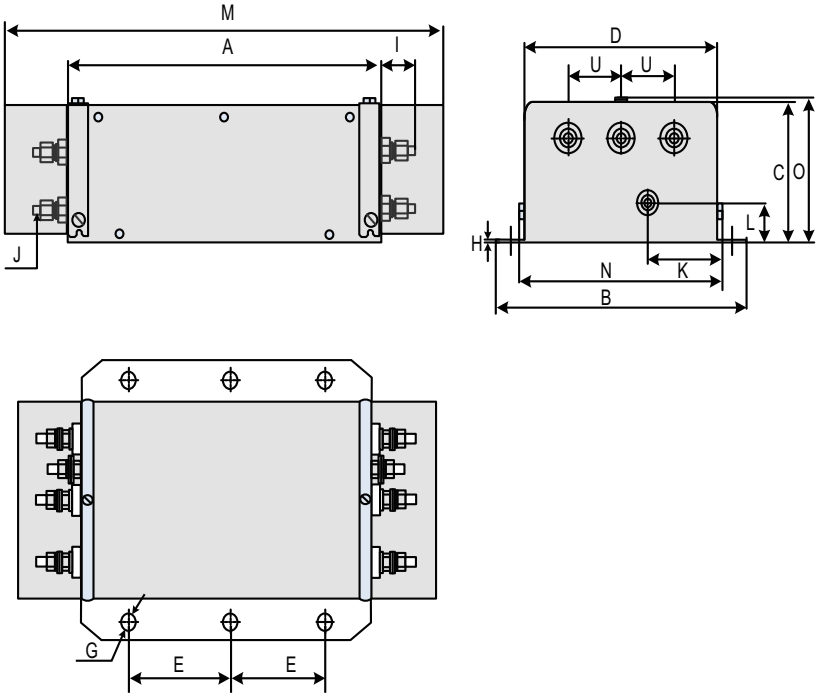


Figure 5-30 Dimensions of FN 3359 series filters (150-250 A)

Table 5–31 Dimensions of FN 3359 series filters (150-250 A) (unit: mm)

Code	Rated Current		
	150 A	180 A	250 A
A	300	300	300
B	210	210	230
C	120	120	125
D	160	160	180
E	120	120	120
F	185	185	205
G	ϕ12	ϕ12	ϕ12
H	2	2	2
I	33	33	33
J	M10	M10	M10
K	55	55	62.5
L	30	30	35
M	420	420	420
N	171	171	191
O	127	127	132

Code	Rated Current		
	150 A	180 A	250 A
S	-	-	-
T	-	-	-
U	50	50	55
V	-	-	-
W	-	-	-
X	-	-	-
Y	-	-	-
Z	-	-	-

The following figure shows the dimensions of FN 3359 series filters (320-2500 A).

320A~2500A

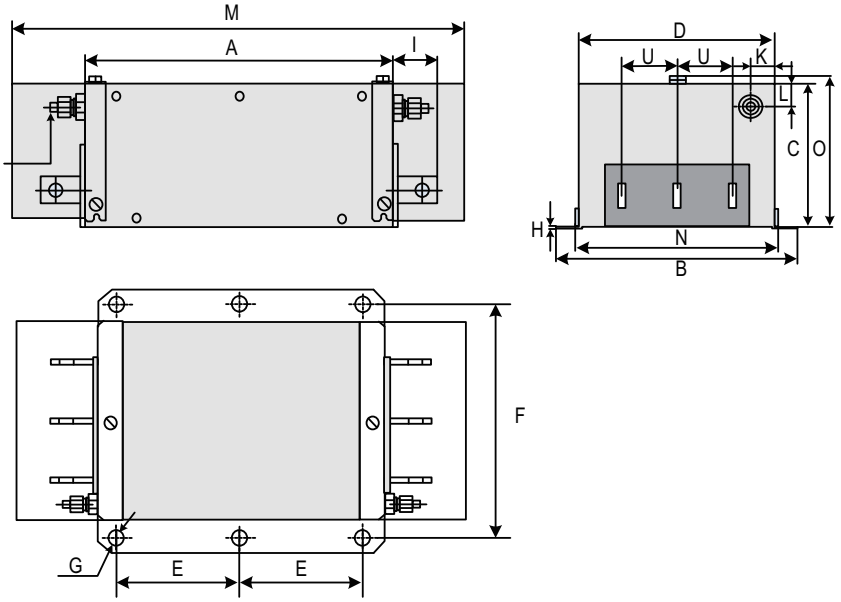


Figure 5-31 Dimensions of FN 3359 series filters (320-2500 A)

The following figure shows dimensions of the copper busbar.

320A~1000A

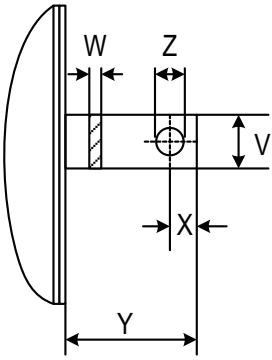


Figure 5-32 Dimensions of the copper busbar

Table 5–32 Dimensions of FN 3359 series filters (320-2500 A) (unit: mm)

Code	Rated Current						
	320 A	400 A	600 A	800 A	1000 A	1600 A	2500 A
A	300	300	300	350	350	400	600
B	260	260	260	280	280	300	370
C	115	115	135	170	170	160	200
D	210	210	210	230	230	250	300
E	120	120	120	145	145	170	250
F	235	235	235	255	255	275	330
G	ϕ12	ϕ12	ϕ12	ϕ12	ϕ12	ϕ12	ϕ14
H	2	2	2	3	3	3	3
I	43	43	43	53	53	93	98
J	M12	M12	M12	M12	M12	M12	M16
K	20	20	20	25	25	25	25
L	20	20	20	25	25	25	25
M	440	440	440	510	510	-	-
N	221	221	221	241	241	-	-
O	122	122	142	177	177	-	-
S	-	-	-	-	-	26	35
T	-	-	-	-	-	26	35
U	60	60	60	60	60	60	100
V	25	25	25	40	40	60	70
W	6	6	8	8	8	10	15
X	15	15	15	20	20	17	20
Y	40	40	40	50	50	90	95
Z	ϕ10.5	ϕ10.5	ϕ10.5	ϕ14	ϕ14	ϕ14	ϕ14

Models and dimensions of Jianli filters

Table 5–33 Selection of Jianli filters (three-phase 380 V to 480 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T1	MD500T0.4GB-PLUS	DL-5EBK5	6.9
	MD500T0.7GB-PLUS	DL-5EBK5	6.9
	MD500T1.1GB-PLUS	DL-5EBK5	6.9
	MD500T1.5GB-PLUS	DL-5EBK5	6.9
	MD500T2.2GB-PLUS	DL-10EBK5	6.9
	MD500T3.0GB-PLUS	DL-10EBK5	6.9
T2	MD500T3.7GB-PLUS	DL-16EBK5	8.5
	MD500T5.5GB-PLUS	DL-25EBK5	9.4
T3	MD500T7.5GB-PLUS	DL-25EBK5	11
	MD500T11GB-PLUS	DL-35EBK5	19.2
T4	MD500T15GB-PLUS	DL-50EBK5	21.7
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	DL-50EBK5	21.7
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	DL-65EBK5	27.4
T6	MD500T30G(B)-PLUS	DL-65EBK5	27.4
	MD500T37G(B)-PLUS	DL-80EBK5	32.6
T7	MD500T45G(B)-PLUS	DL-100EBK5	33
	MD500T55G(B)-PLUS	DL-130EBK5	37.5
T8	MD500T75G(B)-PLUS	DL-160EBK5	38.4
	MD500T90G-PLUS	DL-200EBK5	34
	MD500T110G-PLUS	DL-250EBK5	49
T9	MD500T132G-PLUS	DL-300EBK3	49
	MD500T160G-PLUS	DL-400EBK3	19
T10	MD500T200G(-L)-PLUS	DL-400EBK3	29
	MD500T220G(-L)-PLUS	DL-600EBK3	44
T11	MD500T250G(-L)-PLUS	DL-600EBK3	44
	MD500T280G(-L)-PLUS	DL-600EBK3	44
T12	MD500T315G(-L)-PLUS	DL-600EBK3	44
	MD500T355G(-L)-PLUS	DL-700EBK3	39
	MD500T400G(-L)-PLUS	DL-700EBK3	39
T13	MD500T500G(-A)-PLUS	DL-1000EBK3	60
	MD500T560G(-A)-PLUS	DL-1000EBK3	60
	MD500T630G(-A)-PLUS	1600EBK1-60-HV	131
Note: T13 models with the model name containing -A are equipped with the built-in EMC filter 1600EBK1-60-HV.			

Table 5–34 Selection of Jianli filters (three-phase 200 V to 240 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	DL-5EBK5	6.9
	MD500-2T0.7GB-PLUS	DL-5EBK5	6.9
	MD500-2T1.1GB-PLUS	DL-10EBK5	6.9
	MD500-2T1.5GB-PLUS	DL-10EBK5	6.9
T2	MD500-2T2.2GB-PLUS	DL-16EBK5	8.5
	MD500-2T3.7GB-PLUS	DL-25EBK5	9.4
T3	MD500-2T5.5GB-PLUS	DL-35EBK5	19.2
T4	MD500-2T7.5GB-PLUS	DL-50EBK5	21.7
T5	MD500-2T11G(B)-PLUS	DL-65EBK5	27.4
T6	MD500-2T15G(B)-PLUS	DL-65EBK5	27.4
	MD500-2T18.5G(B)-PLUS	DL-80EBK5	32.6
T7	MD500-2T22G(B)-PLUS	DL-100EBK5	33
	MD500-2T30G(B)-PLUS	DL-130EBK5	37.5
T8	MD500-2T37G(B)-PLUS	DL-160EBK5	38.4
	MD500-2T45G-PLUS	DL-250EBK5	49
	MD500-2T55G-PLUS	DL-250EBK5	49
T9	MD500-2T75G-PLUS	DL-300EBK3	49
T10	MD500-2T90G-PLUS	DL-400EBK3	29
	MD500-2T110G-PLUS	DL-600EBK3	44
T11	MD500-2T132G-PLUS	DL-600EBK3	44
T12	MD500-2T160G-PLUS	DL-600EBK3	44
	MD500-2T200G-PLUS	DL-700EBK3	39

Table 5–35 Selection of Jianli filters (single-phase 200 V to 240 V)

Structure	AC Drive Model	Filter Model	Power Consumption (W)
T2	MD500-2S0.4GB-PLUS	DL-10TH3	-
	MD500-2S0.7GB-PLUS	DL-20TH1	-
	MD500-2S1.5GB-PLUS	DL-20TH1	-
	MD500-2S2.2GB-PLUS	DL-30TH1	-

The following figure and table show the dimensions of Jianli filters (50-200 A).

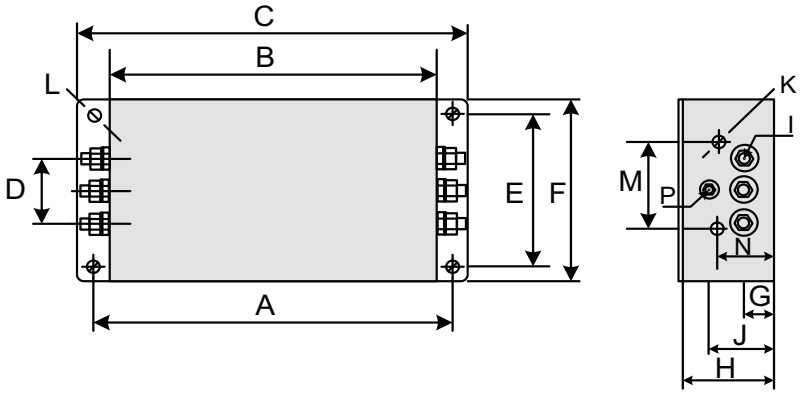


Figure 5-33 Dimensions of Jianli filters (50-200 A)

Table 5–36 Dimensions of Jianli filters (50-200 A) (unit: mm)

Model	A	B	C	D	E	F	G	H	I	J	K	M	N	P	L
DL-25EBK5	243	224	265	58	70	102	25	92	M6	58	M4	74	49	M6	6.4 x 9.4
DL-35EBK5															
DL-50EBK5															
DL-65EBK5															
DL-80EBK5	354	323	388	66	155	188	30	92	M8	62	M4	86	56	M8	6.4 x 9.4
DL-100EBK5															
DL-130EBK5															
DL-160EBK5															
DL-200EBK5															

The following figure shows the dimensions of Jianli series filter (250-800 A).

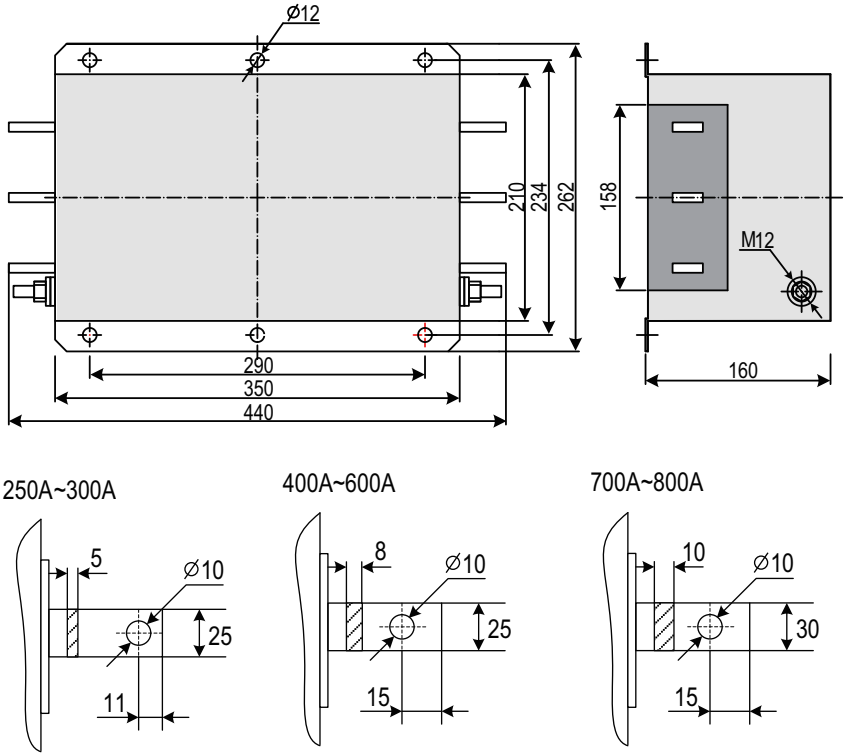


Figure 5-34 Dimensions of Jianli filters (250-800 A) (unit: mm)

Dimensions of Jianli filters (1000 A)

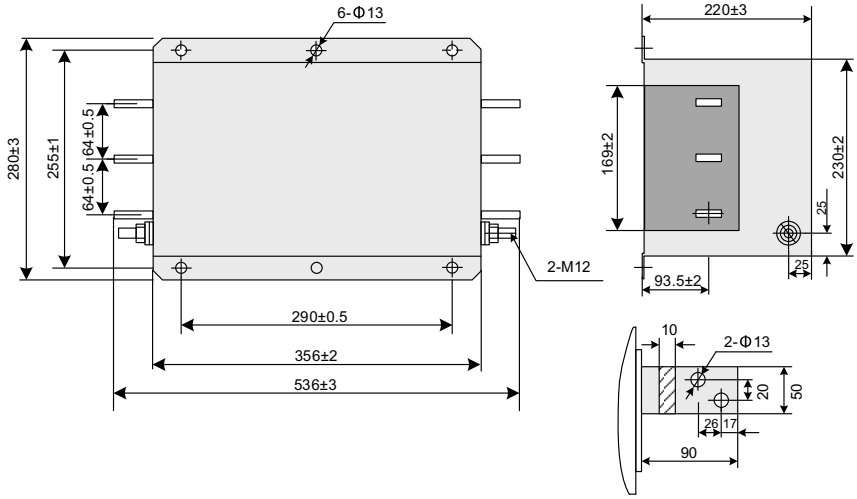


Figure 5-35 Dimensions of Jianli filters (1000 A) (unit: mm)

5.4.4 Simple Filter

A simple filter can be used to suppress the RF electromagnetic noise from the power grid and the AC drive during operation. For an AC drive with an earth leakage circuit breaker, a simple filter can be installed on the input side to prevent malfunction of the earth leakage circuit breaker.

The simple filter must be grounded securely and the cable between the filter and AC drive must be shorter than 30 cm. The grounding terminal of the simple filter must be connected to the grounding terminal of the drive, and the grounding cable must be as short as possible and cannot exceed 30 cm.

Dimensions

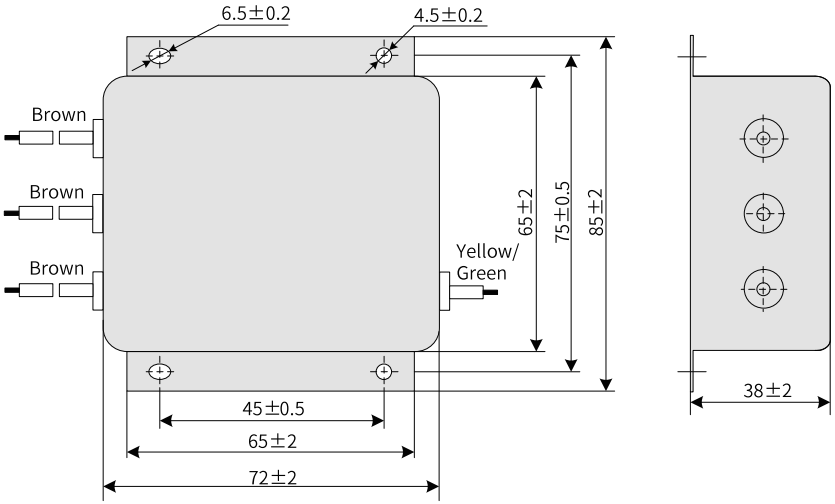


Figure 5-36 Outline dimensions of the simple filter

Table 5–37 Outline dimensions of the simple filter

Model	Code	Simple Filter Dimension (Length x Width x Height) (unit: mm)	Mounting Dimension (Length x Width) (unit: mm)
Cxy-1-1	11025018	85 x 72 x 38	45 x 75

Installation Method

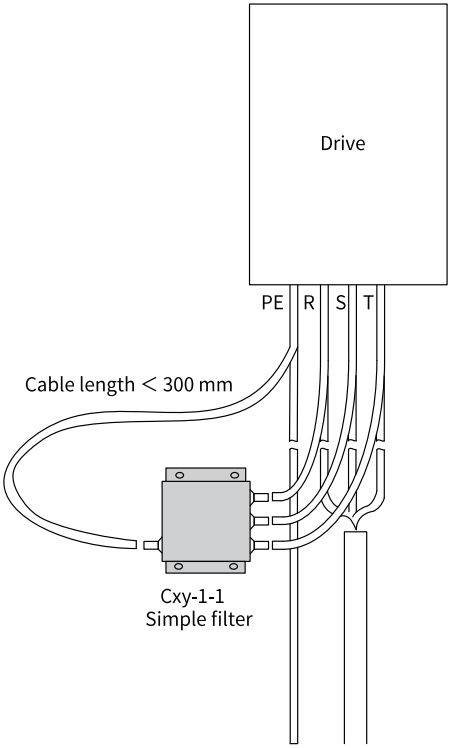


Figure 5-37 Simple filter installation

5.4.5 Braking Components

Selecting the resistance of the braking resistor

During braking, almost all the regenerative energy of the motor is consumed by the braking resistor. The resistance of the braking resistor is calculated by the following equation: U x U/R = Pb

U indicates the braking voltage used to stabilize the system braking. The value of U varies with systems. The default braking voltage of the AC drive is 760 V, which can be adjusted through F9-08.

Pb indicates the braking power.

Selecting the power of the braking resistor

In theory, the power of the braking resistor is consistent with the braking power. However, in consideration of the derating value K, the relationship between the power of the braking resistor and the braking power is as follows: K x Pr = Pb x D

K: about 50%

Pr: Power of the braking resistor

D: Braking frequency, which is the proportion of the regenerative process to the whole working process

The power of the braking resistor Pr can be calculated based on the following equations:

K x Pr = Pb x D = U x U/R x D

Pr = (U x U x D)/(R x K)

K is the derating coefficient of the braking resistor. A low K value ensures that the braking resistor does not get overheated. You can increase the K value appropriately if the braking resistor features good heat dissipation; however, do not set K to a value higher than 50%. Failure to comply may result in a fire caused by overheating of the braking resistor.

The braking frequency D is determined based on actual applications. *"Table 5–38 " on page 103* lists the typical values in common occasions.

Table 5–38 Braking frequencies in common occasions

Common Occasion	Elevator	Winding and unwinding	Centrifuge	Occasional braking load	Regular applications
Value of the Braking Frequency	20% to 30%	20% to 30%	50% to 60%	5%	10%

Outline dimensions of the braking unit

The braking unit has two types of outline dimensions.

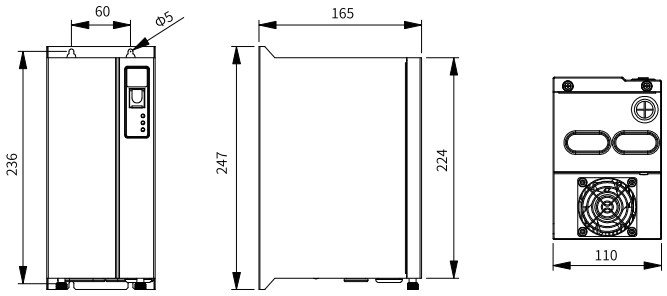


Figure 5-38 Outline dimensions (unit: mm) of MDBUN series braking units (MDBUN-45-2T to MDBUN-90-2T, MDBUN-45-T to MDBUN-90-T, MDBUN-45-5T to MDBUN-90-5T)

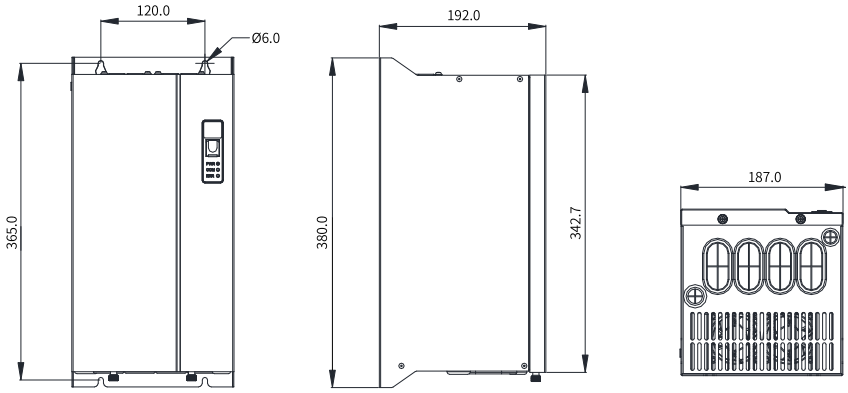


Figure 5-39 Outline dimensions (unit: mm) of MDBUN series braking units (MDBUN-200-T, MDBUN-200-5T, MDBUN-200-7T)

Braking unit models

Note

The value in the table is obtained under working conditions featuring a braking usage ratio of 10% for heavy overload G-type equipment and a maximum braking time of 10s.

Table 5–39 Selection of braking components (three-phase 380 V to 480 V)

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Specifications of Recommended Braking Resistors	Qty. of Braking Resistors		
MD500T0.4GB-PLUS	Built-in, standard		80 W, 1450 Ω	1	AC drive model with the model name containing "B"	96
MD500T0.7GB-PLUS			140 W, 800 Ω	1		96
MD500T1.1GB-PLUS			220 W, 500 Ω	1		96
MD500T1.5GB-PLUS			300 W, 380 Ω	1		96
MD500T2.2GB-PLUS			440 W, 260 Ω	1		64
MD500T3.0GB-PLUS			600 W, 190 Ω	1		64
MD500T3.7GB-PLUS			740 W, 150 Ω	1		32
MD500T5.5GB-PLUS			1100 W, 100 Ω	1		32
MD500T7.5GB-PLUS			1500 W, 75 Ω	1		32
MD500T11GB-PLUS			2200 W, 50 Ω	1		24
MD500T15GB-PLUS			3000 W, 38 Ω	1		24
MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	Built-in, optional		4000 W, 32 Ω	1	AC drive model with the model name containing "B"	24
MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS			4500 W, 27 Ω	1		24
MD500T30G(B)-PLUS			6000 W, 20 Ω	1		19.2
MD500T37G(B)-PLUS			7000 W, 16 Ω	1		14.8
MD500T45G(B)-PLUS			9000 W, 13 Ω	1		12.8
MD500T55G(B)-PLUS			11000 W, 10.5 Ω	1		9.6
MD500T75G(B)-PLUS			15000 W, 7.7 Ω	1		6.8
MD500T90G-PLUS	MDBUN-60-T	2	9000 W, 10.2 Ω	2	Input voltage ⩽ 440 VAC	10.2 x 2
	MDBUN-60-5T	2	9000 W, 12.8 Ω	2	Input voltage > 440 VAC	11.4 x 2
MD500T110G-PLUS	MDBUN-90-T	2	11000 W, 8.0 Ω	2	Input voltage ⩽ 440 VAC	6.8 x 2
	MDBUN-90-5T	2	11000 W, 10.5 Ω	2	Input voltage > 440 VAC	7.7 x 2
MD500T132G-PLUS	MDBUN-90-T	2	13000 W, 6.8 Ω	2	Input voltage ⩽ 440 VAC	6.8 x 2
	MDBUN-90-5T	2	13000 W, 8.8 Ω	2	Input voltage > 440 VAC	7.7 x 2
MD500T160G-PLUS	MDBUN-200-T	2	16000 W, 2.8 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	16000 W, 3.6 Ω	2	Input voltage > 440 VAC	2.8 x 2

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Specifications of Recommended Braking Resistors	Qty. of Braking Resistors		
MD500T200G(-L)-PLUS	MDBUN-200-T	2	21000 W, 4.1 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	21000 W, 5.3 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD500T220G(-L)-PLUS	MDBUN-200-T	2	27000 W, 3.2 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	27000 W, 4.1 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD500T250G(-L)-PLUS	MDBUN-200-T	3	20000 W, 4.3 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	20000 W, 5.5 Ω	2	Input voltage > 440 VAC	3.0 x 3
MD500T280G(-L)-PLUS	MDBUN-200-T	3	23000 W, 3.8 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	23000 W, 4.9 Ω	2	Input voltage > 440 VAC	3.0 x 3
MD500T315G(-L)-PLUS	MDBUN-200-T	3	26000 W, 3.4 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	26000 W, 4.3 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD500T355G(-L)-PLUS	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD500T400G(-L)-PLUS	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD500T500G(-A)-PLUS	MDBU-200-B	4	32000 W, 2.8 Ω	4	Input voltage ⩽ 440 VAC	2.5 x 4
	MDBU-200-C	4	32000 W, 3.7 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD500T560G(-A)-PLUS	MDBU-200-B	4	36000 W, 2.5 Ω	4	Input voltage ⩽ 440 VAC	2.5 x 4
	MDBU-200-C	4	39000 W, 3.0 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD500T630G(-A)-PLUS	MDBU-200-B	5	32000 W, 2.8 Ω	4	Input voltage ⩽ 440 VAC	2.5 x 5
	MDBU-200-C	5	32000 W, 3.7 Ω	4	Input voltage > 440 VAC	3.0 x 5

Table 5–40 Selection of braking components (three-phase 200 V to 240 V)

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Specifications of Recommended Braking Resistors	Qty. of Braking Resistors		
MD500-2T0.4GB-PLUS	Built-in, standard		90 W, 300 Ω	1	AC drive model with the model name containing "B"	48
MD500-2T0.7GB-PLUS			160 W, 170 Ω	1		48
MD500-2T1.1GB-PLUS			250 W, 110 Ω	1		32
MD500-2T1.5GB-PLUS			340 W, 80 Ω	1		32
MD500-2T2.2GB-PLUS			500 W, 55 Ω	1		16
MD500-2T3.7GB-PLUS			800 W, 33 Ω	1		16
MD500-2T5.5GB-PLUS			1300 W, 22 Ω	1		10
MD500-2T7.5GB-PLUS			1700 W, 16 Ω	1		10
MD500-2T11G(B)-PLUS	Built-in, optional		2300 W, 12 Ω	1		12
MD500-2T15G(B)-PLUS			3000 W, 9 Ω	1		9
MD500-2T18.5G(B)-PLUS			3900 W, 7 Ω	1		7
MD500-2T22G(B)-PLUS			4600 W, 6 Ω	1		6
MD500-2T30G(B)-PLUS			5500 W, 5 Ω	1		5
MD500-2T37G(B)-PLUS			6800 W, 4 Ω	1		4
MD500-2T45G-PLUS	MDBUN-60-2T	2	5000 W, 5.4 Ω	2	-	4.9
MD500-2T55G-PLUS	MDBUN-60-2T	2	6000 W, 4.4 Ω	2	-	4
MD500-2T75G-PLUS	MDBUN-90-2T	2	7500 W, 4.0 Ω	2	-	3.7
MD500-2T90G-PLUS	MDBUN-90-2T	3	6000 W, 4.0 Ω	3	-	3.7
MD500-2T110G-PLUS	MDBUN-90-2T	3	7500 W, 4.0 Ω	3	-	3.7
MD500-2T132G-PLUS	MDBUN-90-2T	4	7000 W, 4.0 Ω	4	-	3.7
MD500-2T160G-PLUS	MDBUN-90-2T	5	6500 W, 4.0 Ω	5	-	3.7
MD500-2T200G-PLUS	MDBUN-90-2T	6	7000 W, 4.0 Ω	6	-	3.7

Table 5–41 Selection of braking components (single-phase 200 V to 240 V)

Model	Braking Unit	125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
		Specifications of Recommended Braking Resistors	Qty. of Braking Resistors		
MD500-2S0.4GB-PLUS	Built-in, standard	80 W, 200 Ω	1	AC drive model with the model name containing "B"	64
MD500-2S0.7GB-PLUS		80 W, 150 Ω	1		64
MD500-2S1.5GB-PLUS		100 W, 100 Ω	1		32
MD500-2S2.2GB-PLUS		100 W, 70 Ω	1		32

Note

- The default initial braking voltages of built-in braking units are 760 V and 350 V for the 380-480 V models and 200-240 V models, respectively.
- The default initial braking voltage of the external braking units MDBUN-60-T, MDBUN-90-T, and MDBUN-200-T is 670 V. These braking units apply to grids with the input voltage lower than or equal to 440 VAC. The default initial braking voltage of the external braking units MDBUN-60-5T, MDBUN-90-5T, and MDBUN-200-5T is 760 V. These braking units apply to grids with the input voltage higher than 440 VAC. You can adjust the initial braking voltage based on the grid voltage. Higher initial braking voltage requires higher braking resistance.
- The values in the preceding table are only for reference. You can select different resistance and power based on actual conditions. Note that the resistance cannot be lower than the minimum braking resistance listed in the table. The power may be higher than the recommended value in the table. Select the braking resistor based on the generation power of the motor in the actual system, system inertia, deceleration time, and potential energy load.
- The larger the system inertia, the shorter the deceleration time and the more frequency braking required. For the system with large inertia, select a braking resistor with high power and low resistance.
- For details on how to install and use the MDBUN, see *MDBUN Series Braking Unit User Guide*.

5.4.6 AFE Unit

The active front end (AFE) is an optional unit used to feed the energy generated by the motor during braking back to the power grid. This eliminates the needs of the braking unit and braking resistor and reduces heat emission. Inovance AFE features high energy efficiency, low noise, low harmonics, and high power factor.

Note

The optional AFE unit is not available for T13 models.

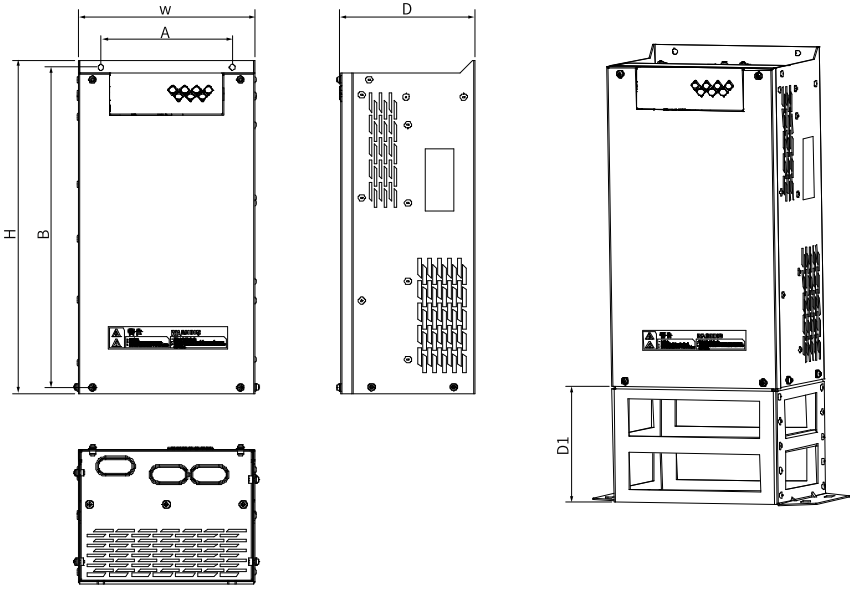


Figure 5-40 Dimensions of AFE unit of MD051 series (unit: mm)

Table 5–42 Dimensions of AFE unit of MD051 series

Model	Outline Dimensions (mm)			Bracket	Mounting Hole (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	W	D	D1	A	B		
MD051T5.5G	365	200	153	121	160	350	6.0	8.5
MD051T7.5G								8.7
MD051T11G								9.0
MD051T15G	405	215	165	142	160	390	7.0	14.0
MD051T18.5G								14.8
MD051T22G	505	260	171	161	160	490	7.0	18.2
MD051T30G								20.0

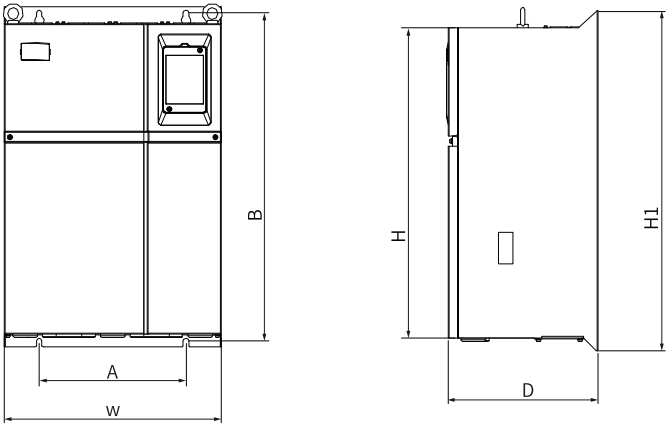


Figure 5-41 Dimensions of AFE unit of MD050 series (unit: mm)

Table 5–43 Dimensions of AFE unit of MD050 series

Model	Outline Dimensions (mm)				Mounting Hole (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	H1	W	D	A	B		
MD050-T37G	549	600	385	265	260	580	10	32
MD050-T45G								
MD050-T55G								
MD050-T75G	660	700	473	307	343	678	10	47
MD050-T90G								
MD050-T110G	880	930	579	380	449	903	10	90
MD050-T132G								
MD050-T160G								
MD050-T200G	983	1060	650	377	420	1030	12	130
MD050-T220G								
MD050-T250G								
MD050-T280G								
MD050-T315G	1203	1358	800	400	520	1300	14	200
MD050-T355G								
MD050-T400G								
MD050-T450G								

Note

For installation and use of the energy feedback unit, see *MD051 Series Active Front End (AFE) User Guide*.

5.4.7 Output Reactor

With an output reactor installed on the output side of the drive, the excessive dV/dt can be reduced, lowering the voltage stress on the motor winding. This protects the motor winding, lowers the motor temperature, and prolongs the service life of the motor.

Table 5–44 Minimum length of the cable for the output reactor (three-phase 380 V to 480 V)

AC Drive Power (kW)	Rated Voltage (V)	Min. Length of the Cable for the Output Reactor (m)
0.4–3.0	200–500	50
3.7	200–500	50
5.5	200–500	70
7.5	200–500	100
11	200–500	110
15	200–500	125
18.5	200–500	135
22	200–500	150
⩾ 30	280–690	150

Table 5–45 Minimum length of the cable for the output reactor (three-phase 200 V to 240 V)

AC Drive Power (kW)	Rated Voltage (V)	Min. Length of the Cable for the Output Reactor (m)
0.4–3	200–500	50
3.7	200–500	70
5.5	200–500	110
7.5	200–500	125
⩾ 11	200–500	150

Models and dimensions (Inovance)

Models and dimensions of the recommended Inovance AC output reactors are as follows.

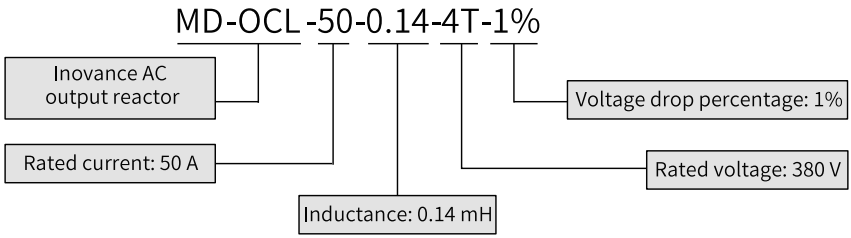


Figure 5-42 AC output reactor model

Note

- The following recommended AC output reactors are applicable only for T1 to T9 models.
- For T10 to T12 models, purchase AC output reactors with a model number containing "-L".
- T13 models are delivered with an AC output reactor.

Table 5–46 Selection of Inovance AC output reactors (three-phase 380 V to 480 V)

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T1	MD500T0.4GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T0.7GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T1.1GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T1.5GB-PLUS	MD-OCL-7-1.0-4T-1%	1.0	-
	MD500T2.2GB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
	MD500T3.0GB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD500T3.7GB-PLUS	MD-OCL-15-0.47-4T-1%	0.47	-
	MD500T5.5GB-PLUS	MD-OCL-20-0.35-4T-1%	0.35	-
T3	MD500T7.5GB-PLUS	MD-OCL-30-0.23-4T-1%	0.23	-
	MD500T11GB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T4	MD500T15GB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	MD-OCL-50-0.14-4T-1%	0.14	-
T6	MD500T30G(B)-PLUS	MD-OCL-60-0.12-4T-1%	0.12	-
	MD500T37G(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
T7	MD500T45G(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
	MD500T55G(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
T8	MD500T75G(B)-PLUS	MD-OCL-150-0.047-4T-1%	0.047	-
	MD500T90G-PLUS	MD-OCL-200-0.035-4T-1%	0.035	-
	MD500T110G-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
T9	MD500T132G-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
	MD500T160G-PLUS	MD-OCL-490-0.014-4T-1%	0.014	-

Note:
For T10 to T12 models, purchase AC output reactors with the name containing "-L".
The T13 model is equipped with a built-in output reactor as standard.

Table 5–47 Selection of Inovance AC output reactors (three-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500-2T0.7GB-PLUS	MD-OCL-7-1.0-4T-1%	1.0	-
	MD500-2T1.1GB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
	MD500-2T1.5GB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD500-2T2.2GB-PLUS	MD-OCL-15-0.47-4T-1%	0.47	-
	MD500-2T3.7GB-PLUS	MD-OCL-20-0.35-4T-1%	0.35	-
T3	MD500-2T5.5GB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T4	MD500-2T7.5GB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD500-2T11G(B)-PLUS	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD500-2T15G(B)-PLUS	MD-OCL-60-0.12-4T-1%	0.12	-
	MD500-2T18.5G(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
T7	MD500-2T22G(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
	MD500-2T30G(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
T8	MD500-2T37G(B)-PLUS	MD-OCL-150-0.047-4T-1%	0.047	-
	MD500-2T45G-PLUS	MD-OCL-200-0.035-4T-1%	0.035	-
	MD500-2T55G-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
T9	MD500-2T75G-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-

Table 5–48 Model selection of Inovance AC output reactors (single-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T2	MD500-2S0.4GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500-2S0.7GB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500-2S1.5GB-PLUS	MD-OCL-7-1.0-4T-1%	1.0	-
	MD500-2S2.2GB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-

The following figure shows the dimensions of the AC output reactor.

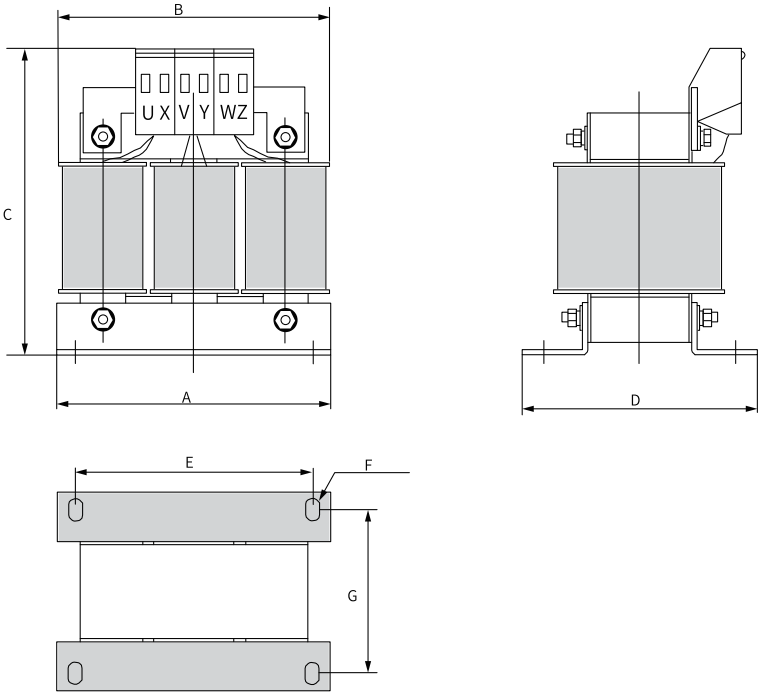


Figure 5-43 Dimensions of 5-10 A AC output reactors

Table 5–49 Dimensions of 5-10 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
5	105 ± 1	110	130	84 ± 2	91 ± 1	Φ6 x 11	65 ± 2
7	105 ± 1	110	130	84 ± 2	91 ± 1	Φ6 x 11	65 ± 2
10	105 ± 1	110	130	84 ± 2	91 ± 1	Φ6 x 11	65 ± 2

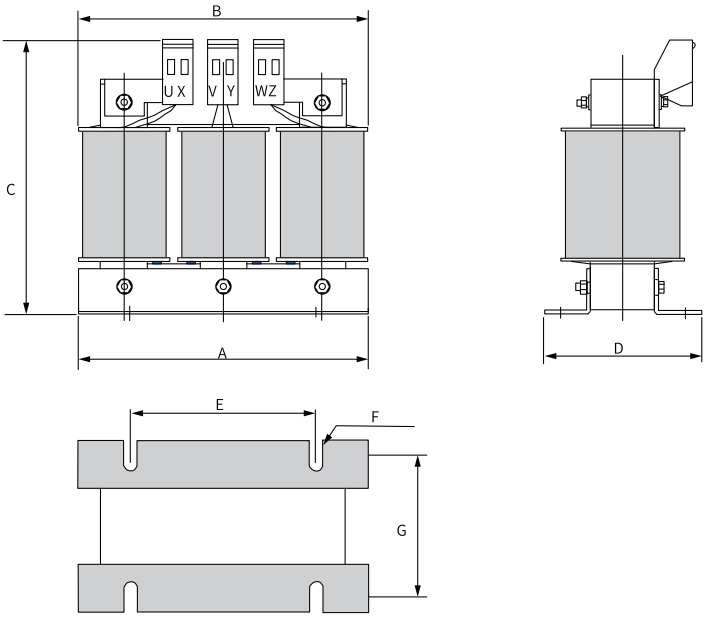


Figure 5-44 Dimensions of 15 A AC output reactors

Table 5–50 Dimensions of 15 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
15	148 ± 1	155	140	76 ± 2	95 ± 1	Φ6 x 15	61 ± 2

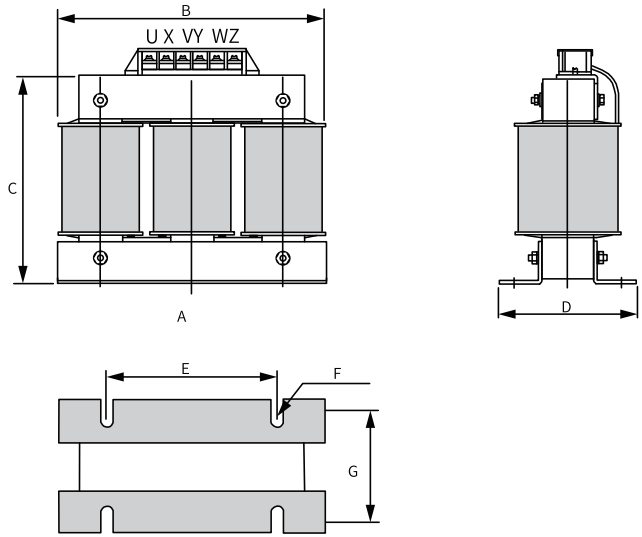


Figure 5-45 Dimensions of 20 A AC output reactors

Table 5–51 Dimensions of 20 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
20	148 ± 1	155	165	76 ± 2	95 ± 1	Φ6 x 15	61 ± 2

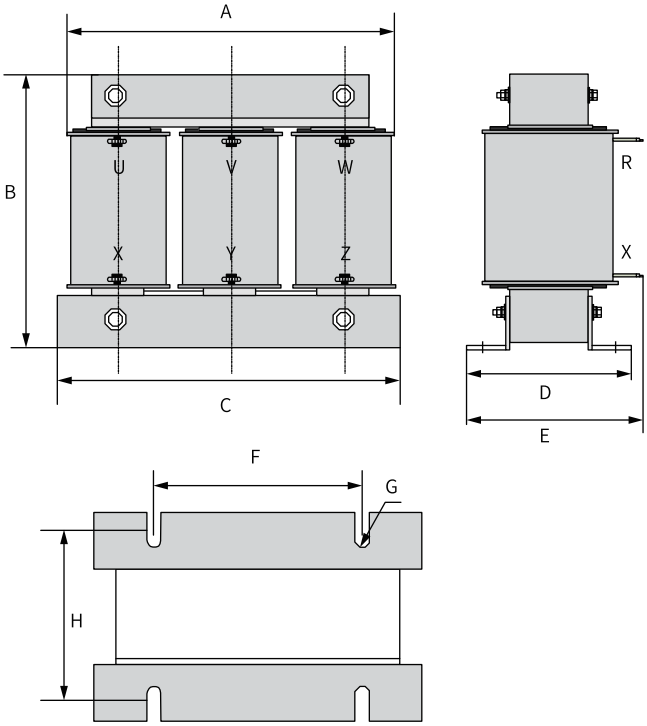


Figure 5-46 Dimensions of 30-60 A AC output reactors

Table 5–52 Dimensions of 30-60 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H
30	155	130	148 ± 1	95 ± 2	135	95 ± 1	Φ6 x 15	80 ± 2
40	155	130	148 ± 1	95 ± 2	135	95 ± 1	Φ6 x 15	80 ± 2
50	155	130	148 ± 1	95 ± 2	135	95 ± 1	Φ6 x 15	80 ± 2
60	195	165	188 ± 1	92 ± 2	130	120 ± 1	Φ8.5 x 20	72 ± 2

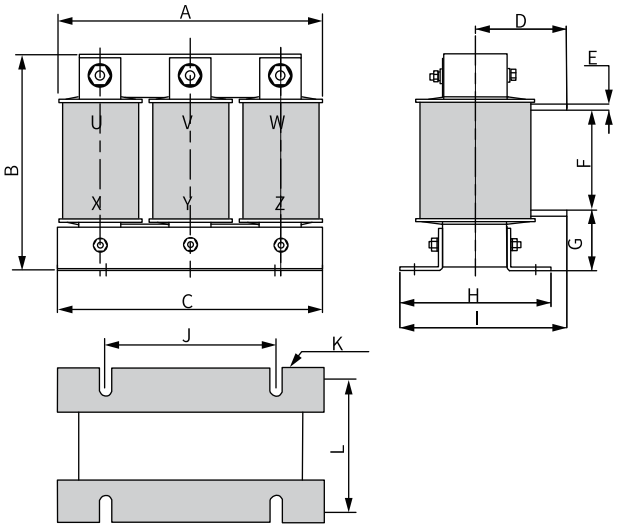


Figure 5-47 Dimensions of 80-120 A AC output reactors

Table 5–53 Dimensions of 80-120 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
80	195	165	188 ± 1	68 ± 10	4	75 ± 5	40 ± 5	92 ± 2	130	120 ± 1	Φ8.5 x 20	72 ± 2
90	195	165	188 ± 1	68 ± 10	4	75 ± 5	40 ± 5	92 ± 2	130	120 ± 1	Φ8.5 x 20	72 ± 2
120	195	165	188 ± 1	78 ± 10	4	75 ± 5	40 ± 5	112 ± 2	135	120 ± 1	Φ8.5 x 20	72 ± 2

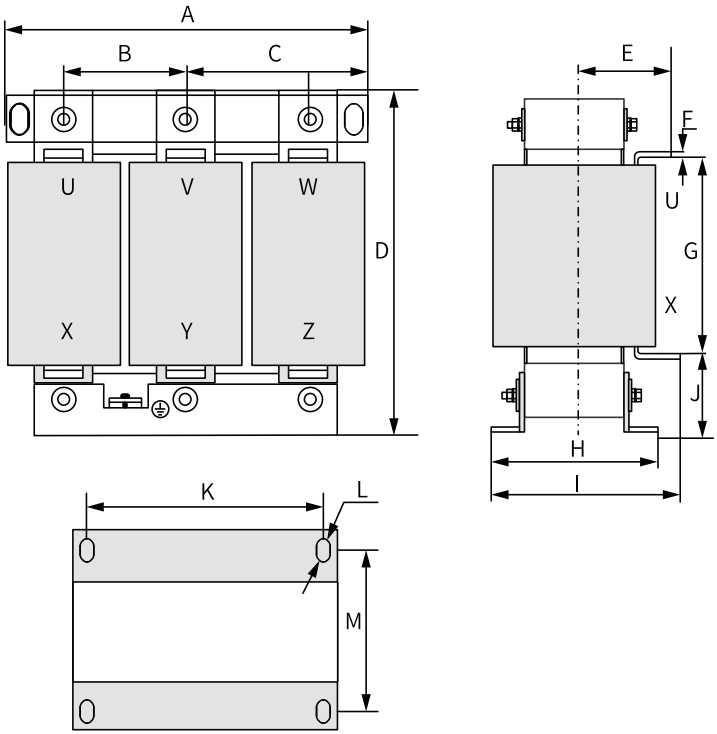


Figure 5-48 Dimensions of 150-250 A AC output reactors

Table 5–54 Dimensions of 150-250 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81 ± 5	81 ± 5	230	97 ± 10	5	140 ± 5	113 ± 2	170	42 ± 5	182 ± 1	Φ11 x 18	87 ± 2
200	250	81 ± 5	81 ± 5	230	102 ± 10	5	140 ± 5	123 ± 2	175	42 ± 5	182 ± 1	Φ11 x 18	97 ± 2
250	250	81 ± 5	81 ± 5	230	102 ± 10	5	140 ± 5	123 ± 2	175	42 ± 5	182 ± 1	Φ11 x 18	97 ± 2

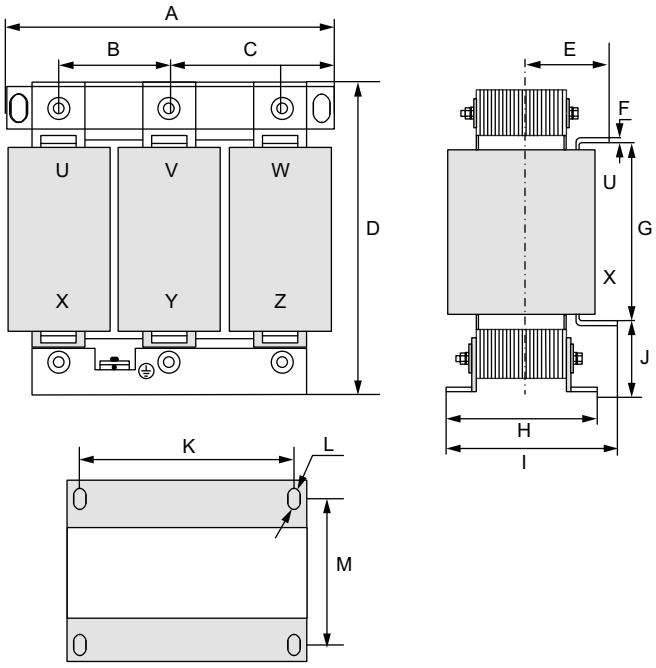


Figure 5-49 Dimensions of 330 A AC output reactors

Table 5–55 Dimensions of 330 A AC output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
330	290	95 ± 5	95 ± 5	250	110 ± 10	5	155 ± 5	132 ± 2	190	45 ± 5	214 ± 1	Φ11 x 18	160 ± 2

Models and dimensions (Schaffner)

Models and dimensions of the recommended Schaffner AC output reactors are as follows.

Table 5–56 Model selection of Schaffner output reactors

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T1	MD500T0.4GB-PLUS	RWK 305-4-KL	1.47	22
	MD500T0.7GB-PLUS	RWK 305-4-KL	1.47	22
	MD500T1.1GB-PLUS	RWK 305-4-KL	1.47	22
	MD500T1.5GB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500T2.2GB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500T3.0GB-PLUS	RWK 305-10-KL	0.588	30
T2	MD500T3.7GB-PLUS	RWK 305-14-KL	0.42	34
	MD500T5.5GB-PLUS	RWK 305-17-KL	0.364	38
T3	MD500T7.5GB-PLUS	RWK 305-24-KL	0.245	45
	MD500T11GB-PLUS	RWK 305-32-KL	0.184	55
T4	MD500T15GB-PLUS	RWK 305-45-KL	0.131	60
T5	MD500T18.5G(B)-PLUS MD500T18.5G(B)-T-PLUS	RWK 305-45-KL	0.131	60
	MD500T22G(B)-PLUS MD500T22G(B)-T-PLUS	RWK 305-60-KL	0.098	65
T6	MD500T30G(B)-PLUS	RWK 305-72-KL	0.082	70
	MD500T37G(B)-PLUS	RWK 305-90-KL	0.065	75
T7	MD500T45G(B)-PLUS	RWK 305-110-KL	0.053	90
	MD500T55G(B)-PLUS	RWK 305-156-KS	0.038	120
T8	MD500T75G(B)-PLUS	RWK 305-182-KS	0.032	140
	MD500T90G-PLUS	RWK 305-230-KS	0.026	180
	MD500T110G-PLUS	RWK 305-280-KS	0.021	220
T9	MD500T132G-PLUS	RWK 305-330-KS	0.018	240
	MD500T160G-PLUS	RWK 305-400-S	0.015	330
T10	MD500T200G(-L)-PLUS	RWK 305-500-S	0.012	340
	MD500T220G(-L)-PLUS	RWK 305-600-S	0.01	380
T11	MD500T250G(-L)-PLUS	RWK 305-600-S	0.01	380
	MD500T280G(-L)-PLUS	RWK 305-680-S	0.009	410
T12	MD500T315G(-L)-PLUS	RWK 305-790-S	0.007	590
	MD500T355G(-L)-PLUS	RWK 305-910-S	0.006	740
	MD500T400G(-L)-PLUS	RWK 305-910-S	0.006	740
Note: Note: The T13 model is equipped with an output reactor as standard.				

Table 5–57 Model selection of Schaffner output reactors (three-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T1	MD500-2T0.4GB-PLUS	RWK 305-4-KL	1.47	22
	MD500-2T0.7GB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500-2T1.1GB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500-2T1.5GB-PLUS	RWK 305-10-KL	0.588	30
T2	MD500-2T2.2GB-PLUS	RWK 305-14-KL	0.42	34
	MD500-2T3.7GB-PLUS	RWK 305-17-KL	0.364	38
T3	MD500-2T5.5GB-PLUS	RWK 305-32-KL	0.184	55
T4	MD500-2T7.5GB-PLUS	RWK 305-45-KL	0.131	60
T5	MD500-2T11G(B)-PLUS	RWK 305-60-KL	0.098	65
T6	MD500-2T15G(B)-PLUS	RWK 305-72-KL	0.082	70
	MD500-2T18.5G(B)-PLUS	RWK 305-90-KL	0.065	75
T7	MD500-2T22G(B)-PLUS	RWK 305-110-KL	0.053	90
	MD500-2T30G(B)-PLUS	RWK 305-156-KS	0.038	120
T8	MD500-2T37G(B)-PLUS	RWK 305-182-KS	0.032	140
	MD500-2T45G-PLUS	RWK 305-230-KS	0.026	180
	MD500-2T55G-PLUS	RWK 305-280-KS	0.021	220
T9	MD500-2T75G-PLUS	RWK 305-330-KS	0.018	240
T10	MD500-2T90G-PLUS	RWK 305-400-S	0.015	330
	MD500-2T110G-PLUS	RWK 305-500-S	0.012	340
T11	MD500-2T132G-PLUS	RWK 305-500-S	0.012	340
T12	MD500-2T160G-PLUS	RWK 305-600-S	0.01	380
	MD500-2T200G-PLUS	RWK 305-790-S	0.007	590

Table 5–58 Model selection of Schaffner output reactors (single-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor Model	Inductance (mH)	Power Consumption (W)
T2	MD500-2S0.4GB-PLUS	RWK 305-4-KL	1.47	22
	MD500-2S0.7GB-PLUS	RWK 305-7.8-KL	0.754	22
	MD500-2S1.5GB-PLUS	RWK 305-10-KL	0.588	25
	MD500-2S2.2GB-PLUS	RWK 305-14-KL	0.42	30

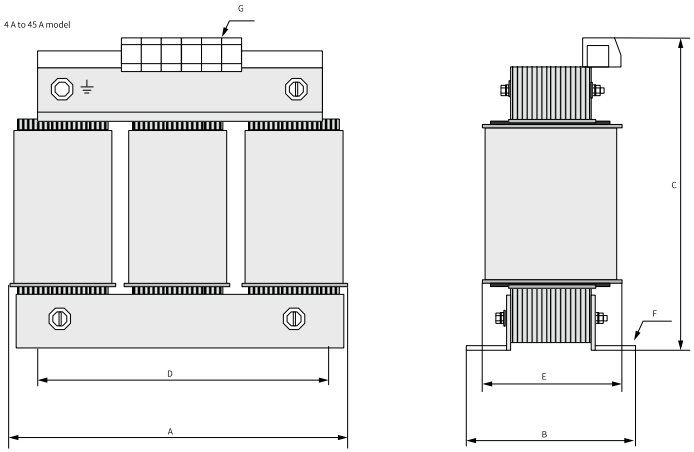


Figure 5-50 Dimensions of 4–45 A output reactors

Table 5–59 Dimensions of 4–45 A output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
4 and 7.8	100	Max. 60	Max. 115	56	34	4.8 x 9	2.5 mm^2
10	100	Max. 70	Max. 115	56	43	4.8 x 9	2.5 mm^2
14	125	Max. 70	Max. 135	100	45	5 x 8	2.5 mm^2
17	125	Max. 75	Max. 135	100	55	5 x 8	2.5 mm^2
24	125	Max. 75	Max. 135	100	55	5 x 8	4 mm^2
32	155	Max. 95	Max. 170	130	56	8 x 12	10 mm^2
45	155	Max. 110	Max. 190	130	72	8 x 12	10 mm^2

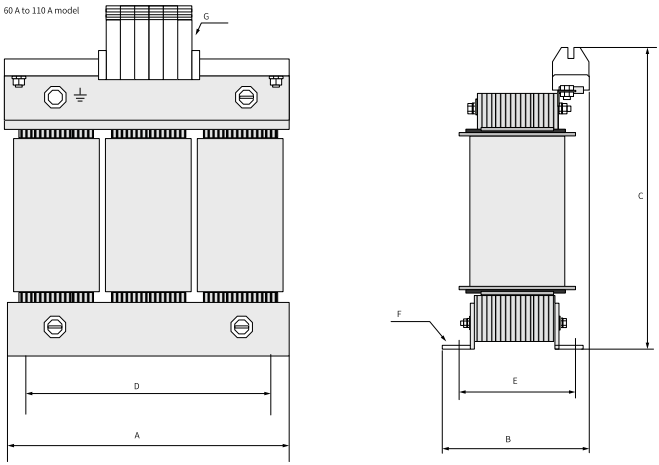


Figure 5-51 Dimensions of 60–110 A output reactors

Table 5–60 Dimensions of 60–110 A output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
60 and 72	155	Max. 125	Max. 190	130	70	8 x 12	16 mm^2
90	190	Max. 115	Max. 225	170	57	8 x 12	35 mm^2
110	190	Max. 130	Max. 220	170	67	8 x 12	35 mm^2

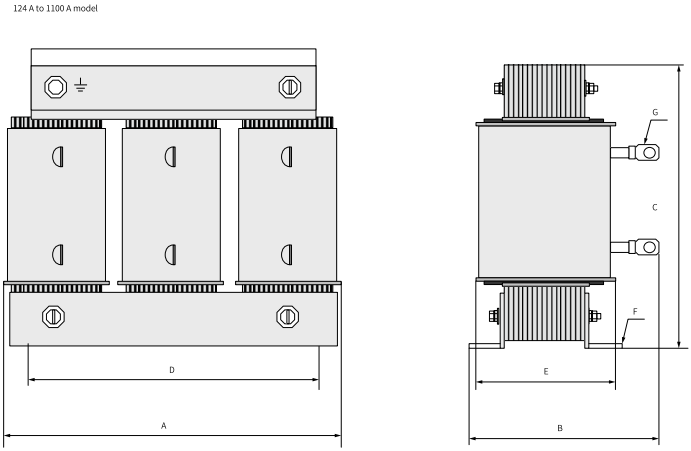


Figure 5-52 Dimensions of 124-1100 A output reactors

Table 5–61 Dimensions of 124–1100 A output reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G
124	190	Max. 180	Max. 160	170	67	8 x 12	Ø8
143	190	Max. 180	Max. 160	170	77	8 x 12	Ø8
156 and 170	190	Max. 180	Max. 160	170	77	8 x 12	Ø10
182	210	Max. 180	Max. 185	175	97	8 x 12	Ø10
230	240	220	220	190	119	11 x 15	Ø12
280	240	235	220	190	133	11 x 15	Ø12
330	240	240	220	190	135	11 x 15	Ø12
400 and 500	240	220	325	190	119	11 x 15	Ø11
600 and 680	240	230	325	190	128	11 x 15	Ø11
790	300	218	355	240	136	11 x 15	Ø11

Rated Current (A)	A	B	C	D	E	F	G
910	300	228	355	240	148	11 x 15	Ø11
1100	360	250	380	310	144	11 x 15	Ø11

5.4.8 Magnetic Ring and Ferrite Clamp

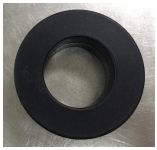
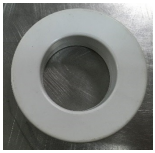
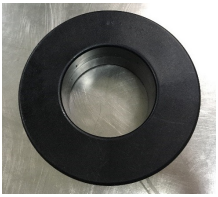
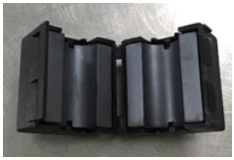
Model

The magnetic ring can be used on the input or output side of the AC drive. Install it as close to the AC drive as possible. When installed on the input side, the magnetic ring can suppress the noise in the input power supply system of the drive. When installed on the output side, the magnetic ring can suppress interference generated by the AC drive to external devices and reduce the bearing current.

In applications with leakage current and signal cable interference, install a magnetic ring or a ferrite clamp.

- Amorphous magnetic ring: It features high magnetic conductivity when the frequency is within 1 MHz and can efficiently suppress interference of the AC drive. However, it is relatively expensive.
- Ferrite clamp: It features high magnetic conductivity when the frequency is above 1 MHz and can efficiently suppress interference of signal cables and low-power AC drives at a low cost.

Table 5–62 Appearance and model of the magnetic ring and ferrite clamp

Category	Model	Appearance
Magnetic ring	DY644020H	
	DY805020H	
	DY1207030H	
Ferrite clamp	DYR-130-B	

Dimensions

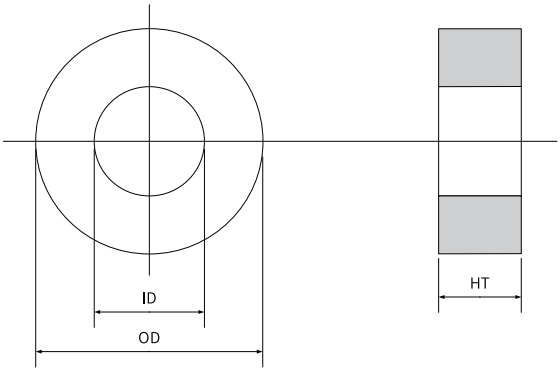


Figure 5-53 Dimensions of the magnetic ring

Table 5–63 Dimensions of the magnetic ring

Model	Dimensions (OD x ID x HT) (mm)
DY644020H	64 x 40 x 20
DY805020H	80 x 50 x 20
DY1207030H	120 x 70 x 30

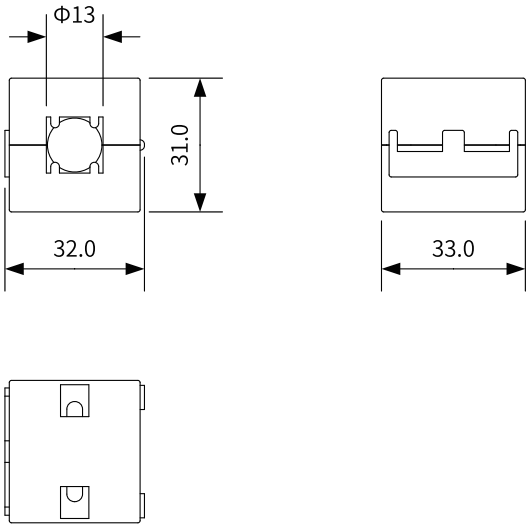
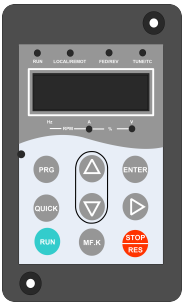


Figure 5-54 Dimensions of the ferrite clamp

5.5 Operating Panel

Model	Description	Appearance
MD32NKE1	An external LED operating panel that operates in the same way as the AC drive's operating panel for easy commissioning For dimensions, see *"Figure 5–55 " on page 128* .	
MDKE9	An optional LCD operating panel that supports copy, download, and modification of parameters For dimensions, see *"Figure 5–56 " on page 129* .	

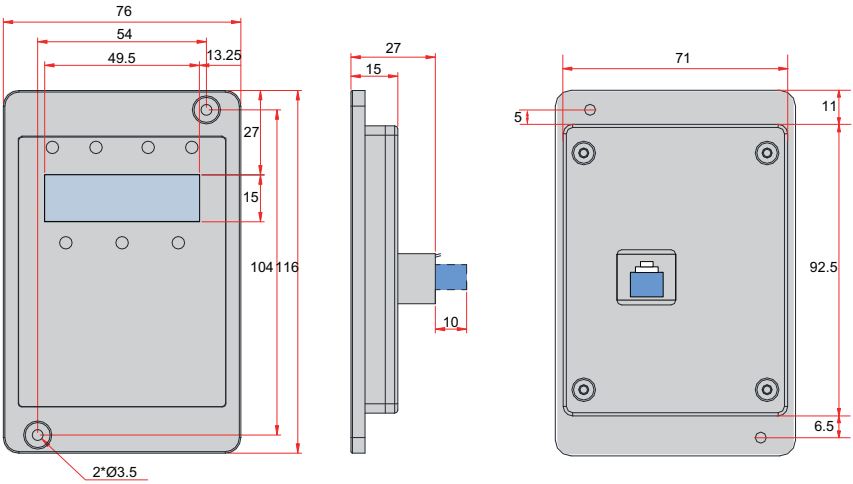


Figure 5-55 Dimensions of MD32NKE1 (unit: mm)

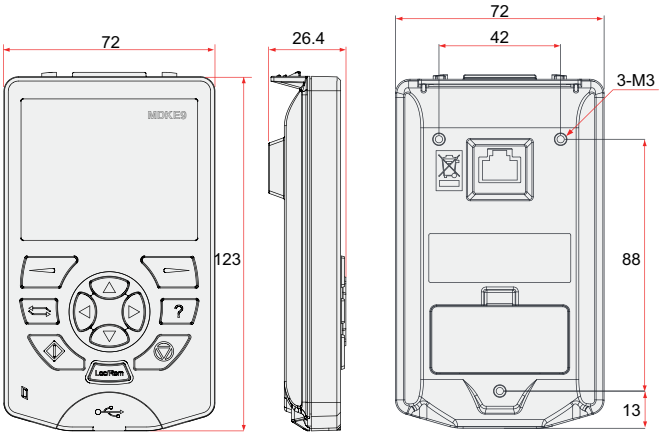


Figure 5-56 Dimensions of MDKE9 (unit: mm)

6 Expansion Cards

6.1 List of Expansion Cards

The AC drive supports multiple expansion cards that can be used to connect to field buses for communication. It also supports multiple types of encoders for programming and secondary development. For details on the functions and configurations of expansion cards, see their user guides.

Table 6–1 List of expansion cards

Name	Model	Function	Remarks
I/O expansion card 1	MD38IO1	The following terminals can be added: five DIs, one relay output terminal, and one DO. Modbus and CANlink are supported. When this kind of the I/O expansion card is used, AIs and AOs cannot be added.	Applicable to T4 models and above
I/O expansion card 2	MD38IO2	Three DIs can be added.	Applicable to all models
I/O expansion card 3	MD38IO3	The following terminals can be added: Three DIs, one RS-485 communication signal isolation input terminal, and one NO relay output terminal.	Applicable to all models
RS-485 communication card	MD38TX1/ MD38TX2	Modbus communication card with the isolation function	Applicable to all models
CANlink communication card	MD38CAN1	CANlink communication adapter card	Applicable to all models
CANopen communication card	MD38CAN2	CANopen communication card	Applicable to all models
PROFIBUS DP communication card	MD-SI-DP1	PROFIBUS DP communication card	Applicable to all models
PROFIBUS DP communication card	MD38DP2	PROFIBUS DP communication card	Applicable to T4 models and above
PROFINET communication card	MD500-PN1	PROFINET communication card	Applicable to all models
PROFINET communication card	MD500-PN2	PROFINET communication card	Applicable to all models
EtherCAT communication card	MD500-ECAT	EtherCAT communication card	Applicable to all models
Ethernet/IP communication card	MD500-EN1	Ethernet/IP communication card	Applicable to all models
Modbus TCP communication card	MD500-EM1	Modbus TCP communication card	Applicable to all models
User programmable expansion card	MD38PC1	User programmable expansion card Compatible with H1U series PLCs of Inovance	Applicable to T4 models and above

Name	Model	Function	Remarks
Resolver interface card	MD38PG4	The card is applicable to resolvers with an excitation frequency of 10 kHz and has a DB9 interface. To meet the MD38PG4 requirements, the excitation input DC resistance of the resolver must be greater than 17 Ω. Failure to comply may result in MD38PG4 exceptions. Select a resolver with a maximum of four pole pairs. Otherwise, the MD38PG4 will be overloaded.	Applicable to all models
Resolver frequency division encoder card	MD38PG4D	The MD38PG4D card is a PG card specially developed for resolvers. Featuring differential frequency division, it is suitable for various applications such as machine tool electric master axis, master-slave control, and synchronous control.	Applicable to T4 models, and T7 models and above
MD38PGMD multi-function encoder card	MD38PGMD	The card is an encoder interface card with the optional multiplied frequency division output function and supports 5 V or 15 V power supply. The card supports differential input, collector input, and push-pull input, as well as differential output and collector output; therefore, it can be used to connect to different encoders and supports A/B phase input of the host controller.	Applicable to all models
23-bit PG card	ES510–PG-CT1	It supports 23-bit encoders.	Applicable to all models

6.2 Installing the Expansion Card

The AC drive supports three I/O expansion cards, one PC expansion card, eleven field bus cards (Modbus RTU, Modbus TCP, PROFIBUS DP, CANlink, CANopen, PROFINET, EtherCAT, and Ethernet/IP), and four PG cards. Their installation positions are shown in the figure below. Before installing these cards, remove the front cover of the AC drive.

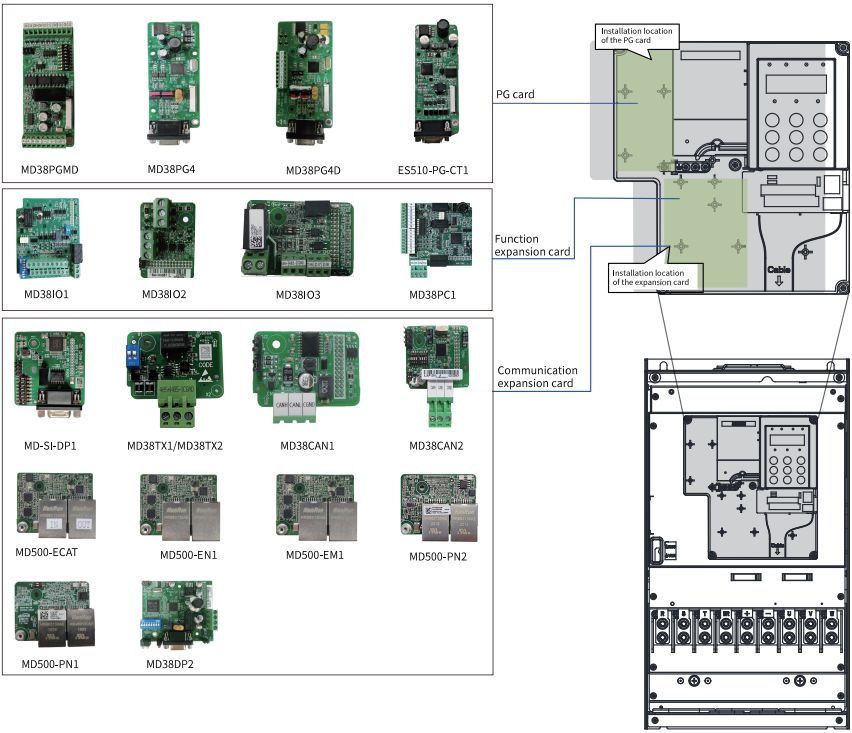


Figure 6-1 Installation position of expansion cards

7 Technical Data

7.1 Electrical Parameters

Note

The rated power of AC drives in the following tables is measured under the following conditions:

- For three-phase 380 V to 480 V models, the input voltage is 440 VAC.
- For three-phase 200 V to 240 V models, the input voltage is 220 VAC.
- For single-phase 200 V to 240 V models, the input voltage is 220 VAC.

Three-phase 380 V to 480 V models

Table 7–1 Electrical parameters of T1 models (three-phase 380 V to 480 V)

Item		Specification					
Model: MD500Txxxxx-PLUS		0.4GB	0.7GB	1.1GB	1.5GB	2.2GB	3.0GB
Structure		T1					
Output	Power (kW)	0.4	0.75	1.1	1.5	2.2	3.0
	Rated output current (A)	1.5	2.1	3.1	3.8	5.1	7.2
	Output voltage	Three phase, 0 V to input voltage					
	Maximum output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	60s at 150% the rated current					
Input	Rated input current (A)	1.8	2.4	3.7	4.6	6.3	9
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA)	2	2.8	4.1	5	6.7	9.5
Heat dissipation design	Thermal power consumption (kW)	0.039	0.046	0.057	0.068	0.081	0.109
	Exhaust air flow (CFM)	-	-	-	9	9	9
Overvoltage category		OVCIII					
Pollution degree		PD2					
IP rating		IP20 (open type, applicable to IEC-certified products) Type 1 (enclosed type, applicable to UL-certified products)					

Table 7–2 Electrical parameters of T2 to T4 models (three-phase 380 V to 480 V)

Item		Specification				
Model: MD500Txxxxx-PLUS		3.7GB	5.5GB	7.5GB	11GB	15GB
Structure		T2		T3		T4
Output	Power (kW)	3.7	5.5	7.5	11	15
	Rated output current (A)	9	13	17	25	32
	Output voltage	Three phase, 0 V to input voltage				
	Maximum output frequency	599 Hz (editable through parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	60s at 150% the rated current				
Input	Rated input current (A)	11.4	16.7	21.9	32.2	41.3
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA)	12	17.5	22.8	33.4	42.8
Heat dissipation design	Thermal power consumption (kW)	0.138	0.201	0.24	0.355	0.454
	Exhaust air flow (CFM)	20	24	30	40	42
Overvoltage category		OVCIII				
Pollution degree		PD2				
IP rating		IP20 (open type, applicable to IEC-certified products) Type 1 (enclosed type, applicable to UL-certified products)				

Table 7–3 Electrical parameters of T5 to T6 models (three-phase 380 V to 480 V)

Item		Specification					
Model: MD500Txxxxx-PLUS		18.5G(B)	22G(B)	18.5G(B)-T	22G(B)-T	30G(B)	37G(B)
Structure		T5				T6	
Output	Power (kW)	18.5	22	18.5	22	30	37
	Rated output current (A)	37	45	37	45	60	75
	Output voltage	Three phase, 0 V to input voltage					
	Maximum output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	60s at 150% the rated current					

Item		Specification					
Model: MD500Txxxxx-PLUS		18.5G(B)	22G(B)	18.5G(B)-T	22G(B)-T	30G(B)	37G(B)
Input	Rated input current (A)	49.5	59	43.4	51.3	57	69
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA)	45	54	45	54	52	63
Heat dissipation design	Thermal power consumption (kW)	0.478	0.551	0.478	0.551	0.694	0.815
	Exhaust air flow (CFM)	51.9	57.4	51.9	57.4	118.5	118.5
Overvoltage category		OVCIII					
Pollution degree		PD2					
IP rating		IP20 (open type, applicable to IEC-certified products) Type 1 (enclosed type, applicable to UL-certified products)					

Table 7–4 Electrical parameters of T7 to T9 models (three-phase 380 V to 480 V)

Item		Specification						
Model: MD500Txxxxx-PLUS		45G(B)	55G(B)	75G(B)	90G	110G	132G	160G
Structure		T7		T8			T9	
Output	Power (kW)	45	55	75	90	110	132	160
	Rated output current (A)	91	112	150	176	210	253	304
	Output voltage	Three phase, 0 V to input voltage						
	Maximum output frequency	599 Hz (editable through parameter)						
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)			0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	60s at 150% the rated current						
Input	Rated input current (A)	89	106	139	164	196	240	287
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz						
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC						
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz						
	Power supply capacity (kVA)	81	97	127	150	179	220	263
Heat dissipation design	Thermal power consumption (kW)	1.01	1.21	1.57	1.81	2.14	2.85	3.56
	Exhaust air flow (CFM)	122.2	122.2	218.6	287.2	354.2	547	627
Overvoltage category		OVCIII						

Item	Specification						
Model: MD500Txxxxx-PLUS	45G(B)	55G(B)	75G(B)	90G	110G	132G	160G
Pollution degree	PD2						
IP rating	IP20 (open type, applicable to IEC-certified products)						

Table 7–5 Electrical parameters of T10 to T11 models (three-phase 380 V to 480 V)

Item		Specification			
Model: MD500Txxxxx-PLUS		200G(-L)	220G(-L)	250G(-L)	280G(-L)
Structure		T10		T11	
Output	Power (kW)	200	220	250	280
	Rated output current (A)	377	426	465	520
	Output voltage	Three phase, 0 V to input voltage			
	Maximum output frequency	599 Hz (editable through parameter)			
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	60s at 150% the rated current			
Input	Rated input current (A)	365	410	441	495
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC			
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz			
	Power supply capacity (kVA)	334	375	404	453
Heat dissipation design	Thermal power consumption (kW)	4.15	4.55	5.06	5.33
	Exhaust air flow (CFM)	638.4	722.5	789.4	882
Overvoltage category		OVCIII			
Pollution degree		PD2			
IP rating		IP20 (open type, applicable to IEC-certified products)			

Table 7–6 Electrical parameters of T12 models (three-phase 380 V to 480 V)

Item		Specification			
Model: MD500Txxxxx-PLUS		315G(-L)	355G(-L)	400G(-L)	450G(-L)
Structure		T12			
Output	Power (kW)	315	355	400	450
	Rated output current (A)	585	650	725	820
	Output voltage	Three phase, 0 V to input voltage			
	Maximum output frequency	599 Hz (editable through parameter)			
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	60s at 150% the rated current			
Input	Rated input current (A)	565	617	687	782
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC			
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz			
	Power supply capacity (kVA)	517	565	629	716
Heat dissipation design	Thermal power consumption (kW)	5.69	6.31	6.91	7.54
	Exhaust air flow (CFM)	645	860	860	860
Overvoltage category		OVCIII			
Pollution degree		PD2			
IP rating		IP20 (open type, applicable to IEC-certified products)			

Table 7–7 Electrical parameters of T13 models (three-phase 380 V to 480 V)

Item		Specification		
Model: MD500Txxxxx-PLUS		500G(-A)	560G(-A)	630G(-A)
Structure		T13		
Output	Power (kW)	500	560	630
	Rated output current (A)	900	1020	1120
	Output voltage	Three phase, 0 V to input voltage		
	Maximum output frequency	599 Hz (editable through parameter)		
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)		
	Overload capacity	60s at 150% the rated current		

Item		Specification		
Model: MD500Txxxxx-PLUS		500G(-A)	560G(-A)	630G(-A)
Input	Rated input current (A)	838.1	949.6	1043.5
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz		
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC		
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz		
	Power supply capacity (kVA)	766.0	868.0	957.0
Heat dissipation design	Thermal power consumption (kW)	9.94	10.4	11.5
	Exhaust air flow (CFM)	2200	2200	2200
Overvoltage category		OVCIII		
Pollution degree		PD2		
IP rating		IP21		

Three-phase 200 V to 240 V

Table 7–8 Electrical parameters of T1 to T2 models (three-phase 200 V to 240 V)

Item		Specification					
Model: MD500-2Txxxxx-PLUS		0.4GB	0.7GB	1.1GB	1.5GB	2.2GB	3.7GB
Structure		T1				T2	
Output	Power (kW)	0.4	0.75	1.1	1.5	2.2	3.7
	Rated output current (A)	2.1	3.8	5.1	7.2	9	13
	Output voltage	Three phase, 0 V to input voltage					
	Maximum output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	60s at 150% the rated current					
Input	Rated input current (A)	2.4	4.6	6.3	9	11.4	16.7
	Rated voltage/frequency	Three-phase 200 V to 240 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA)	1.1	2.1	2.9	4.1	5.2	7.6
Heat dissipation design	Thermal power consumption (kW)	0.046	0.068	0.081	0.109	0.138	0.201
	Exhaust air flow (CFM)	-	9	9	9	20	24
Overvoltage category		OVCIII					
Pollution degree		PD2					
IP rating		IP20					

Table 7–9 Electrical parameters of T3 to T6 models (three-phase 200 V to 240 V)

Item		Specification				
Model: MD500-2Txxxxx-PLUS		5.5GB	7.5GB	11G(B)	15G(B)	18.5G(B)
Structure		T3	T4	T5	T6	
Output	Power (kW)	5.5	7.5	11	15	18.5
	Rated output current (A)	25	32	45	60	75
	Output voltage	Three phase, 0 V to input voltage				
	Maximum output frequency	599 Hz (editable through parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	60s at 150% the rated current				
Input	Rated input current (A)	32.2	41.3	59	57	69
	Rated voltage/ frequency	Three-phase 200 V to 240 V, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA)	14.7	18.9	27	26.1	31.6
Heat dissipation design	Thermal power consumption (kW)	0.355	0.454	0.551	0.694	0.815
	Exhaust air flow (CFM)	40	42	57.4	118.5	118.5
Overvoltage category		OVCIII				
Pollution degree		PD2				
IP rating		IP20				

Table 7–10 Electrical parameters of T7 to T8 models (three-phase 200 V to 240 V)

Item		Specification				
Model: MD500-2Txxxxx-PLUS		22G(B)	30G(B)	37G(B)	45G	55G
Structure		T7		T8		
Output	Power (kW)	22	30	37	45	55
	Rated output current (A)	91	112	150	176	210
	Output voltage	Three phase, 0 V to input voltage				
	Maximum output frequency	599 Hz (editable through parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	60s at 150% the rated current				

Item		Specification				
Model: MD500-2Txxxxx-PLUS		22G(B)	30G(B)	37G(B)	45G	55G
Input	Rated input current (A)	89	106	139	164	196
	Rated voltage/ frequency	Three-phase 200 V to 240 V, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA)	40.7	48.5	63.6	75	89.6
Heat dissipation design	Thermal power consumption (kW)	1.01	1.21	1.57	1.81	2.14
	Exhaust air flow (CFM)	122.2	122.2	218.6	287.2	354.2
Overvoltage category		OVCIII				
Pollution degree		PD2				
IP rating		IP20				

Table 7–11 Electrical parameters of T9 to T12 models (three-phase 200 V to 240 V)

Item		Specification					
Model: MD500-2Txxxxx-PLUS		75G	90G	110G	132G	160G	200G
Structure		T9	T10		T11	T12	
Output	Power (kW)	75	90	110	132	160	200
	Rated output current (A)	304	377	426	465	585	725
	Output voltage	Three phase, 0 V to input voltage					
	Maximum output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	60s at 150% the rated current					
Input	Rated input current (A)	287	365	410	441	565	687
	Rated voltage/ frequency	Three-phase 200 V to 240 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA)	263	334	375	453	517	629
Heat dissipation design	Thermal power consumption (kW)	3.56	4.15	4.55	5.33	5.69	6.91
	Exhaust air flow (CFM)	627	638.4	722.5	882	645	860

Item	Specification					
Model: MD500-2Txxxxx-PLUS	75G	90G	110G	132G	160G	200G
Overvoltage category	OVCIII					
Pollution degree	PD2					
IP rating	IP20					

Single-phase 200 V to 240 V

Table 7–12 Electrical parameters of T2 models (single-phase 200 V to 240 V)

Item		Specification			
Model: MD500-2Sxxxxx-PLUS		0.4GB	0.7GB	1.5GB	2.2GB
Structure		T2			
Output	Applicable motor capacity (kW)	0.4	0.75	1.5	2.2
	Rated output current (A)	2.3	4.0	7.0	9.6
	Output voltage	Three-phase 0 V to 240 V (subject to input voltage)			
	Maximum output frequency	599 Hz (editable through parameter)			
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	60s at 150% the rated current			
Input	Rated input current (A)	5.4	8.2	14	20.0
	Rated voltage/ frequency	Single-phase 200 V to 240 V, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC			
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz			
	Power supply capacity (kVA)	1.4	2.2	3.7	6.0
Heat dissipation design	Thermal power consumption (kW)	0.043	0.065	0.097	0.121
	Exhaust air flow (CFM)	20	20	20	20
Overvoltage category		OVCIII			
Pollution degree		PD2			
IP rating		IP20 (open type, applicable to IEC-certified products) Type 1 (enclosed type, applicable to UL-certified products)			

7.2 Technical Specifications

Table 7–13 Technical specifications of the AC drive

Item		Specification
Basic functions	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.025%
	Control mode	Sensorless vector control (SVC), feedback vector control (FVC), and voltage/frequency (V/f) control
	Torque starting	0.25 Hz/150% (SVC); 0 Hz/180% (FVC)
	Speed regulation range	1:200 (SVC); 1:1000 (FVC)
	Speed stability accuracy	±0.5% (SVC) ±0.02% (FVC)
	Torque control accuracy	FVC: ±3% SVC: ±5% for above 5 Hz
Contin ued	Torque boost	Automatic boost; customized boost 0.1 % to 30.0 %
	V/f curve	Linear V/f curve Multi-point V/f curve Complete V/f separation Half V/f separation
	Acceleration/ Deceleration curve	Straight-line or S-curve acceleration/deceleration Four groups of acceleration/deceleration time ranging from 0.0s to 6500.0s
	DC injection braking	Starting frequency of DC injection braking: 0.00 Hz to the maximum frequency Braking time: 0.0s to 36.0s Braking current level: 0.0% to 100.0%.
	Jog control	Frequency range of jog running: 0.00 Hz to 50.00 Hz Jog acceleration/deceleration time: 0.0s to 6500.0s

Item		Specification
Continued	Simple PLC, multi-speed running	The system implements up to 16 speeds by using the built-in PLC or control terminal.
	Built-in proportional–integral–derivative (PID)	This function facilitates closed-loop control of process control.
	Automatic voltage regulation (AVR)	When the mains voltage changes, the output voltage keeps constant automatically.
	Overvoltage/ Overcurrent stall control	This function limits the current and voltage automatically during running to avoid frequent tripping due to overvoltage/overcurrent.
	Quick current limit	This function minimizes the occurrence of overcurrent faults and guarantees a proper operation of the drive.
	Torque limit and control	This function limits the torque during running to avoid frequent tripping due to overcurrent and realizes torque control in vector control mode.
Highlights	Power dip ride-through	Load feedback energy compensates for any voltage reduction, allowing the drive to continue to operate for a short time during instantaneous power failure.
	Virtual I/O	Five groups of virtual digital inputs/outputs (DIs/DOs) support simple logic control.
	Timing control	Time range: 0.0–6500.0 minutes
	Multiple field buses available	Six buses are supported: Modbus, Profibus-DP, CANlink, CANopen, Profinet, EtherCAT, and Ethernet/IP.
	Multiple types of encoders available	Differential type, open-collector type, UVW type, and resolver type are supported.
	Powerful software tool	It supports operations of AC drive parameters and virtual oscillograph function. The state inside the drive can be monitored using the virtual oscilloscope.
	Motor overtemperature protection	Signals of the motor temperature sensor can be input to AI3 (PT100, PT1000, KTY-84-130, PTC-130).

Item		Specification
Running	Command sources	Operating panel, control terminal, and serial communication port, which can be switched over in various ways.
	Frequency reference sources	Supports up to 10 frequency reference sources including digital setting, analog voltage setting, analog current setting, pulse setting, and serial communication setting. The reference sources can be switched over in various ways.
	Auxiliary frequency references	Ten auxiliary frequency references are available. The auxiliary frequency reference can be used together with the main frequency reference to implement fine adjustment and frequency synthesis.
	Input terminal	Standard: Five DIs Three AIs. One supports only -10 V to +10 V voltage input, and the other two support -10 V to +10 V voltage input or 0 mA to 20 mA current input. Extension capacity: Five DIs
	Output terminal	Standard: One DO Two relay output terminals Two AOs, supporting 0 mA to 20 mA current output or 0 V to 10 V voltage output Extension capacity: One DO One relay output terminal
Display and operation on the operating panel	LED display	The LED displays parameters.
	LCD display	Optional and two languages (Chinese or English) available
	Parameter copy	Quick parameter copy through the optional LCD
	Key locking and function selection	Keys on the operating panel can be locked completed or partially. In addition, functions with limited availability range can be assigned to some keys. These can prevent accidental operation.

Item		Specification
Protection functions	Phase loss protection	This function provides protection against input/output phase loss.
	Instantaneous overcurrent protection	The AC drive stops when the current exceeds 250% of the rated output current.
	Overvoltage protection	The AC drive stops when the DC voltage of the main circuit is above 820 V.
	Undervoltage protection	The AC drive stops when the DC voltage of the main circuit is lower than 350 V.
	Overtemperature protection	This function provides protection in case of inverter bridge overtemperature.
	Overload protection	The AC drive stops after running at 150% of rated current for 60 seconds.
	Overcurrent protection	The AC drive stops when the current exceeds 2.5 times the rated current.
	Braking protection	This function provides protections against overload for the braking unit and short circuit for the braking resistor.
	Short circuit protection	This function provides protections in case of short circuit among output phases and output short-circuited to ground.
Environment	Operating location	Indoor without direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, drip, or salt.
	Altitude	For altitude equal to or below 1000 m, derating is not required. For altitude ranging from 1000 m to 3000 m, derating is required. In this case, derate 1% for every additional 100 m. For altitude above 3000 m, contact Inovance. (Note: The maximum altitude for T1 models is 2000 m. For use at the altitude higher than 2000 m, contact Inovance.)
	Ambient temperature	-10°C to +50°C. If the ambient temperature ranges from 40°C to 50°C, derate 1.5% for every additional 1°C.
	Humidity	Less than 95% RH, no condensation
	Vibration	< 5.9 m/s^2 (0.6 g)
	Storage temperature	-20°C to +60°C

8 Maintenance

8.1 Routine Maintenance

8.1.1 Daily Inspection Items

The service life of the devices inside the AC drive is affected by the ambient temperature, humidity, dust, and vibration. Therefore, it is necessary to carry out daily and periodic maintenance. Frequent inspections are required if the device is used in harsh environments suffering: 1) high ambient temperature; 2) frequent start and stop; 3) violent fluctuation in the AC power supply or load; 4) excessive vibrations or shock; and 5) dust, metal dust, hydrochloric acid, and other corrosive articles.

Check the following items on a daily basis to avoid deterioration in performance or product damage. Copy this checklist and sign the "Checked" column after each inspection.

Item	Description	Solution	Checked
Motor	Check whether unusual noise or vibration is generated from the motor.	• Check whether the mechanical connection is normal. • Check whether phase loss occurs on the motor. • Check whether retaining screws of the motor are tightened.	
Cooling fan	Check whether the cooling fans of the AC drive and motor are normal.	• Check whether the cooling fan of the AC drive is normal. • Check whether the cooling fan of the motor is normal. • Check whether the ventilation channels are clogged. • Check whether the ambient temperature is within the permissible range.	
Installation environment	Check whether the cabinet and cable ducts are normal.	• Check input and output cables of MD500-PLUS for damaged insulation. • Check the mounting bracket for vibration. • Check whether copper busbars and cable terminals become loose or get corroded.	
Load	Check whether the operating current of the AC drive exceeds the rated current of the AC drive and motor.	• Check whether the motor parameter settings are correct. • Check whether the motor is overloaded. • Check whether the mechanical vibration is above 0.6 g.	
Input voltage	Check whether the power voltage of the main circuit and control circuit is normal.	• Check whether the input voltage is within the permissible range. • Check whether a heavy load is started near the AC drive.	

8.1.2 Regular Maintenance

Check the items listed in the following table every one or two years, dependent on actual use and work environment of the product. Periodic maintenance helps detect product function deterioration and damage.

Make a copy of the following checklist and sign the "Checked" column after each inspection.

Do not perform inspection or connection work with power on. Failure to do so may result in an electric shock. Cut off the power supplies of all equipment before wiring or repair. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safety voltage range. Failure to do so may result in an electric shock.

Item	Description	Solution	Checked
Drive	Check whether dirt, waste, or dust builds up on the surface of the drive.	• Check whether the controller cabinet is powered off. • Use a vacuum cleaner to suck up waste and dust to prevent direct contact with the components. • Wipe stubborn stains with a piece of soft cloth immersed with alcohol and wait until the alcohol evaporates.	
Cable	• Check whether power cables and cable connectors are discolored and cracked. • Check whether the insulation layer of the cable is aged or cracked.	• Replace the cracked cable. • Replace the aged or cracked terminal.	
Peripheral of the electromagnetic contactor	• Check whether the peripheral is in poor contact or generates unexpected noise during operation. • Check whether the peripheral is short-circuited, polluted by water, expanded, or cracked.	Replace the defective peripheral.	
Air vent	• Check whether the air vent and heatsink are blocked. • Check whether the fan is damaged.	• Clean the air vent. • Replace the fan.	

Item	Description	Solution	Checked
Control circuit	• Check whether control components are in poor contact. • Check whether terminal screws are loose. • Check whether the insulation of the control cable is cracked.	• Clean up the surface of control cables and terminals. • Replace damaged or corroded control cables.	
Coolant (for T13 models only)	Check coolant for yellowing, discoloration, and foreign matters.	Replace the coolant.	
Filter foam (for T13 models only)	Check whether dust builds up on the filter foam, affecting the cooling effect of the cabinet.	Clean the filter foam.	

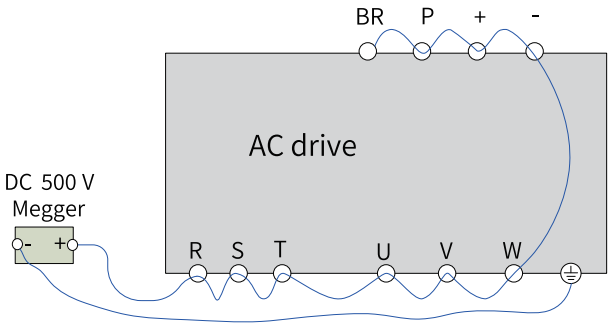
8.2 Main Circuit Insulation Test

Danger

The high voltage (> 500 V) test need not be performed again because it has been completed before delivery.

Before testing, remove the VDR screw and disconnect the VDR.

Before measuring insulation resistance with a megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive first. Do not measure the control circuit insulation resistance with an insulation resistance meter.



The insulation resistance measured must be greater than 5 MΩ.

Caution

Disconnect the optional grounding screw of VDR before performing a voltage resistance test. Otherwise, the test may fail.

8.3 Replacement of Quick-Wear Parts

8.3.1 Service Life of Quick-wear Parts

Quick-wear parts of the AC drive include the cooling fan and electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is as follows.

Part	Service Life[Note]
Fan	⩾ 5 years
Electrolytic capacitor	⩾ 5 years
Note: The service life indicates the time when the part is used in the following conditions. You can determine when to replace the part according to the actual operating time. Ambient temperature: 40°C Load rate: 80% Running rate: 24 hours/day	

8.3.2 Replacing the Cooling Fan

Description of the cooling fan

- Possible damage causes: bearing worn-out and blade ageing.
- Signs of fan damage: cracks on the blade, unusual vibration noise upon start, and abnormal operation of fan blades.
- Replacement: Press the fan plastic cover hook and pull the fan outward to replace the fan. After replacement, check that the air flows upwards.

Table 8–1 Number of cooling fans needed

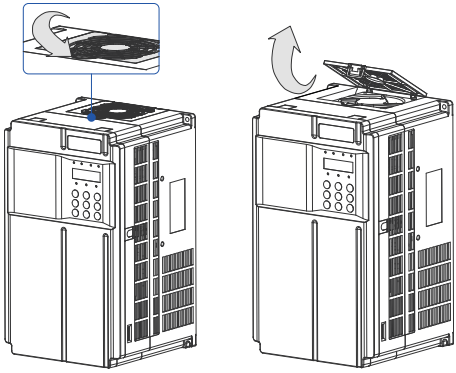
Model	Quantity
T1 (0.4 kW to 1.1 kW)	/
T1 (1.5 kW to 3.0 kW) T2 T3 (7.5 kW) T5 to T7	1

Model	Quantity
T3 (11 kW) T4 T8 to T10	2
T11 to T12	3

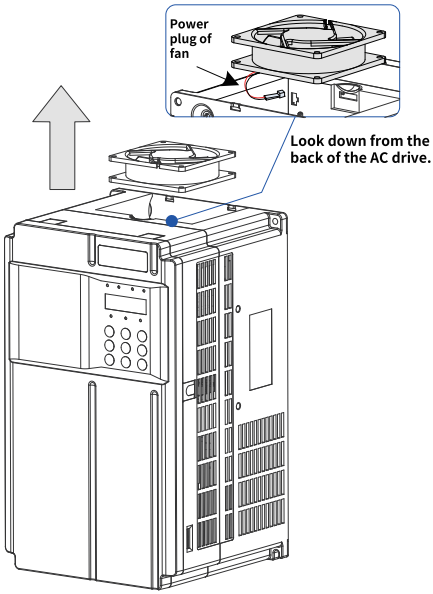
Removing and installing cooling fans of T1 to T6 models

Removing

1. Press the snap-fit joint of the fan cover to remove the fan cover.



2. Pull the fan upward and disconnect the power cable plug from the socket.

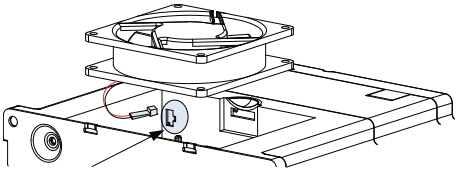


Installing

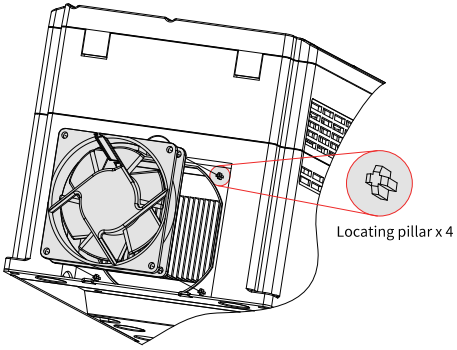
Note

- Install the fan in reverse order of removal. Pay attention to the fan direction.
- The fan rotates clockwise and blows air towards the motor air filter when viewed from the rear cover of the fan.

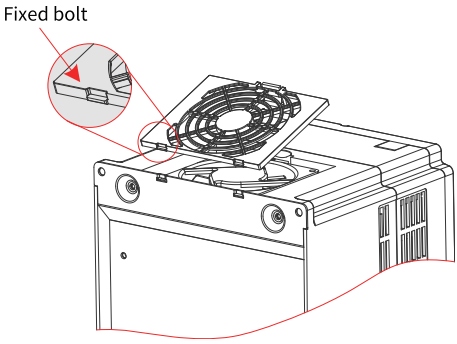
1. Plug the fan power cable into the fan power socket.



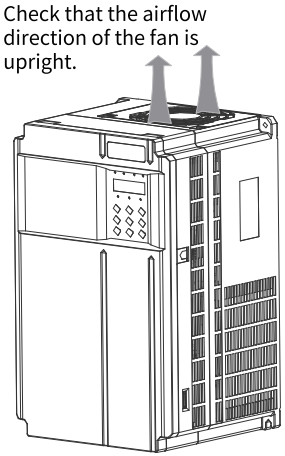
2. Install the fan into the AC drive, with the four fixing holes at the bottom aligned to the guide pins.



3. Insert the two snap-fit joints into the groove and then snap them into the groove.



4. After replacement, check that the air flows upwards.



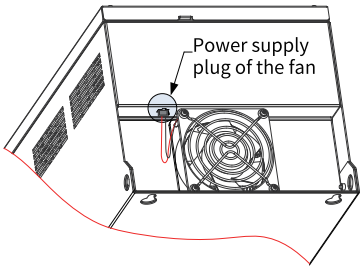
Removing and installing cooling fans of T7 to T9 models

Note

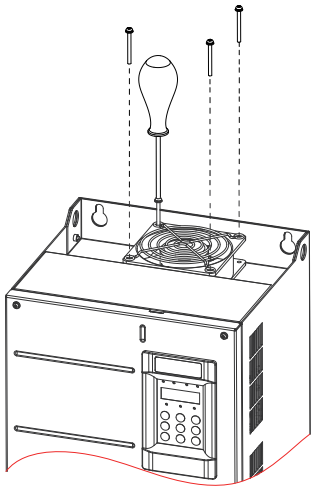
The number and position of cooling fans vary with models. However, the fans are removed and installed in the same way.

Removing

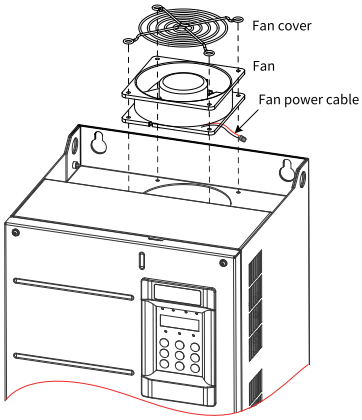
1. Unplug the fan power cable from the socket (top view).



2. Use a screwdriver to remove the four fixing screws from the fan cover.



3. Remove the fan cover and fan from the AC drive.

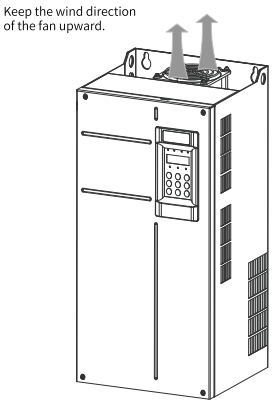


Installing

1. Install the fan in reverse order of removal. Pay attention to the fan direction.

2. When installing the fan and fan cover to the AC drive, align the mounting holes.

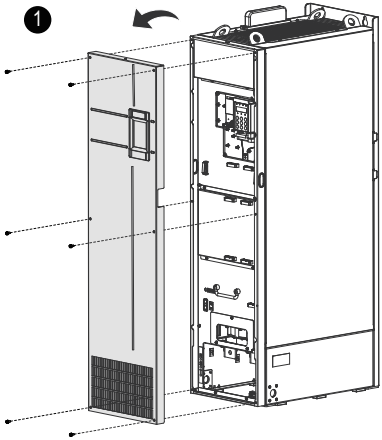
3. After replacement, check that the air flows upwards.



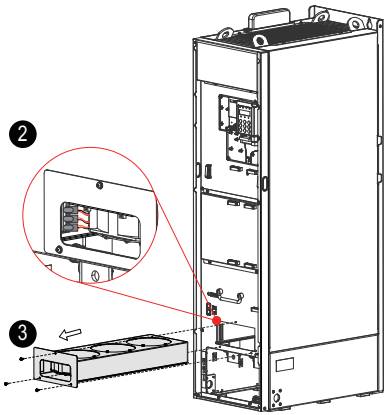
Removing and Installing Cooling Fans of T10 to T12 Models

Removing

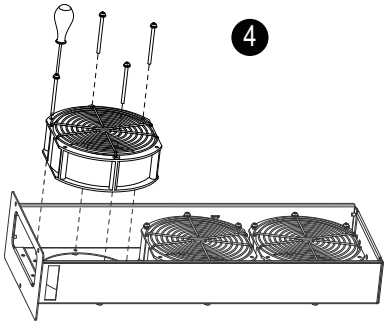
1. Remove the six fixing screws from the cover, hold the cover with two hands, and lift it along the arrow direction to remove it.



2. Unplug the fan power cable connector (one connector for one fan). Then remove the three fixing screws from the fan box and draw the fan box out in the direction indicated by the arrow.



3. Remove the four fixing screws from each fan cover and remove the fan.

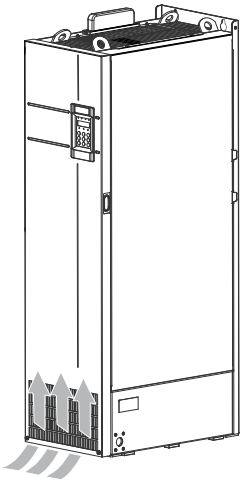


Installing

1. Install the fan in reverse order of removal. Pay attention to the fan direction.

2. Align the fan box to the rail and push it into the AC drive.

3. Connect the fan power cable connectors and fasten the fan box. After replacement, check that the air flows upwards.



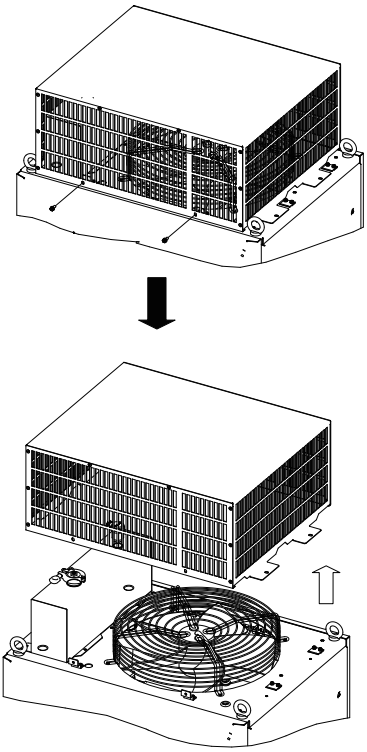
Removing and installing cooling fans of T13 models

Note

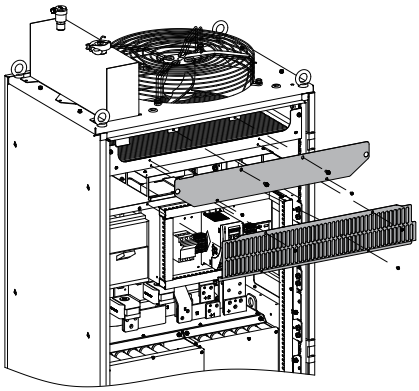
T13 models have a top-mounted fan and a cabinet-mounted fan. See the following for how to remove and install the fan.

Removing the top-mounted fan

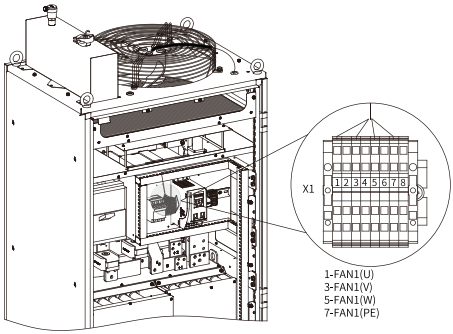
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



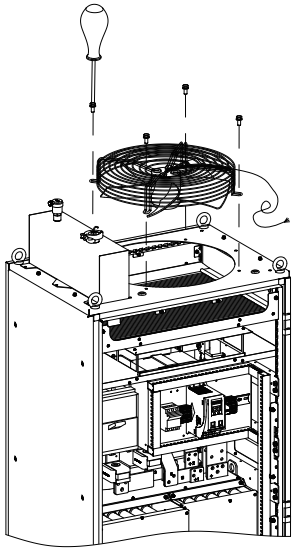
2. Remove the baffle plate as shown in the figure.



3. Disconnect the cables connecting the X1 terminal block to the top-mounted fan and pull out the cables from the wiring tray. Remove cables of terminals 1, 3, 5, and 7 only.



4. Remove the four fixing screws from the top-mounted fan and take out the fan from the AC drive.



Installing the top-mounted fan

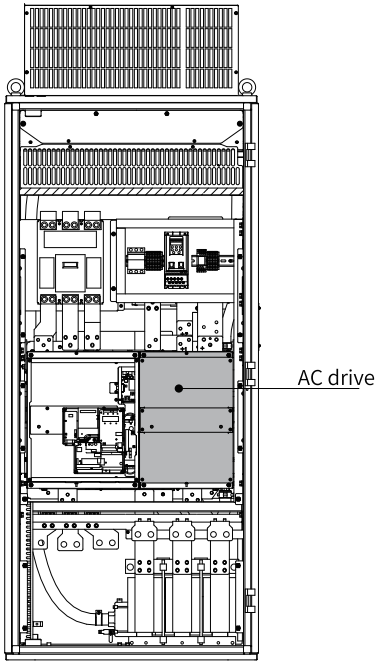
1. Install the fan in reverse order of removal.

2. Wire fan cables according to the wiring diagram.

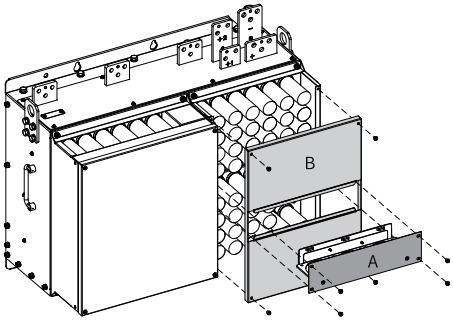
3. Connect the cables to terminals 1, 3, 5, and 7 of the X1 terminal block.

Removing the cabinet-mounted fan

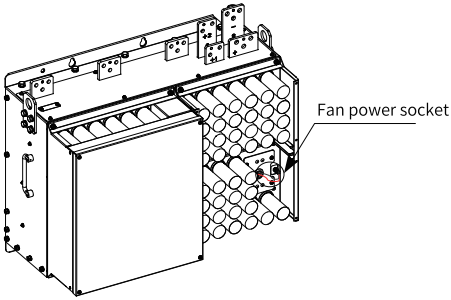
1. Open the cabinet door to locate the AC drive, which is shown in the following figure.



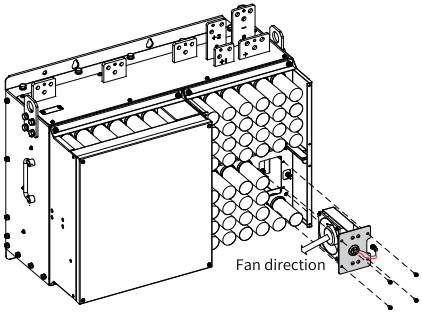
2. Remove baffle plates A and B from the AC drive in sequence shown in the figure.



3. Unplug the fan power cable from the socket.



4. Remove the four fixing screws from the fan and take out the fan from the AC drive. Note that the fan direction is from right to left.



Installing the cabinet-mounted fan

1. Install the fan in reverse order of removal. Pay attention to the fan direction.

2. When installing the fan to the AC drive, align the mounting holes as indicated by the dotted lines in removal step 4.

3. After replacement, check the air flow direction.

8.3.3 Replacing theElectrolytic Capacitor

- Possible damage causes: poor power supply, high ambient temperature, frequent load jump, and electrolyte ageing.

- Signs of fan damage: cracks on the blade, unusual vibration noise upon start, and abnormal operation of fan blades.
- Replacement: To protect related components, contact Inovance for replacement of the filter capacitor.

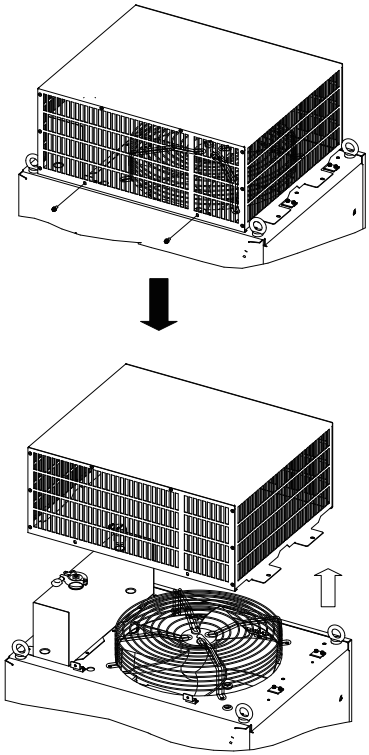
8.3.4 Refilling and Replacing the Coolant

The coolant is applicable to T13 models only.

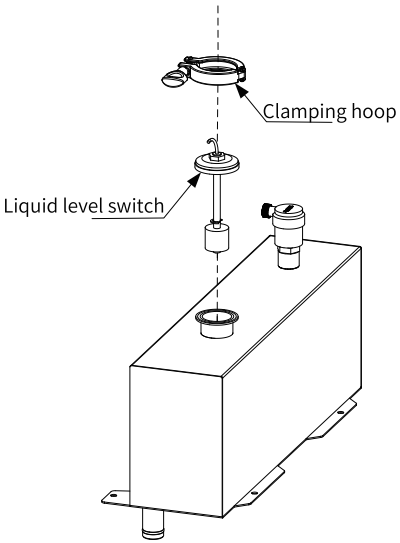
Refilling the coolant

The fault code A63 displayed on the operating panel of the AC drive indicates that the coolant level is below the threshold. In this case, add coolant (coolant used in this product is 45% ethylene glycol solution with a freezing point of -40°C) by following the steps below:

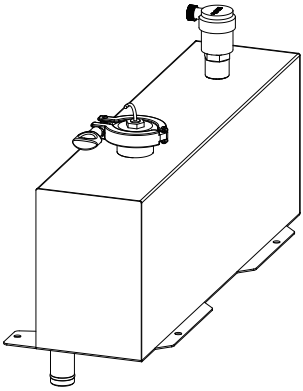
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



2. Remove the clamping hoop and liquid level switch from the water tank, as shown below.



3. Add coolant, install the liquid level switch, and tighten the clamping hoop.



4. Install the top cover on the AC drive cabinet.

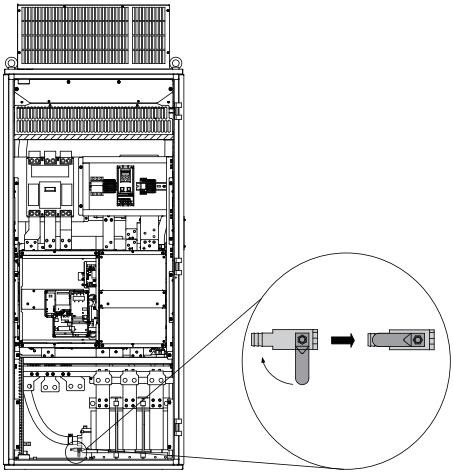
Replacing the coolant

Check the coolant once every year. Replace the coolant if it is deteriorated (yellowed), discolored, or polluted.

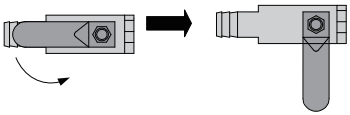
Drain used coolant completely before refilling with fresh coolant. The procedure is as follows:

1. Open the bottom cover of the AC drive cabinet, prepare a 16 L container, and place one end of the drain hose of the bottom pump in the container.

2. Remove the clamping hoop from the water tank on top of the cabinet, open the pump valve (rotate the valve to the horizontal position) as shown in the figure, and drain the coolant completely (it takes about 10 minutes).



3. Close the pump valve (rotate the valve to the vertical position) as shown in the figure.



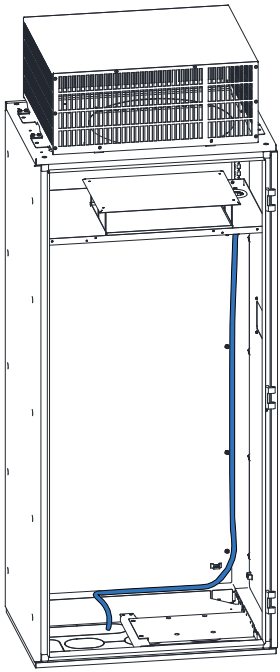
4. Refill with 13.5 L coolant.

8.3.5 Placing the Drain Hose of Waterproof Baffle

This procedure is applicable to T13 models only. The waterproof baffle a safety design inside the AC drive, which is used to prevent component damage caused by condensed water drops. The procedure for placing the drain hose of the waterproof baffle is as follows.

1. Remove the protective cover on the base of the AC drive cabinet.

2. Extend the drainage end of the drain hose to the trench through the bottom protective cover of the AC drive.



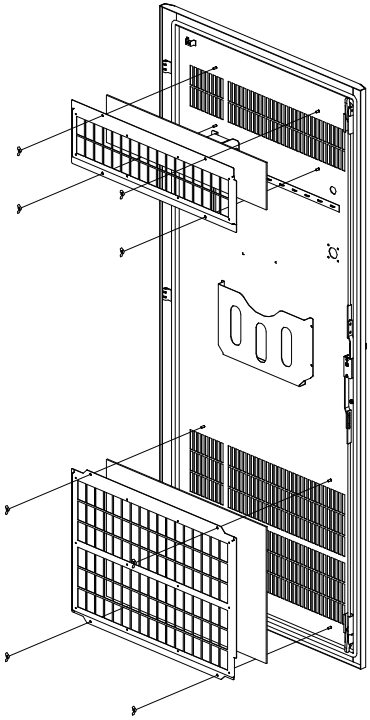
8.3.6 Replacing the Dust Filter Foam

This procedure is applicable to T13 models only. When the dust accumulates on the dust filter foam and affects ventilation and heat dissipation of the cabinet, clean or replace the dust filter foam by following the steps below.

Removing the Dust Filter Foam

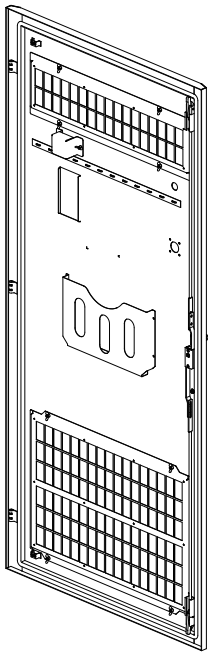
1. Remove the M6 butterfly nuts at the four corners, hold the foam frame with two hands, and pull out the dust filter foam.

2. Clear the dust from the dust filter foam with water or cleaning agent. Air dry the dust filter foam.



Installing the dust filter foam

1. Install the fan in reverse order of removal.



8.4 Storage and Warranty

Storage

For storage of the AC drive, observe the following items:

- Pack the drive into the original packing box provided by Inovance.
- Do not expose the drive to an environment with moisture, high temperature, or direct sunlight for a long time.
- The electrolytic capacitor will deteriorate after being stored for a long time. Therefore, switch on the drive at least once every six months and keep the power-on time for at least five hours each time. Increase the input voltage gradually until the rated value is reached through a voltage regulator. Contact Inovance for technical support if necessary.

Warranty

Under the condition of normal use, if the product is faulty or damaged, Inovance provides the warranty service within the warranty period (specified in the order). After the warranty period expires, maintenance will be charged.

Within the warranty period, maintenance will also be charged for the damage caused in the following situations:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use
- Damage caused by out-of-range applications
- Damage caused by force majeure (such as natural disaster, earthquake, and lightning strike) and the secondary damage caused thereof

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

9 Compliance

9.1 Compliance List

The following table lists related certifications, directives, and standards. Certification marks on the product nameplate indicate the certifications acquired.

Certification	Directive		Standard
CE certification	EMC Directive	2014/30/EU	EN IEC 61800-3
	Low Voltage Directive (LVD)	2014/35/EU	EN 61800-5-1
	RoHS Directive	2011/65/EU	EN 50581
UL/cUL Certification	-		UL61800-5-1 C22.2 No.274-17

The drive complies with the latest version of CE/UL/cUL certifications.

9.2 CE Certification

9.2.1 Introduction to CE Certification

Figure 9-1 CE mark

- The CE mark is required for commercial trades (including manufacture, import, and sale) in Europe to indicate compliance with the directives for safety (LVD), electromagnetic compatibility (EMC), and environmental protection (RoHS).
- The CE mark is required for engaging in commercial business (production, import, and distribution) in Europe.
- This product conforms to the Low Voltage Directive (LVD), Electromagnetic Compatibility (EMC) Directive, and Restriction of Hazardous Substances (RoHS) Directive, and is therefore marked with CE.
- Machines and devices integrated with this product must also be CE certified for distribution in Europe.
- The integrator who integrates this product into other products and attaches the CE mark to the final assembly has the responsibility of ensuring compliance with CE certification.

9.2.2 Requirement for Compliance with EMC Directive

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

When used in the first environment, the equipment may generate radio interference. Except that the equipment must confirm to requirements of CE certifications, you also need to take measures to prevent radio interference if required.

- To enable the drive to comply with the EMC directive and standards, install an EMC filter on the input side and use shielded cables on the output side. Ground the filter properly and ground the shield of the output cable 360 degrees.

Manufacturers of systems integrating with this product are responsible for system compliance with the European EMC directive and EN IEC 61800-3 requirements in different system application environments.

EMC specifications

The drive complies with EN IEC 61800-3. The maximum length of the motor cable allowed by the conduction and radiation disturbance is shown in the following table.

Table 9–1 Maximum cable length allowed by conduction and radiation disturbance

Model	Maximum Cable Length Allowed by Conduction Disturbance				Maximum Cable Length Allowed by Radiation Conduction			
	C2		C3		C2		C3	
	Built-in Filter	External EMC Filter	Built-in Filter	External EMC filter	Built-in Filter	External EMC filter	Built-in Filter	External EMC filter
T1	-	3 m	3 m	-	-	3 m	3 m	-
T2 to T4	-	1 m*	1 m	-	-	1 m	1 m	-
T5 to T8	-	3 m	-	-	-	3 m	-	-
T9 to T13	-	3 m	3 m	-	-	3 m	3 m	-
Item with an asterisk (*): For T2 model single-phase series products, you need to install the DY644020H magnetic ring on the input side of the filter.								

Introduction to EMC standards

Electromagnetic compatibility (EMC) describes the ability of electrical and electronic devices to work properly in the electromagnetic environment without introducing electromagnetic interferences that disturb the operation of other local devices or systems. Therefore, EMC includes the following requirements:

- The electromagnetic interference generated by the device in the normal operation process cannot exceed a certain limit.
- The device must have sufficient immunity to electromagnetic interference in the environment and can work properly in the environment with electromagnetic interference, which is described as electromagnetic sensitivity.

EN IEC 61800-3 defines the following two environments:

- First environment: This includes domestic premises, and establishments directly connected without intermediate transformers to a low-voltage power supply network which supplies buildings used for domestic purposes.
- Second environment: This includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes.

According to the expected use environment, the products are divided into the following four categories:

- C1 equipment: power drive system (PDS) with rated voltage lower than 1000 V, which is intended for use in the first environment
- C2 equipment: PDS with rated voltage lower than 1000 V, which is neither a plug-in device nor a movable device and. When used in the first environment, the equipment is intended to be installed and commissioned only by professionals.
- C3 equipment: PDS with rated voltage lower than 1000 V, intended for use in the second environment and not intended for use in the first environment
- C4 equipment: PDS with rated voltage equal to or higher than 1000 V or rated current equal to or higher than 400 A, or intended for use in complex systems in the second environment

9.2.3 Requirements for Compliance with the LVD

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

Installation location

Install the drive in a place that meets requirements of overvoltage category III and pollution degree 1 or 2 as specified by IEC 60664-1.

Installation environment

For installation environment requirements, refer to the related section in the *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.

Protective requirements of installation

- The drive must be installed in a cabinet that is used in a final system. The 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.
- Drives (IP20) intended to be installed in the cabinet must be installed in a structure that can prevent intrusion of unwanted objects from the top and the front.

Requirements of wiring main circuit terminals

For requirements of wiring main circuit terminals, see the related section in the *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.

Requirements of protective devices

To comply with EN 61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit. Use a fuse that matches the maximum input value of the AC drive. For selection of fuses, see *"5.4.1 Fuse, Contactor, and Circuit Breaker" on page 75*.

9.3 UL or cUL Certification

Figure 9-2 UL/cUL mark

- The UL/cUL mark is commonly applied to products sold in United States and Canada. It indicates that UL has performed product tests and evaluation, and determined that their stringent standards have been met. To pass UL/cUL certification, main built-in components of electrical products must also be UL certified.
- The drive has been tested in accordance with UL 61800–5–1 and CSA C22.2 No. 274-17 standards and has complied with UL/cUL standards. Observe the following requirements to enable machines and devices integrated with this product to comply with UL/cUL standards.

Installation location

Install the drive in a place with overvoltage category III and pollution degree 1 or 2 as specified by UL61800–5–1.

Ambient temperature

Keep the ambient temperature within the following range based on the protective class:

- Ambient temperature range for T1 to T6 models (Type 1, enclosed type): –10°C to +50°C
- Ambient temperature range for T1 to T12 models (open type): –10°C to +50°C

Installation requirements

- T1 to T6 models are enclosed-type drive, which must be installed according to the following requirements:
  - The enclosure protection must meet requirements of UL Type 1.
  - Holes must be drilled based on the installation dimensions. For details, see the installation dimension section in *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.
- T1 to T12 models are open-type drives, which must be installed in a cabinet according to the following requirements:
  The drive must be installed in a fireproof cabinet with the enclosure that provides effective electrical and mechanical protection. The installation must conform to local and regional laws and regulations and relevant NEC standards.

Main circuit wiring requirements

Field installation is not allowed for output terminals BR, (-), and (+).

- Terminals BR, (-), and (+) are used to connect optional parts. Do not connect these terminals to an AC power supply.
- To protect the main circuit, separate and cover the surface that may come into contact with the main circuit.
- The control circuit is the internal safety extra-low voltage (SELV) circuit that must be strictly insulated and isolated from other circuits. Make sure that the control circuit is connected to the external SELV circuit.
- Take measures to prevent unwanted objects from falling into the wiring part of the terminal block.
- Do not solder the twisted conductors.

- The tightening torque of each terminal may be different. Tighten the screws according to the specified tightening torque. Use a torque screwdriver, torque ratchet, or torque wrench to tighten terminal screws.
- When using an electric screwdriver to tighten terminal screws, set the electric screwdriver to a low speed to prevent damage to the terminal screws.
- Tighten the terminal screws with an angle not larger than 5°. Failure to comply may damage the terminal screws.

Control circuit wiring requirements

Observe the requirements specified in UL508 standards during wiring.

Selection requirement of main circuit cables

For selection of cable specifications, follow the requirements of the National Electric Code (NEC) and Part 1 of Canadian Electrical Code (CEC) and relevant local regulations.

- Use cables with copper conductors.
- The recommended cables for the main circuit are 600 V Class 2 heat-resistant indoor PVC cables that can work under temperature of 75°C continuously. The following conditions are used as premises:

  1. Ambient temperature: Below 40°C
  2. Operation at rated values

If the recommended cable specifications for peripheral devices or optional parts exceed the applicable cable specification range, contact Inovance.

Main circuit terminal dimensions and cable selection

For main circuit terminal dimensions and cable selection, see *"5.3.1 Main Circuit Cable" on page 64*.

Requirements of protective devices

- To comply with UL standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.
- Install sufficient protective devices against short circuit in branch circuits according to applicable regulations and this guide. The drive is applicable to circuits with a rated breaking capacity lower than 100000 A and a maximum voltage of 480 VAC (400 V class). For selection of circuit breakers, see *"5.4.1 Fuse, Contactor, and Circuit Breaker" on page 75*.

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