



MD500-PLUS Series General-Purpose AC Drive

Hardware Guide (Global Version)

Preface

Introduction

The MD500-PLUS series AC drive is a general-purpose high-performance current vector control AC drive 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 composition, technical specifications, components, dimensions, options (including mounting accessories, cables, and peripheral electrical devices), and extension cards of the MD500-PLUS series AC drive, as well as routine maintenance and repair and certifications and standards of the AC drive.

More Documents

Document Name	Data Code	Description
MD500-PLUS Series General-Purpose AC Drive Quick Installation and Commissioning Guide	19011581	Describes the installation, wiring, commissioning, troubleshooting, parameters, and fault codes of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Hardware Guide	19011578	Describes the composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), and extension cards of the MD500-PLUS series AC drive, as well as routine maintenance and repair, and certifications and standards of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Installation Guide	19011582	Describes the installation dimensions, space design, specific installation steps, wiring requirements, routing requirements, and option installation requirements of the AC drive, as well as common EMC problem solving recommendations.
MD500-PLUS Series General-Purpose AC Drive Commissioning Guide	19011579	Describes the tools, processes, and specific steps of debugging and commissioning of the AC drive, as well as troubleshooting, fault codes, and parameters related to the AC drive.
MD500-PLUS Series General-Purpose AC Drive Software Guide	19011580	Describes the function application, communication, fault codes, and parameters of the AC drive.

Revision History

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Document Acquisition

This guide is not delivered with the AC drive. You can obtain the PDF version of this document using the following method:

Log in to Inovance's website (<http://en.inovance.cn/>), choose **Support > Download**, perform keyword search, and download the PDF file.

Table of Contents

Preface	1
AC Drive Models	5
Fundamental Safety Instructions	7
1 Product Information	13
1.1 Features	13
1.2 Nameplate and Model Number	14
2 Components	16
2.1 Overview	16
2.2 Components of T1 to T6 Models	16
2.3 Components of T7 to T9 Models	18
2.4 Components of T10 to T12 Models	19
2.5 Components of T13 Models	20
3 System Structure	22
3.1 System Connection Diagram	22
3.2 Electrical Wiring Diagram	23
3.3 Main Circuit Terminals	26
3.4 Control Circuit Terminals	30
4 Dimensions Drawings	33
4.1 T1 to T9 Models	33
4.2 T10 to T12 Models (Without AC Output Reactor)	36
4.3 T10 to T12 Models (with AC Output Reactor)	37
4.4 T13 Models (Without Auxiliary Power Distribution Cabinet)	38
4.5 T13 Models (with Auxiliary Power Distribution Cabinet)	40
5 Options	42
5.1 List of Options	42
5.2 Mounting Accessories	45
5.2.1 Through-Hole Mounting Bracket	45
5.2.2 Bottom Mounting Bracket	55
5.2.3 Guide Rail	57
5.2.4 Conduit Box	57
5.3 Cables	63
5.3.1 Main Circuit Cable	63
5.3.2 Selection of Control Circuit Cables	71
5.4 Peripheral Electrical Devices	71
5.4.1 Fuse, Contactor, and Circuit Breaker	71

5.4.2	AC Input Reactor	74
5.4.3	EMC Filter	85
5.4.4	Simple Filter	98
5.4.5	Braking Components	100
5.4.6	AFE Unit	106
5.4.7	Output Reactor	109
5.4.8	Magnetic Ring and Ferrite Clamp	123
5.5	Operating Panel.....	127
6	Extension Cards	129
6.1	List of Extension Cards.....	129
6.2	Installing Extension Cards	130
7	Technical Data	132
7.1	Electrical Specifications	132
7.2	Technical Specifications	144
8	Routine Maintenance and Inspection	148
8.1	Routine Inspection Items	148
8.1.1	Daily Inspection Items	148
8.1.2	List of Periodic Inspection Items.....	149
8.2	Main Circuit Insulation Test	150
8.3	Replacing Quick-Wear Parts	151
8.3.1	Service Life of Quick-Wear Parts	151
8.3.2	Replacing the Cooling Fan	151
8.3.3	Replacing theElectrolytic Capacitor	160
8.3.4	Refilling and Replacing the Coolant	160
8.3.5	Placing the Drain Hose of Waterproof Baffle	162
8.3.6	Replacing the Dust Filter Foam	163
8.4	Storage and Warranty	165
9	Compliance.....	167
9.1	Compliance List	167
9.2	CE Certification	167
9.2.1	Introduction to CE Certification	167
9.2.2	Conditions for Compliance with the EMC Directive	168
9.2.3	Conditions for Compliance with the LVD	170
9.3	UL/cUL Certification	170

AC Drive Models

The following table lists the relationship between the AC drive model and structure.

Table –1 Relationship between the AC drive model and structure

Structure	AC Drive Model (Three-phase 380 V to 480 V)	AC Drive Model (Three-phase 200 V to 240 V)	AC Drive Model (Single- phase 200 V to 240 V)
T1	MD500T0.4G/0.7PB-PLUS MD500T0.7G/1.1PB-PLUS MD500T1.1G/1.5PB-PLUS MD500T1.5G/2.2PB-PLUS MD500T2.2G/3.0PB-PLUS MD500T3.0G/3.7PB-PLUS	MD500-2T0.4G/0.7PB-PLUS MD500-2T0.7G/1.1PB-PLUS MD500-2T1.1G/1.5PB-PLUS MD500-2T1.5G/2.2PB-PLUS	-
T2	MD500T3.7G/5.5PB-PLUS MD500T5.5G/7.5PB-PLUS	MD500-2T2.2G/3.7PB-PLUS MD500-2T3.7G/5.5PB-PLUS	MD500-2S0.4GB-PLUS MD500-2S0.7GB-PLUS MD500-2S1.5GB-PLUS MD500-2S2.2GB-PLUS
T3	MD500T7.5G/11PB-PLUS MD500T11G/15PB-PLUS	MD500-2T5.5G/7.5PB-PLUS	-
T4	MD500T15G/18.5PB-PLUS	MD500-2T7.5G/11PB-PLUS	-
T5 (without DC reactor)	MD500T18.5G/22P(B)-PLUS MD500T22G/30P(B)-PLUS	MD500-2T11G/15P(B)-PLUS	-
T5 (with DC reactor)	MD500T18.5G/22P(B)-T-PLUS MD500T22G/30P(B)-T-PLUS	-	-
T6	MD500T30G/37P(B)-PLUS MD500T37G/45P(B)-PLUS	MD500-2T15G/18.5P(B)-PLUS MD500-2T18.5G/22P(B)-PLUS	-
T7	MD500T45G/55P(B)-PLUS MD500T55G/75P(B)-PLUS	MD500-2T22G/30P(B)-PLUS MD500-2T30G/37P(B)-PLUS	-
T8	MD500T75G/90P(B)-PLUS MD500T90G/110P-PLUS MD500T110G/132P-PLUS	MD500-2T37G/45P(B)-PLUS MD500-2T45G/55P-PLUS MD500-2T55G/75P-PLUS	-
T9	MD500T132G/160P-PLUS MD500T160G/200P-PLUS	MD500-2T75G/90P-PLUS	-
T10 (without AC output reactor)	MD500T200G/250P-PLUS MD500T220G/280P-PLUS	MD500-2T90G/110P-PLUS MD500-2T110G/132P-PLUS	-
T10 (with AC output reactor)	MD500T200G/250P-L-PLUS MD500T220G/280P-L-PLUS	-	-
T11 (without AC output reactor)	MD500T250G/315P-PLUS MD500T280G/355P-PLUS	MD500-2T132G/160P-PLUS	-
T11 (with AC output reactor)	MD500T250G/315P-L-PLUS MD500T280G/355P-L-PLUS	-	-
T12 (without AC output reactor)	MD500T315G/400P-PLUS MD500T355G/450P-PLUS MD500T400G/500P-PLUS	MD500-2T160G/200P-PLUS MD500-2T200G/220P-PLUS	-
T12 (with AC output reactor)	MD500T315G/400P-L-PLUS MD500T355G/450P-L-PLUS MD500T400G/500P-L-PLUS	-	-

Structure	AC Drive Model (Three-phase 380 V to 480 V)	AC Drive Model (Three-phase 200 V to 240 V)	AC Drive Model (Single- phase 200 V to 240 V)
T13 (without auxiliary power distribution cabinet)	MD500T500G/630P-PLUS MD500T560G/710P-PLUS MD500T630G/800P-PLUS	-	-
T13 (with auxiliary power distribution cabinet)	MD500T500G/630P-A-PLUS MD500T560G/710P-A-PLUS MD500T630G/800P-A-PLUS	-	-

Fundamental Safety Instructions

Safety Precautions

1. This chapter presents essential safety instructions for a 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.
2. "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.
3. Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
4. 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 damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.

 CAUTION

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package 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.

 WARNING

- 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.

 CAUTION

- 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

 DANGER

- 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.

 WARNING

- 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.

 CAUTION

- 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

 DANGER

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before 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.

 WARNING

- 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

 DANGER

- 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.

**WARNING**

- 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**DANGER**

- 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.

**WARNING**

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

Repair**DANGER**

- 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**

- 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 Signs		Description
T1 to T12 models		• Read through the safety instructions before operating the equipment. Failure to comply may result in equipment damage, personal injuries, or even death. • Do not touch terminals or remove the cover while the power is on or within 10 minutes after the power is turned off. Failure to comply may result in an electric shock.
T13 models		• Read through the safety instructions before operating the equipment. Failure to comply may result in equipment damage, personal injuries, or even death. • Do not touch terminals or remove the cover while the power is on or within 15 minutes after the power is turned off. Failure to comply may result in an electric shock.

1 Product Information

1.1 Features

The MD500-PLUS series AC drive is a general-purpose high-performance current vector AC drive used to control the speed and torque of three-phase AC asynchronous motors and three-phase AC permanent magnet motors.



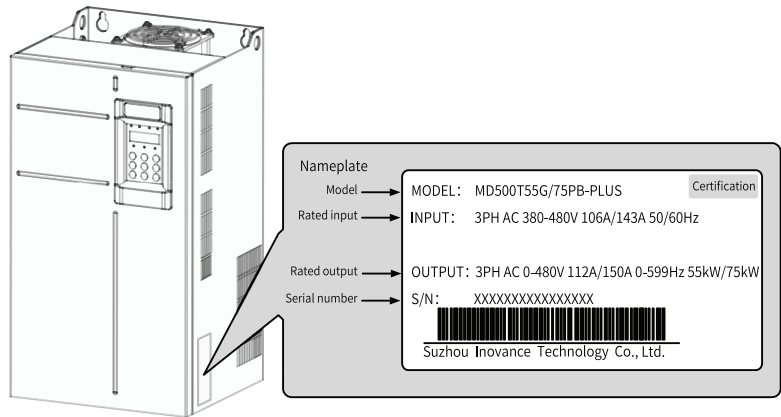
Figure 1-1 Appearance

The AC drive is armed with the following features:

1. Drives three-phase AC asynchronous motors and three-phase AC permanent magnet 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. Integrated with tension control process to keep a constant tension when the roll diameter changes, which is widely applied in winding and unwinding of wire drawing machines, coating machines, printers, and papermaking machines.
4. Integrated with VVC algorithm to simplify and stabilize synchronous motor control in high speed applications.

5. Upgraded based on MD500, MD500E, MD290, and MD330 series AC drives and compatible with MD500 series AC drive options, including the PG card, communication card, I/O extension card, and bracket.

1.2 Nameplate and Model Number



MD500 T 55 G / 75 P B - PLUS

Code	Product Name
MD500	AC drive series

Code	Voltage Class
T	3-phase 380 V to 480 V
2T	3-phase 200 V to 240 V
2S	1-phase 200 V to 240 V

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

Code	Applicable Motor
G	Heavy overload
P	Light overload

Code	Reactor
Blank	See the note below.
-T	With the DC reactor, applicable to T5 models
-L	With AC output reactor, applicable to T10 to T12 models
-A	With auxiliary power distribution cabinet, applicable to T13 models

Code	Braking unit
Blank	See the note below.
B	With the braking unit

Figure 1-2 Nameplate and designation rules

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.
 - 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 following types of enclosures are available for the AC drive:

- T1 to T6 models: plastic enclosure
- T7 to T13 models: sheet metal enclosure

2.2 Components of T1 to T6 Models

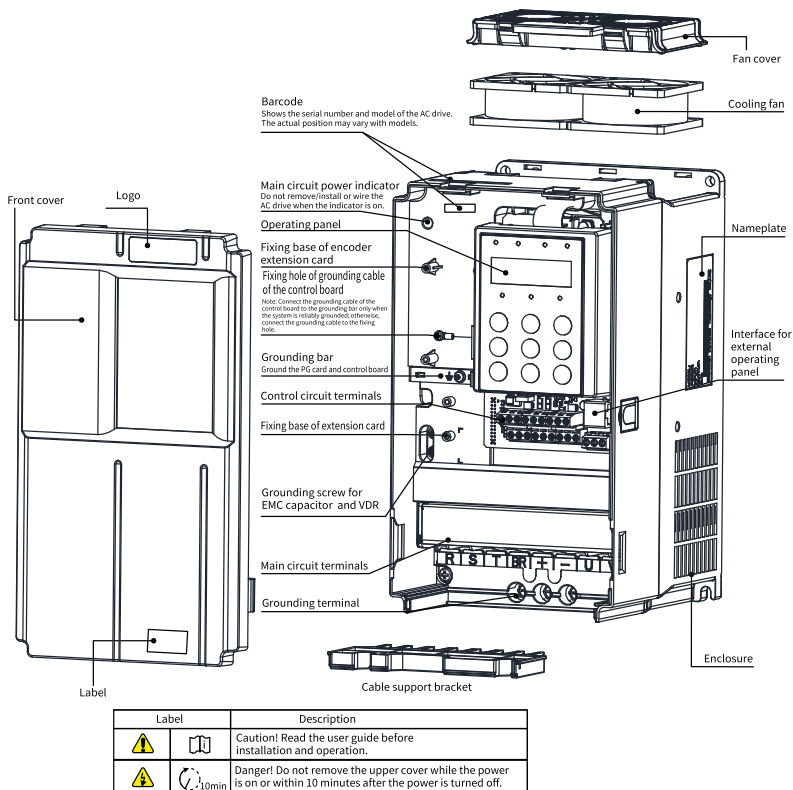


Figure 2-1 Components of T1 to T4 models

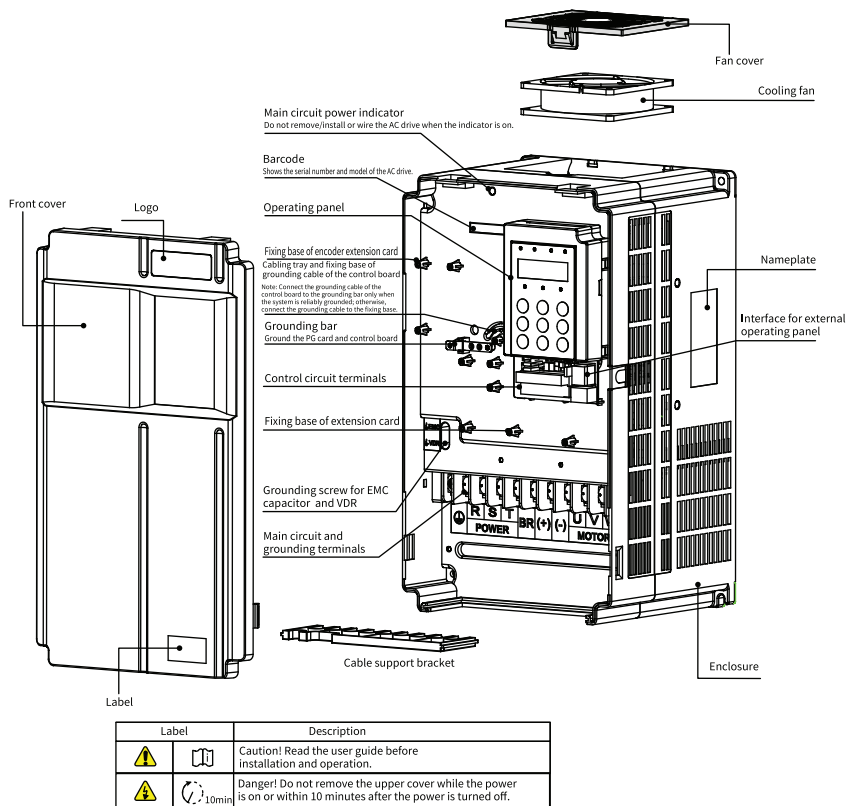


Figure 2-2 Components of T5 to T6 models

2.3 Components of T7 to T9 Models

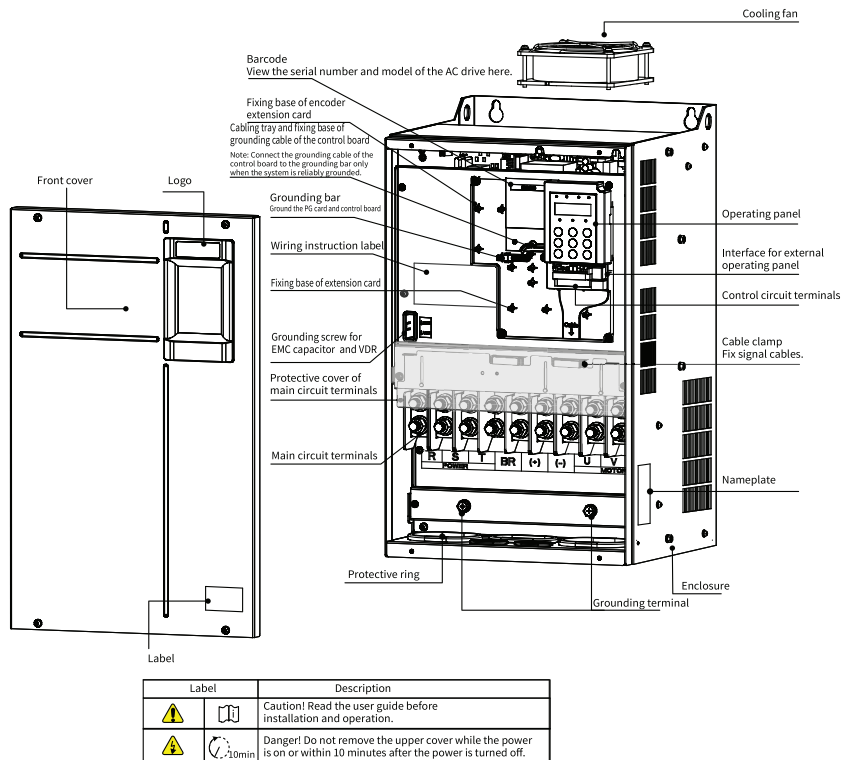


Figure 2-3 Components of T7 to T9 models

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

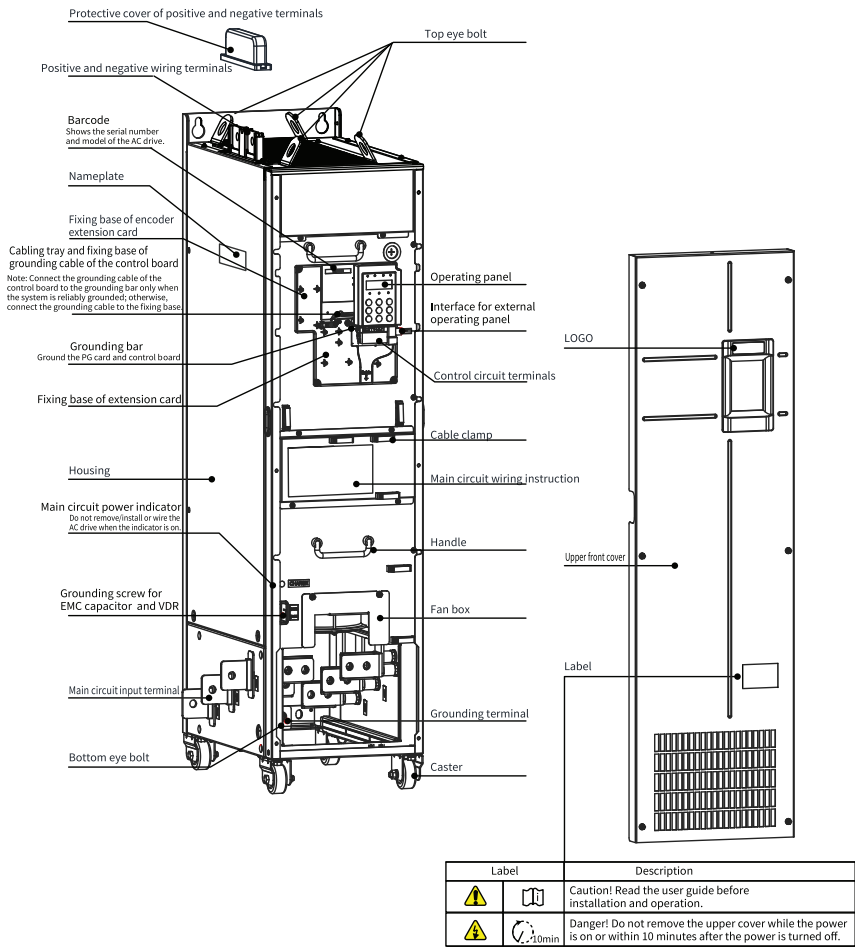


Figure 2-4 Components of T10 to T12 models (without AC output reactor)

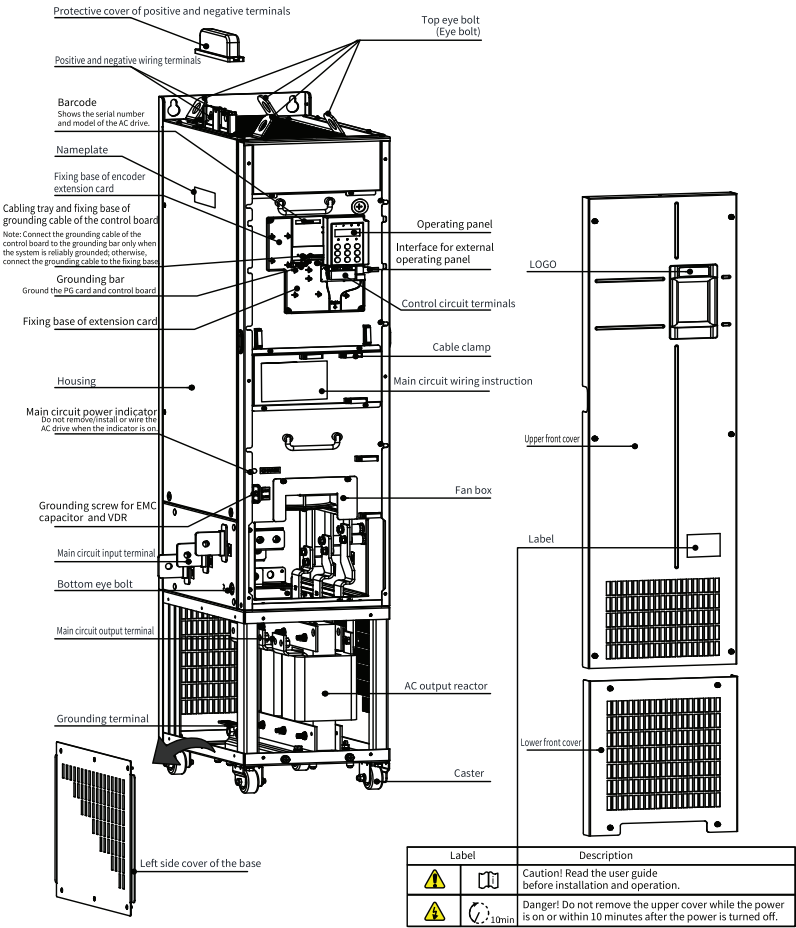


Figure 2-5 Components of T10 to T12 models (with AC output reactor)

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](#).

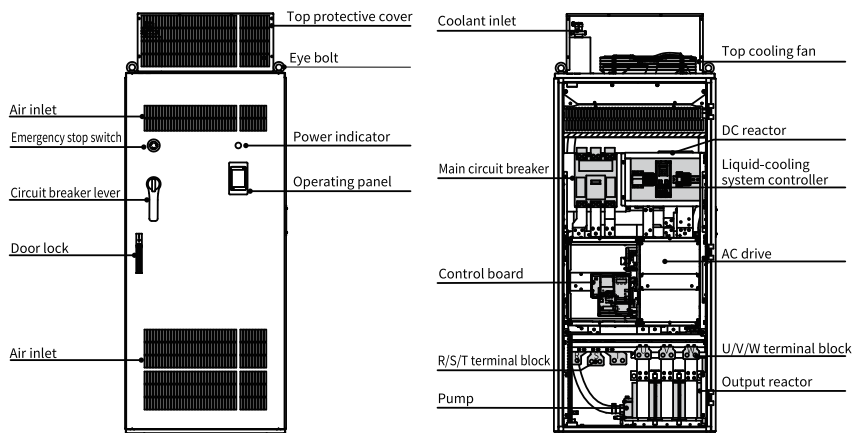


Figure 2-6 Components of standard cabinet

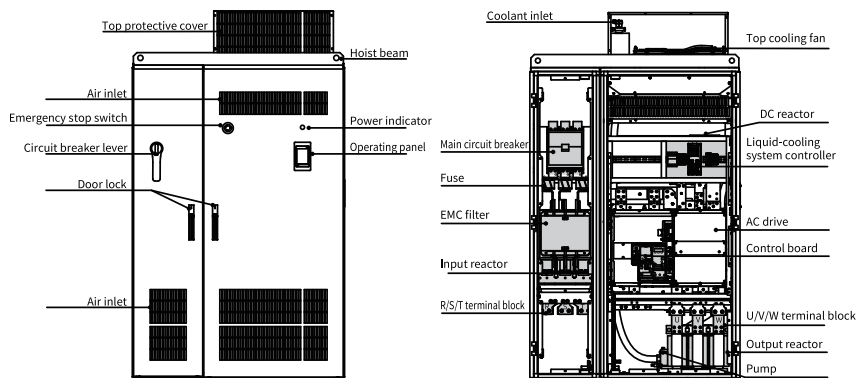


Figure 2-7 Components of standard cabinet with auxiliary power distribution cabinet

3 System Structure

3.1 System Connection Diagram

When the AC drive is used to control asynchronous motors to form a control system, a variety of electrical devices must be installed on the input and output sides of the AC drive to ensure system safety and stability. The following figure shows how to configure the AC drive.

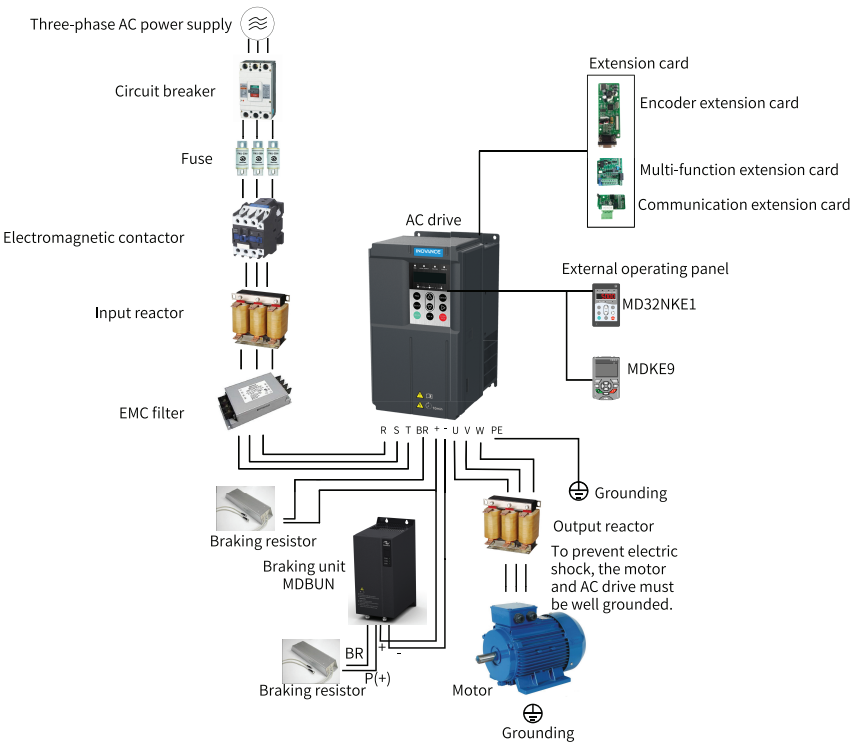


Figure 3-1 System structure

Table 3-1 Description of peripheral parts

Device	Description
Circuit breaker	Installed between power supply and AC drive input side. Circuit breaker for protection against short circuit: Cuts off power supply when overcurrent occurs on downstream devices. Earth leakage circuit breaker: Provides protection against potential leakage current during operation to prevent electric shock and even a fire. Select proper earth leakage circuit breakers as needed.
Fuse	Protects downstream semiconductor components in case of short circuit.

Device	Description
(Electromagnetic) Contactor	Switches ON/OFF the AC drive. Do not start/stop the AC drive frequently by switching the contactor ON/OFF (time interval is at least one hour) or use the contactor to directly start the AC drive.
AC input reactor	Improves the power factor on the input side . Eliminates high harmonics of the input side effectively and prevents other devices from being damaged due to distortion of voltage waveform. Eliminates input current unbalance due to unbalance between the power phases.
EMC filter	Reduces external conduction and radiation interference of the AC drive. Decreases conduction interference flowing from the power supply to the AC drive and improves the anti-interference capacity of the AC drive.
Simple filter	Reduces external conduction and radiation interference of the AC drive.
Braking resistor	Use a braking resistor for models containing letter B in the designation. The braking resistor is used to consume the regenerative energy during motor deceleration.
Braking unit	Use a braking unit (MDBUN) or recommended braking resistor of Inovance for models not containing letter B in the designation. The braking unit is used to consume the regenerative energy during motor deceleration.
AFE unit	An active front end (AFE) is an optional unit used to feed the energy generated by the motor during braking back to the power grid, which removes the use of the braking unit and braking resistor and reduces heat emission. Inovance AFE features energy efficiency, low noise, low harmonic, and high power factor.
DC reactor	Optional for T5 models. Standard for T6 models and above. Improves the input-side power factor. Improves the efficiency and thermal stability of the AC drive. Eliminates the impact of input high harmonics on the AC drive and reduces external conducted and radiated disturbance.
Output reactor	Standard for T10 to T12 models containing letter L in the designation and built in for T13 models. The output side of the AC drive generally suffers from high harmonics. When a motor is far away from the AC drive, distributed capacitance will be generated in the circuit and certain harmonics may cause resonance in the circuit, which will: 1. Degrade motor insulation performance and damage the motor in the long term. 2. Generate large leakage current and trigger AC drive protection frequently. Protects motor insulation and reduces the bearing current.
Magnetic ring and ferrite clamp	A magnetic ring on the input side suppresses noise in the input power supply system of the AC drive. A magnetic ring on the output side reduces the interference generated by the AC drive to external devices and reduces the bearing current.
Motor	Select an applicable motor.
External operating panel	External LED operating panel MD32NKE1 and LCD operating panel MDKE9.
Note: For selection of peripheral electrical devices, see Chapter "Options".	

3.2 Electrical Wiring Diagram

The typical wiring diagram is shown in *"Figure 3-2 " on page 24 .*

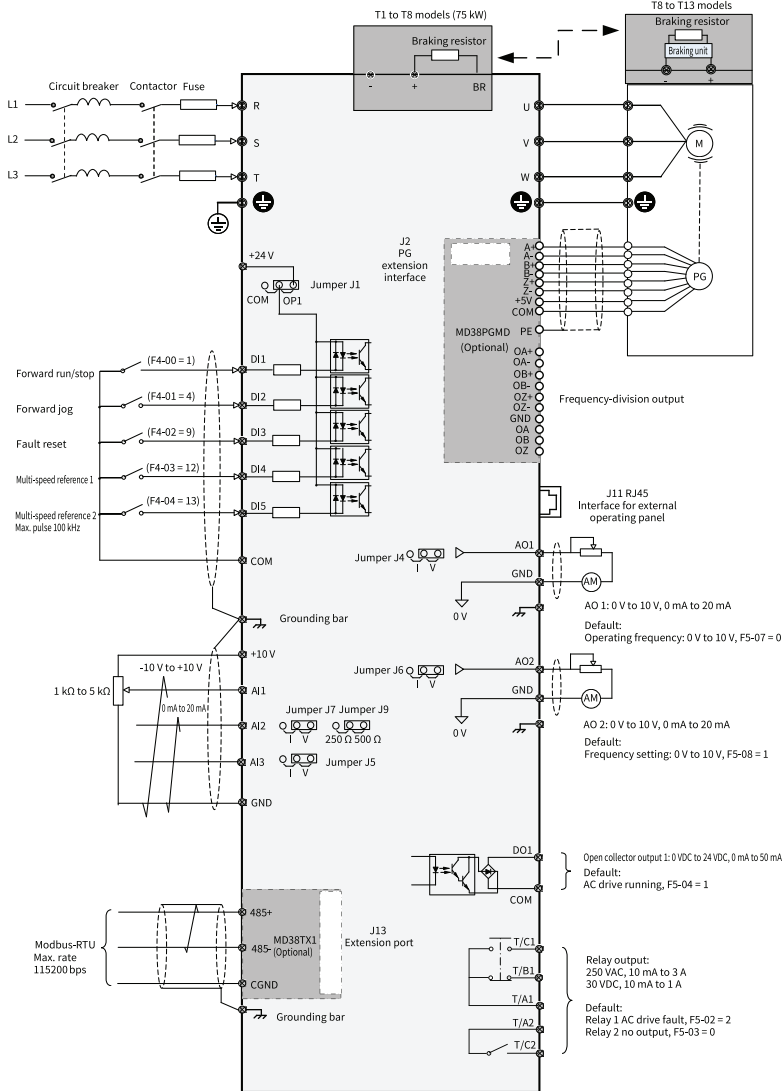


Figure 3-2 Standard wiring

Note

For T1 to T8 (75 W) models (model number containing letter B) and T8 to T13 models (model number without letter B), the connection indicated by the double-headed arrow is different.

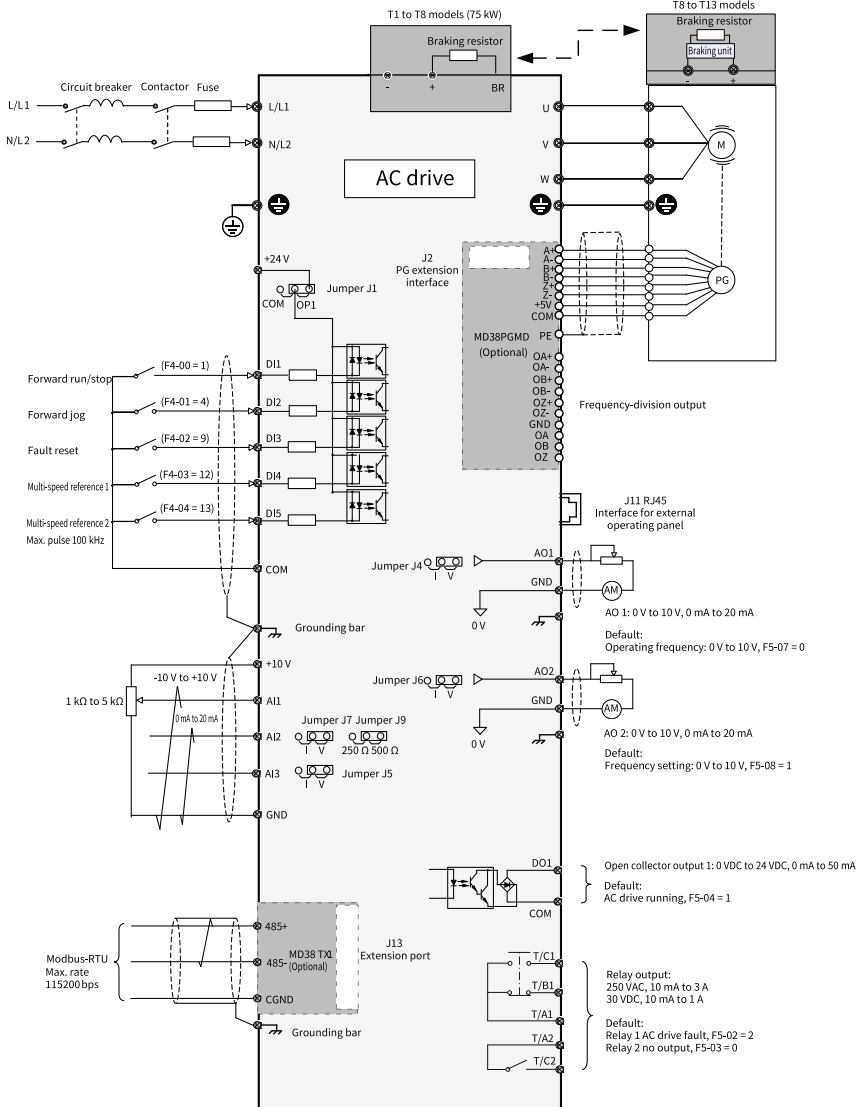


Figure 3-3 Standard wiring (single-phase 220 V)

T13 models

"Figure 3-2" on page 24 shows the standard wiring of the cabinet, and "Figure 3-4" on page 26 shows the electrical connection in the cabinet.

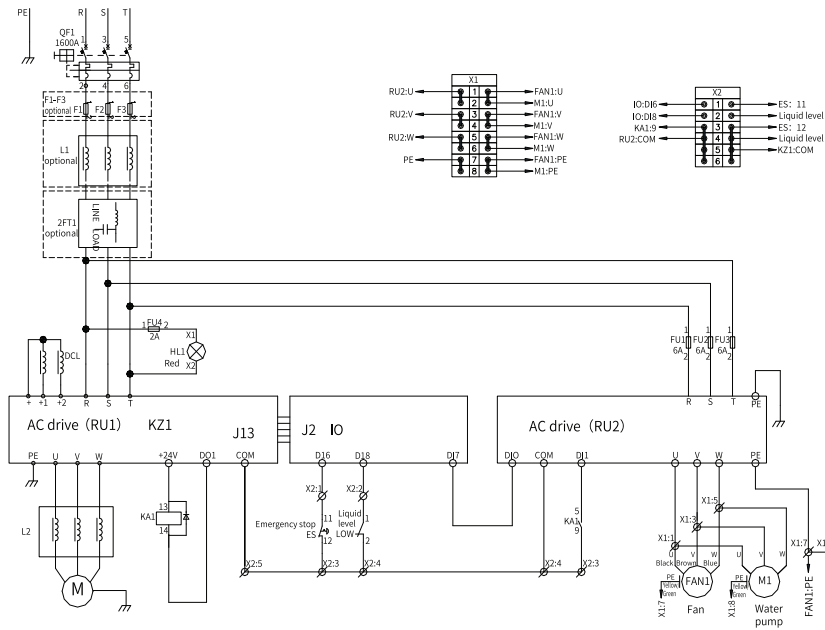


Figure 3-4 Electrical connection in the cabinet (T13 models)

3.3 Main Circuit Terminals

T1 to T9 models

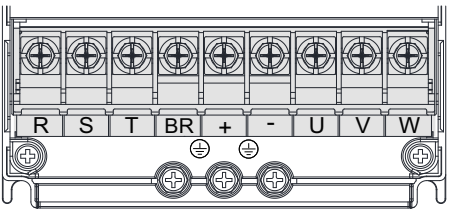


Figure 3-5 Arrangement of main circuit terminals of T1 to T4 models

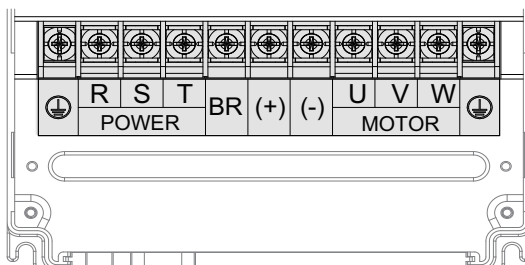


Figure 3-6 Arrangement of main circuit terminals of T5 to T8 models

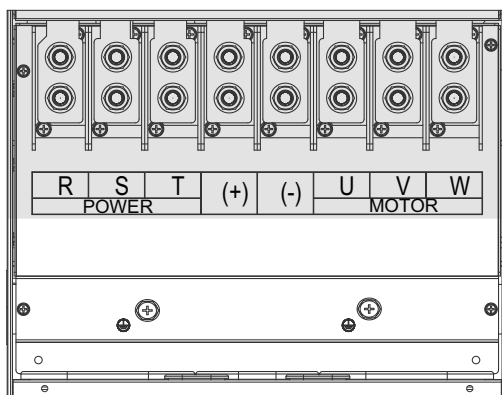


Figure 3-7 Arrangement of main circuit terminals of T9 models

Table 3-2 Main circuit terminals

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connected to AC input three-phase power supply.
(+), (-)	Positive and negative terminals of DC bus	Common DC busbar input point, connected to the external braking unit of T9 models and above.
(+), BR	Braking resistor connection terminals	Connected to the braking resistor of T8 models and below.
U, V, W	Output terminals	Connected to a three-phase motor.
	Grounding terminal (PE)	Used for protective grounding.

T10 to T12 models

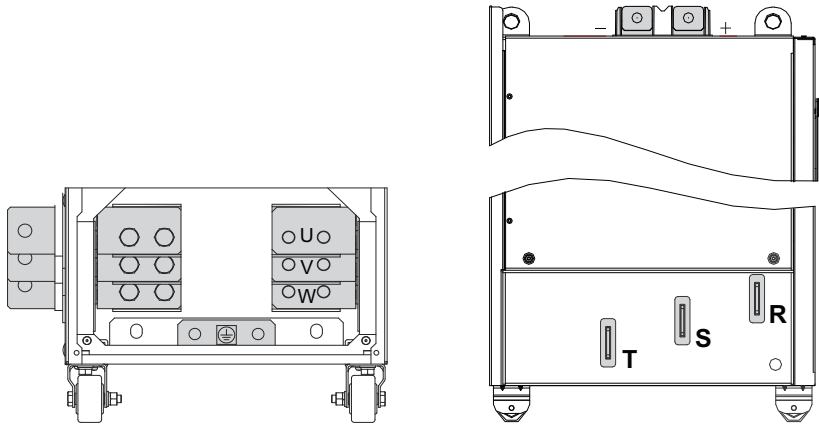


Figure 3-8 Arrangement of main circuit terminals of T10 to T12 models

Table 3-3 Main Circuit Terminals

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connected to AC input three-phase power supply.
+, -	Positive and negative terminals of DC bus	Common DC busbar input point, connected to an external braking unit.
U, V, W	AC drive output terminals	Connected to a three-phase motor.
	Grounding terminal (PE)	Used for protective grounding.

T13 models

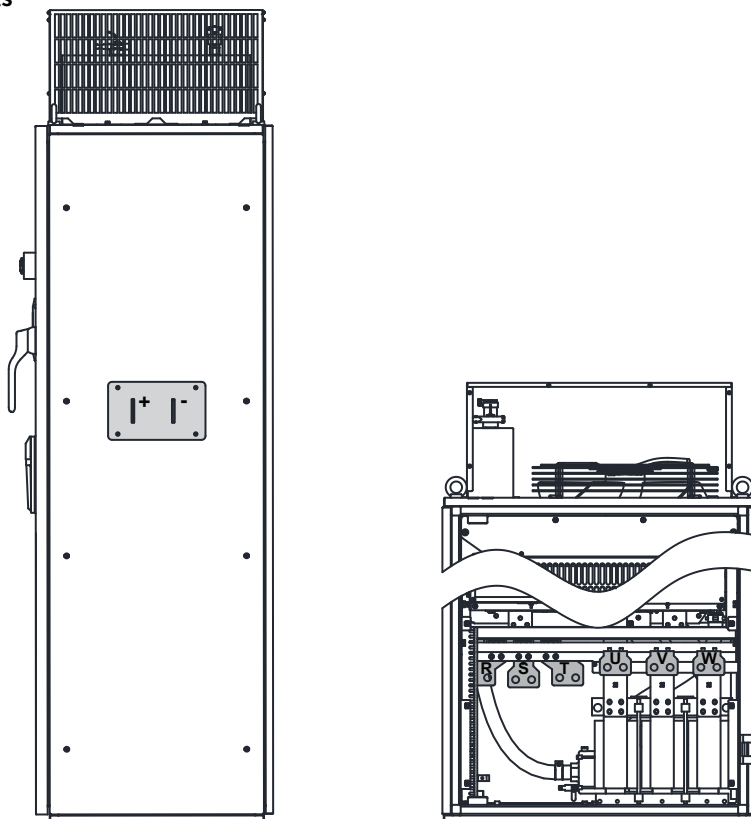


Figure 3-9 Arrangement of main circuit terminals of T13 models

Table 3-4 Main Circuit Terminals

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connected to AC input three-phase power supply.
+, -	Positive and negative terminals of DC bus	Common DC busbar input point, connected to an external braking unit.
U, V, W	AC drive output terminals	Connected to a three-phase motor.
	Grounding terminal (PE)	Used for protective grounding.

3.4 Control Circuit Terminals

"Figure 3-10 " on page 30 shows the control circuit terminal arrangement.

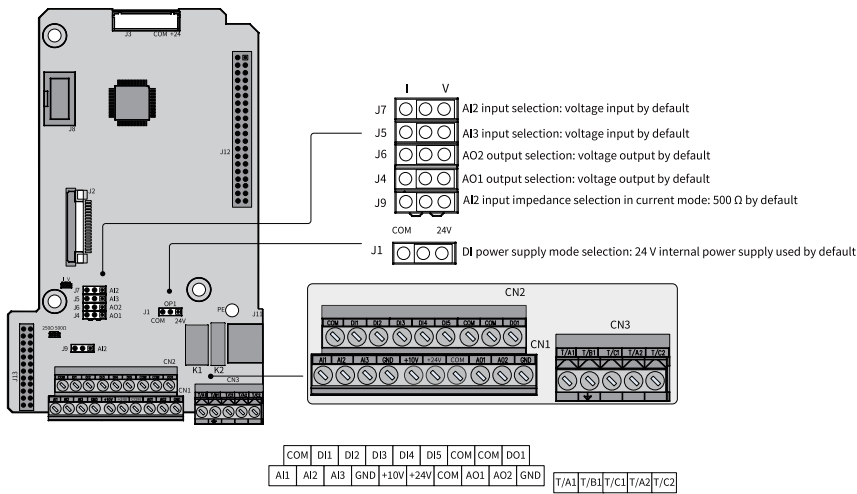


Table 3-5 Description of control circuit terminals

Item	Terminal Code	Terminal Name	Function
Power supply	+10V-GND	External +10 V power supply	Provides +10 V power supply to an external unit. Its maximum output current is 10 mA. Generally used to supply power to an external potentiometer with resistance ranging from 1 k Ω to 5 k Ω .
	+24V-COM	External +24V power supply	Provides +24 V power supply to an external unit. It is generally used to supply power to digital input/output terminals and external sensors. Maximum output current: 200 mA
Analog input	AI1-GND	Analog input terminal 1	Input voltage range: -10 VDC to +10 VDC Input impedance: 22 k Ω
	AI2-GND	Analog input terminal 2	Input range: -10 VDC to +10 VDC/0 mA to 20 mA, determined by the J7 jumper on the control board Input impedance: 22 k Ω (voltage input), or 250 Ω to 500 Ω (current input), switchable by using jumper cap J9.
	AI3-GND	Analog input terminal 3	Input range: -10 VDC to +10 VDC/0 mA to 20 mA, determined by the J5 jumper on the control board Input impedance: 22 k Ω (voltage input) or 500 Ω (current input) AI3 supports inputs of PT100, PT1000, KTY-84-130, and PTC130 temperature sensors, switchable by using F9-56.
Digital input	DI1-COM	Digital input 1	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 k Ω Voltage range for effective level input: 9 V to 30 V
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	DI5-COM	Digital input 5	DI5 can be used for high-speed pulse input. Maximum input frequency: 100 kHz Input impedance: 1.03 k Ω

Item	Terminal Code	Terminal Name	Function
Analog Output	AO1-GND	Analog output 1	Voltage or current output is selected by using 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	Analog output 2	Voltage or current output is selected by using 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	Digital output 1	Photocoupler isolation, dual polarity open collector output Output voltage range: 0 V to 24 V Output current range: 0 mA to 50 mA Through F4-41 parameter setting, DO can be used for high-speed pulse output, with the maximum frequency being 100 kHz.
Relay output	T/A1-T/B1	Normally closed terminal	Contact driving capacity: 250 VAC, 3 A, COS ϕ = 0.4 30 VDC, 1 A
	T/A1-T/C1	Normally open terminal	
	T/A2-T/C2	Normally open terminal	
Auxiliary interfaces	J13	Extension card interface	Interface for the 28-core terminal and optional cards (various bus cards)
	J2	PG card interface	Supports resolvers and differential encoders.
	J11	External operating panel interface	Connected to an external operating panel.
Jumpers	J1	Power supply mode for the DI terminal	The internal 24 V power supply is used by default.
	J4	AO1 output	Voltage output or current output supported, voltage output applied by default
	J6	AO2 output	Voltage output or current output supported, voltage output applied by default
	J5	AI3 input	Voltage input or current input supported, voltage input applied by default
	J7	AI2 input	Voltage input or current input supported, voltage input applied by default
	J9	Selection of input impedance in AI2 current mode	In AI2 current mode, input impedance is 250 Ω or 500 Ω .

4 Dimensions Drawings

4.1 T1 to T9 Models

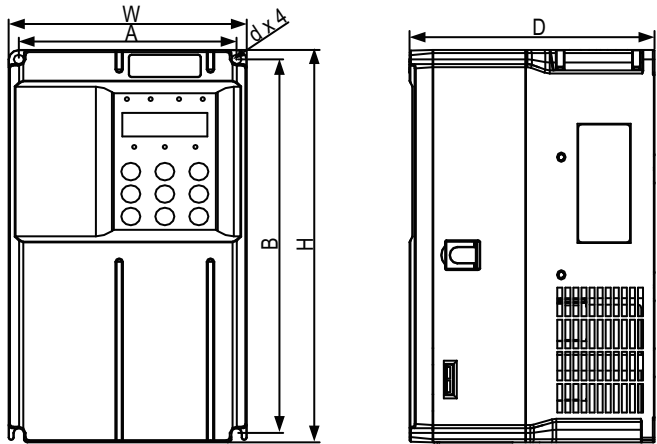


Figure 4-1 Dimension drawing of T1 to T4 models

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)

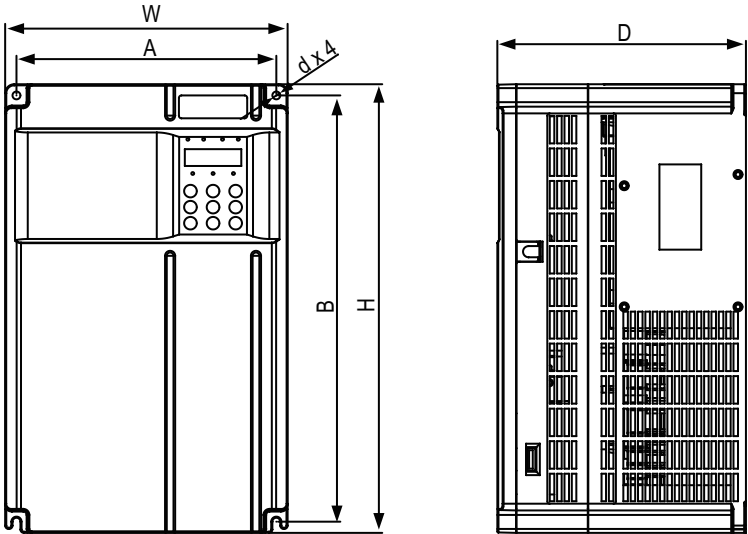


Figure 4-2 Dimension drawing of T5 to T6 models

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)

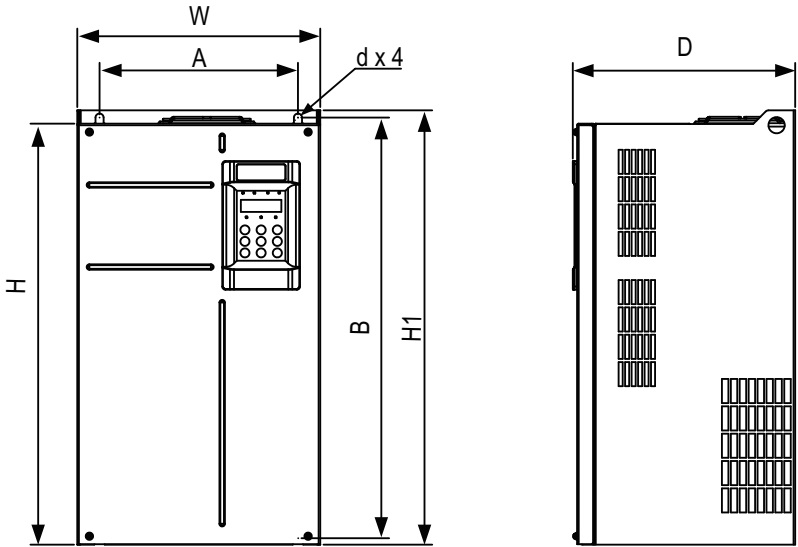


Figure 4-3 Dimension drawing of T7 to T9 models

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)

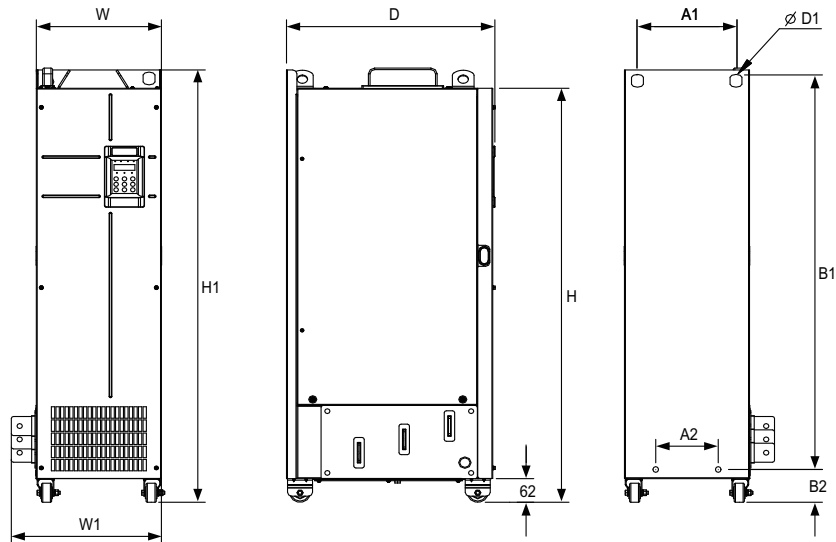


Figure 4-4 Dimension drawing of T10 to T12 models (without AC output reactor)

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)

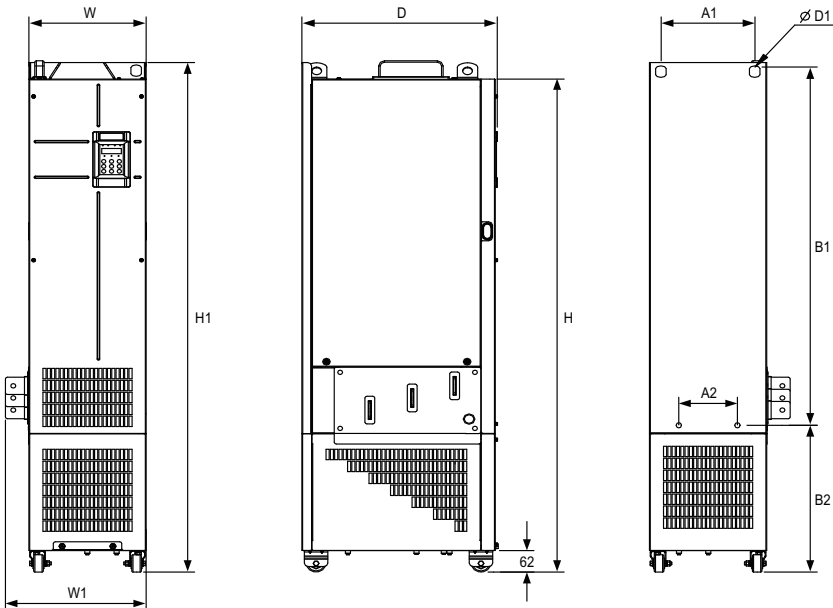


Figure 4-5 Dimension drawing of T10 to T12 models (with AC output reactor)

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 T13 Models (Without Auxiliary Power Distribution Cabinet)

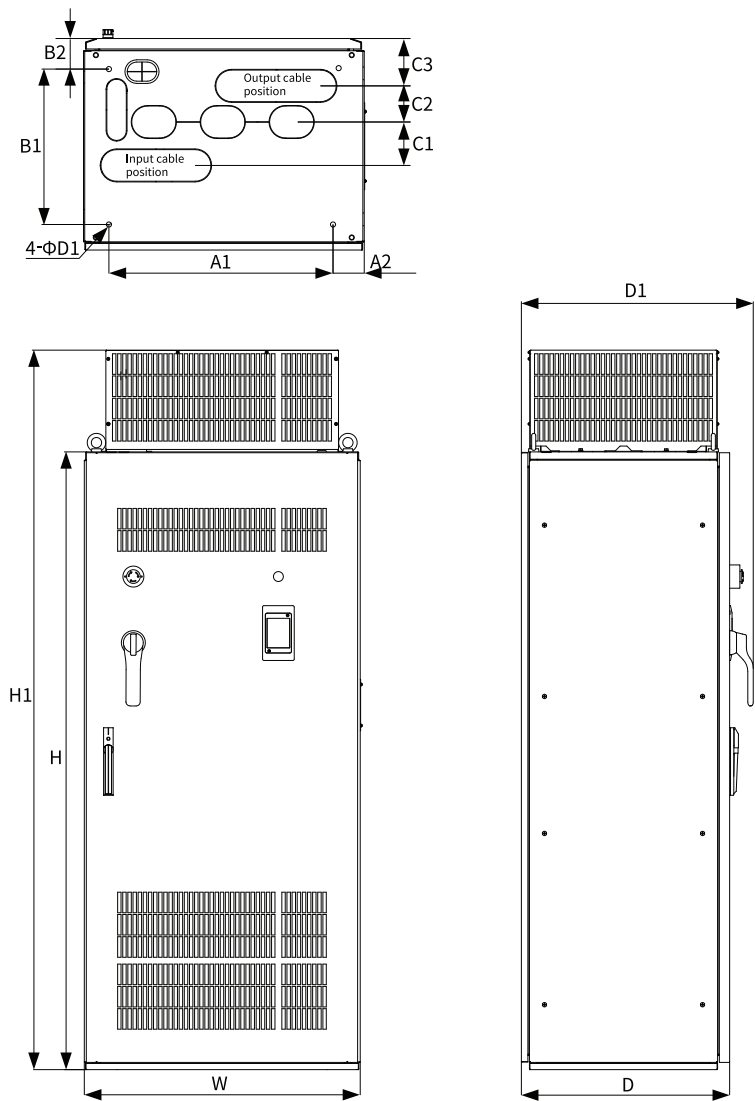


Figure 4-6 Dimension drawing of T13 models (without auxiliary power distribution cabinet)

Table 4-6 Dimensions of T13 models (without auxiliary power distribution cabinet)

Structure	Mounting Hole Spacing mm (in.)							Outline Dimensions 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)

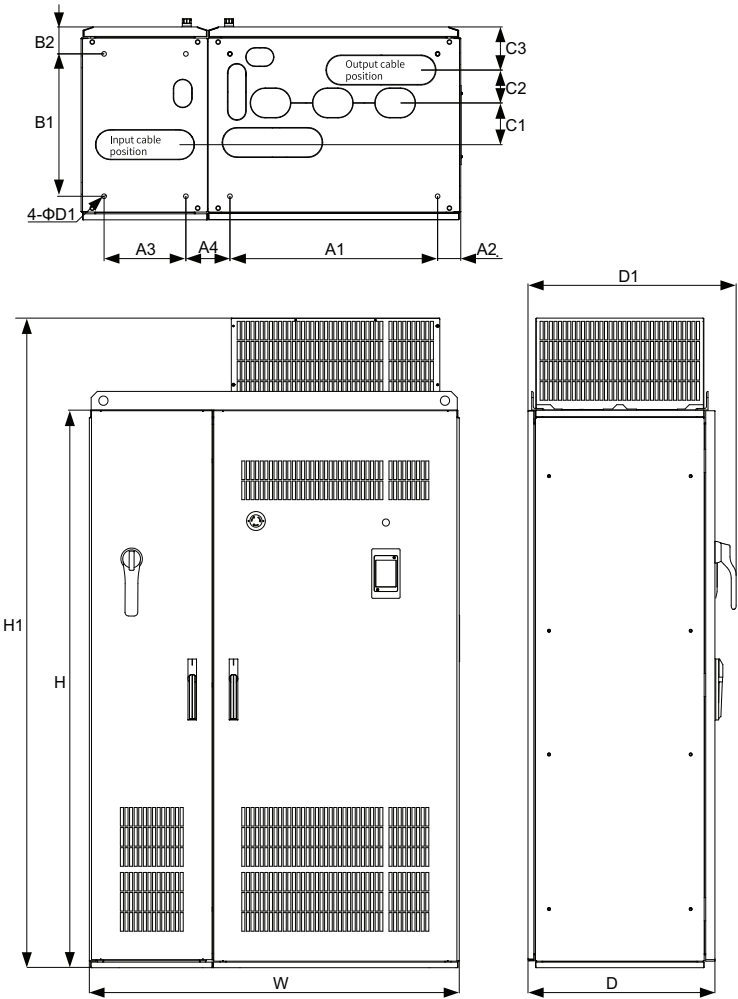


Figure 4-7 Dimension drawing of T13 models (with auxiliary power distribution cabinet)

Table 4–7 Dimensions of T13 models (with auxiliary power distribution cabinet)

Mounting Hole Spacing mm (in.)									Outline Dimensions mm (in.)					Hole Dia. mm (in.)	Wgt. kg (lb)
A1	A2	A3	A4	B1	B2	C1	C2	C3	H	H1	W	D	D1	D1	
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

Optional peripherals include braking units, function extension cards, and external operating panels. For use of each option, see the corresponding user guide. If any option is required, specify it in your order.

Table 5–1 List of options

Device		Model	Order No.	Supported Models	Description
Braking parts	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	Models containing letter "B"	/	T1 to T8 (75 kW)	Three-phase 380 V to 480 V: standard for T1 to T4 models and optional for T5 to T8 (75 kW) models
Extension cards	I/O extension card 1	MD38IO1	01013098	T4 to T13	Adds five DIs, one RO, and one DO, with Modbus/CANlink.
	I/O extension card 2	MD38IO2	01013103	All models	Adds three DIs.
	I/O extension card 3	MD38IO3	01040051	All models	Adds three DIs, one RS485 communication signal isolation input, and one normally open relay output.
	RS485 communication card	MD38TX1	01013112	All models	Provides the isolated Modbus communication adapter card.
	CANlink communication extension card	MD38CAN1	01013100	All models	CANlink communication adapter card
	CANopen communication extension card	MD38CAN2	01013102	All models	CANopen communication adapter card
	PROFIBUS-DP communication card	MD-SI-DP	01040172	T1 to T3	
	PROFIBUS-DP communication card	MD38DP2	01013144	T4 to T13	PROFIBUS-DP communication card

Device		Model	Order No.	Supported Models	Description
Extension cards	PROFINET communication extension card	MD500-PN1	01040098	All models	PROFINET communication adapter card
	EtherCAT communication extension card	MD500-ECAT	01040113	All models	EtherCAT communication adapter card
	Resolver interface card	MD38PG4	01013081	All models	Applied to the resolver. Excitation frequency: 10 kHz. 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. Use resolvers with no more than four pole pairs; failure to comply may result in MD38PG4 overload.
	MD38PGMD new multi-function encoder card	MD38PGMD	01013147	All models	Collector and differential encoder interface card with an optional frequency multiplication/division output interface. Applicable to 5 V/15 V power supplies. Compatible with differential input, collector input, and push-pull input. Supports differential output and collector output and a variety of interfaces such as encoder interfaces and host controller A/B phase input interfaces.
	23-bit PG card	ES510-PG-CT1	01320007	All models	Supports Inovance 23-bit encoders and provides a DB9 interface.

Device		Model	Order No.	Supported Models	Description
Mounting accessories	Through-hole mounting bracket	MD500-AZJ-A1T1	01040072	T1	Satisfies requirements of through-hole mounting. Applicable to T1 to T9 models only.
		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 of cable shield	MD500-AZJ-A2T1	01040085	T1	Used for secondary fixing of power cables and stable grounding of the shield. Applicable to T1 to T9 models only.
		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	
	Guide rail	MD500-AZJ-A3T10	01040009	T10 to T12	Used for installing the AC drive in a cabinet. Guide rail is recommended for installing T10 models and above in a cabinet.
	Conduit box	MD500-NE MA1-T1	01040108	T1 to T2	Models requiring UL Type 1 enclosure have a conduit box. The conduit box is optional and can be purchased as needed (applicable to T6 models and below).
		MD500-NE MA1-T3	01040109	T3	
		MD500-NE MA1-T4	01040110	T4	
		MD500-NE MA1-T5	01040111	T5	
		MD500-NE MA1-T6	01040112	T6	
Cables	Main circuit cable	It is recommended to use Lugs from Suzhou Yuanli Metal Enterprise Co., Ltd., see "5.3.1 Main Circuit Cable" on page 63 .			It is recommended to use symmetrical shielded cables as power cables and I/O cables in the main circuit. Compared with quad-cord cable, symmetrical shielded cable reduces 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. Shielded twisted pairs (STPs) are recommended as digital signal cables.			

Device		Model	Order No.	Supported Models	Description
Operating panels	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 copy and parameters display in Chinese or English.
	Extension cable	MDCAB	01013008	All models	Used by the external operating panel as a standard 8-core cable in a length of 3 m, which can be connected to MD32NKE1, MD32KC, and MDCP.
		MDCAB-1.5	15048471	All models	Used by the external operating panel, with a length of 1.5 m.

Note

Models and specifications of input reactors, EMC filters, output reactors, fuses, and other peripheral electrical devices are described in Chapter "Options".

5.2 Mounting Accessories

5.2.1 Through-Hole Mounting Bracket

The through-hole mounting bracket is optional and can be purchased as needed.

Applicable models

Table 5–2 Models of through-hole mounting brackets

Models of Through-hole Mounting Brackets	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

Models of Through-hole Mounting Brackets	Structure
MD500-AZJ-A1T8	T8
MD500-AZJ-A1T9	T9

Mounting hole dimensions

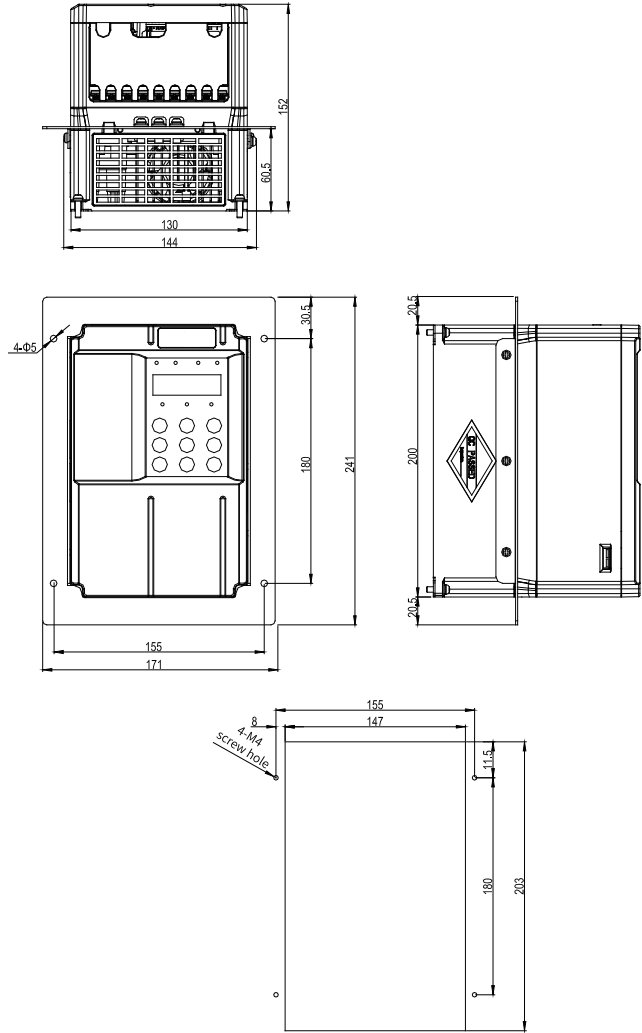


Figure 5-1 Dimensions of MD500-AZJ-A1T1 through-hole mounting bracket and mounting holes

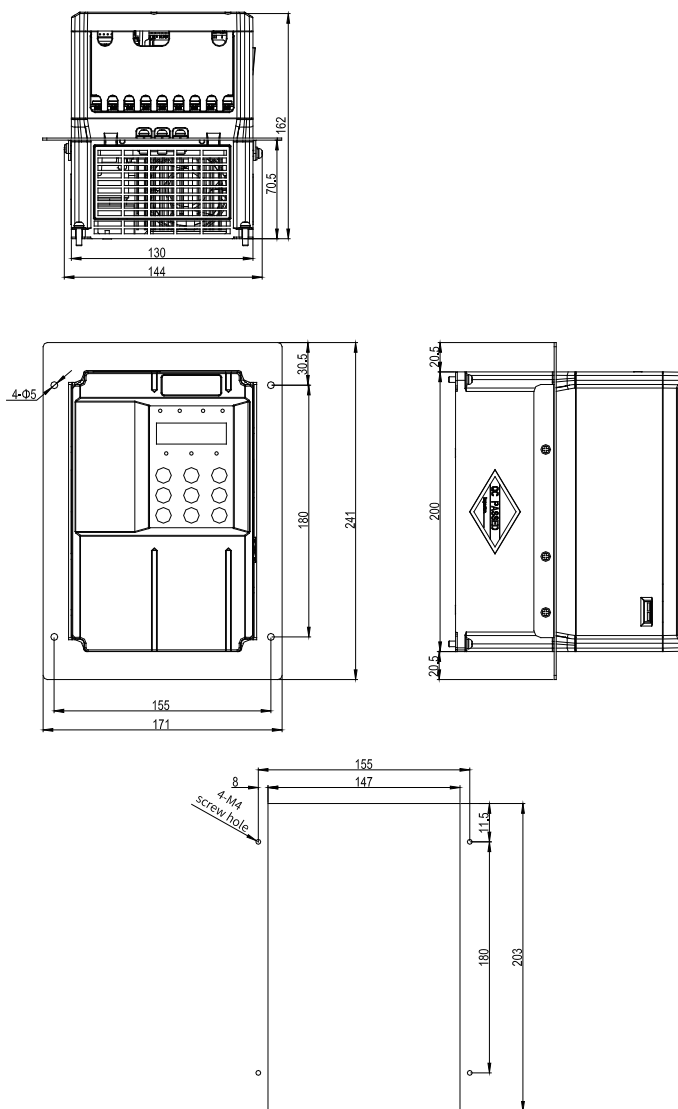


Figure 5-2 Dimensions of MD500-AZJ-A1T2 through-hole mounting bracket and mounting holes

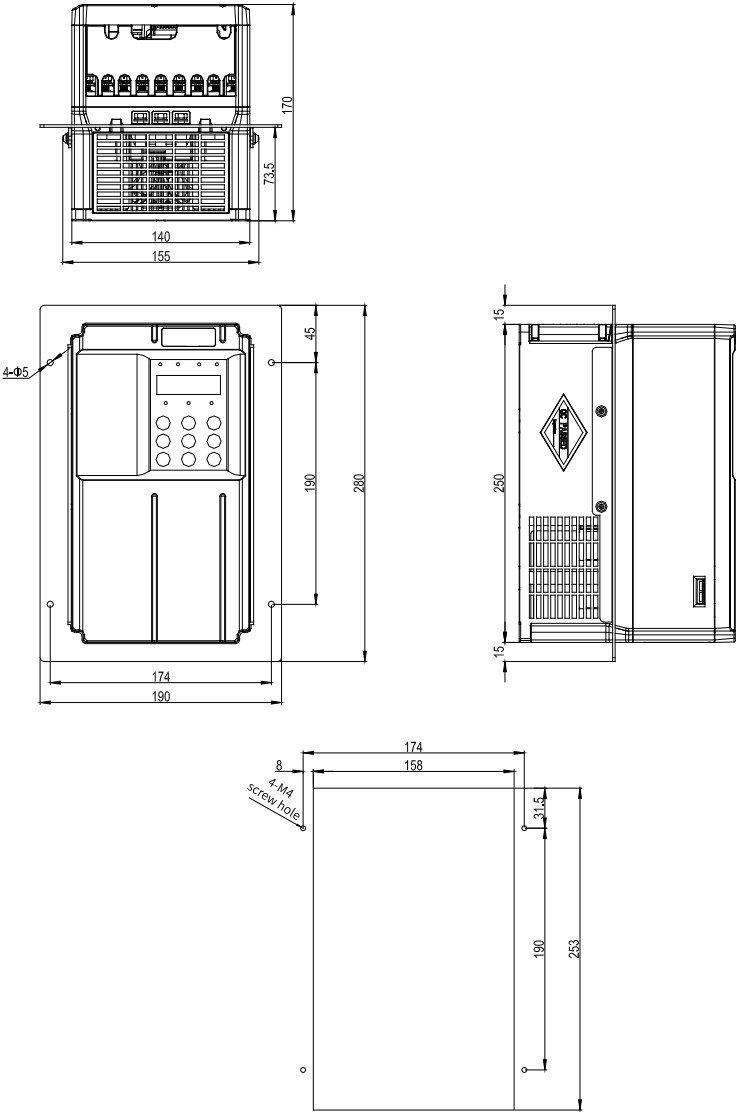


Figure 5-3 Dimensions of MD500-AZJ-A1T3 through-hole mounting bracket and mounting holes

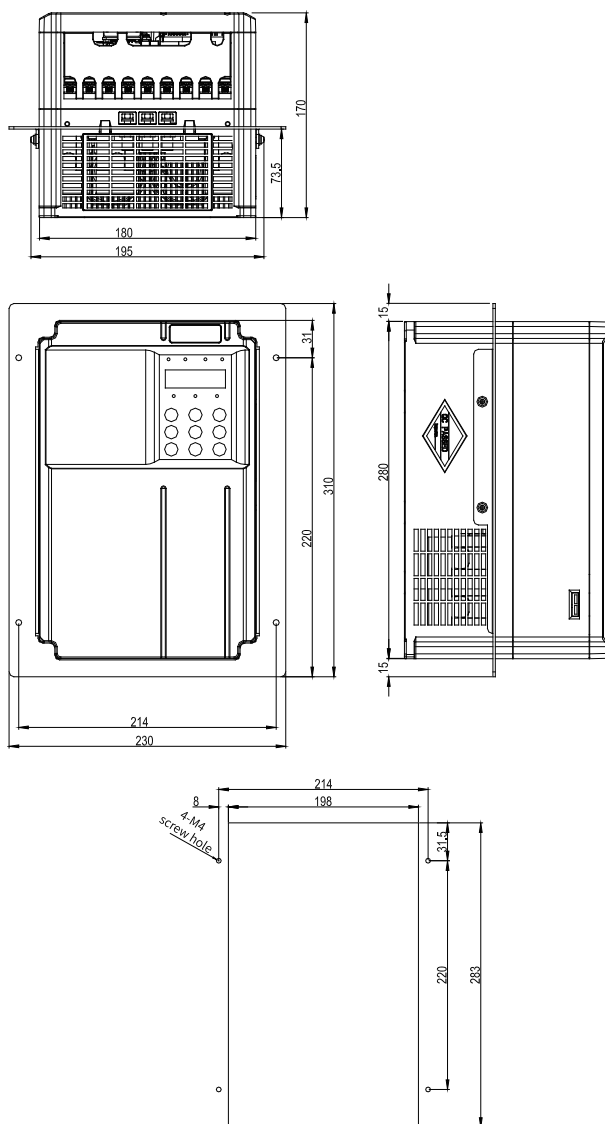


Figure 5-4 Dimensions of MD500-AZJ-A1T4 through-hole mounting bracket and mounting holes

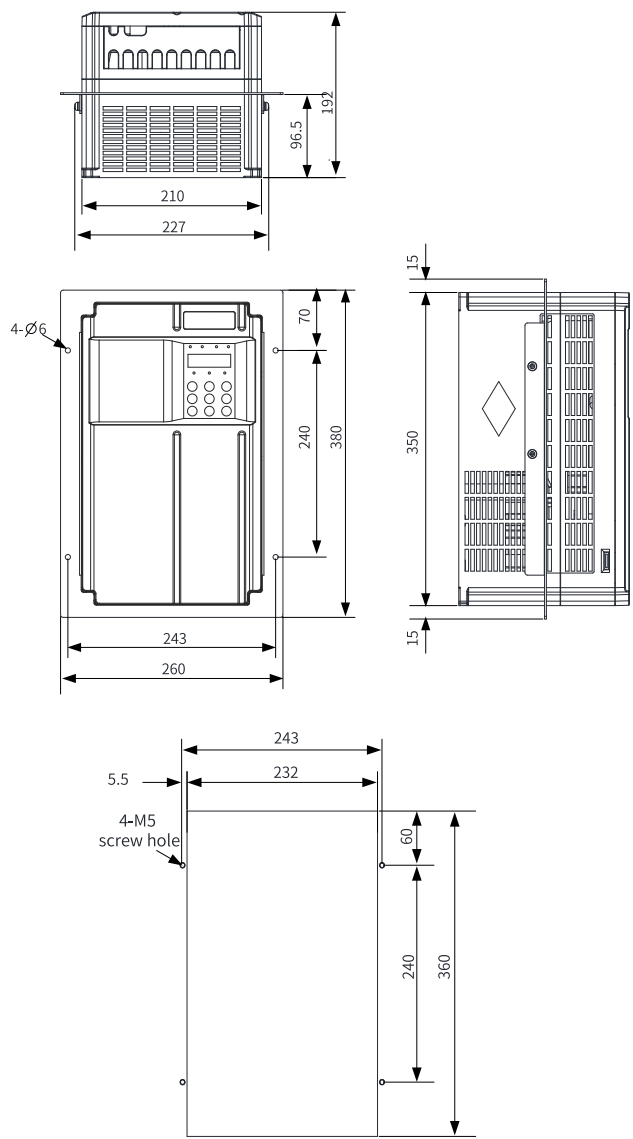


Figure 5-5 Dimensions of MD500-AZJ-A1T5 through-hole mounting bracket and mounting holes

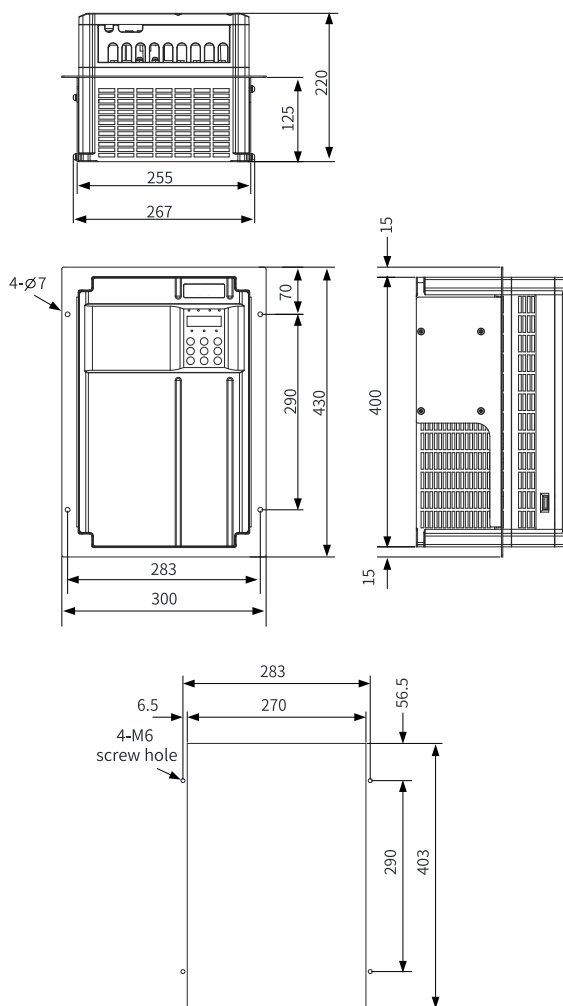


Figure 5-6 Dimensions of MD500-AZJ-A1T6 through-hole mounting bracket and mounting holes

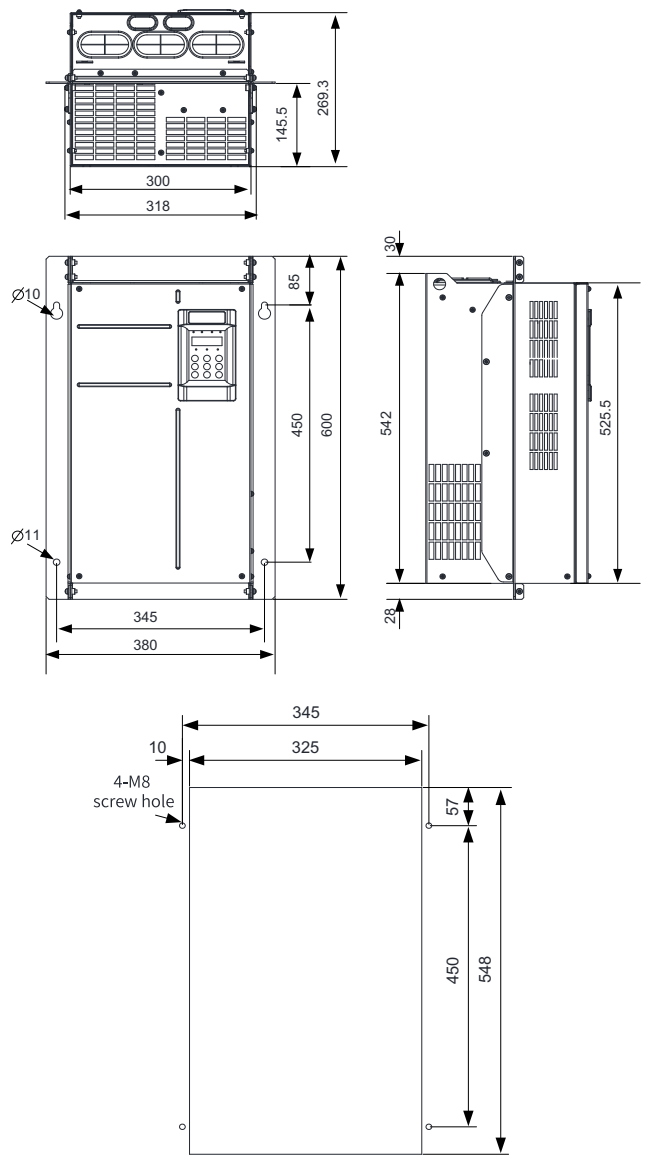


Figure 5-7 Dimensions of MD500-AZJ-A1T7 through-hole mounting bracket and mounting holes

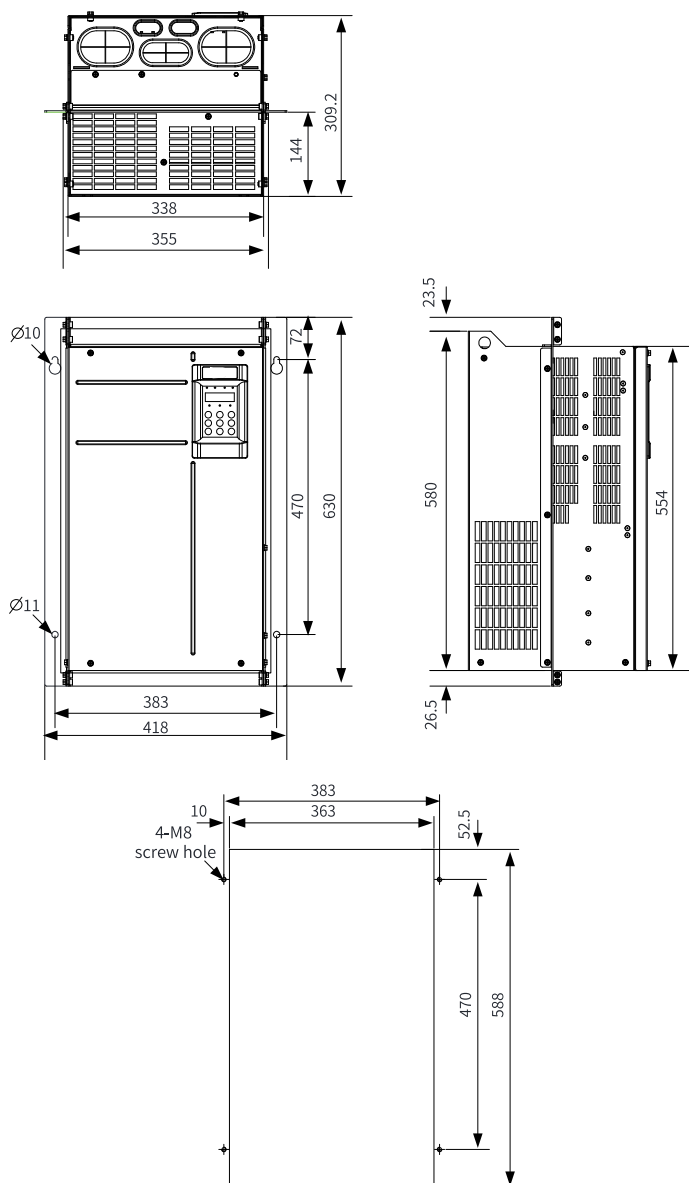


Figure 5-8 Dimensions of MD500-AZJ-A1T8 through-hole mounting bracket and mounting holes

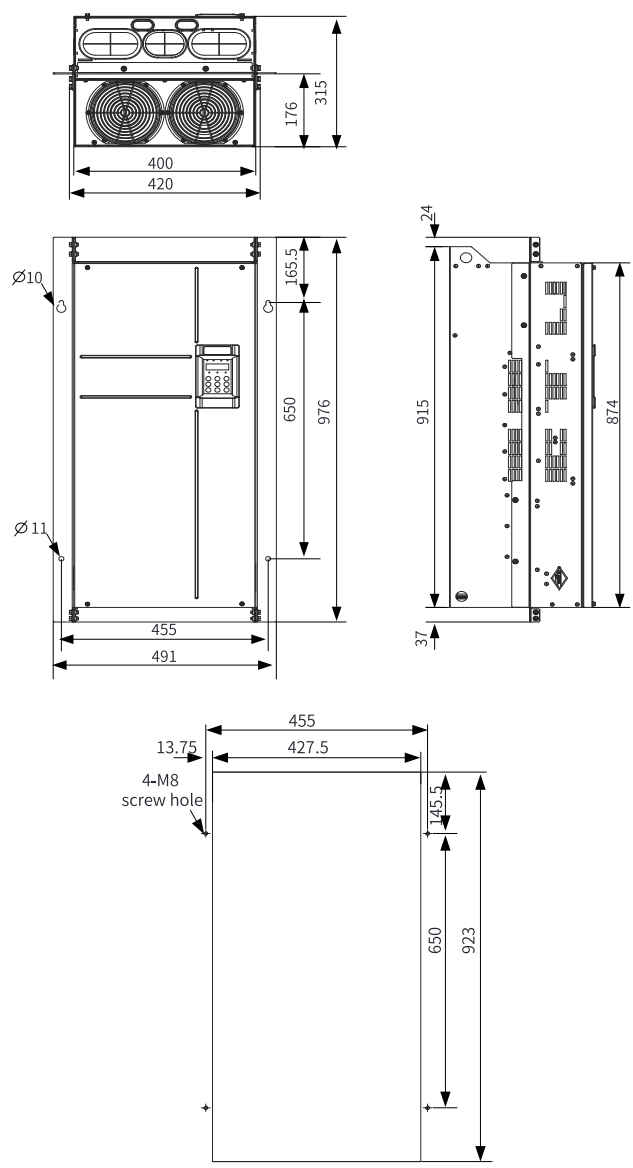


Figure 5-9 Dimensions of MD500-AZJ-A1T9 through-hole mounting bracket and mounting holes

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.

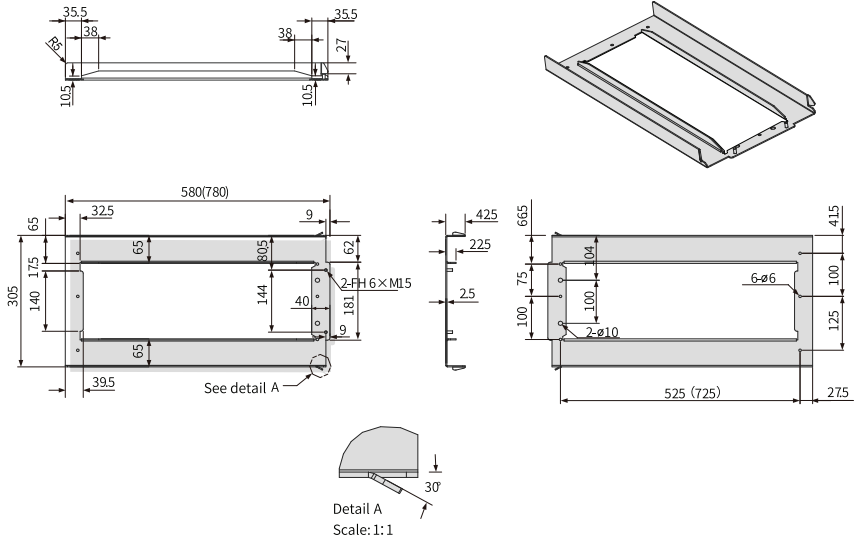


Figure 5-10 Dimensions of bottom mounting bracket for T10 models (mm)

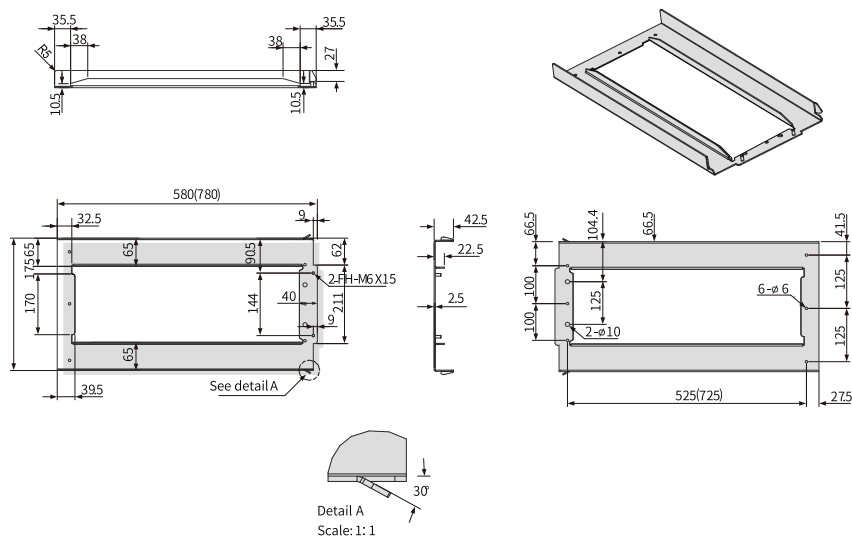


Figure 5-11 Dimensions of bottom mounting bracket for T11 models (mm)

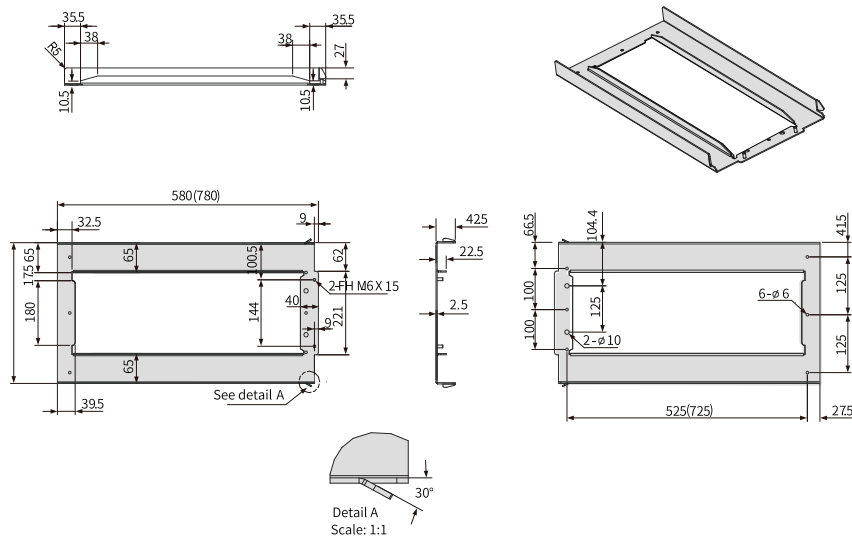


Figure 5-12 Dimensions of bottom mounting bracket for T12 models (mm)

Note

- The rail diagram applies to PS cabinets (800 x 600 or 800 x 800 (W x D) in mm).
- Dimensions inside the parentheses apply to standard PS cabinets with a depth of 800 mm.

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 additionally provided with a conduit box to reach the enclosure IP rating of UL Type 1. The conduit box can be purchased as needed. The following table lists conduit box models.

Applicable models

Table 5-3 Conduit box models

Conduit Box Model	Applicable Structure
MD500-NEMA1-T1	T1
	T2
MD500-NEMA1-T3	T3
MD500-NEMA1-T4	T4
MD500-NEMA1-T5	T5
MD500-NEMA1-T6	T6

Dimension drawings

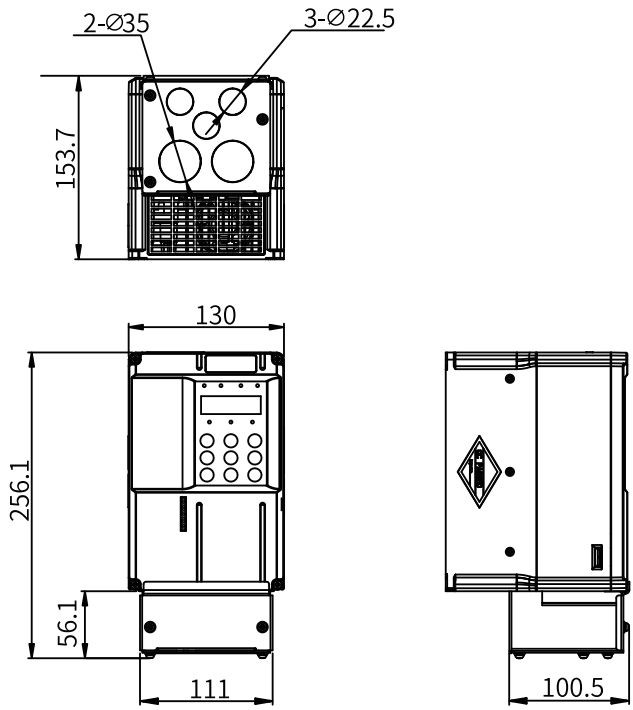


Figure 5-13 Dimension drawing of T1 models (with conduit box)

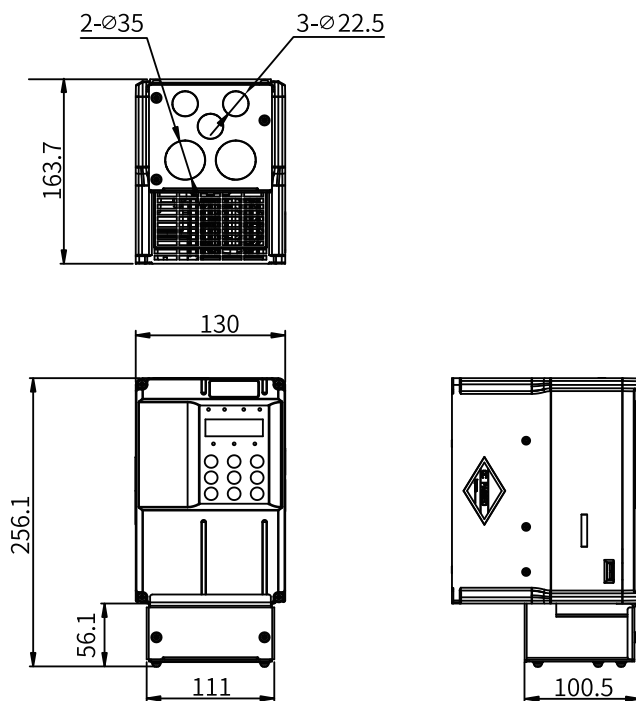


Figure 5-14 Dimension drawing of T2 models (with conduit box)

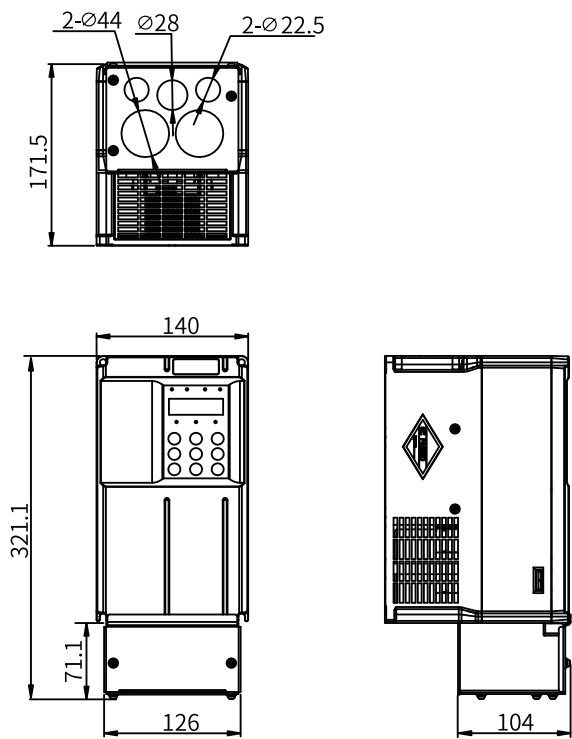


Figure 5-15 Dimension drawing of T3 models (with conduit box)

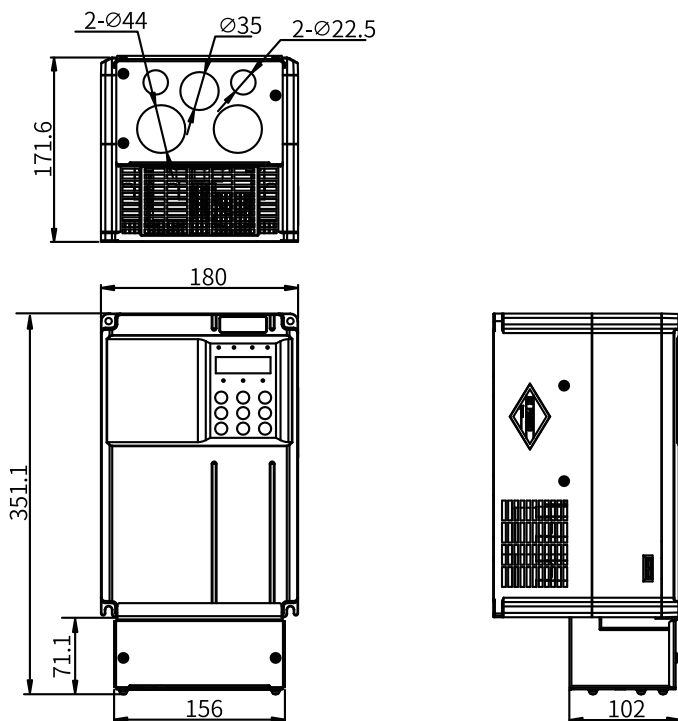


Figure 5-16 Dimension drawing of T4 models (with conduit box)

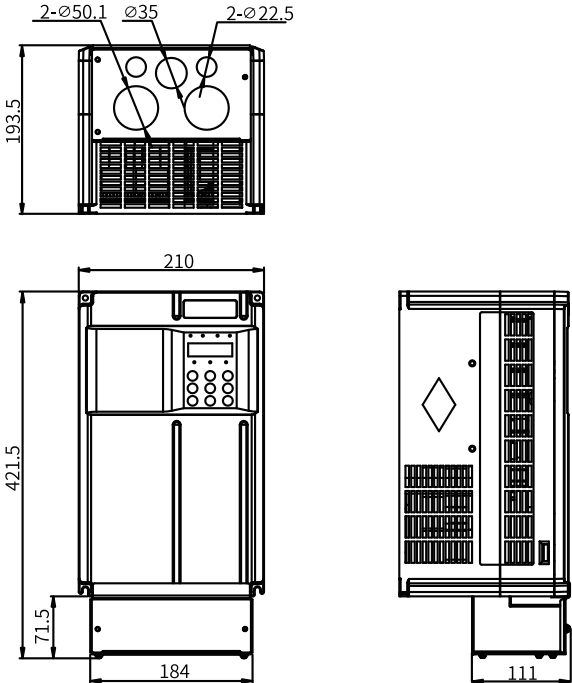


Figure 5-17 Dimension drawing of T5 models (with conduit box)

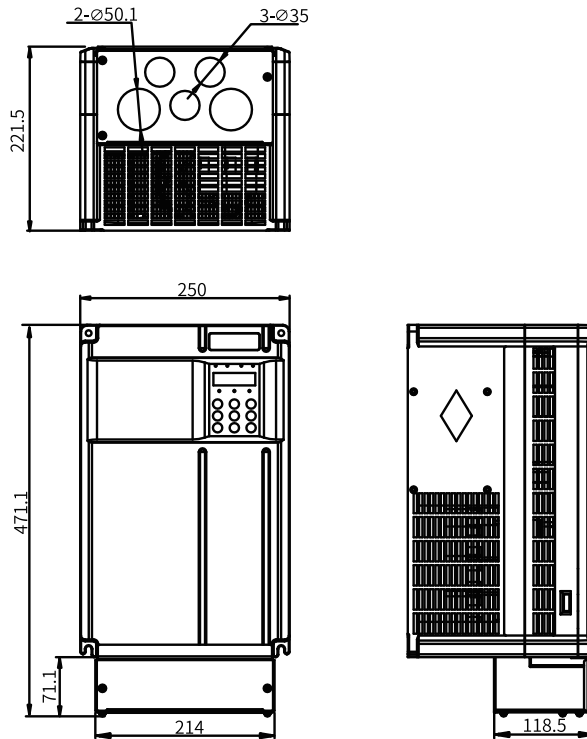


Figure 5-18 Dimension drawing of T6 models (with conduit box)

5.3 Cables

5.3.1 Main Circuit Cable

Power cable selection requirements

Observe national or regional regulations and the following requirements when selecting power cables.

- Compliant with EN 60204-1 and IEC 60364-5-52 standards
- PVC cables with copper conductors
- 40°C ambient temperature and 70°C cable surface temperature (Note: Contact Inovance for ambient temperatures above 40°C.)
- Symmetrical cables with copper-braided shield

If the recommended cables for peripheral equipment or options are not suitable for the product, contact Inovance.

To satisfy the EMC requirements, use shielded cables. Shielded cables are classified into three-conductor cables and four-conductor cables, as shown in the following figure. If the shield of the three-conductor cable cannot provide sufficient conductivity, add an independent PE cable. or use a four-conductor cable that contains a PE conductor. To suppress radio frequency interference effectively, use shielded cables with concentric copper-braided shield. The weaving density of the copper-braided shield should be greater than 90% to enhance the shielding efficiency and conductivity.

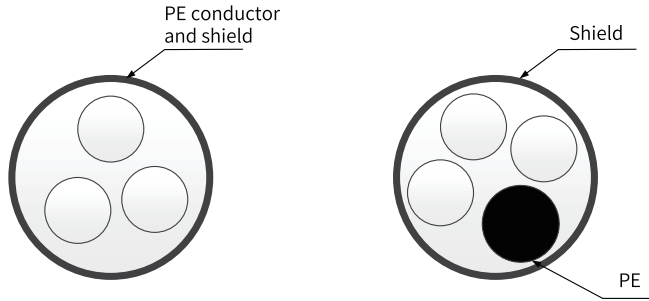


Figure 5-19 Recommended power cable types

Recommended cables

Table 5–4 Recommended cable specifications (three-phase 380 V to 480 V)

Structure	Model	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	MD500T0.4G/0.7PB-PLUS	3 × 0.75	TNR0.75-4	0.75	TNR5.5-5	M4	1.2 (10.6)
	MD500T0.7G/1.1PB-PLUS	3 × 0.75	TNR0.75-4	0.75	TNR8-5	M4	
	MD500T1.1G/1.5PB-PLUS	3 × 0.75	TNR0.75-4	0.75	TNR5.5-5	M4	
	MD500T1.5G/2.2PB-PLUS	3 × 0.75	TNR0.75-4	0.75	TNR8-5	M4	
	MD500T2.2G/3PB-PLUS	3 × 0.75	TNR0.75-4	0.75	TNR5.5-5	M4	
	MD500T3.0G/3.7PB-PLUS	3 × 1.5	TNR1.25-4	1.5	TNR8-5	M4	
T2	MD500T3.7G/5.5PB-PLUS	3 × 2.5	TNR2-4	2.5	TNR5.5-5	M4	2.8 (24.8)
	MD500T5.5G/7.5PB-PLUS	3 × 4	TNR3.5-5	4	TNR8-5	M5	
T3	MD500T7.5G/11PB-PLUS	3 × 6	TNR5.5-5	6	TNR5.5-5	M5	
	MD500T11G/15PB-PLUS	3 × 10	TNR8-5	10	TNR8-5	M5	
T4	MD500T15G/18.5PB-PLUS	3 × 10	TNR8-5	10	TNR8-5	M5	4.8 (45.2)
T5	MD500T18.5G/22P(B)-PLUS	3 × 16	GTNR16-6	16	GTNR16-6	M6	
	MD500T18.5G/22P(B)-T-PLUS	3 × 16	GTNR16-6	16	GTNR16-6	M6	
	MD500T22G/30P(B)-PLUS	3 × 16	GTNR16-6	16	GTNR16-6	M6	
	MD500T22G/30P(B)-T-PLUS	3 × 16	GTNR16-6	16	GTNR16-6	M6	
T6	MD500T30G/37P(B)-PLUS	3 × 25	GTNR25-6	16	GTNR16-6	M6	
	MD500T37G/45P(B)-PLUS	3 × 35	GTNR35-6	16	GTNR16-6	M6	
T7	MD500T45G/55P(B)-PLUS	3 × 50	GTNR50-8	25	GTNR25-8	M8	13.0 (115.2)
	MD500T55G/75P(B)-PLUS	3 × 70	GTNR70-8	35	GTNR35-8	M8	
T8	MD500T75G/90P(B)-PLUS	3 × 95	GTNR95-12	50	GTNR50-12	M12	35.0 (310.1)
	MD500T90G/110P-PLUS	3 × 120	GTNR120-12	70	GTNR70-12	M12	
	MD500T110G/132P-PLUS	3 × 150	GTNR150-12	95	GTNR95-12	M12	
T9	MD500T132G/160P-PLUS	3 × 185	BC185-12	95	BC95-12	M12	
	MD500T160G/200P-PLUS	2 × (3 × 95)	BC95-12	95	BC95-12	M12	
T10	MD500T200G/250P(-L)-PLUS	2 × (3 × 120)	BC120-12	120	BC120-12	M12	
	MD500T220G/280P(-L)-PLUS	2 × (3 × 150)	BC150-12	150	BC150-12	M12	
T11	MD500T250G/315P(-L)-PLUS	2 × (3 × 185)	BC185-16	185	BC185-16	M16	85.0 (753.1)
	MD500T280G/355P(-L)-PLUS	2 × (3 × 185)	BC185-16	185	BC185-16	M16	
T12	MD500T315G/400P(-L)-PLUS	2 × (3 × 240)	BC240-16	240	BC240-16	M16	
	MD500T355G/450P(-L)-PLUS	2 × (3 × 240)	BC240-16	240	BC240-16	M16	
	MD500T400G/500P(-L)-PLUS	2 × (3 × 300)	BC300-16	300	BC300-16	M16	
T13	MD500T500G/630P(-A)-PLUS	4 × (3 × 150)	GTNR150-16	2 × 150	GTNR150-16	M16	180 (1592.9)
	MD500T560G/710P(-A)-PLUS	4 × (3 × 185)	GTNR185-16	2 × 185	GTNR185-16	M16	
	MD500T630G/800P(-A)-PLUS	4 × (3 × 240)	GTNR240-16	2 × 240	GTNR240-16	M16	

Table 5-5 Recommended cable specifications (three-phase 380 V to 480 V) (UL-compliant)

Structure	Model	RST/UWV		Grounding Cable		Screw
		Cable (AWG/mil) ^[2]	Cable Lug Model	Cable (AWG/kcmil) ^[2]	Cable Lug Model	
T1	MD500T0.4G/0.7PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500T0.7G/1.1PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500T1.1G/1.5PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500T1.5G/2.2PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500T2.2G/3PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500T3.0G/3.7PB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
T2	MD500T3.7G/5.5PB-PLUS	10	TLK6-4	2 x 10	TLK6-4	M4
	MD500T5.5G/7.5PB-PLUS	10	TLK6-5	2 x 10	TLK6-5	M5
T3	MD500T7.5G/11PB-PLUS	8	TLK10-5	2 x 8	TLK10-5	M5
	MD500T11G/15PB-PLUS	6	TLK16-5	6	TLK16-5	M5
T4	MD500T15G/18.5PB-PLUS	6	TLK16-5	6	TLK16-5	M5
T5	MD500T18.5G/22P(B)-PLUS	4	TLK25-6	4	TLK25-6	M6
	MD500T18.5G/22P(B)-T-PLUS	4	TLK25-6	4	TLK25-6	M6
	MD500T22G/30P(B)-PLUS	4	TLK25-6	4	TLK25-6	M6
	MD500T22G/30P(B)-T-PLUS	4	TLK25-6	4	TLK25-6	M6
T6	MD500T30G/37P(B)-PLUS	3	TLK35-6	4	TLK25-6	M6
	MD500T37G/45P(B)-PLUS	2	TLK35-6	4	TLK25-6	M6
T7	MD500T45G/55P(B)-PLUS	1/0	TLK50-8	3	TLK35-8	M8
	MD500T55G/75P(B)-PLUS	3/0	TLK95-10	1	TLK50-8	M8
T8	MD500T75G/90P(B)-PLUS	4/0	TLK120-12	1/0	TLK70-12	M12
	MD500T90G/110P-PLUS	300	SQNBS180-12	3/0	TLK95-12	M12
	MD500T110G/132P-PLUS	400	SQNBS250-12	4/0	TLK120-12	M12
T9	MD500T132G/160P-PLUS	500	SQNBS250-12	250	TLK300-12	M12
	MD500T160G/200P-PLUS	2 x 250	SQNBS150-12	250	SQNBS150-12	M12
T10	MD500T200G/250P(-L)-PLUS	2 x 300	TLK185-12	300	TLK185-12	M12
	MD500T220G/280P(-L)-PLUS	2 x 350	TLK185-12	350	TLK185-12	M12
T11	MD500T250G/315P(-L)-PLUS	2 x 350	TLK185-12	350	TLK185-12	M12
	MD500T280G/355P(-L)-PLUS	2 x 500	SQNBS325-16	500	SQNBS325-16	M16
T12	MD500T315G/400P(-L)-PLUS	2 x 700	TLK400-16	700	TLK400-16	M16
	MD500T355G/450P(-L)-PLUS	4 x 300	TLK185-16	2 x 300	TLK185-16	M16
	MD500T400G/500P(-L)-PLUS	4 x 300	TLK185-16	2 x 300	TLK185-16	M16

Table 5-6 Recommended cable specifications (three-phase 200 V to 240 V)

Structure	Model	RST/UVW		Grounding Cable		Screw
		Cable (mm ²) ^[1]	Cable Lug Model	Cable (mm ²) ^[1]	Cable Lug Model	
T1	MD500-2T0.4G/0.7PB-PLUS	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4
	MD500-2T0.7G/1.1PB-PLUS					
	MD500-2T1.1G/1.5PB-PLUS	3 x 1	TNR1.25-4	1	TNR1.25-4	M4
	MD500-2T1.5G/2.2PB-PLUS					
T2	MD500-2T2.2G/3.7PB-PLUS	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	M4
	MD500-2T3.7G/5.5PB-PLUS	3 x 2.5	TNR2-4	2.5	TNR2-4	M4
T3	MD500-2T5.5G/7.5PB-PLUS	3 x 6	TNR5.5-5	6	TNR5.5-5	M5
T4	MD500-2T7.5G/11PB-PLUS	3 x 10	TNR8-5	10	TNR8-5	M5
T5	MD500-2T11G/15P(B)-PLUS	3 x 16	GTNR16-6	16	GTNR16-6	M6
T6	MD500-2T15G/18.5P(B)-PLUS	3 x 16	GTNR16-6	16	GTNR16-6	M6
	MD500-2T18.5G/22P(B)-PLUS	3 x 25	GTNR25-6	16	GTNR16-6	M6
T7	MD500-2T22G/30P(B)-PLUS	3 x 35	GTNR35-8	16	GTNR16-8	M8
	MD500-2T30G/37P(B)-PLUS	3 x 50	GTNR50-8	25	GTNR25-8	M8
T8	MD500-2T37G/45P(B)-PLUS	3 x 70	GTNR70-12	35	GTNR35-12	M12
	MD500-2T45G/55P-PLUS	3 x 95	GTNR95-12	50	GTNR50-12	M12
	MD500-2T55G/75P-PLUS	3 x 120	GTNR120-12	70	GTNR70-12	M12
T9	MD500-2T75G/90P-PLUS	2 x (3 x 95)	BC95-12	95	BC95-12	M12
T10	MD500-2T90G/110P-PLUS	2 x (3 x 120)	BC120-12	120	BC120-12	M12
	MD500-2T110G/132P-PLUS	2 x (3 x 150)	BC150-12	150	BC150-12	M12
T11	MD500-2T132G/160P-PLUS	2 x (3 x 185)	BC185-16	185	BC185-16	M16
T12	MD500-2T160G/200P-PLUS	2 x (3 x 240)	BC240-16	240	BC240-16	M16
	MD500-2T200G/220P-PLUS	2 x (3 x 240)	BC240-16	240	BC240-16	M16

Table 5-7 Recommended cable specifications (single-phase 200 V to 240 V)

Structure	Model	RST/UVW		Grounding Cable		Screw
		Cable (mm ²) ^[1]	Cable Lug Model	Cable (mm ²) ^[1]	Cable Lug Model	
T2	MD500-2S0.4GB-PLUS	0.75	TNR0.75-4	0.75	TNR8-5	M4
	MD500-2S0.7GB-PLUS	1.5	TNR0.75-4	1.5	TNR8-5	
	MD500-2S1.5GB-PLUS	2.5	TNR1.25-4	1.5	TNR8-5	
	MD500-2S2.2GB-PLUS	4.0	TNR2-4	2.5	TNR8-5	

Table 5–8 Recommended cable specifications (single-phase 200 V to 240 V) (UL-compliant)

Structure	Model	RST/UVW		Grounding Cable		Screw
		Cable (AWG)	Cable Lug Model	Cable (AWG)	Cable Lug Model	
T2	MD500-2S0.4GB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD500-2S0.7GB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	
	MD500-2S1.5GB-PLUS	14	TLK2.5-4	2 x 14	TLK2.5-4	
	MD500-2S2.2GB-PLUS	10	TLK6-4	2 x 10	TLK6-4	

Note

- [1]: Applicable to GB standards.
- [2]: Applicable to AWG standards (5: 5AWG; 1/0: 0AWG; 2/0: 00AWG; 3/0: 000AWG; 4/0: 0000AWG).
- 3 x 10: one 3-core cable; 2 x (3 x 95): two 3-core cables; 2 x 250: two 250 kcmil cables

Recommended lug

Lugs recommended below are TNR series, GTNR series, and BC series lugs from Suzhou Yuanli. TLK series and SQNBS series lugs from KST are UL-compliant lugs.

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

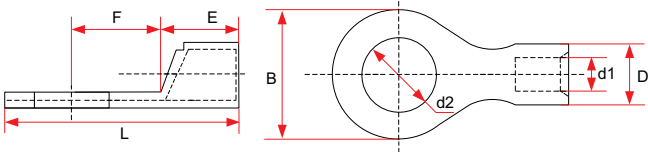
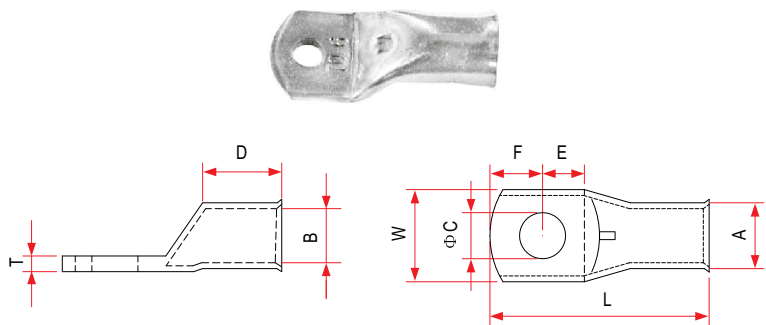
Model	Cable Range		D	d1	E	F	B	d2	L	Current (A)	Crimping Tool
	AWG/MCM	mm ²									
 											
TNR0.75-4	22-16	0.25-1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8 AK-1M
TNR1.25-4	22-16	0.25-1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	

Table 5-10 Appearance, models, and dimensions of GTNR series lugs (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	RYO-8 YYT-8 RYO-14
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	
GTNR4-6	5.2	3.6	7.0	6.0	2.0	10.0	6.4	1.0	20.0	7	
GTNR6-5	6.0	4.2	9.0	6.0	3.0	10.0	5.3	1.2	23.0	7	
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	CT-38 CT-100
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	
GTNR25-10	9.5	7.5	12.0	10.5	4.5	17.5	10.5	1.4	37.0	10	
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	CT-100
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	
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 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
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	

Model	A	B	W	E	D	L	T	C	F
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

Connect the control circuit cables 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.

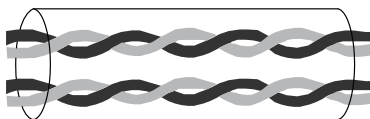


Figure 5-20 Shielded twisted pair cable

5.4 Peripheral Electrical Devices

5.4.1 Fuse, Contactor, and Circuit Breaker



Caution

To avoid electric shock, do not switch on the power supply of the AC drive or operate peripheral devices immediately after a fuse burns or a circuit breaker trips. Instead, wait for 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 meet requirements of EN 61800-5-1 and UL61800-5-1, install a fuse and circuit breaker on the input side to prevent accidents caused by internal short circuit.

The following tables list recommended fuses and circuit breakers made by Bussmann.

Table 5-12 Recommended specifications of fuses, contactors, and circuit breakers
(three-phase 380 V to 480 V)

Structure	Model	Fuse (Bussmann, and UL-compliant)		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD500T0.4G/0.7PB-PLUS	5	FWP-5B	9	4
	MD500T0.7G/1.1PB-PLUS	10	FWP-10B	9	6
	MD500T1.1G/1.5PB-PLUS	10	FWP-10B	9	6
	MD500T1.5G/2.2PB-PLUS	10	FWP-10B	9	10
	MD500T2.2G/3PB-PLUS	15	FWP-15B	12	13
	MD500T3.0G/3.7PB-PLUS	20	FWP-20B	16	16
T2	MD500T3.7G/5.5PB-PLUS	30	FWP-30B	26	25
	MD500T5.5G/7.5PB-PLUS	40	FWP-40B	26	32
T3	MD500T7.5G/11PB-PLUS	60	FWP-60B	38	50
	MD500T11G/15PB-PLUS	70	FWP-70B	50	63
T4	MD500T15G/18.5PB-PLUS	70	FWH-70B	50	63
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	100	FWH-100B	65	80
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	125	FWH-125B	80	80
T6	MD500T30G/37P(B)-PLUS	125	FWH-125B	80	100
	MD500T37G/45P(B)-PLUS	150	FWH-150B	95	160
T7	MD500T45G/55P(B)-PLUS	200	FWH-200B	115	160
	MD500T55G/75P(B)-PLUS	250	FWH-250A	150	250
T8	MD500T75G/90P(B)-PLUS	275	FWH-275A	170	250
	MD500T90G/110P-PLUS	325	FWH-325A	205	250
	MD500T110G/132P-PLUS	400	FWH-400A	245	400
T9	MD500T132G/160P-PLUS	500	FWH-500A	300	400
	MD500T160G/200P-PLUS	600	FWH-600A	410	500
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	800	FWH-800A	475	630
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	800	FWH-800A	620	800
T11	MD500T250G/315P-PLUS MD500T250G/315P-L-PLUS	1000	170M5016	620	800
	MD500T280G/355P-PLUS MD500T280G/355P-L-PLUS	1000	170M5016	620	800

Structure	Model	Fuse (Bussmann, and UL-compliant)		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T12	MD500T315G/400P-PLUS MD500T315G/400P-L-PLUS	1400	170M6017	800	1000
	MD500T355G/450P-PLUS MD500T355G/450P-L-PLUS	1400	170M6017	800	1000
	MD500T400G/500P-PLUS MD500T400G/500P-L-PLUS	1400	170M6017	1000	1250
T13	MD500T500G/630P-PLUS MD500T500G/630P-A-PLUS	1400 A	-	-	-
	MD500T560G/710P-PLUS MD500T560G/710P-A-PLUS	1600 A	-		
	MD500T630G/800P-PLUS MD500T630G/800P-A-PLUS	1800 A	-		

Note: T13 cabinets are delivered with a circuit breaker.

Table 5–13 Recommended specifications of fuses, contactors, and circuit breakers
(three-phase 200 V to 240 V)

Structure	Model	Fuse (Bussmann)		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD500-2T0.4G/0.7PB-PLUS	10	FWP-10B	9	6
	MD500-2T0.7G/1.1PB-PLUS	10	FWP-10B	9	10
	MD500-2T1.1G/1.5PB-PLUS	15	FWP-15B	12	13
	MD500-2T1.5G/2.2PB-PLUS	20	FWP-20B	16	16
T2	MD500-2T2.2G/3.7PB-PLUS	30	FWP-30B	26	25
	MD500-2T3.7G/5.5PB-PLUS	40	FWP-40B	26	32
T3	MD500-2T5.5G/7.5PB-PLUS	70	FWP-70B	50	63
T4	MD500-2T7.5G/11PB-PLUS	70	FWH-70B	50	63
T5	MD500-2T11G/15P(B)-PLUS	125	FWH-125B	80	80
T6	MD500-2T15G/18.5P(B)-PLUS	125	FWH-125B	80	100
	MD500-2T18.5G/22P(B)-PLUS	150	FWH-150B	95	160
T7	MD500-2T22G/30P(B)-PLUS	200	FWH-200B	115	160
	MD500-2T30G/37P(B)-PLUS	250	FWH-250A	150	250
T8	MD500-2T37G/45P(B)-PLUS	275	FWH-275A	170	250
	MD500-2T45G/55P-PLUS	325	FWH-325A	205	250
	MD500-2T55G/75P-PLUS	400	FWH-400A	245	400
T9	MD500-2T75G/90P-PLUS	600	FWH-600A	410	500
T10	MD500-2T90G/110P-PLUS	600	FWH-600A	410	500
	MD500-2T110G/132P-PLUS	700	FWH-700A	410	630

Structure	Model	Fuse (Bussmann)		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T11	MD500-2T132G/160P-PLUS	800	FWH-800A	475	630
T12	MD500-2T160G/200P-PLUS	1000	170M5016	620	800
	MD500-2T200G/220P-PLUS	1400	170M6017	800	1000

Table 5–14 Recommended specifications of fuses, contactors, and circuit breakers
(single-phase 200 V to 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 used to eliminate harmonics in the input current. As an optional device, the reactor can be installed externally for suppressing harmonics where necessary.

To install an AC input reactor on models above 200 kW, ensure sufficient space is reserved in the cabinet for installing the reactor.

Models and dimensions of Inovance AC input reactors

Recommended models are listed in the following tables.

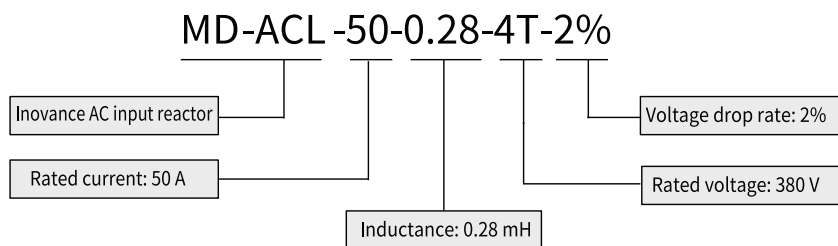


Figure 5-21 AC input reactor model

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

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T0.7G/1.1PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T1.1G/1.5PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T1.5G/2.2PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T2.2G/3PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500T3.0G/3.7PB-PLUS	MD-ACL-10-5-4T	5	50
T2	MD500T3.7G/5.5PB-PLUS	MD-ACL-15-3-4T	3	50
	MD500T5.5G/7.5PB-PLUS	MD-ACL-15-3-4T	3	50
T3	MD500T7.5G/11PB-PLUS	MD-ACL-40-1.45-4T	1.45	100
	MD500T11G/15PB-PLUS	MD-ACL-40-1.45-4T	1.45	100
T4	MD500T15G/18.5PB-PLUS	MD-ACL-50-1.2-4T	1.2	150
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	MD-ACL-60-0.24-4T-2%	0.24	-
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD500T30G/37P(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
	MD500T37G/45P(B)-PLUS	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD500T45G/55P(B)-PLUS	MD-ACL-120-0.12-4T-2%	0.12	-
	MD500T55G/75P(B)-PLUS	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD500T75G/90P(B)-PLUS	MD-ACL-200-0.07-4T-2%	0.07	-
	MD500T90G/110P-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
	MD500T110G/132P-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD500T132G/160P-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
	MD500T160G/200P-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T11	MD500T250G/315P-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
	MD500T250G/315P-L-PLUS			
	MD500T280G/355P-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
	MD500T280G/355P-L-PLUS			
T12	MD500T315G/400P-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-
	MD500T315G/400P-L-PLUS			
	MD500T355G/450P-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-
	MD500T355G/450P-L-PLUS			
	MD500T400G/500P-PLUS	MD-ACL-1000-0.014-4T-2%	0.014	-
	MD500T400G/500P-L-PLUS			
T13	MD500T500G/630P-PLUS	GH-MVT504ZG-L2	0.022	-
	MD500T500G/630P-A-PLUS			
	MD500T560G/710P-PLUS	GH-MVT634ZG-L3	0.018	
	MD500T560G/710P-A-PLUS			
	MD500T630G/800P-PLUS	GH-MVT634ZG-L3	0.018	
	MD500T630G/800P-A-PLUS			
Note: T13 models containing "-A" in the designation are delivered with an input reactor.				

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

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T0.7G/1.1PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T1.1G/1.5PB-PLUS	MD-ACL-10-5-4T	5	50
	MD500-2T1.5G/2.2PB-PLUS	MD-ACL-10-5-4T	5	50
T2	MD500-2T2.2G/3.7PB-PLUS	MD-ACL-15-3-4T	3	50
	MD500-2T3.7G/5.5PB-PLUS	MD-ACL-15-3-4T	3	50
T3	MD500-2T5.5G/7.5PB-PLUS	MD-ACL-40-1.45-4T	1.45	100
T4	MD500-2T7.5G/11PB-PLUS	MD-ACL-50-1.2-4T	1.2	150
T5	MD500-2T11G/15P(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD500-2T15G/18.5P(B)-PLUS	MD-ACL-80-0.17-4T-2%	0.17	-
	MD500-2T18.5G/22P(B)-PLUS	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD500-2T22G/30P(B)-PLUS	MD-ACL-120-0.12-4T-2%	0.12	-
	MD500-2T30G/37P(B)-PLUS	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD500-2T37G/45P(B)-PLUS	MD-ACL-200-0.07-4T-2%	0.07	-
	MD500-2T45G/55P-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
	MD500-2T55G/75P-PLUS	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD500-2T75G/90P-PLUS	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD500-2T90G/110P-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
	MD500-2T110G/132P-PLUS	MD-ACL-490-0.028-4T-2%	0.028	-
T11	MD500-2T132G/160P-PLUS	MD-ACL-660-0.021-4T-2%	0.028	-

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T12	MD500-2T160G/200P-PLUS	MD-ACL-660-0.021-4T-2%	0.021	-
	MD500-2T200G/220P-PLUS	MD-ACL-800-0.017-4T-2%	0.017	-

Dimensions

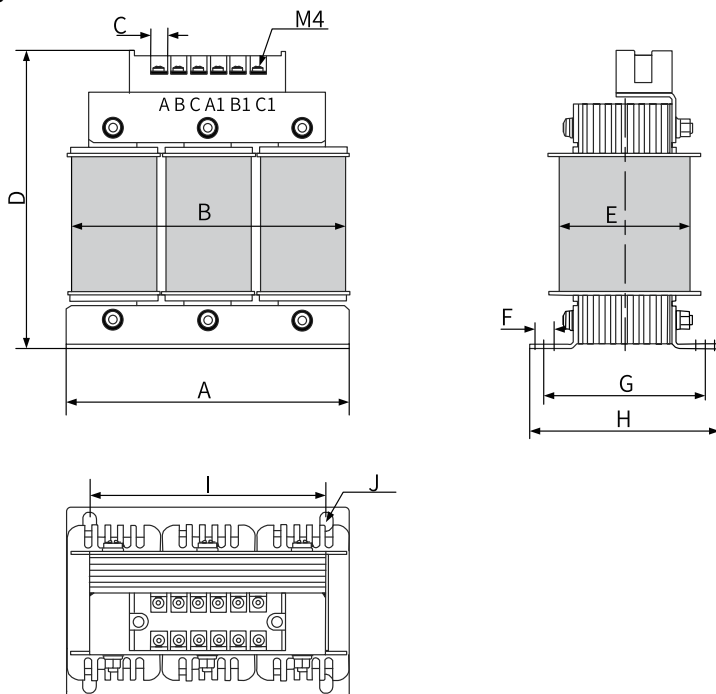


Figure 5-22 Dimension drawing of AC input reactors (10 A/15 A)

Table 5-17 Dimensions of AC input reactors (10 A/15 A) (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

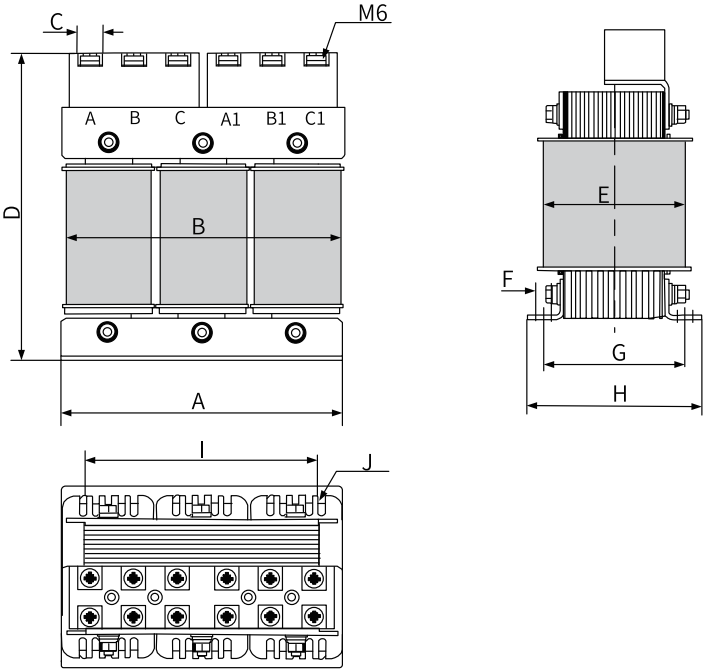


Figure 5-23 Dimension drawing of AC input reactors (40 A/50 A) (1.2 mH)

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

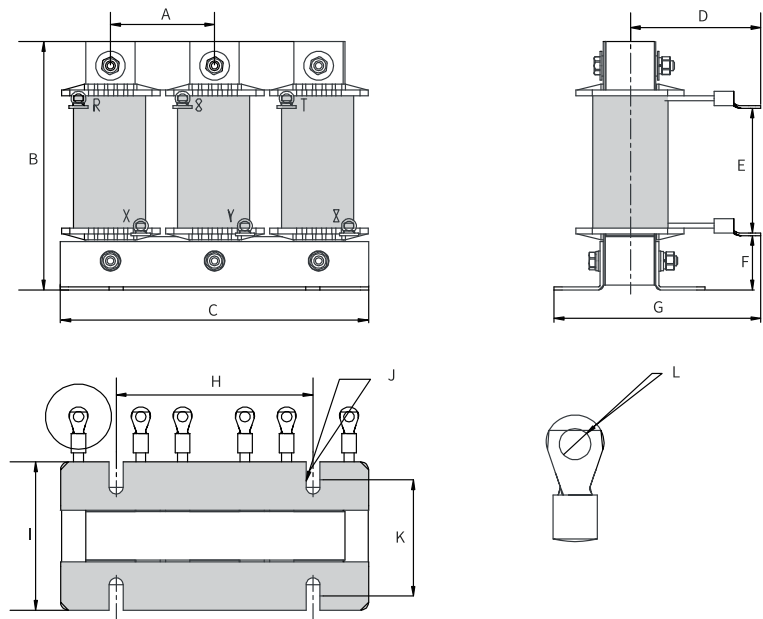


Figure 5-24 Dimension drawing of AC input reactors (50 A (0.28 mH)/60 A)

Table 5-19 Dimensions of AC input reactors (50 A (0.28 mH)/60 A) (unit: 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

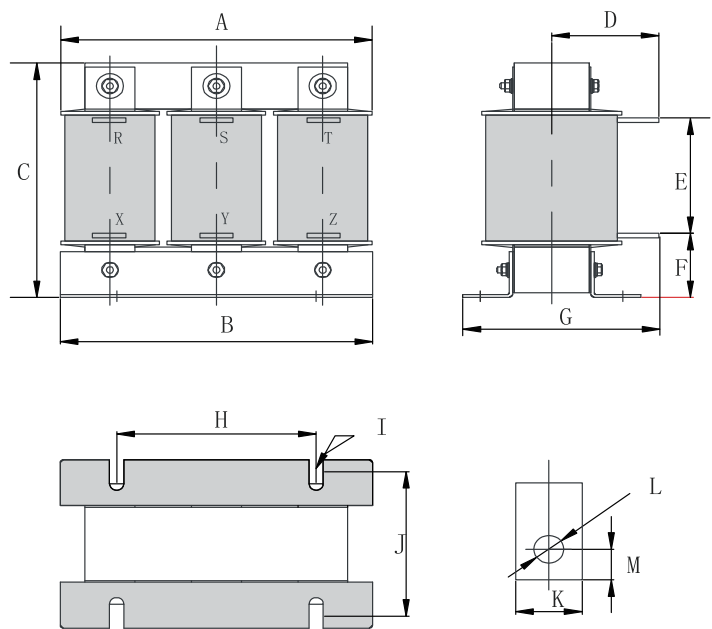


Figure 5-25 Dimension drawing of AC input reactors (90 A/120 A)

Table 5-20 Dimensions of AC input reactors (90 A/120 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
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

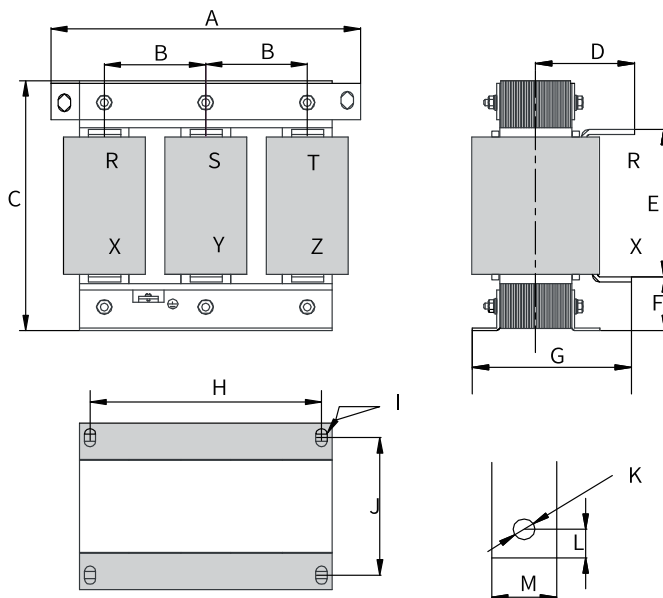


Figure 5-26 Dimension drawing of AC input reactors (150 A to 330 A)

Table 5-21 Dimensions of AC input reactors (150 A to 330 A) (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

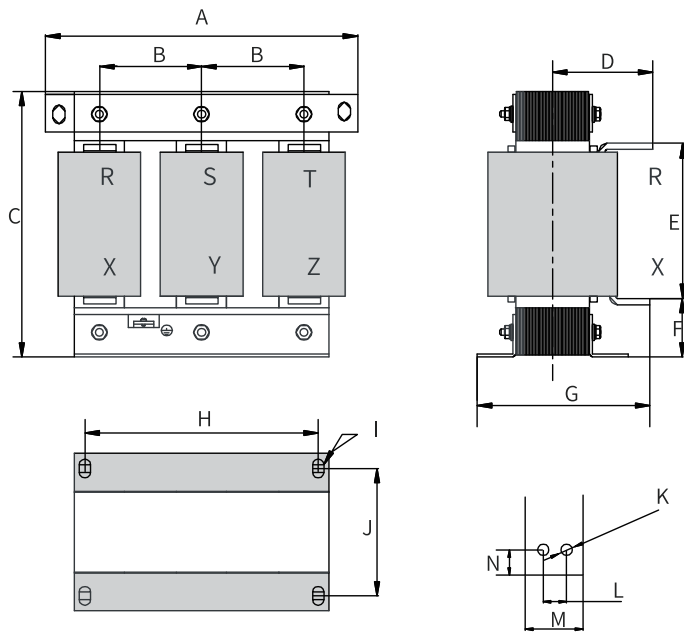


Figure 5-27 Dimension drawing of AC input reactors (490 A/660 A)

Table 5-22 Dimensions of AC input reactors (490 A/660 A) (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±1 0	198± 5	60±5	220	243± 1	Φ12 x 20	122± 2	Φ12	22	50	23
660	320	106± 5	305	145±1 0	203± 5	50±5	240	243± 1	Φ12 x 20	137± 2	Φ12	22	50	23

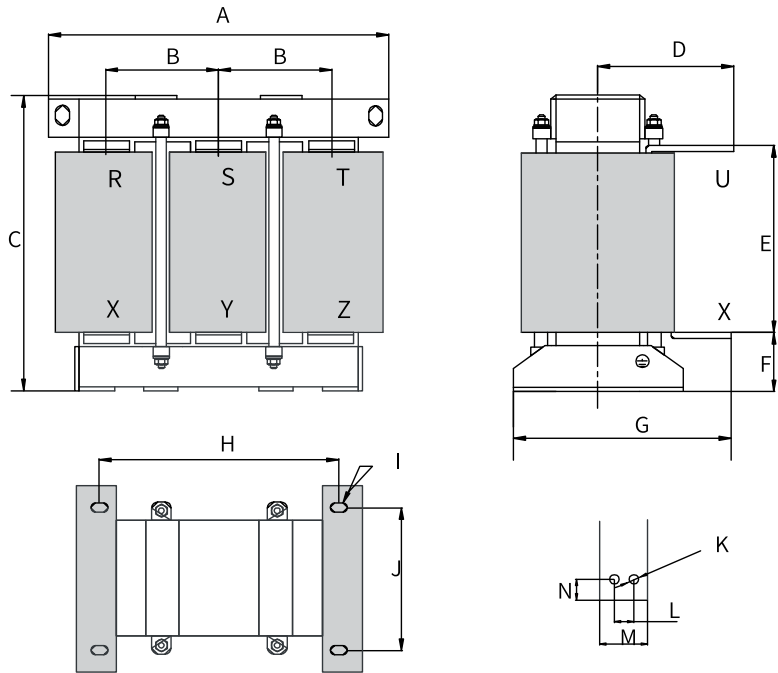


Figure 5-28 Dimension drawing of AC input reactors (800 A to 1000 A)

Table 5-23 Dimensions of AC input reactors (800 A/1000 A) (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 of Schaffner AC input reactors

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

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500T0.7G/1.1PB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500T1.1G/1.5PB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T1.5G/2.2PB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T2.2G/3PB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500T3.0G/3.7PB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
T2	MD500T3.7G/5.5PB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
	MD500T5.5G/7.5PB-PLUS	RWK 3044-18-89-E0XXX	1.67	103
T3	MD500T7.5G/11PB-PLUS	RWK 3044-24-89-E0XXX	1.22	106
	MD500T11G/15PB-PLUS	RWK 3044-35-92-E0XXX	0.83	151
T4	MD500T15G/18.5PB-PLUS	RWK 3044-48-92-E0XXX	0.61	172
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	RWK 3044-59-92-E0XXX	0.5	206
T6	MD500T30G/37P(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500T37G/45P(B)-PLUS	RWK 3044-72-99-E0XXX	0.41	294
T7	MD500T45G/55P(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
	MD500T55G/75P(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
T8	MD500T75G/90P(B)-PLUS	RWK 3044-140-99-E0XXX	0.2	399
	MD500T90G/110P-PLUS	RWK 3044-180-99-E0XXX	0.17	456
	MD500T110G/132P-PLUS	RWK 3044-210-99-E0XXX	0.14	553
T9	MD500T132G/160P-PLUS	RWK 3044-260-99-E0XXX	0.11	593
	MD500T160G/200P-PLUS	RWK 3044-320-99-E0XXX	0.092	747
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	RWK 3044-400-99-E0XXX	0.073	1055
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD500T250G/315P-PLUS MD500T250G/315P-L-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
	MD500T280G/355P-PLUS MD500T280G/355P-L-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD500T315G/400P-PLUS MD500T315G/400P-L-PLUS	RWK 3044-570-99-E0XXX	0.052	1181
	MD500T355G/450P-PLUS MD500T355G/450P-L-PLUS	RWK 3044-640-99-E0XXX	0.046	1116
	MD500T400G/500P-PLUS MD500T400G/500P-L-PLUS	RWK 3044-800-99-E0XXX	0.037	1280

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T13	MD500T500G/630P-PLUS	RWK 3044-1000-99-E0XXX	0.029	1167
	MD500T500G/630P-A-PLUS			
	MD500T560G/710P-PLUS	RWK 3044-1000-99-E0XXX	0.029	1167
	MD500T560G/710P-A-PLUS			
	MD500T630G/800P-PLUS	-	-	-
	MD500T630G/800P-A-PLUS			
Note: T13 models containing "-A" in the designation are delivered with an input reactor.				

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

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	RWK 3044-3.5-88-E0XXX	8.3	32
	MD500-2T0.7G/1.1PB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500-2T1.1G/1.5PB-PLUS	RWK 3044-6.5-88-E0XXX	4.6	47
	MD500-2T1.5G/2.2PB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
T2	MD500-2T2.2G/3.7PB-PLUS	RWK 3044-12-88-E0XXX	2.44	69
	MD500-2T3.7G/5.5PB-PLUS	RWK 3044-18-89-E0XXX	1.67	103
T3	MD500-2T5.5G/7.5PB-PLUS	RWK 3044-35-92-E0XXX	0.83	151
T4	MD500-2T7.5G/11PB-PLUS	RWK 3044-48-92-E0XXX	0.61	172
T5	MD500-2T11G/15P(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
T6	MD500-2T15G/18.5P(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500-2T18.5G/22P(B)-PLUS	RWK 3044-72-99-E0XXX	0.41	294
T7	MD500-2T22G/30P(B)-PLUS	RWK 3044-59-92-E0XXX	0.5	206
	MD500-2T30G/37P(B)-PLUS	RWK 3044-120-99-E0XXX	0.24	324
T8	MD500-2T37G/45P(B)-PLUS	RWK 3044-140-99-E0XXX	0.2	399
	MD500-2T45G/55P-PLUS	RWK 3044-180-99-E0XXX	0.17	456
	MD500-2T55G/75P-PLUS	RWK 3044-210-99-E0XXX	0.14	553
T9	MD500-2T75G/90P-PLUS	RWK 3044-320-99-E0XXX	0.092	747
T10	MD500-2T90G/110P-PLUS	RWK 3044-400-99-E0XXX	0.073	1055
	MD500-2T110G/132P-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD500-2T132G/160P-PLUS	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD500-2T160G/200P-PLUS	RWK 3044-570-99-E0XXX	0.052	1181
	MD500-2T200G/220P-PLUS	RWK 3044-800-99-E0XXX	0.037	1280

5.4.3 EMC Filter

Overview

To meet the conducted and radiated emission requirements of EN IEC 61800-3, the AC drive must be connected to an external EMC filter listed in the following table.

AC drives of 132 kW to 400 kW have a built-in filter that meets the EN 61800-3 C3 requirements and therefore do not require an external filter.

Table 5-26 Models and appearance of standard EMC filters

Filter Model		Appearance
Schaffner series	FN2090 series	
	FN 3258 series	
	FN 3359 series	
JIANLI series	TH series	
	EBK5 series	

Models and dimensions of Schaffner filters

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

Structure	Model	Filter Model	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	FN 3258-7-44	3.8
	MD500T0.7G/1.1PB-PLUS	FN 3258-7-44	3.8
	MD500T1.1G/1.5PB-PLUS	FN 3258-7-44	3.8
	MD500T1.5G/2.2PB-PLUS	FN 3258-7-44	3.8
	MD500T2.2G/3PB-PLUS	FN 3258-7-44	3.8
	MD500T3.0G/3.7PB-PLUS	FN 3258-16-44	6.1
T2	MD500T3.7G/5.5PB-PLUS	FN 3258-16-44	6.1
	MD500T5.5G/7.5PB-PLUS	FN 3258-30-44	11.8
T3	MD500T7.5G/11PB-PLUS	FN 3258-30-44	11.8
	MD500T11G/15PB-PLUS	FN 3258-42-44	15.7
T4	MD500T15G/18.5PB-PLUS	FN 3258-42-44	15.7
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	FN 3258-55-44	25.9
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	FN 3258-75-44	31.2
T6	MD500T30G/37P(B)-PLUS	FN 3258-75-44	32.2
	MD500T37G/45P(B)-PLUS	FN 3258-75-44	32.2
T7	MD500T45G/55P(B)-PLUS	FN 3258-100-44	34.5
	MD500T55G/75P(B)-PLUS	FN 3258-130-44	43.1
T8	MD500T75G/90P(B)-PLUS	FN 3258-180-44	58.3
	MD500T90G/110P-PLUS	FN 3258-180-44	58.3
	MD500T110G/132P-PLUS	FN 3359-250-28	49
T9	MD500T132G/160P-PLUS	FN 3359-250-28	49
	MD500T160G/200P-PLUS	FN 3359-320-99	19
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	FN 3359-400-99	29
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	FN 3359-600-99	44
T11	MD500T250G/315P-PLUS MD500T250G/315P-L-PLUS	FN 3359-600-99	44
	MD500T280G/355P-PLUS MD500T280G/355P-L-PLUS	FN 3359-600-99	44

Structure	Model	Filter Model	Loss (W)
T12	MD500T315G/400P-PLUS MD500T315G/400P-L-PLUS	FN 3359-600-99	44
	MD500T355G/450P-PLUS MD500T355G/450P-L-PLUS	FN 3359-800-99	39
	MD500T400G/500P-PLUS MD500T400G/500P-L-PLUS	FN 3359-800-99	39
T13	MD500T500G/630P-PLUS MD500T500G/630P-A-PLUS	FN 3359-1000-99	60
	MD500T560G/710P-PLUS MD500T560G/710P-A-PLUS	FN 3359-1000-99	60
	MD500T630G/800P-PLUS MD500T630G/800P-A-PLUS	FN 3359-1600-99	131
Note: EMC filter 1600EBK1-60-HV is standard for T13 models containing "-A".			

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

Structure	Model	Filter Model	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	FN 3258-7-44	3.8
	MD500-2T0.7G/1.1PB-PLUS	FN 3258-7-44	3.8
	MD500-2T1.1G/1.5PB-PLUS	FN 3258-7-44	3.8
	MD500-2T1.5G/2.2PB-PLUS	FN 3258-16-44	6.1
T2	MD500-2T2.2G/3.7PB-PLUS	FN 3258-16-44	6.1
	MD500-2T3.7G/5.5PB-PLUS	FN 3258-30-44	11.8
T3	MD500-2T5.5G/7.5PB-PLUS	FN 3258-42-44	15.7
T4	MD500-2T7.5G/11PB-PLUS	FN 3258-42-44	15.7
T5	MD500-2T11G/15P(B)-PLUS	FN 3258-75-44	31.2
T6	MD500-2T15G/18.5P(B)-PLUS	FN 3258-75-44	31.2
	MD500-2T18.5G/22P(B)-PLUS	FN 3258-75-44	31.2
T7	MD500-2T22G/30P(B)-PLUS	FN 3258-100-44	34.5
	MD500-2T30G/37P(B)-PLUS	FN 3258-130-44	43.1
T8	MD500-2T37G/45P(B)-PLUS	FN 3258-180-44	58.3
	MD500-2T45G/55P-PLUS	FN 3258-180-44	58.3
	MD500-2T55G/75P-PLUS	FN 3359-250-28	49
T9	MD500-2T75G/90P-PLUS	FN 3359-320-99	19
T10	MD500-2T90G/110P-PLUS	FN 3359-400-99	29
	MD500-2T110G/132P-PLUS	FN 3359-600-99	44
T11	MD500-2T132G/160P-PLUS	FN 3359-600-99	44
T12	MD500-2T160G/200P-PLUS	FN 3359-600-99	44
	MD500-2T200G/220P-PLUS	FN 3359-800-99	39

Table 5-29 Recommended specifications of Schaffner filters (single-phase 220 V)

Structure	Model	Filter Model	Loss (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	-

Dimensions of FN3258 series filters (50 A to 180 A)

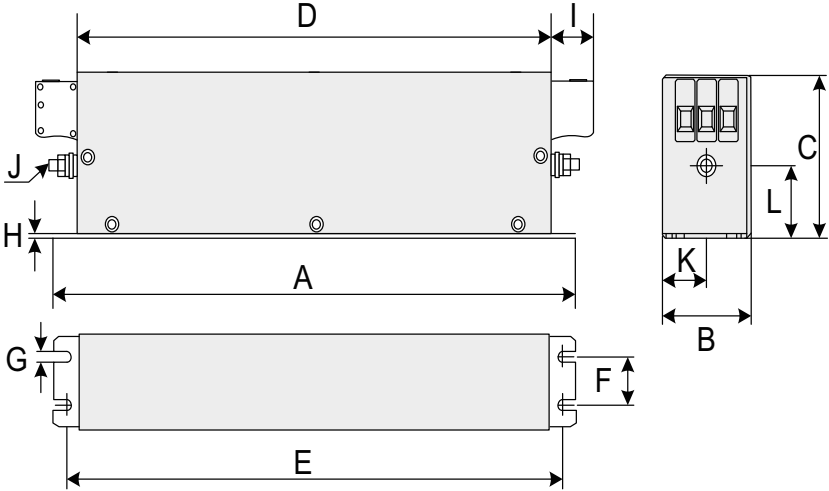


Figure 5-29 Dimension drawing of FN3258 series filters (50 A to 180 A)

Table 5-30 Dimensions of FN3258 series filters (50 A to 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

Dimensions of FN3359 series filters (150 A to 250 A)

150~250A

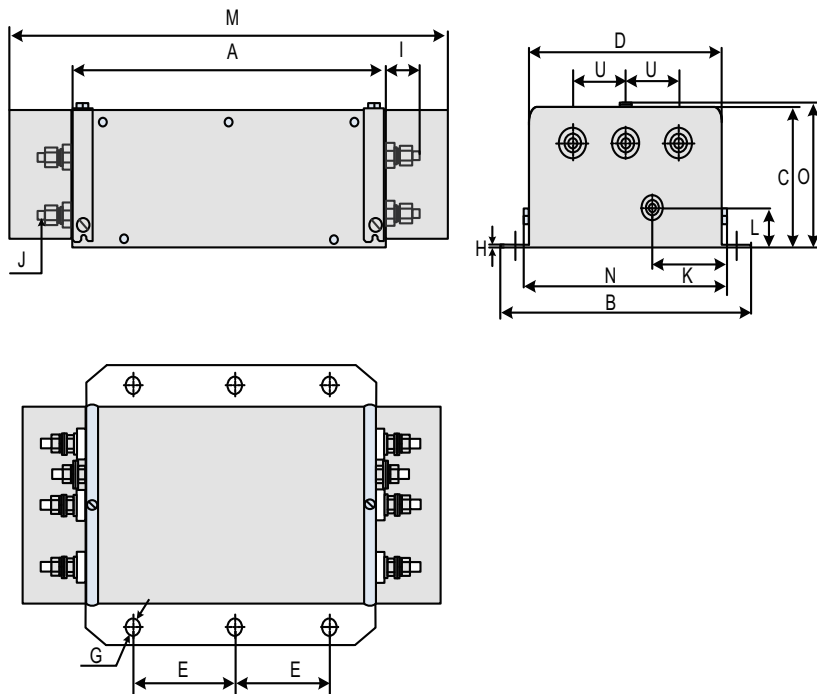


Figure 5-30 Dimension drawing of FN3359 series filters (150 A to 250 A)

Table 5-31 Dimensions of FN3359 series filters (150 A to 250 A) (unit: mm)

Mark	Rated Current (A)		
	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

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

Dimensions of FN 3359 series filters (320 A to 2500 A)
320~2500A

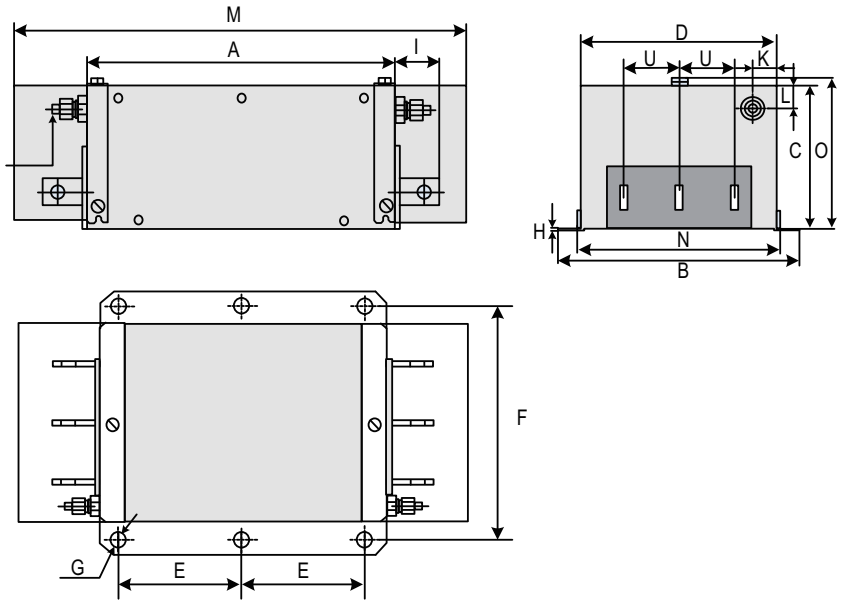


Figure 5-31 Dimension drawing of FN 3359 series filters (320 A to 2500 A)

Dimensions of copper busbars are shown in the following figure:

320~1000A

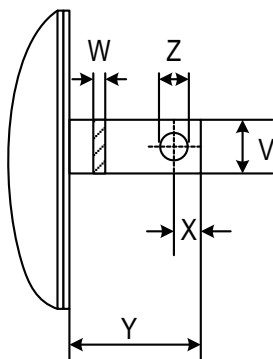


Figure 5-32 Dimensions of copper busbars

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

Mark	Rated Current (A)						
	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 Recommended specifications of JIANLI filters (three-phase 380 V to 480 V)

Structure	Model	Filter Model	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	DL-5EBK5	6.9
	MD500T0.7G/1.1PB-PLUS	DL-5EBK5	6.9
	MD500T1.1G/1.5PB-PLUS	DL-5EBK5	6.9
	MD500T1.5G/2.2PB-PLUS	DL-5EBK5	6.9
	MD500T2.2G/3PB-PLUS	DL-10EBK5	6.9
	MD500T3.0G/3.7PB-PLUS	DL-10EBK5	6.9
T2	MD500T3.7G/5.5PB-PLUS	DL-16EBK5	8.5
	MD500T5.5G/7.5PB-PLUS	DL-25EBK5	9.4
T3	MD500T7.5G/11PB-PLUS	DL-25EBK5	11
	MD500T11G/15PB-PLUS	DL-35EBK5	19.2
T4	MD500T15G/18.5PB-PLUS	DL-50EBK5	21.7
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	DL-50EBK5	21.7
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	DL-65EBK5	27.4
T6	MD500T30G/37P(B)-PLUS	DL-65EBK5	27.4
	MD500T37G/45P(B)-PLUS	DL-80EBK5	32.6
T7	MD500T45G/55P(B)-PLUS	DL-100EBK5	33
	MD500T55G/75P(B)-PLUS	DL-130EBK5	37.5
T8	MD500T75G/90P(B)-PLUS	DL-160EBK5	38.4
	MD500T90G/110P-PLUS	DL-200EBK5	34
	MD500T110G/132P-PLUS	DL-250EBK5	49
T9	MD500T132G/160P-PLUS	DL-300EBK3	49
	MD500T160G/200P-PLUS	DL-400EBK3	19
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	DL-400EBK3	29
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	DL-600EBK3	44
T11	MD500T250G/315P-PLUS MD500T250G/315P-L-PLUS	DL-600EBK3	44
	MD500T280G/355P-PLUS MD500T280G/355P-L-PLUS	DL-600EBK3	44

Structure	Model	Filter Model	Loss (W)
T12	MD500T315G/400P-PLUS MD500T315G/400P-L-PLUS	DL-600EBK3	44
	MD500T355G/450P-PLUS MD500T355G/450P-L-PLUS	DL-700EBK3	39
	MD500T400G/500P-PLUS MD500T400G/500P-L-PLUS	DL-700EBK3	39
T13	MD500T500G/630P-PLUS MD500T500G/630P-A-PLUS	DL-1000EBK3	60
	MD500T560G/710P-PLUS MD500T560G/710P-A-PLUS	DL-1000EBK3	60
	MD500T630G/800P-PLUS MD500T630G/800P-A-PLUS	1600EBK1-60-HV	131
Note: EMC filter 1600EBK1-60-HV is standard for T13 models containing "-A".			

Table 5–34 Recommended specifications of JIANLI filters (three-phase 200 V to 240 V)

Structure	Model	Filter Model	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	DL-5EBK5	6.9
	MD500-2T0.7G/1.1PB-PLUS	DL-5EBK5	6.9
	MD500-2T1.1G/1.5PB-PLUS	DL-10EBK5	6.9
	MD500-2T1.5G/2.2PB-PLUS	DL-10EBK5	6.9
T2	MD500-2T2.2G/3.7PB-PLUS	DL-16EBK5	8.5
	MD500-2T3.7G/5.5PB-PLUS	DL-25EBK5	9.4
T3	MD500-2T5.5G/7.5PB-PLUS	DL-35EBK5	19.2
T4	MD500-2T7.5G/11PB-PLUS	DL-50EBK5	21.7
T5	MD500-2T11G/15P(B)-PLUS	DL-65EBK5	27.4
T6	MD500-2T15G/18.5P(B)-PLUS	DL-65EBK5	27.4
	MD500-2T18.5G/22P(B)-PLUS	DL-80EBK5	32.6
T7	MD500-2T22G/30P(B)-PLUS	DL-100EBK5	33
	MD500-2T30G/37P(B)-PLUS	DL-130EBK5	37.5
T8	MD500-2T37G/45P(B)-PLUS	DL-160EBK5	38.4
	MD500-2T45G/55P-PLUS	DL-250EBK5	49
	MD500-2T55G/75P-PLUS	DL-250EBK5	49
T9	MD500-2T75G/90P-PLUS	DL-300EBK3	49
T10	MD500-2T90G/110P-PLUS	DL-400EBK3	29
	MD500-2T110G/132P-PLUS	DL-600EBK3	44
T11	MD500-2T132G/160P-PLUS	DL-600EBK3	44
T12	MD500-2T160G/200P-PLUS	DL-600EBK3	44
	MD500-2T200G/220P-PLUS	DL-700EBK3	39

Table 5–35 Selection of filters (JIANLI) (single-phase 220 V)

Structure	Model	Filter Model	Loss (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	-

Dimensions of JIANLI filters (50 A to 200 A)

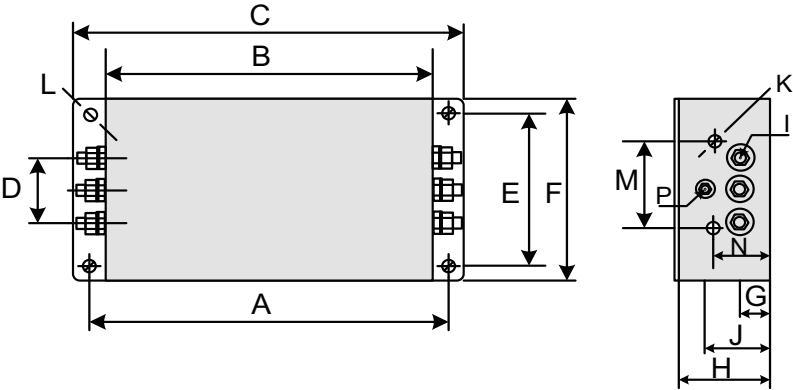


Figure 5-33 Dimension drawing of JIANLI filters (50 A to 200 A)

Table 5–36 Dimensions of JIANLI filters (50 A to 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															

Dimensions of JIANLI filters (250 A to 800 A)

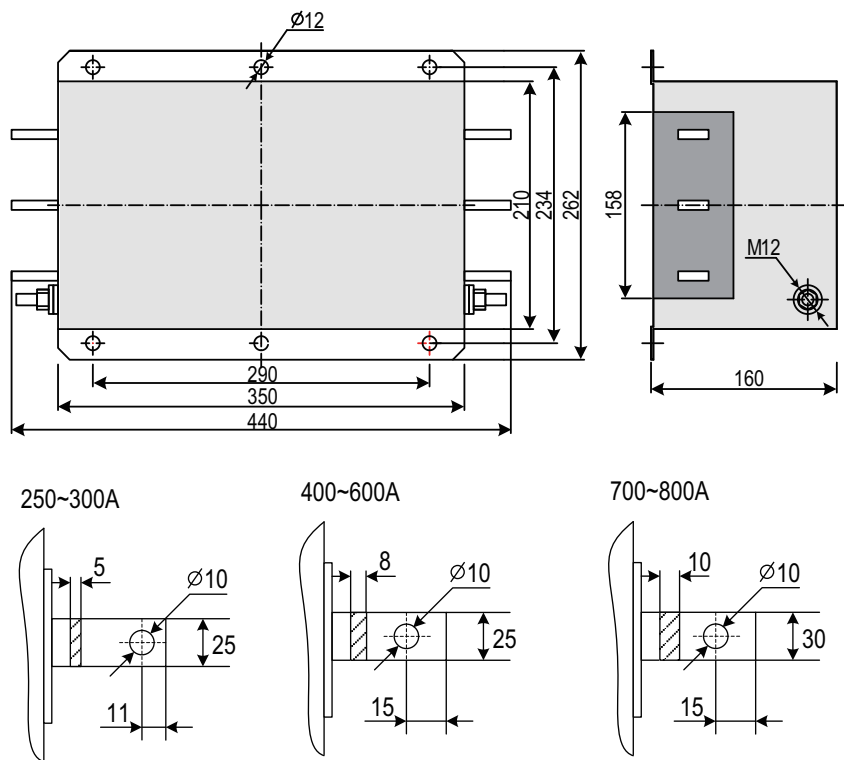


Figure 5-34 Dimension drawing of JIANLI filters (250 A to 800 A) (unit: mm)

Dimensions of JIANLI filters (1000 A)

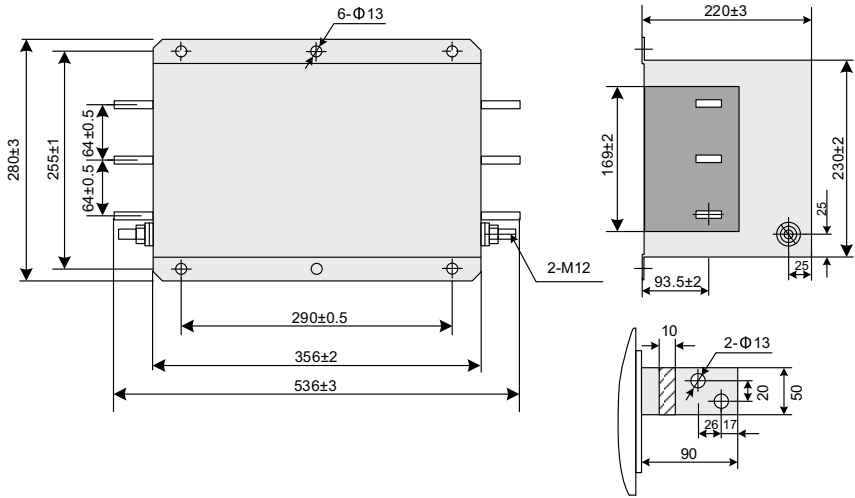


Figure 5-35 Dimensions of JIANLI filters (1000 A) (unit: mm)

5.4.4 Simple Filter

A simple filter can be used to suppress the RF electromagnetic noise generated 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. The grounding cable must be as short as possible without exceeding 30 cm.

Dimensions

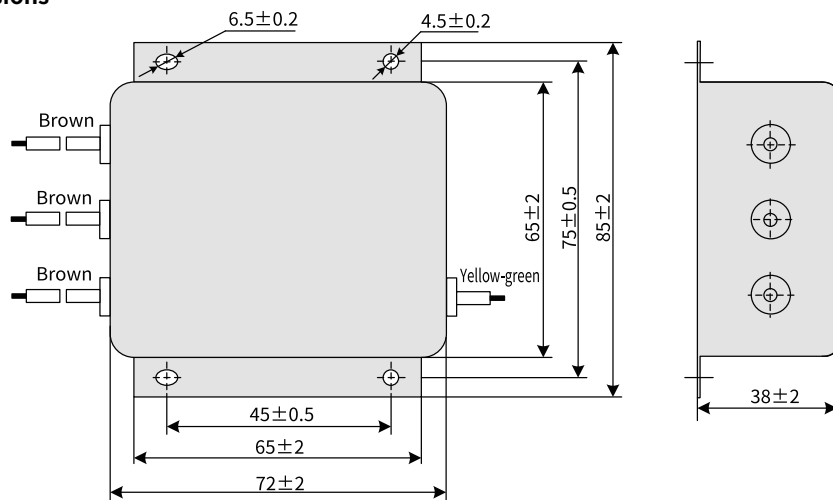


Figure 5-36 Dimension drawing of the simple filter

Table 5-37 Dimensions of the simple filter

Model	Code	Dimensions (Width x Depth x Height) (unit: mm)	Mounting Dimensions (Width x Depth) (unit: mm)
Cxy-1-1	11025018	85 x 72 x 38	45 x 75

Installation method

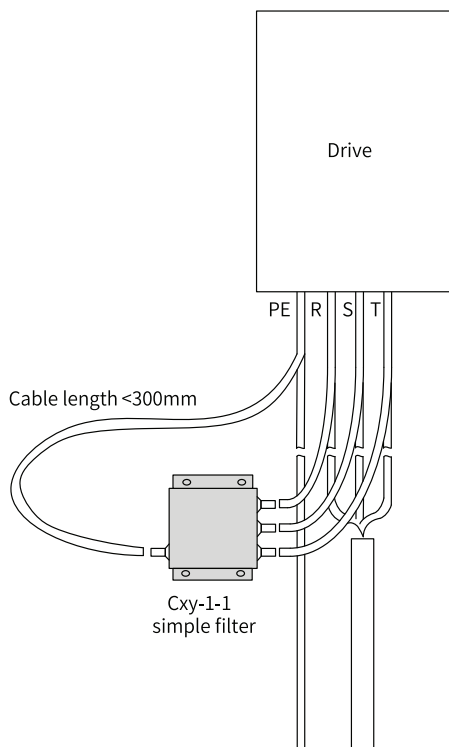


Figure 5-37 Installation of simple filter

5.4.5 Braking Components

Resistance of braking resistors

During braking, almost all regenerative energy of the motor is dissipated by the braking resistor. The resistance of the braking resistor is calculated according to the following formula: $U \times U/R = P_b$.

U indicates the braking voltage upon stable braking of the system. The U value varies with product series and can be adjusted through F9-08. The U value of the MD500 series is 760 V by default.

P_b indicates the braking power.

Power of braking resistors

In theory, the power of braking resistor is the same as the braking power. However, given the derating coefficient K, the actual power of braking resistor is calculated using the following formula: $K \times P_r = P_b \times D$.

K is set to 50% or an approximate value.

Pr indicates the power of the braking resistor.

D indicates the braking frequency (ratio of the regenerative process to the whole operation process).

The following equations are established based on the preceding two formulas:

$$K \times Pr = Pb \times D = U \times U / R \times D$$

$$Pr = (U \times U \times D) / (R \times K)$$

The braking resistor power can be calculated accordingly.

K is the derating coefficient of the braking resistor. A low value of K prevents the braking resistor from overheat. K can be increased moderately in case of proper ventilation, but in no case should K exceed 50%. Failure to comply may result in braking resistor overheat and fire.

Braking frequency (D) is determined based on actual applications. Typical values of braking frequency in different applications are listed in ["Table 5-38 " on page 101.](#)

Table 5-38 Typical values of braking frequency in different applications

Application	Elevator	Winding and unwinding	Centrifuge	Occasional braking load	General application
Braking Frequency	20% to 30%	20% to 30%	50% to 60%	5%	10%

Dimension drawings of the braking unit

The following figures show the dimensions of two types of braking units.

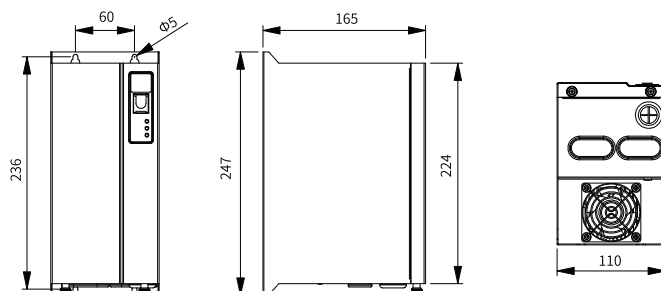


Figure 5-38 Dimensions of MDBUN series braking units (MDBUN-45-2T to MDBUN-90-2T, MDBUN-45-T to MDBUN-90-T, and MDBUN-45-5T to MDBUN-90-5T) (unit: mm)

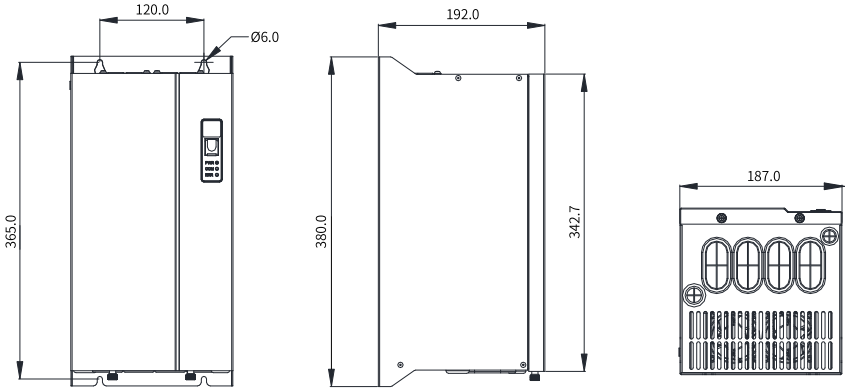


Figure 5-39 Dimensions of MDBUN series braking units (MDBUN-200-T, MDBUN-200-5T, and MDBUN-200-7T) (unit: mm)

Braking unit models

Note

The braking resistance in the following tables is determined based on the scenario where the braking use ratio (ED) of G-type AC drives is 10% and the maximum duration of an individual braking process is 10s.

Table 5–39 Recommended specifications (three-phase 380 V to 480 V)

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	QTY	Braking Resistor	QTY		
MD500T0.4G/0.7PB-PLUS	Built-in (standard)		80 W 1450 Ω	1	AC drive models suffixed with letter "B"	96
MD500T0.7G/1.1PB-PLUS			140 W 800 Ω	1		96
MD500T1.1G/1.5PB-PLUS			220 W 500 Ω	1		96
MD500T1.5G/2.2PB-PLUS			300 W 380 Ω	1		96
MD500T2.2G/3PB-PLUS			440 W 260 Ω	1		64
MD500T3.0G/3.7PB-PLUS			600 W 190 Ω	1		64
MD500T3.7G/5.5PB-PLUS			740 W 150 Ω	1		32
MD500T5.5G/7.5PB-PLUS			1100 W 100 Ω	1		32
MD500T7.5G/11PB-PLUS			1500 W 75 Ω	1		32
MD500T11G/15PB-PLUS			2200 W 50 Ω	1		24
MD500T15G/18.5PB-PLUS			3000 W 38 Ω	1		24
MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	Built-in (optional)		4000 W 32 Ω	1	AC drive models suffixed letter "B"	24
MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS			4500 W 27 Ω	1		24
MD500T30G/37P(B)-PLUS			6000 W 20 Ω	1		19.2
MD500T37G/45P(B)-PLUS			7000 W 16 Ω	1		14.8
MD500T45G/55P(B)-PLUS			9000 W 13 Ω	1		12.8
MD500T55G/75P(B)-PLUS			11000 W 10.5 Ω	1		9.6
MD500T75G/90P(B)-PLUS			15000 W 7.7 Ω	1		6.8
MD500T90G/110P-PLUS	MDBUN-60-T	2	9000 W 10.2 Ω	2	Input voltage $\leq$ 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/132P-PLUS	MDBUN-90-T	2	11000 W 8.0 Ω	2	Input voltage $\leq$ 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/160P-PLUS	MDBUN-90-T	2	13000 W 6.8 Ω	2	Input voltage $\leq$ 440 VAC	6.8 x 2
	MDBUN-90-5T	2	13000 W 8.8 Ω	2	Input voltage > 440 VAC	7.7 x 2

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	QTY	Braking Resistor	QTY		
MD500T160G/200P-PLUS	MDBUN-200-T	2	16000 W 2.8 Ω	2	Input voltage $\leq$ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	16000 W 3.6 Ω	2	Input voltage > 440 VAC	2.8 x 2
MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	MDBUN-200-T	2	21000 W 4.1 Ω	2	Input voltage $\leq$ 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/280P-PLUS MD500T220G/280P-L-PLUS	MDBUN-200-T	2	27000 W 3.2 Ω	2	Input voltage $\leq$ 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/315P-PLUS MD500T250G/315P-L-PLUS	MDBUN-200-T	3	20000 W 4.3 Ω	2	Input voltage $\leq$ 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/355P-PLUS MD500T280G/355P-L-PLUS	MDBUN-200-T	3	23000 W 3.8 Ω	2	Input voltage $\leq$ 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/400P-PLUS MD500T315G/400P-L-PLUS	MDBUN-200-T	3	26000 W 3.4 Ω	3	Input voltage $\leq$ 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/450P-PLUS MD500T355G/450P-L-PLUS	MDBUN-200-T	3	29000 W 3.0 Ω	3	Input voltage $\leq$ 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/500P-PLUS MD500T400G/500P-L-PLUS	MDBUN-200-T	3	29000 W 3.0 Ω	3	Input voltage $\leq$ 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/630P-PLUS MD500T500G/630P-A-PLUS	MDBU-200-B	4	32000 W 2.8 Ω	4	Input voltage $\leq$ 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/710P-PLUS MD500T560G/710P-A-PLUS	MDBU-200-B	4	36000 W 2.5 Ω	4	Input voltage $\leq$ 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/800P-PLUS MD500T630G/800P-A-PLUS	MDBU-200-B	5	32000 W 2.8 Ω	4	Input voltage $\leq$ 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 Recommended specifications (three-phase 200 V to 240 V)

Model	Braking unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	QTY	Braking Resistor Specifications	QTY		
MD500-2T0.4G/0.7PB-PLUS	Built-in (standard)		90 W 300 Ω	1	AC drive models suffixed with letter "B"	48
MD500-2T0.7G/1.1PB-PLUS			160 W 170 Ω	1		48
MD500-2T1.1G/1.5PB-PLUS			250 W 110 Ω	1		32
MD500-2T1.5G/2.2PB-PLUS			340 W 80 Ω	1		32
MD500-2T2.2G/3.7PB-PLUS			500 W 55 Ω	1		16
MD500-2T3.7G/5.5PB-PLUS			800 W 33 Ω	1		16
MD500-2T5.5G/7.5PB-PLUS			1300 W 22 Ω	1		10
MD500-2T7.5G/11PB-PLUS			1700 W 16 Ω	1		10
MD500-2T11G/15P(B)-PLUS	Built-in (optional)		2300 W 12 Ω	1		12
MD500-2T15G/18.5P(B)-PLUS			3000 W 9 Ω	1		9
MD500-2T18.5G/22P(B)-PLUS			3900 W 7 Ω	1		7
MD500-2T22G/30P(B)-PLUS			4600 W 6 Ω	1		6
MD500-2T30G/37P(B)-PLUS			5500 W 5 Ω	1		5
MD500-2T37G/45P(B)-PLUS			6800 W 4 Ω	1		4
MD500-2T45G/55P-PLUS	MDBUN-60-2T	2	5000 W 5.4 Ω	2	-	4.9
MD500-2T55G/75P-PLUS	MDBUN-60-2T	2	6000 W 4.4 Ω	2	-	4
MD500-2T75G/90P-PLUS	MDBUN-90-2T	2	7500 W 4.0 Ω	2	-	3.7
MD500-2T90G/110P-PLUS	MDBUN-90-2T	3	6000 W 4.0 Ω	3	-	3.7
MD500-2T110G/132P-PLUS	MDBUN-90-2T	3	7500 W 4.0 Ω	3	-	3.7
MD500-2T132G/160P-PLUS	MDBUN-90-2T	4	7000 W 4.0 Ω	4	-	3.7
MD500-2T160G/200P-PLUS	MDBUN-90-2T	5	6500 W 4.0 Ω	5	-	3.7
MD500-2T200G/220P-PLUS	MDBUN-90-2T	6	7000 W 4.0 Ω	6	-	3.7

Table 5-41 Recommended specifications (single-phase 200 V to 240 V)

Model	Braking unit	125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
		Braking Resistor Specifications	QTY		
MD500-2S0.4GB-PLUS	Built-in (standard)	80 W 200 Ω	1	AC drive models suffixed with letter "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 on the 380 to 480 VAC models and 200 V to 240 V models, respectively.
 - The external braking units MDBUN-60-T, MDBUN-90-T, and MDBUN-200-T have a default initial braking voltage of 670 V and are applicable in scenarios where the input voltage is no greater than 440 VAC. The external braking units MDBUN-60-5T, MDBUN-90-5T, and MDBUN-200-5T have a default initial braking voltage of 760 V and are applicable in scenarios where the input voltage is above 440 VAC. You can adjust the initial braking voltage based on the grid voltage. Higher initial braking voltage requires higher braking resistance.
 - The preceding table is for reference only. You can select any resistance and power as needed. (Note that the resistance cannot be lower than the recommended minimum value, whereas the power can exceed the recommended value.) The braking resistor model should be selected based on the generating power of the motor in the actual system and is also related to the system inertia, deceleration time, and potential energy load. Select a proper braking resistor as needed.
 - A larger system inertia requires shorter deceleration time and more frequent braking. In this case, select a braking resistor with higher power and lower resistance.
-

Note

For installation and use of 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.

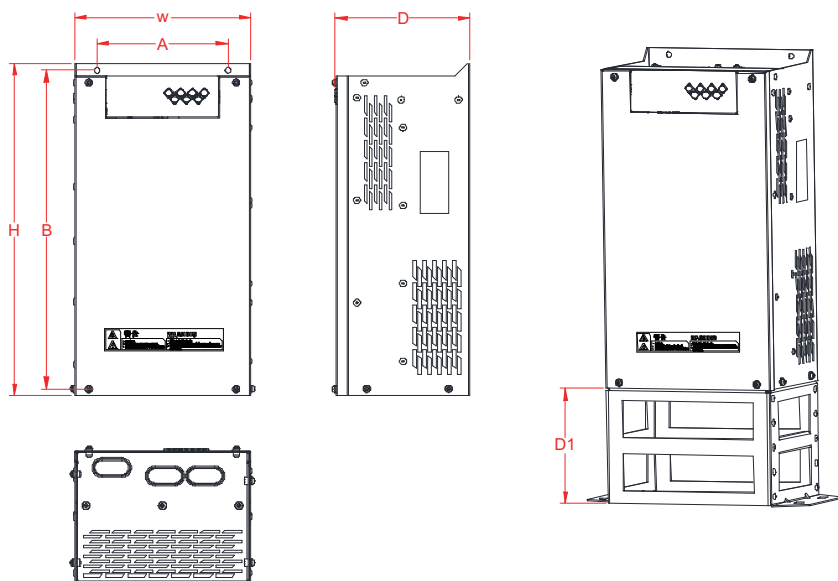


Figure 5-40 Dimensions of AFE unit of MD051 series (unit: mm)

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		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

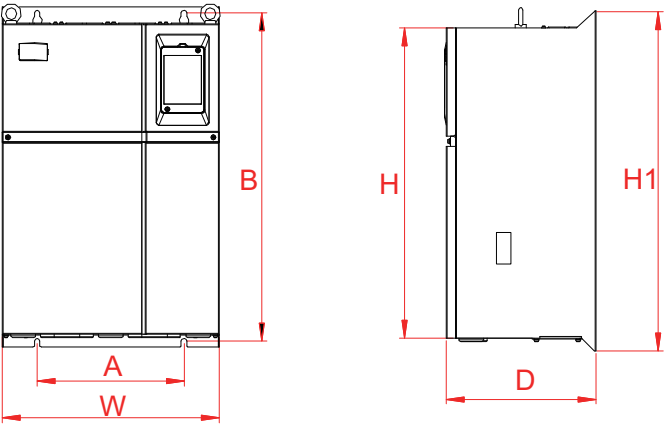


Figure 5-41 Dimensions of AFE unit of MD050 series (unit: mm)

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								
MD050-T132G	880	930	579	380	449	903	10	90
MD050-T160G								
MD050-T200G								
MD050-T220G	983	1060	650	377	420	1030	12	130
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

When installed on the output side of the AC drive, the output reactor can reduce dV/dt and voltage stress on the motor winding, protecting the motor winding, lowering the motor temperature, and prolonging the motor service life.

Table 5-44 Cable length limit with the output reactor configured
(three-phase 380 V to 480 V)

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

Table 5-45 Cable length limit with the output reactor configured
(three-phase 200 V to 240 V)

AC Drive Power (kW)	Rated Voltage (V)	Min. Cable Length with Output Reactor Configured (m)
0.4 to 3	200 to 500	50
3.7	200 to 500	70
5.5	200 to 500	110
7.5	200 to 500	125
≥ 11	200 to 500	150

Models and dimensions of Inovance output reactors

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

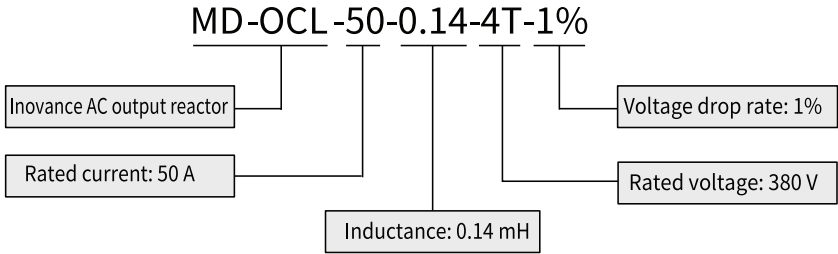


Figure 5-42 AC output reactor model

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 Applicable Inovance AC output reactors (three-phase 380 V to 480 V)

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T0.7G/1.1PB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T1.1G/1.5PB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500T1.5G/2.2PB-PLUS	MD-OCL-7-1.0-4T-1%	1.0	-
	MD500T2.2G/3PB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
	MD500T3.0G/3.7PB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD500T3.7G/5.5PB-PLUS	MD-OCL-15-0.47-4T-1%	0.47	-
	MD500T5.5G/7.5PB-PLUS	MD-OCL-20-0.35-4T-1%	0.35	-
T3	MD500T7.5G/11PB-PLUS	MD-OCL-30-0.23-4T-1%	0.23	-
	MD500T11G/15PB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T4	MD500T15G/18.5PB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD500T18.5G/22P(B)-PLUS	MD-OCL-50-0.14-4T-1%	0.14	-
	MD500T18.5G/22P(B)-T-PLUS			
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD500T30G/37P(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
	MD500T37G/45P(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
T7	MD500T45G/55P(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
	MD500T55G/75P(B)-PLUS	MD-OCL-150-0.047-4T-1%	0.047	-

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T8	MD500T75G/90P(B)-PLUS	MD-OCL-200-0.035-4T-1%	0.035	-
	MD500T90G/110P-PLUS	MD-OCL-250-0.028-4T-1%	0.028	-
	MD500T110G/132P-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
T9	MD500T132G/160P-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
	MD500T160G/200P-PLUS	MD-OCL-490-0.014-4T-1%	0.014	-
Note: 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 5-47 Applicable Inovance AC output reactors (three-phase 200 V to 240 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	MD-OCL-5-1.4-4T-1%	1.4	-
	MD500-2T0.7G/1.1PB-PLUS	MD-OCL-7-1.0-4T-1%	1.0	-
	MD500-2T1.1G/1.5PB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
	MD500-2T1.5G/2.2PB-PLUS	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD500-2T2.2G/3.7PB-PLUS	MD-OCL-15-0.47-4T-1%	0.47	-
	MD500-2T3.7G/5.5PB-PLUS	MD-OCL-20-0.35-4T-1%	0.35	-
T3	MD500-2T5.5G/7.5PB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T4	MD500-2T7.5G/11PB-PLUS	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD500-2T11G/15P(B)-PLUS	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD500-2T15G/18.5P(B)-PLUS	MD-OCL-80-0.087-4T-1%	0.087	-
	MD500-2T18.5G/22P(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
T7	MD500-2T22G/30P(B)-PLUS	MD-OCL-120-0.058-4T-1%	0.058	-
	MD500-2T30G/37P(B)-PLUS	MD-OCL-150-0.047-4T-1%	0.047	-
T8	MD500-2T37G/45P(B)-PLUS	MD-OCL-200-0.035-4T-1%	0.035	-
	MD500-2T45G/55P-PLUS	MD-OCL-250-0.028-4T-1%	0.028	-
	MD500-2T55G/75P-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-
T9	MD500-2T75G/90P-PLUS	MD-OCL-330-0.021-4T-1%	0.021	-

Table 5-48 Applicable Inovance AC output reactors (single-phase 200 V to 240 V)

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (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	-

Dimensions of the AC output reactor

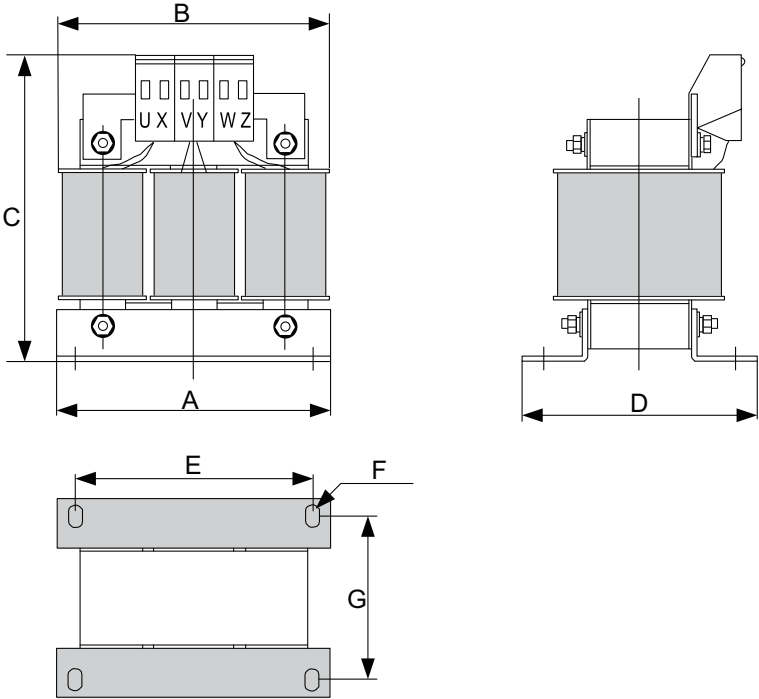


Figure 5-43 Dimensions of AC output reactors (5 A to 10 A)

Table 5-49 Dimensions of AC output reactors (5 A to 10 A) (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

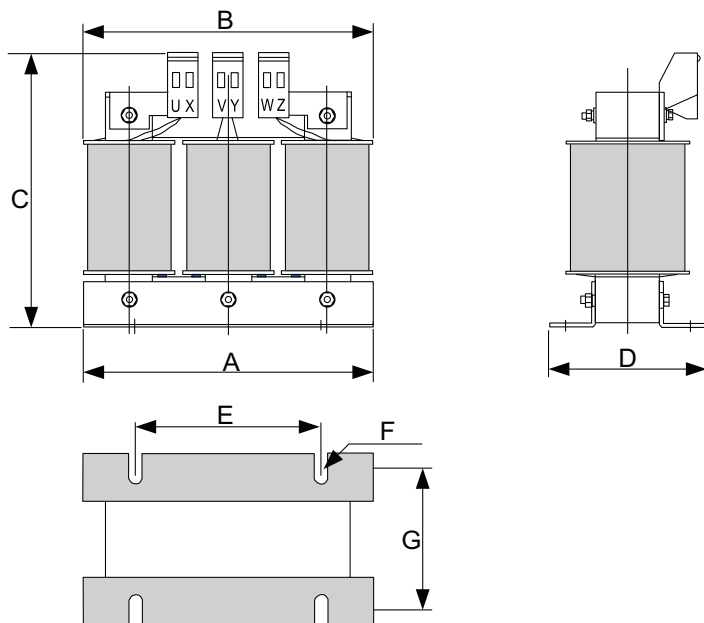


Figure 5-44 Dimensions of AC output reactors (15 A)

Table 5-50 Dimensions of AC output reactors (15 A) (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

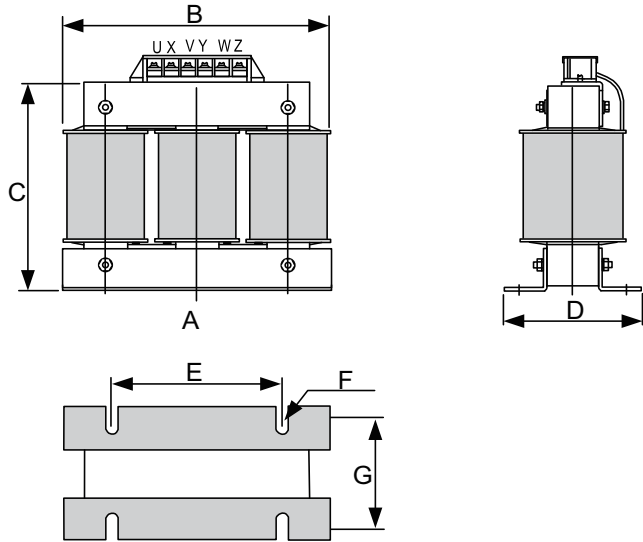


Figure 5-45 Dimensions of AC output reactors (20 A)

Table 5-51 Dimensions of AC output reactors (20 A) (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

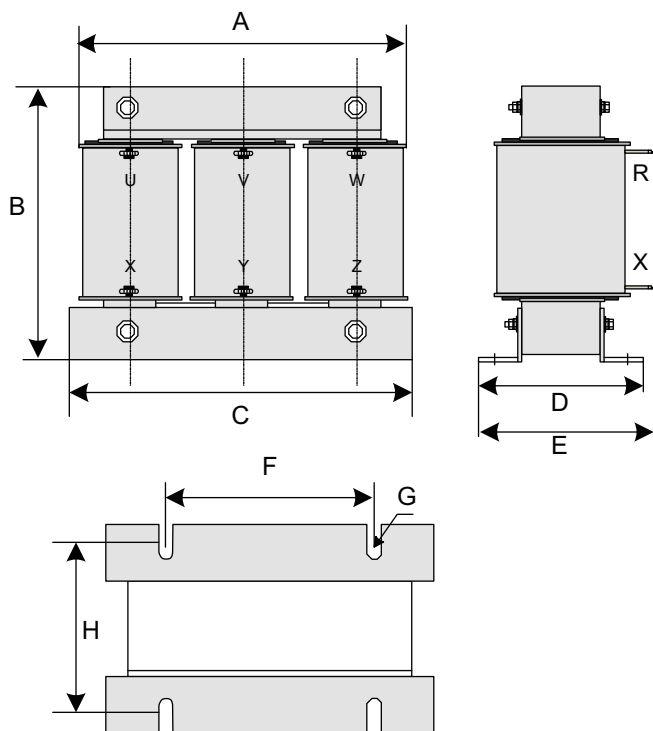


Figure 5-46 Dimensions of AC output reactors (30 A to 60 A)

Table 5-52 Dimensions of AC output reactors (30 A to 60 A) (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

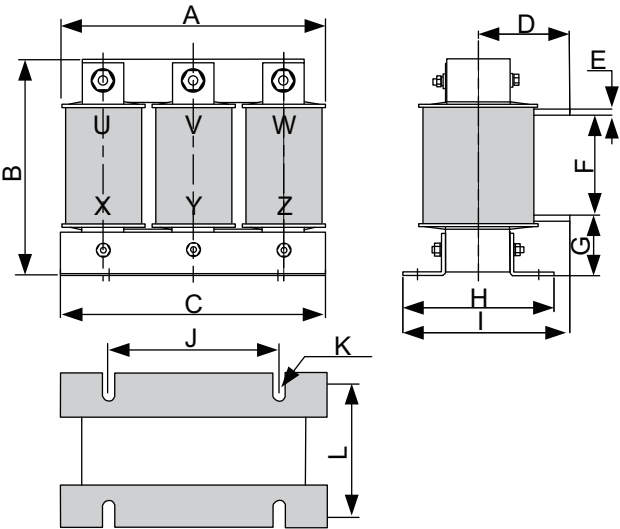


Figure 5-47 Dimensions of AC output reactors (80 A to 120 A)

Table 5-53 Dimensions of AC output reactors (80 A to 120 A) (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

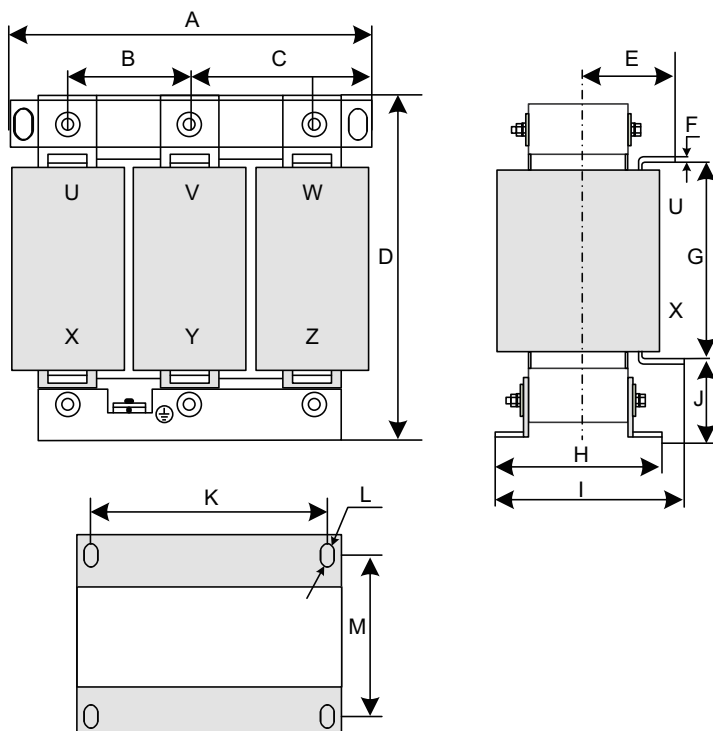


Figure 5-48 Dimensions of AC output reactors (150 A to 250 A)

Table 5-54 Dimensions of AC output reactors (150 A to 250 A) (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±1 0	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

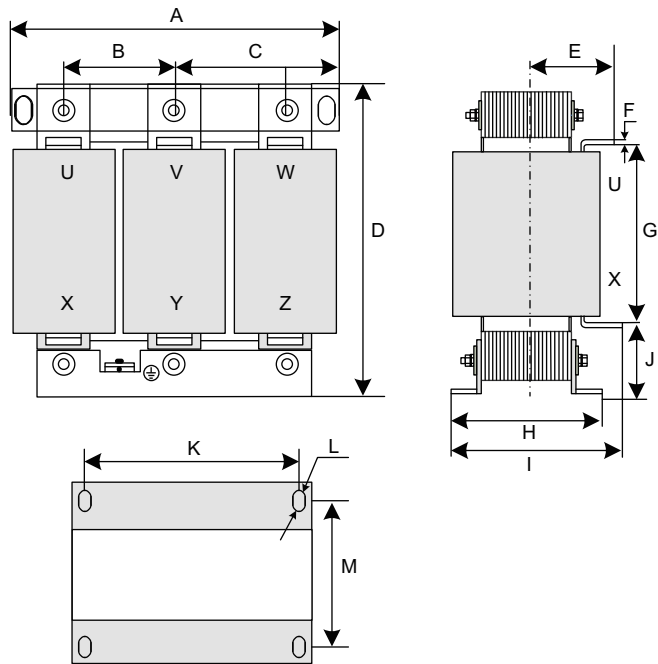


Figure 5-49 Dimensions of AC output reactors (330 A)

Table 5-55 Dimensions of AC output reactors (330 A) (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	106±2

Models and dimensions of Schaffner AC output reactors

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

Table 5-56 Schaffner AC output reactors

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500T0.4G/0.7PB-PLUS	RWK 305-4-KL	1.47	22
	MD500T0.7G/1.1PB-PLUS	RWK 305-4-KL	1.47	22
	MD500T1.1G/1.5PB-PLUS	RWK 305-4-KL	1.47	22
	MD500T1.5G/2.2PB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500T2.2G/3PB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500T3.0G/3.7PB-PLUS	RWK 305-10-KL	0.588	30
T2	MD500T3.7G/5.5PB-PLUS	RWK 305-14-KL	0.42	34
	MD500T5.5G/7.5PB-PLUS	RWK 305-17-KL	0.364	38
T3	MD500T7.5G/11PB-PLUS	RWK 305-24-KL	0.245	45
	MD500T11G/15PB-PLUS	RWK 305-32-KL	0.184	55
T4	MD500T15G/18.5PB-PLUS	RWK 305-45-KL	0.131	60
T5	MD500T18.5G/22P(B)-PLUS MD500T18.5G/22P(B)-T-PLUS	RWK 305-45-KL	0.131	60
	MD500T22G/30P(B)-PLUS MD500T22G/30P(B)-T-PLUS	RWK 305-60-KL	0.098	65
T6	MD500T30G/37P(B)-PLUS	RWK 305-72-KL	0.082	70
	MD500T37G/45P(B)-PLUS	RWK 305-90-KL	0.065	75
T7	MD500T45G/55P(B)-PLUS	RWK 305-110-KL	0.053	90
	MD500T55G/75P(B)-PLUS	RWK 305-156-KS	0.038	120
T8	MD500T75G/90P(B)-PLUS	RWK 305-182-KS	0.032	140
	MD500T90G/110P-PLUS	RWK 305-230-KS	0.026	180
	MD500T110G/132P-PLUS	RWK 305-280-KS	0.021	220
T9	MD500T132G/160P-PLUS	RWK 305-330-KS	0.018	240
	MD500T160G/200P-PLUS	RWK 305-400-S	0.015	330
T10	MD500T200G/250P-PLUS MD500T200G/250P-L-PLUS	RWK 305-500-S	0.012	340
	MD500T220G/280P-PLUS MD500T220G/280P-L-PLUS	RWK 305-600-S	0.01	380
T11	MD500T250G/315P-PLUS MD500T250G/315P-L-PLUS	RWK 305-600-S	0.01	380
	MD500T280G/355P-PLUS MD500T280G/355P-L-PLUS	RWK 305-680-S	0.009	410
T12	MD500T315G/400P-PLUS MD500T315G/400P-L-PLUS	RWK 305-790-S	0.007	590
	MD500T355G/450P-PLUS MD500T355G/450P-L-PLUS	RWK 305-910-S	0.006	740
	MD500T400G/500P-PLUS MD500T400G/500P-L-PLUS	RWK 305-910-S	0.006	740
Note: T13 models are delivered with an output reactor.				

Table 5-57 Applicable Schaffner AC output reactors (three-phase 200 V to 240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD500-2T0.4G/0.7PB-PLUS	RWK 305-4-KL	1.47	22
	MD500-2T0.7G/1.1PB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500-2T1.1G/1.5PB-PLUS	RWK 305-7.8-KL	0.754	25
	MD500-2T1.5G/2.2PB-PLUS	RWK 305-10-KL	0.588	30
T2	MD500-2T2.2G/3.7PB-PLUS	RWK 305-14-KL	0.42	34
	MD500-2T3.7G/5.5PB-PLUS	RWK 305-17-KL	0.364	38
T3	MD500-2T5.5G/7.5PB-PLUS	RWK 305-32-KL	0.184	55
T4	MD500-2T7.5G/11PB-PLUS	RWK 305-45-KL	0.131	60
T5	MD500-2T11G/15P(B)-PLUS	RWK 305-60-KL	0.098	65
T6	MD500-2T15G/18.5P(B)-PLUS	RWK 305-72-KL	0.082	70
	MD500-2T18.5G/22P(B)-PLUS	RWK 305-90-KL	0.065	75
T7	MD500-2T22G/30P(B)-PLUS	RWK 305-110-KL	0.053	90
	MD500-2T30G/37P(B)-PLUS	RWK 305-156-KS	0.038	120
T8	MD500-2T37G/45P(B)-PLUS	RWK 305-182-KS	0.032	140
	MD500-2T45G/55P-PLUS	RWK 305-230-KS	0.026	180
	MD500-2T55G/75P-PLUS	RWK 305-280-KS	0.021	220
T9	MD500-2T75G/90P-PLUS	RWK 305-330-KS	0.018	240
T10	MD500-2T90G/110P-PLUS	RWK 305-400-S	0.015	330
	MD500-2T110G/132P-PLUS	RWK 305-500-S	0.012	340
T11	MD500-2T132G/160P-PLUS	RWK 305-500-S	0.012	340
T12	MD500-2T160G/200P-PLUS	RWK 305-600-S	0.01	380
	MD500-2T200G/220P-PLUS	RWK 305-790-S	0.007	590

Table 5-58 Applicable Schaffner AC output reactors (single-phase 200 V to 240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (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

Models of 4 A to 45 A

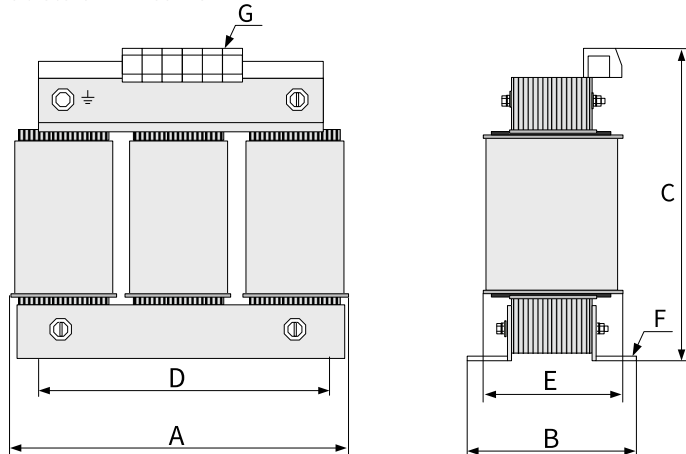


Figure 5-50 Dimension drawing of output reactors (4 A to 45 A)

Table 5-59 Mounting dimensions of output reactors (4 A to 45 A) (unit: mm)

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

Models of 60 A to 110 A

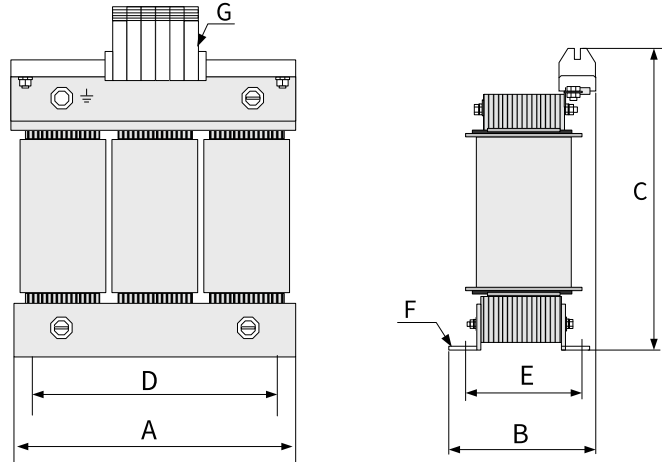


Figure 5-51 Dimension drawing of output reactors (60 A to 110 A)

Table 5-60 Mounting dimensions of output reactors (60 A to 110 A) (unit: mm)

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

Models of 124 A to 330 A

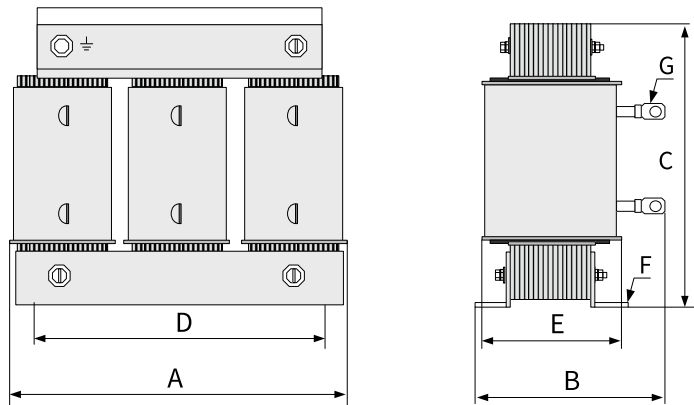


Figure 5-52 Dimension drawing of output reactors (124 A to 330 A)

Table 5-61 Mounting dimensions of output reactors (124 A to 1100 A) (unit: mm)

Rated Current	A	B	C	D	E	F	G
124 A	190	max.180	max.160	170	67	8 x 12	Ø8
143 A	190	max.180	max.160	170	77	8 x 12	Ø8
156 A and 170 A	190	max.180	max.160	170	77	8 x 12	Ø10
182 A	210	max.180	max.185	175	97	8 x 12	Ø10
230 A	240	220	-	190	119	11 x 15	Ø12
280 A	240	235	-	190	133	11 x 15	Ø12
330 A	240	240	-	190	135	11 x 15	Ø12
400 A and 500 A	240	220	-	190	119	11 x 15	Ø11
600 A and 680 A	240	230	-	190	128	11 x 15	Ø11
790 A	300	218	-	240	136	11 x 15	Ø11
910 A	300	228	-	240	148	11 x 15	Ø11
1100 A	360	250	-	310	144	11 x 15	Ø11

5.4.8 Magnetic Ring and Ferrite Clamp

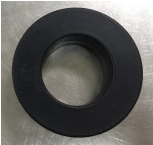
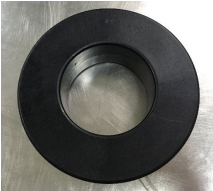
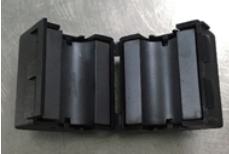
Model

Install the magnetic ring on the input or output side of the AC drive and as close to the AC drive as possible. Installing the magnetic ring on the input side suppresses noise in the power supply system of the AC drive. Installing the magnetic ring on the output side suppresses interference escaped from the AC drive to the outside and reduces the bearing current.

Use the magnetic ring or ferrite clamp in applications suffering current leakage and signal cable interference.

- Amorphous magnetic ring: featuring a high magnetic conductivity within frequency band of 1 MHz and an excellent interference reduction performance, but not as low-cost as the ferrite clamp
- Ferrite clamp: featuring a good magnetic conductivity in frequency band above 1 MHz and a good signal cable interference reduction performance in case of low-power AC drives

Table 5-62 Appearance and models of magnetic rings and ferrite clamp

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

Dimensions

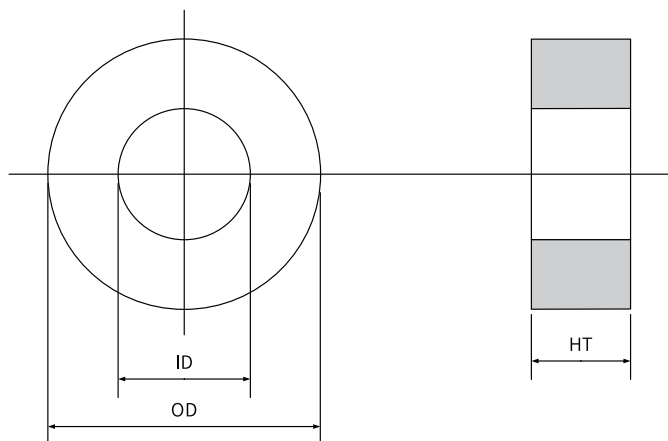


Figure 5-53 Dimension drawing of magnetic ring

Table 5-63 Dimensions of magnetic ring

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

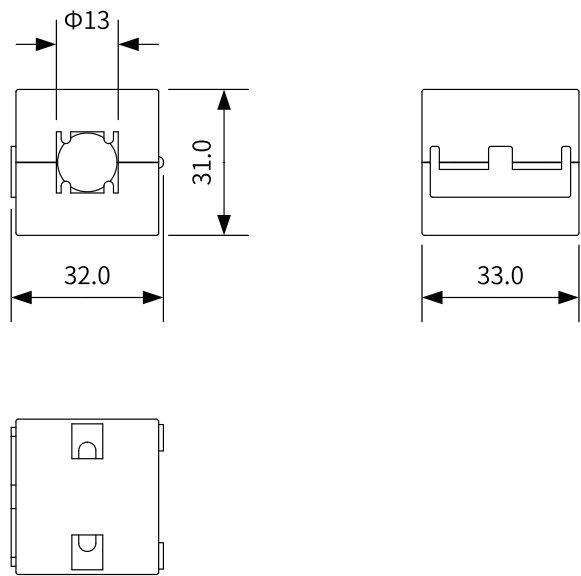


Figure 5-54 Dimension drawing of ferrite clamp

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 127 .	
MDKE9	An optional LCD operating panel that supports copy, download, and modification of parameters For dimensions, see "Figure 5-56" on page 128 .	

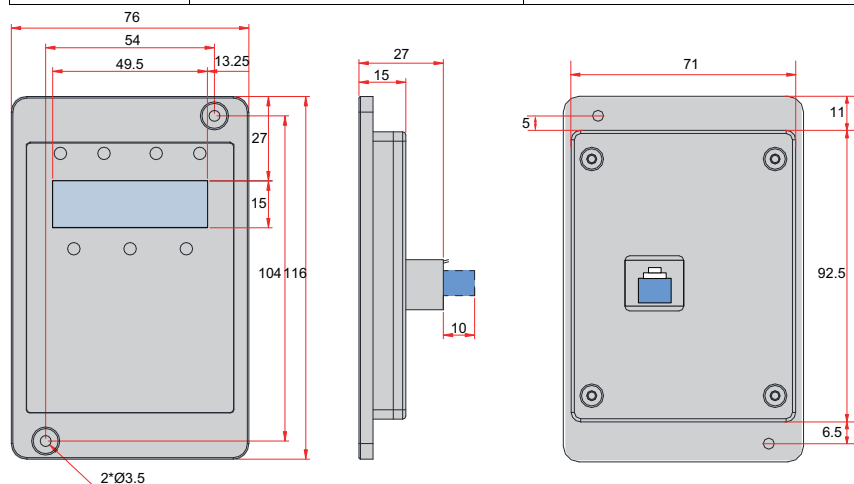


Figure 5-55 Dimensions of MD32NKE1 (unit: mm)

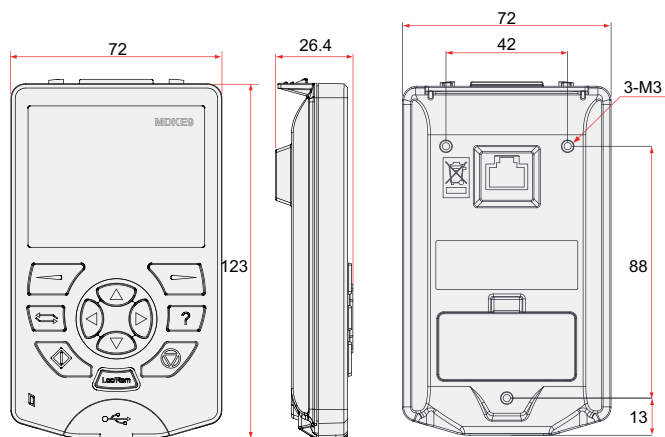


Figure 5-56 Dimensions of MDKE9 (unit: mm)

6 Extension Cards

6.1 List of Extension Cards

The AC drive supports multiple types of extension cards and encoders for communication with the fieldbus as well as programming and secondary development.

Table 6–1 List of extension cards

Card	Model	Function	Remarks
I/O extension card 1	MD38IO1	Adds five DI, one RO, and one DO, with Modbus/CANlink.	Available for T4 models and above
I/O extension card 2	MD38IO2	Adds three DI.	Available for all models
I/O extension card 3	MD38IO3	Adds three DI, one RS485 communication signal isolation input, and one normally open relay output.	Available for all models
RS485 communication card	MD38TX1	Modbus communication adapter card with isolation	Available for all models
CANlink communication extension card	MD38CAN1	CANlink communication adapter card	Available for all models
CANopen communication extension card	MD38CAN2	CANopen communication adapter card	Available for all models
PROFIBUS-DP communication card	MD-SI-DP	PROFIBUS-DP communication card	T1 to T3
PROFIBUS-DP communication card	MD38DP2	PROFIBUS-DP communication card	T4 to T13
PROFINET communication extension card	MD500-PN1	PROFINET communication adapter card	Available for all models
EtherCAT communication extension card	MD500-ECAT	EtherCAT communication adapter card	Available for all models
Ethernet/IP communication extension card	MD500-EN1	Ethernet/IP communication adapter card	Available for all models
Resolver interface card	MD38PG4	Applicable to resolvers, with DB9 interface, excitation frequency: 10 kHz; 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 malfunction of MD38PG4. Use resolvers with no more than four pole pairs. Failure to comply may result in overload of MD38PG4.	Available for all models

Card	Model	Function	Remarks
MD38PGMD multi-function encoder card	MD38PGMD	Collector and differential encoder interface card with an optional frequency multiplication/division output interface; Requires a 5 V/15 V power supply and compatible with differential input, collector input, and push-pull input. Supports differential output and collector output and a variety of interfaces such as encoder interfaces and host controller A/B phase input interfaces.	Available for all models
23-bit PG card	ES510-PG-CT1	Supports Inovance 23-bit encoders and provides a DB9 interface.	Available for all models

6.2 Installing Extension Cards

The AC drive is equipped with three I/O extension cards, one PC programmable card, seven fieldbus cards (Modbus-RTU, PROFIBUS-DP, CANlink, CANopen, PROFINET, EtherCAT, and Ethernet/IP) and two PG cards, as installed in the positions shown below. Before installing these cards, remove the cover first.

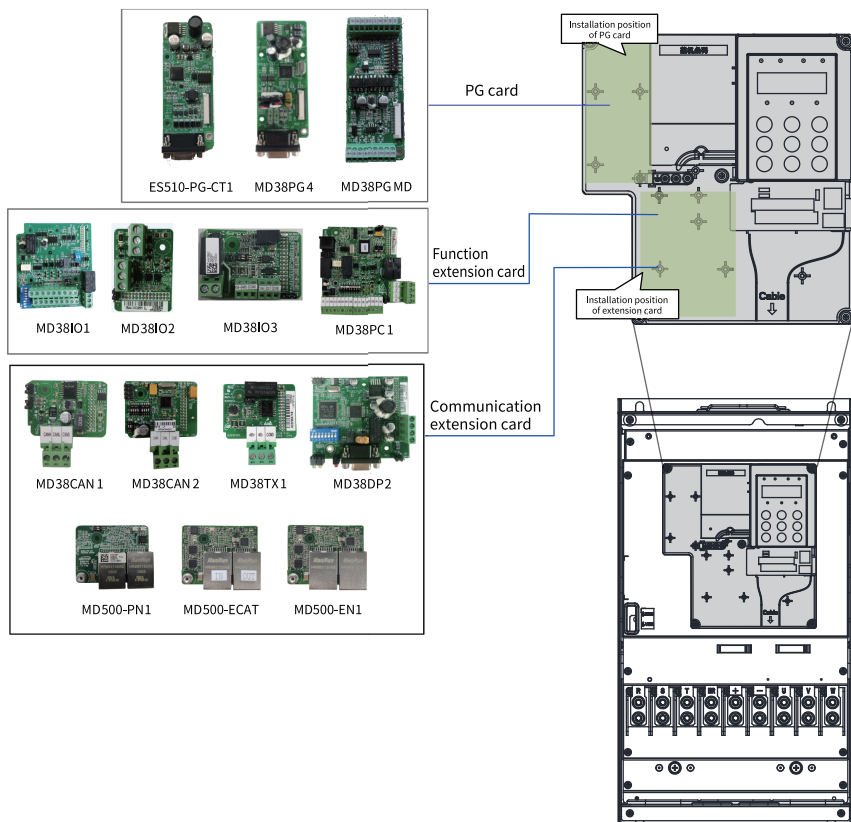


Figure 6-1 Installation position of extension card

7 Technical Data

7.1 Electrical Specifications

Three-phase 380 V to 480 V

Table 7-1 Electrical specifications (three-phase 380 V to 480 V) (T1 models)

Item		Specifications					
Model: MD500Txxxx-PLUS		0.4G/0.7PB	0.7G/ 1.1PB	1.1G/1.5PB	1.5G/2.2PB	2.2G/3PB	3.0G/3.7PB
Structure		T1					
Output	Power (kW) (heavy load)	0.4	0.75	1.1	1.5	2.2	3.0
	Power (kW) (light load)	0.75	1.1	1.5	2.2	3.0	3.7
	Rated output current (A) (heavy load)	1.5	2.1	3.1	3.8	5.1	7.2
	Rated output current (A) (light load)	2.1	3.1	3.8	5.1	7.2	9.0
	Output voltage	Three-phase 0 V to input voltage					
	Max. output frequency	599 Hz (editable through a parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current					
Input	Rated input current (A) (heavy load)	1.8	2.4	3.7	4.6	6.3	9
	Rated input current (A) (light load)	2.5	3.7	4.6	6.4	9.1	11.3
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz					
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)					
	Frequency range	Allowable fluctuation: ±5% (47.5 Hz to 63 Hz)					
	Power capacity (kVA) (heavy load)	2	2.8	4.1	5	6.7	9.5
	Power capacity (kVA) (light load)	2.3	3.4	4.2	5.9	8.3	10.4
Thermal design	Thermal design power (kW) (heavy load)	0.039	0.046	0.057	0.068	0.081	0.109
	Thermal design power (kW) (light load)	0.048	0.06	0.068	0.088	0.112	0.14
	Air flow (CFM)	-	-	-	9	9	9
Overvoltage category		OVC III					
Pollution degree		PD2					
IP rating		IP20 (open type, for IEC products) Type 1 (enclosed type, for UL products)					

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

Item		Specifications				
Model: MD500Txxxx-PLUS		3.7G/5.5PB	5.5G/7.5PB	7.5G/11PB	11G/15PB	15G/18.5PB
Structure		T2		T3		T4
Output	Power (kW) (heavy load)	3.7	5.5	7.5	11	15
	Power (kW) (light load)	5.5	7.5	11	15	18.5
	Rated output current (A) (heavy load)	9	13	17	25	32
	Rated output current (A) (light load)	13	17	25	32	37
	Output voltage	Three-phase 0 V to input voltage				
	Max. output frequency	599 Hz (editable through a parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current				
Input	Rated input current (A) (heavy load)	11.4	16.7	21.9	32.2	41.3
	Rated input current (A) (light load)	15.9	22.4	32.9	39.7	44
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz				
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)				
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)				
	Power capacity (kVA) (heavy load)	12	17.5	22.8	33.4	42.8
	Power capacity (kVA) (light load)	15.5	20.5	30.2	38.2	44.4
Thermal design	Thermal design power (kW) (heavy load)	0.138	0.201	0.24	0.355	0.454
	Thermal design power (kW) (light load)	0.207	0.273	0.388	0.491	0.561
	Air flow (CFM)	20	24	30	40	42
Overvoltage category		OVC III				
Pollution degree		PD2				
IP rating		IP20 (open type, for IEC products) Type 1 (enclosed type, for UL products)				

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

Item		Specifications					
Model: MD500Txxxxx-PLUS		18.5G/ 22P(B)	22G/30P(B)	18.5G/ 22P(B)-T	22G/ 30P(B)-T	30G/37P(B)	37G/45P(B)
Structure		T5				T6	
Output	Power (kW) (heavy load)	18.5	22	18.5	22	30	37
	Power (kW) (light load)	22	30	22	30	37	45
	Rated output current (A) (heavy load)	37	45	37	45	60	75
	Rated output current (A) (light load)	45	60	45	60	75	91
	Output voltage	Three-phase 0 V to input voltage					
	Max. output frequency	599 Hz (editable through a parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current					
Input	Rated input current (A) (heavy load)	49.5	59	43.4	51.3	57	69
	Rated input current (A) (light load)	59	65.8	51.3	65.8	71	86
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz					
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)					
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)					
	Power capacity (kVA) (heavy load)	45	54	45	54	52	63
	Power capacity (kVA) (light load)	54	60	54	60	65	79
Thermal design	Thermal design power (kW) (heavy load)	0.478	0.551	0.478	0.551	0.694	0.815
	Thermal design power (kW) (light load)	0.616	0.76	0.616	0.76	0.85	1.04
	Air flow (CFM)	51.9	57.4	51.9	57.4	118.5	118.5
Overvoltage category		OVC III					
Pollution degree		PD2					
IP rating		IP20 (open type, for IEC products) Type 1 (enclosed type, for UL products)					

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

Item		Specifications						
Model: MD500Txxxx-PLUS		45G/ 55P(B)	55G/ 75P(B)	75G/ 90P(B)	90G/110P	110G/ 132P	132G/ 160P	160G/ 200P
Structure		T7		T8			T9	
Output	Power (kW) (heavy load)	45	55	75	90	110	132	160
	Power (kW) (light load)	55	75	90	110	132	160	200
	Rated output current (A) (heavy load)	91	112	150	176	210	253	304
	Rated output current (A) (light load)	112	150	176	210	253	304	377
	Output voltage	Three-phase 0 V to input voltage						
	Max. output frequency	599 Hz (editable through a 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	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current						
Input	Rated input current (A) (heavy load)	89	106	139	164	196	240	287
	Rated input current (A) (light load)	111	143	167	198	239	295	359
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz						
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)						
	Frequency range	Allowable fluctuation: ±5% (47.5 Hz to 63 Hz)						
	Power capacity (kVA) (heavy load)	81	97	127	150	179	220	263
	Power capacity (kVA) (light load)	102	131	153	181	219	270	328
Thermal design	Thermal design power (kW) (heavy load)	1.01	1.21	1.57	1.81	2.14	2.85	3.56
	Thermal design power (kW) (light load)	1.22	1.61	1.91	2.22	2.67	3.61	4.68
	Air flow (CFM)	122.2	122.2	218.6	287.2	354.2	547	627
Overvoltage category		OVC III						
Pollution degree		PD2						
IP rating		IP20 (open type, for IEC products)						

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

Item		Specifications			
Model: MD500Txxxx-PLUS		200G/250P(-L)	220G/280P(-L)	250G/315P(-L)	280G/355P(-L)
Structure		T10		T11	
Output	Power (kW) (heavy load)	200	220	250	280
	Power (kW) (light load)	250	280	315	355
	Rated output current (A) (heavy load)	377	426	465	520
	Rated output current (A) (light load)	465	520	585	650
	Output voltage	Three-phase 0 V to input voltage			
	Max. output frequency	599 Hz (editable through a parameter)			
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current			
Input	Rated input current (A) (heavy load)	365	410	441	495
	Rated input current (A) (light load)	456	507	559	624
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz			
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)			
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)			
	Power capacity (kVA) (heavy load)	334	375	404	453
	Power capacity (kVA) (light load)	417	464	511	571
Thermal design	Thermal design power (kW) (heavy load)	4.15	4.55	5.06	5.33
	Thermal design power (kW) (light load)	5.74	6.63	7.14	7.52
	Air flow (CFM)	638.4	722.5	789.4	882
Overvoltage category		OVC III			
Pollution degree		PD2			
IP rating		IP20 (open type, for IEC products)			

Table 7-6 Electrical specifications (three-phase 380 V to 480 V) (T12 models)

Item		Specifications		
Model: MD500Txxxx-PLUS		315G/400P(-L)	355G/450P(-L)	400G/500P(-L)
Structure		T12		
Output	Power (kW) (heavy load)	315	355	400
	Power (kW) (light load)	400	450	500
	Rated output current (A) (heavy load)	585	650	725
	Rated output current (A) (light load)	725	820	880
	Output voltage	Three-phase 0 V to input voltage		
	Max. output frequency	599 Hz (editable through a parameter)		
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)		
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current		
Input	Rated input current (A) (heavy load)	565	617	687
	Rated input current (A) (light load)	708	782	840
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz		
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)		
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)		
	Power capacity (kVA) (heavy load)	517	565	629
	Power capacity (kVA) (light load)	647	715	768
Thermal design	Thermal design power (kW) (heavy load)	5.69	6.31	6.91
	Thermal design power (kW) (light load)	8.62	8.97	9.6
	Air flow (CFM)	645	860	860
Overvoltage category		OVC III		
Pollution degree		PD2		
IP rating		IP20 (open type, for IEC products)		

Table 7-7 Electrical specifications (three-phase 380 V to 480 V) (T13 models)

Item		Specifications		
Model: MD500Txxxx-PLUS		500G/630P(-A)	560G/710P(-A)	630G/800P(-A)
Structure		T13		
Output	Power (kW) (heavy load)	500	560	630
	Power (kW) (light load)	630	710	800
	Rated output current (A) (heavy load)	900	1020	1120
	Rated output current (A) (light load)	1120	1260	1460
	Output voltage	Three-phase 0 V to input voltage		
	Max. output frequency	599 Hz (editable through a parameter)		
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)		
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current		
Input	Rated input current (A) (heavy load)	838.1	949.6	1043.5
	Rated input current (A) (light load)	1041.0	1170.9	1301.5
	Rated voltage/frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz		
	Voltage range	Allowable fluctuation: -15% to +10% (323 VAC to 528 VAC)		
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)		
	Power capacity (kVA) (heavy load)	766.0	868.0	957.0
	Power capacity (kVA) (light load)	852.0	1071.0	1244.0
Thermal design	Thermal design power (kW) (heavy load)	9.94	10.4	11.5
	Thermal design power (kW) (light load)	13.2	13.6	16.5
	Air flow (CFM)	2200	2200	2200
Overvoltage category		OVC III		
Pollution degree		PD2		
IP rating		IP21		

Three-phase 200 V to 240 V

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

Item		Specifications					
Model: MD500-2Txxxxx-PLUS		0.4G/ 0.7PB	0.7G/ 1.1PB	1.1G/1.5PB	1.5G/2.2PB	2.2G/3.7PB	3.7G/ 5.5PB
Structure		T1				T2	
Output	Power (kW) (heavy load)	0.4	0.75	1.1	1.5	2.2	3.7
	Power (kW) (light load)	0.75	1.1	1.5	2.2	3.7	5.5
	Rated output current (A) (heavy load)	2.1	3.8	5.1	7.2	9	13
	Rated output current (A) (light load)	3.1	5.1	7.2	9	13	17
	Output voltage	Three-phase 0 V to input voltage					
	Max. output frequency	599 Hz (editable through a parameter)					
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current					
Input	Rated input current (A) (heavy load)	2.4	4.6	6.3	9	11.4	16.7
	Rated input current (A) (light load)	3.7	6.4	9.1	11.3	15.9	22.4
	Rated voltage/frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz					
	Voltage range	Allowable fluctuation: -15% to +10% (170 VAC to 264 VAC)					
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)					
	Power capacity (kVA) (heavy load)	1.1	2.1	2.9	4.1	5.2	7.6
	Power capacity (kVA) (light load)	1.7	2.9	4.2	5.2	7.3	10.2
Thermal design	Thermal design power (kW) (heavy load)	0.046	0.068	0.081	0.109	0.138	0.201
	Thermal design power (kW) (light load)	0.06	0.088	0.112	0.14	0.207	0.273
	Air flow (CFM)	-	9	9	9	20	24
Overvoltage category		OVC III					
Pollution degree		PD2					
IP rating		IP20					

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

Item		Specifications				
Model: MD500-2Txxxx-PLUS		5.5G/7.5PB	7.5G/11PB	11G/15P(B)	15G/18.5P(B)	18.5G/22P(B)
Structure		T3	T4	T5	T6	
Output	Power (kW) (heavy load)	5.5	7.5	11	15	18.5
	Power (kW) (light load)	7.5	11	15	18.5	22
	Rated output current (A) (heavy load)	25	32	45	60	75
	Rated output current (A) (light load)	32	37	60	75	91
	Output voltage	Three-phase 0 V to input voltage				
	Max. output frequency	599 Hz (editable through a parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current				
Input	Rated input current (A) (heavy load)	32.2	41.3	59	57	69
	Rated input current (A) (light load)	39.7	44	65.8	71	86
	Rated voltage/frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz				
	Voltage range	Allowable fluctuation: -15% to +10% (170 VAC to 264 VAC)				
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)				
	Power capacity (kVA) (heavy load)	14.7	18.9	27	26.1	31.6
	Power capacity (kVA) (light load)	18.2	20.1	30.1	32.5	39.3
Thermal design	Thermal design power (kW) (heavy load)	0.355	0.454	0.551	0.694	0.815
	Thermal design power (kW) (light load)	0.491	0.561	0.76	0.85	1.04
	Air flow (CFM)	40	42	57.4	118.5	118.5
Overvoltage category		OVC III				
Pollution degree		PD2				
IP rating		IP20				

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

Item		Specifications				
Model: MD500-2Txxxx-PLUS		22G/30P(B)	30G/37P(B)	37G/45P(B)	45G/55P	55G/75P
Structure		T7		T8		
Output	Power (kW) (heavy load)	22	30	37	45	55
	Power (kW) (light load)	30	37	45	55	75
	Rated output current (A) (heavy load)	91	112	150	176	210
	Rated output current (A) (light load)	112	150	176	210	253
	Output voltage	Three-phase 0 V to input voltage				
	Max. output frequency	599 Hz (editable through a parameter)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current				
Input	Rated input current (A) (heavy load)	89	106	139	164	196
	Rated input current (A) (light load)	111	143	167	198	239
	Rated voltage/frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz				
	Voltage range	Allowable fluctuation: -15% to +10% (170 VAC to 264 VAC)				
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)				
	Power capacity (kVA) (heavy load)	40.7	48.5	63.6	75	89.6
	Power capacity (kVA) (light load)	50.8	65.4	76.4	90.5	109.3
Thermal design	Thermal design power (kW) (heavy load)	1.01	1.21	1.57	1.81	2.14
	Thermal design power (kW) (light load)	1.22	1.61	1.91	2.22	2.67
	Air flow (CFM)	122.2	122.2	218.6	287.2	354.2
Overvoltage category		OVC III				
Pollution degree		PD2				
IP rating		IP20				

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

Item		Specifications					
Model: MD500-2Txxxx-PLUS		75G/90P	90G/110P	110G/132P	132G/160P	160G/200P	200G/220P
Structure		T9	T10		T11	T12	
Output	Power (kW) (heavy load)	75	90	110	132	160	200
	Power (kW) (light load)	90	110	135	160	200	220
	Rated output current (A) (heavy load)	304	377	426	465	585	725
	Rated output current (A) (light load)	377	465	520	585	725	880
	Output voltage	Three-phase 0 V to input voltage					
	Max. output frequency	599 Hz (editable through a parameter)					
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load (G-type AC drive): 150% for 60s with rated current Light load (P-type AC drive): 110% for 60s with rated current					
Input	Rated input current (A) (heavy load)	287	365	410	441	565	687
	Rated input current (A) (light load)	359	456	507	559	708	840
	Rated voltage/frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz					
	Voltage range	Allowable fluctuation: –15% to +10% (170 VAC to 264 VAC)					
	Frequency range	Allowable fluctuation: ±5% (47.5 Hz to 63 Hz)					
	Power capacity (kVA) (heavy load)	263	334	375	453	517	629
	Power capacity (kVA) (light load)	334	375	453	517	629	716
Thermal design	Thermal design power (kW) (heavy load)	3.56	4.15	4.55	5.33	5.69	6.91
	Thermal design power (kW) (light load)	4.15	4.55	5.33	5.69	6.91	7.54
	Air flow (CFM)	627	638.4	722.5	882	645	860
Overvoltage category		OVC III					
Pollution degree		PD2					
IP rating		IP20					

Single-phase 200 V to 240 V

Table 7-12 Electrical specifications (single-phase 200 V to 240 V) (T2 models)

Item		Specifications			
Model: MD500-2Sxxxxx-PLUS		0.4GB	0.7GB	1.5GB	2.2GB
Structure		T2			
Output	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)			
	Max. output frequency	599 Hz (editable through a parameter)			
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	150% for 60s with rated current			
Input	Rated input current (A)	5.4	8.2	14	20.0
	Rated voltage/ frequency	Single-phase 200 VAC to 240 VAC, 50/60 Hz			
	Voltage range	Allowable fluctuation: -15% to +10% (170 VAC to 264 VAC)			
	Frequency range	Allowable fluctuation: $\pm 5\%$ (47.5 Hz to 63 Hz)			
	Power capacity (kVA)	1.4	2.2	3.7	6.0
Thermal design	Thermal design power (kW)	0.043	0.065	0.097	0.121
	Air flow (CFM)	20	20	20	20
Overvoltage category		OVC III			
Pollution degree		PD2			
IP rating		IP20 (open type, for IEC products) Type 1 (enclosed type, for UL products)			

7.2 Technical Specifications

Table 7-13 Technical specifications

Item		Technical Specifications
Standard 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); V/f control; PMVVC
	Startup torque	0.25 Hz/150% (SVC); 0 Hz/180% (FVC)
	Speed range	1:200 (SVC); 1:1000 (FVC)
	Speed stability accuracy	±0.5% (SVC) ±0.02% (FVC)
	Torque control accuracy	±3% (FVC) ±5% above 5 Hz (SVC)
	Torque boost	Automatic torque boost Customized torque boost: 0.1% to 30.0%
	V/f curve	Straight-line V/f curve Multi-point V/f curve Complete V/f separation Incomplete V/f separation
	Acceleration/Deceleration curve	Linear or S-curve acceleration/deceleration Four separate acceleration/deceleration time settings in the range of 0.0s to 6500.0s
	DC braking	DC braking start frequency: 0.00 Hz to the maximum frequency Braking time: 0.0s to 36.0s Brake action current: 0.0% to 100.0%
	Jog control	Frequency range of jogging: 0.00 Hz to 50.00 Hz Acceleration/deceleration time of jogging: 0.0s to 6500.0s
	Simple PLC and multi-speed operation	The system implements up to 16 speeds by using the simple PLC function or control terminals.
	Built-in PID	The system implements the Proportional-Integral-Derivative (PID) function in the closed-loop control.
	Automatic voltage regulation (AVR)	The system maintains a constant output voltage automatically when the grid voltage changes.

Item		Technical Specifications
Standard functions	Overvoltage/ Overcurrent stall control	The system limits the output current and voltage automatically during operation to prevent frequent trips.
	Quick current limit	The function helps minimize overcurrent faults.
	Torque limit and control	The system limits the torque automatically during operation to prevent frequent trips due to overcurrent. Torque control can be implemented in vector control mode.
Customized functions	Power dip ride-through	The load feedback energy compensates for any voltage reduction, allowing the AC drive to continue operating for a short period of time during power dips.
	Virtual I/O	Five groups of virtual digital inputs/outputs (DIs/DOs) are available to support simple logic control.
	Timing control	Time range: 0.0 minutes to 6500.0 minutes
	Multiple fieldbuses	The AC drive supports six fieldbuses: Modbus, PROFIBUS-DP, CANlink, CANopen, PROFINET, EtherCAT, and Ethernet/IP.
	Multiple encoder types	The AC drive supports differential encoder, open-collector encoder, UVW encoder, and resolver.
	Advanced software tool	The tool supports parameter settings and virtual oscillograph that monitors the AC drive state.
	Over-temperature protection	AI3 supports motor temperature sensor input (PT100, PT1000, KTY-84-130, and PTC-130).

Item		Technical Specifications
Operation	Operation command	Three command sources are available (operating panel, terminal, communication), which can be switched through multiple methods.
	Frequency reference	Supports 10 frequency reference sources, including digital setting, analog voltage setting, analog current setting, pulse reference, and serial communication setting, which can be switched through multiple methods.
	Auxiliary frequency reference source	Supports 10 auxiliary frequency references, in which fine tuning of auxiliary frequencies and frequency compositing are available.
	Input terminals	Standard: Five DI terminals Three AI terminals, one of which supports -10 V to +10 V voltage input only, and the other two support -10 V to +10 V voltage input and 0 mA to 20 mA current input Expansion capacity: Five digital input (DI) terminals
	Output terminals	Standard: One DO terminal Two relay output (RO) terminals Two analog output (AO) terminals, supporting 0 mA to 20 mA current output or 0 V to 10 V voltage output Expansion capacity: One DO terminal One relay output (RO) terminal
Display and operation on the operating panel	LED display	Displays parameters.
	LCD display	The LCD display is optional and supports multiple languages (Chinese and English).
	Parameter copy	Parameters can be copied through the optional LCD operating panel.
	Key locking and function selection	Used to lock the some or all the keys and define the function range of the keys to prevent accidental operation.

Item		Technical Specifications
Protective functions	Phase loss	Refers to input/output phase loss protection.
	Instantaneous overcurrent	The AC drive stops when the output current exceeds 250% of the rated output current.
	Overvoltage	The AC drive stops when the DC voltage of the main circuit is above 820 V.
	Undervoltage	The AC drive stops when the DC voltage of the main circuit is below 350 V.
	Over-temperature	Protection is triggered when the inverter bridge gets overheated.
	Overload	Heavy load: The AC drive stops after running at 150% of rated current for 60s. Light load: The AC drive stops after running at 110% of rated current for 60s.
	Overcurrent	The AC drive stops when its current exceeds 2.5 x rated current.
	Braking	Refers to braking unit overload protection and braking resistor short-circuit protection
	Short circuit	Refers to interphase short-circuit protection and protection against output short-circuit to ground
Environment	Installation environment	Indoor without direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, drip, or salt.
	Altitude	No derating is required for altitudes below 1000 m. For altitudes above 1000 m, derate 1% for every additional 100 m. For altitudes above 3000 m, contact Inovance. (Note: The maximum altitude for T1 models is 2000 m. For altitudes above 2000 m, contact Inovance.)
	Ambient temperature	–10°C to +50°C. For temperatures between 40°C to 50°C, derate 1.5% for every additional 1°C.
	Humidity	Less than 95% RH (without condensation)
	Vibration	Less than 5.9 m/s ² (0.6 g)
	Storage temperature	–20°C to +60°C

8 Routine Maintenance and Inspection

8.1 Routine Inspection Items

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 List of Periodic Inspection Items

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.

Copy this checklist and sign the "Checked" column after each inspection.



To prevent electric shock, do not perform inspection or wiring with power ON. Switch off the power supplies of all the devices before wiring or maintenance. Wait for at least a period of time specified on the product warning label before further operations because residual voltage still exists after power-off. Measure the DC voltage in the main circuit to ensure the DC voltage is within the safe range; failure to comply may result in electric shock.

Item	Description	Solution	Checked
General	Check for waste, dirt, and dust on the surface of the AC drive.	● Check whether the controller cabinet is powered off. ● Use a vacuum cleaner to suck up waste and dust to prevent contact with the AC drive.. ● Wipe stubborn stains with alcohol and wait until the alcohol evaporates.	
Cables	● Check whether the power cables and the joining parts are discolored. ● Check whether the insulation is ageing or cracked.	● Replace cracked cables. ● Replace damaged terminals.	
Peripheral devices such as relay and contactor	● Check devices for loose connection and unusual noise during operation. ● Check peripheral devices for short circuit, water stains, dilation, and cracks.	Replace abnormal peripheral devices.	
Ventilation	● Check whether the air duct and heatsink are clogged. ● Check whether the fan is damaged.	● Clean the air duct. ● Replace the fan.	
Control circuit	● Check control elements for loose contact. ● Check for loose terminal screws. ● Check control cables for cracked insulation.	● Clear unwanted objects on the surface of control cables and terminals. ● Replace damaged or corroded control cables.	

Item	Description	Solution	Checked
Coolant (for T13 models only)	Check coolant for deterioration (yellowing), discoloration, and impurities.	Replace the coolant.	
Dust filter foam (for T13 models only)	Check the dust filter foam for dust that affects heat dissipation.	Clean the dust filter foam.	

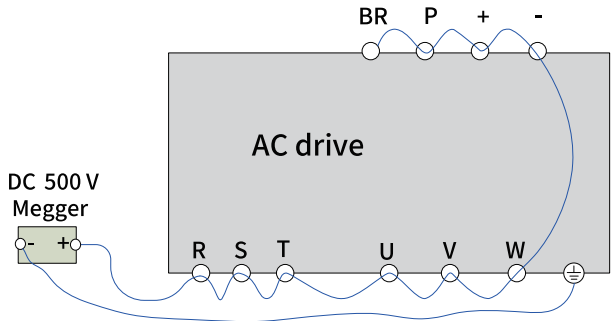
8.2 Main Circuit Insulation Test



Do not conduct high voltage (> 500 V) tests, which are already done 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.



Disconnect the optional grounding screw of VDR before any voltage resistance test; failure to comply may result in test failure.

8.3 Replacing 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:

Component	Service Life ^[Note]
Fan	≥ 5 years
Electrolytic capacitor	≥ 5 years
Note: The standard service life of a device is the expected lifetime when the device is used in the following conditions. You can determine when to replace your devices based on the actual operating time. Ambient temperature: 40°C Load rate: 80% Operating rate: 24 hours per 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.

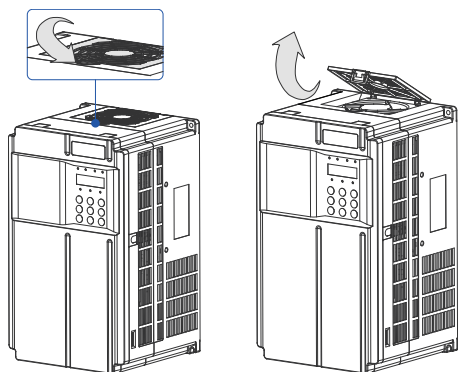
Table 8-1 Number of cooling fans needed

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

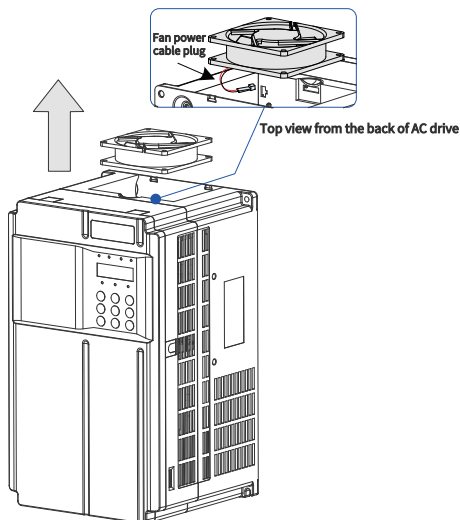
Removing and installing cooling fans of T1 to T6 models

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.

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

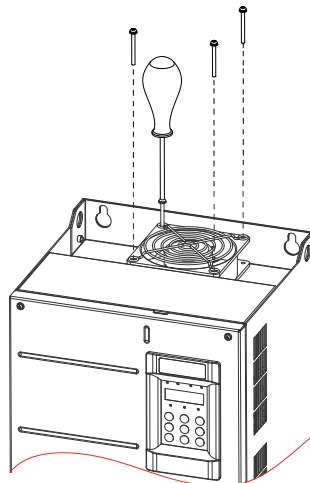
Note

The quantity and layout of cooling fans vary with models, but the fans can be removed or installed in the same way.

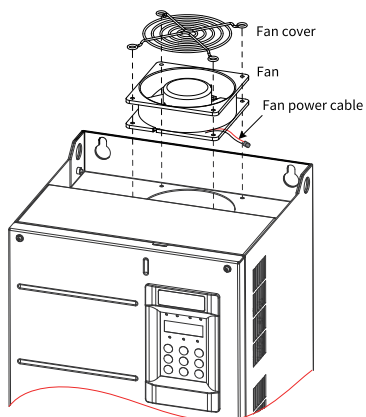
Removing

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.
-



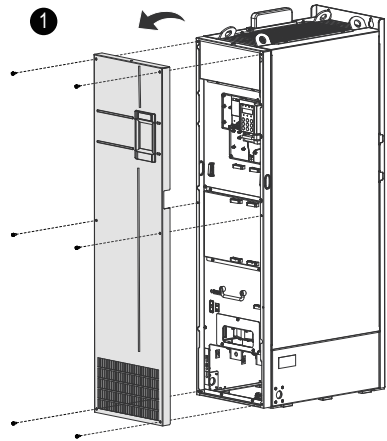
Installing

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.
-

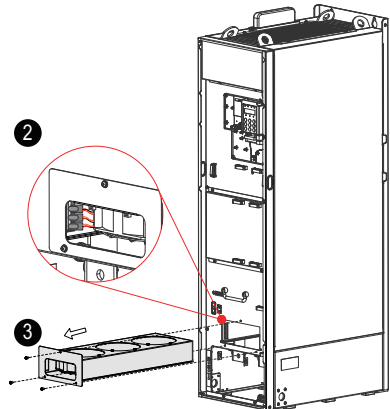
Removing and Installing Cooling Fans of T10 to T12 Models

Removing

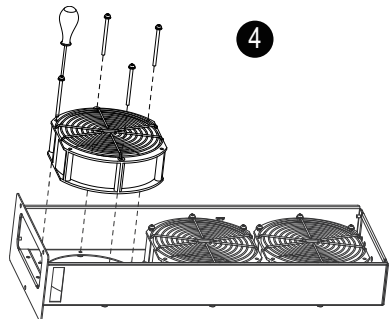
1. Remove the six fixing screws from the cover, hold the cover with two hands, and lift it along the arrow direction to remove it.



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.

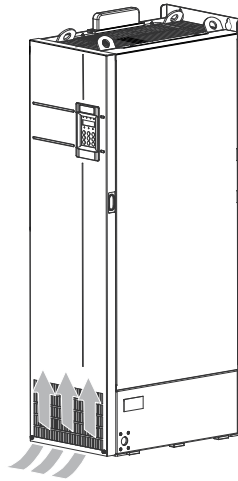


3. Remove the four fixing screws from each fan cover and remove the fan.



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.



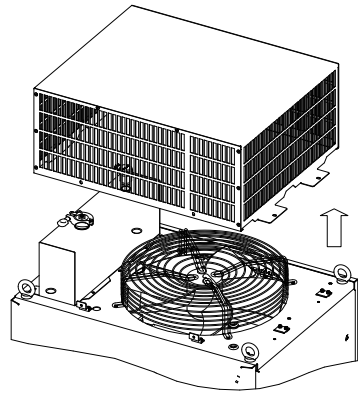
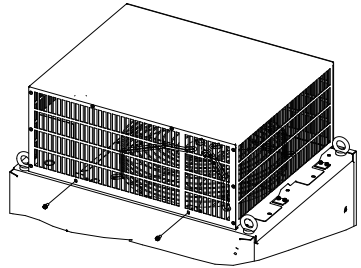
Removing and installing cooling fans of T13 models

Note

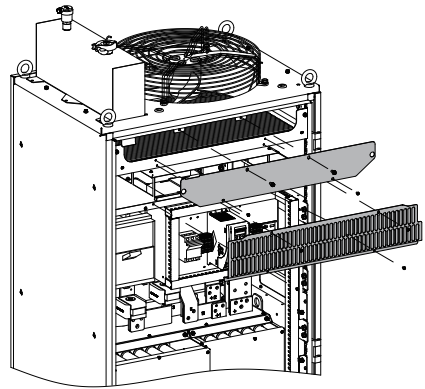
T13 models have a top-mounted fan and a cabinet-mounted fan. See the following for how to remove and install the fan.

Removing the top-mounted fan

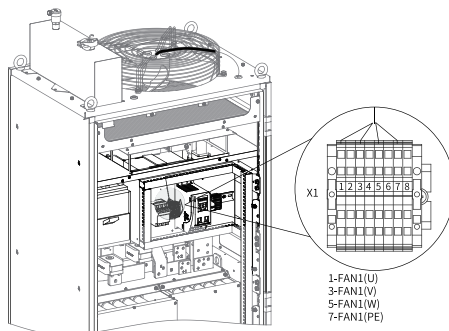
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



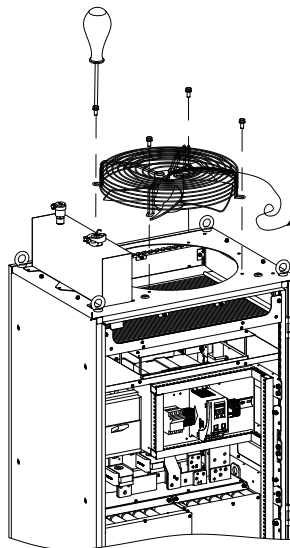
2. Remove the baffle plate as shown in the figure.



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.
-

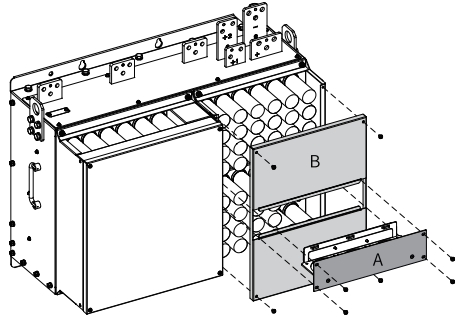


Installing the top-mounted fan

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 the Electrolytic 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.

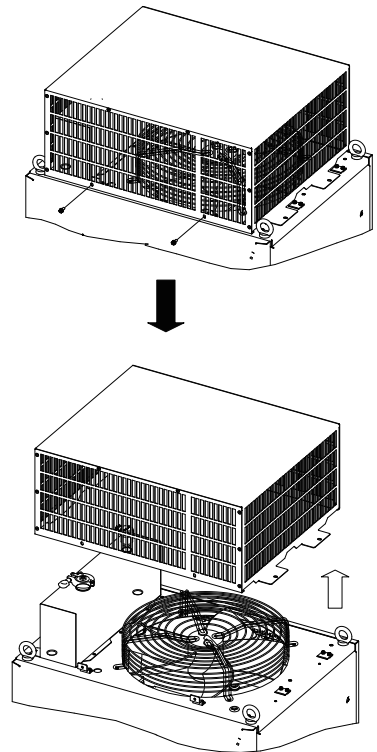
8.3.4 Refilling and Replacing the Coolant

The coolant is applicable to T13 models only.

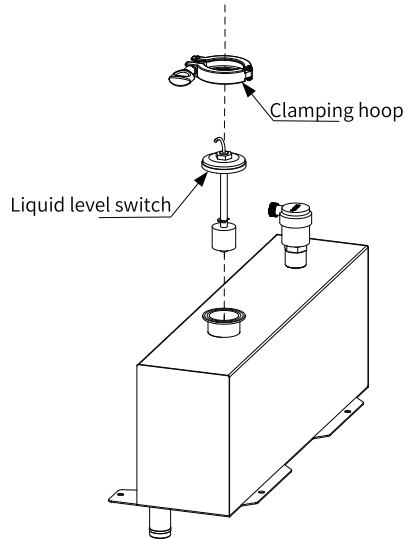
Refilling the coolant

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.

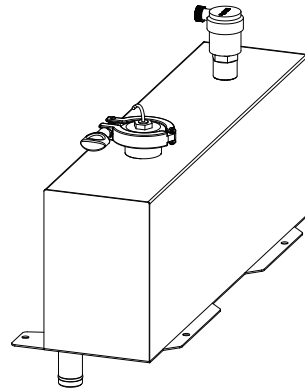


2. Remove the clamping hoop and liquid level switch from the water tank, as shown below.



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

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



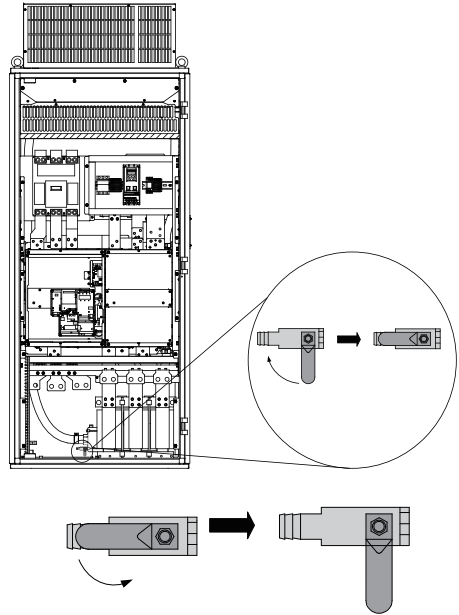
Replacing the coolant

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.
-

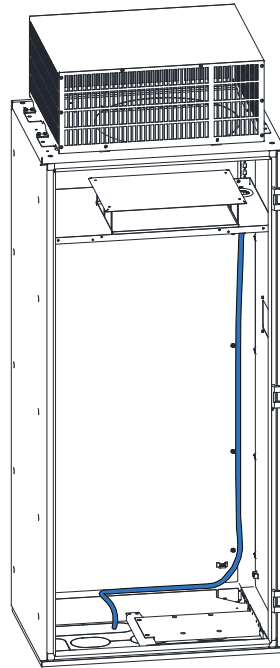
-
4. Refill with 13.5 L coolant.
-

8.3.5 Placing the Drain Hose of Waterproof Baffle

This procedure is applicable to T13 models only. The waterproof baffle is 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.
-

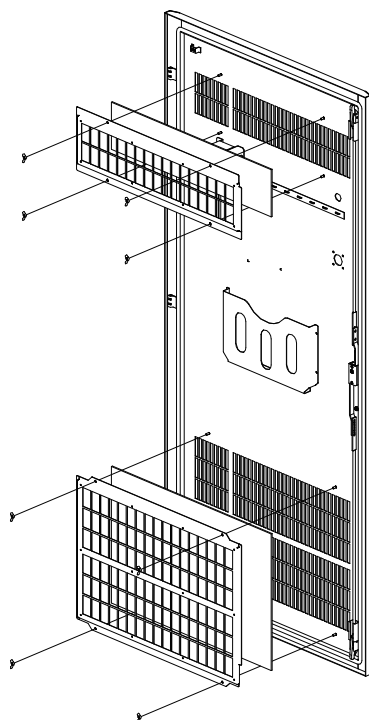


8.3.6 Replacing the Dust Filter Foam

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.

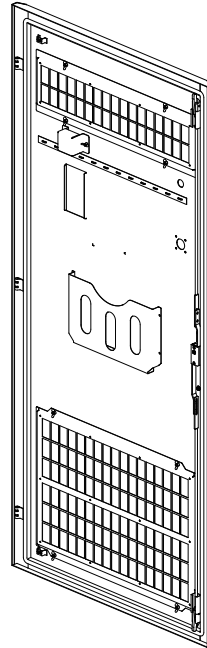
Removing the Dust Filter Foam

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, pay attention to the following three aspects:

- Pack the AC drive with the original packing box provided by Inovance.
- Do not expose the AC drive to moisture, high temperature, or outdoor direct sunlight for an extended period.
- Long-term storage degrades the electrolytic capacitor. The AC drive must be switched on once every six months, each time lasting for at least five hours, with the input voltage increased gradually to the rated value using a regulator. If you have any doubt, contact Inovance.

Warranty

The warranty covers the AC drive only.

Inovance provides an 18-month warranty to the equipment from the date of shipment (subject to the barcode on the AC drive or contract if there is any) for failure or damage that occurs under normal use. When the warranty period expires, reasonable maintenance fee will be charged.

Within the 18-month warranty period, reasonable maintenance fee will be charged for the following cases:

- Device damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, abnormal voltage, or other disasters
- Damage caused by unintended use of the equipment
- Damage caused by use outside the specifications
- Damage caused by force majeure (natural disaster, earthquake, and lightning strike) and second 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.

Certifications	Directives		Standards
CE	EMC directive	2014/30/EU	EN IEC 61800-3
	LVD directive	2014/35/EU	EN 61800-5-1
	RoHS directive	2011/65/EU	EN 50581
UL/cUL	-		UL61800-5-1 C22.2 No.274-17

Note

The CE/UL/cUL certification of the product comply with the latest versions of the directives and standards.

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, importation, 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 CE mark to the final assembly has the responsibility of ensuring compliance with CE certification.

9.2.2 Conditions for Compliance with the EMC Directive

- This product satisfies the European EMC directive 2014/30/EU and the EN 61800-3 standard, and is applicable to both the first environment and the second environment.



When applied in the first environment, this product may generate radio interference. In addition to the CE compliance requirements described in this chapter, take measures to avoid radio interference if otherwise required.

- To satisfy the EMC directive and standard, install an EMC filter on the input side of the product, use a recommended shielded cable on the output side, ground the filter reliably, and ensure the shield of the output cable is grounded 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

Observe the product requirements during installation. This product meets the requirements of the EN IEC 61800-3 standard. Limit the motor cable length in accordance with the following table to avoid impact of conducted and radiated disturbance.

Table 9–1 Maximum allowable length of motor cable allowed by conducted and radiated disturbance

Model	Max. Cable Length for Conducted Emission				Max. Cable Length for Radiated Emission			
	Category C2		Category C3		Category C2		Category 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	-
Note*: For single-phase T2 models, install a DY644020H magnetic ring on the input side of the filter.								

Introduction to EMC standard

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 a device during normal operation must be restricted within a certain limit.
- The device must have sufficient immunity to the electromagnetic interference in the environment, which is electromagnetic susceptibility.

EN IEC 61800-3 defines the following two environments:

- First environment: Environment that 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: Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes

Based on the expected use environment, the products are divided into the following four categories:

- Category C1: power drive system (PDS) of rated voltage below 1000 V, intended for use in the first environment
- Category C2: PDS of rated voltage below 1000 V, which is neither a plug-in device nor a removable device and, when used in the first environment, is intended to be installed and commissioned only by a professional person
- Category C3: PDS of rated voltage below 1000 V, intended for use in the second environment and not intended for use in the first environment
- Category C4: PDS of rated voltage equal to or above 1000 V, or rated current equal to or above 400 A, or intended for use in complex systems in the second environment

9.2.3 Conditions for Compliance with the LVD

This product has been tested according to EN61800-5-1, and it complies with the Low Voltage Directive (LVD) completely. To enable machines and devices integrating this product to comply with the LVD, the following requirements must be met.

Installation location

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

Installation environment

For requirements of installation environment, see "Installation Environment" in *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.

Requirements on installation and protection

- This product must be installed in a cabinet with the fire-proof housing that provides effective electrical and mechanical protection. The installation must conform to local laws and regulations and related IEC requirements..
- For a cabinet-mounted AC drive (IP20), install it in structures that cannot be accessed by foreign objects from the top and front.

Main circuit wiring requirements

For wiring requirements of main circuit terminals, see "Main Circuit Wiring Requirements" in *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.

Requirements on protective devices

To meet the requirements of EN 61800-5-1, install a fuse/circuit breaker on the input side to prevent accidents caused by internal short 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 71](#).

9.3 UL/cUL Certification



Figure 9-2 UL/cUL mark

- The UL/cUL mark is usually attached to products distributed in US and Canada. Products with the UL/cUL mark have been inspected and assessed by the UL organization. For a product to receive UL certification, the main components inside that product must also be UL certified.

- This product has been tested according to UL 61800-5-1 and C22.2 No.274-17 and comply with UL/cUL standard. To enable machines and devices integrating this product to comply with UL/cUL standards, the following requirements must be met:

Installation location

Install this product in a place with the pollution degree of 2 or below and overvoltage category III as specified in UL61800–5–1.

Ambient temperature

The ambient temperature must be within the following range based on the IP rating:

- For T1 to T6 models of enclosed type (Type 1), the ambient temperature should be -10°C to + 50°C.
- For T1 to T12 models of open type, the ambient temperature should be -10°C to + 50°C.

Installation requirements

- To install T1 to T6 models of enclosed type, observe the following requirements:
 - The IP rating of the enclosure must be UL Type1.
 - When installing the AC drive, drill the holes according to the mounting dimensions. For details of mounting dimensions, see "Mounting Dimensions" in *MD500-PLUS Series General-Purpose AC Drive Installation Guide*.
- To install T1 to T12 models of open type in a cabinet, observe the following requirements:

This product must be installed in a cabinet with the fire-proof housing that provides effective electrical and mechanical protection. The installation must conform to local laws and regulations and related NEC requirements.

Main circuit wiring requirements



Caution

Output terminals BR, (-), or (+) is not allowed to be installed on site.

- Terminals BR, (-), and (+) are optional. Do not connect them to the 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 a safety extra-low voltage (SELV) circuit, which must be insulated and isolated from other circuits.

- Prevent foreign matters from entering the wiring part of the terminal block.
- Do not carry out welding when using twisted conductors.
- Tightening torque of terminals may vary. Tighten the screws with corresponding tightening torque. Torque screwdriver, ratchet, or wrench can be used.
- If an electric tool is used to tighten the terminal screws, use a low speed setting to avoid damage to the terminal screws.
- Tighten the terminal screws at an angle within 5 degrees. Failure to comply may damage terminal screws.

Control circuit wiring requirements

Wire the control circuit in accordance with UL508.

Cable selection requirements for the main circuit

For the selection of wire dimensions, follow the requirements of US National Electrical Code (NEC) and Part 1 of Canadian Electrical Code (CEC) and relevant local regulations.

- Use cables with copper conductors.
- For the main circuit, use Class 2 heat-resistant indoor PVC cables rated 600 V, with a continuous maximum allowable temperature of 75 °C. The following conditions are used as premises:
 1. Ambient temperature: < 40°C
 2. Normal operating ratings

If the recommended cables for peripheral equipment or options are not suitable for the product, contact Inovance.

Terminal dimensions and cable selection

For selection of main circuit terminals and cables, see ["5.3.1 Main Circuit Cable" on page 63](#).

Requirements on protective devices

- To meet UL requirements, install a fuse and circuit breaker on the input side to prevent accidents caused by internal short circuit.
- Install adequate branch circuits for short circuit protection in accordance with applicable regulations and the requirements in this user guide. The product is applicable to circuits with maximum rated breaking capacity of 100,000 A and maximum voltage of 480 VAC (400 V class). For selection of recommended fuses, see ["5.4.1 Fuse, Contactor, and Circuit Breaker" on page 71](#).

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