



MD520 Series General-Purpose AC Drive

Hardware Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code 19011713 A00

Preface

About This Guide

The MD520 series AC drive is a general-purpose high-performance current vector control AC drive. It is designed to control and regulate the speed and torque of three-phase AC asynchronous motors and permanent magnet synchronous motors. It can be used to drive textile machines, paper making 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), expansion cards, routine maintenance and repair, certifications, and standards of the AC drive.

More Documents

Document Name	Data No.	Description
MD520 Series General-Purpose AC Drive Quick Installation and Commissioning Guide	19011712	This guide describes the installation, wiring, commissioning, troubleshooting, parameters, and fault codes of the AC drive.
MD520 Series General-Purpose AC Drive Hardware Guide	19011713	This guide describes the composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), and expansion cards of the MD520 series AC drive, routine maintenance and repair, certifications, and standards of the AC drive.
MD520 Series General-Purpose AC Drive Installation Guide	19011714	This guide describes the installation dimensions, space design, specific installation steps, wiring requirements, routing requirements, option installation requirements, and troubleshooting of common EMC-related problems.
MD520 Series General-Purpose AC Drive Commissioning Guide	19011715	This guide describes the commissioning tools, commissioning flows, and specific commissioning steps, as well as troubleshooting, fault codes, and parameters related to the AC drive.
MD520 Series General-Purpose AC Drive Communication Guide	19011716	This guide describes the communication mode, communication networking, and communication configuration of the AC drive.
MD520 Series General-Purpose AC Drive Function Guide	19011717	This guide describes function applications, communication, fault codes, and parameters of the AC drive.

Revision History

Date	Version	Description
January 2022	A00	First release.

How to Obtain

This guide is not delivered with the product. You can obtain the PDF version by the following method:

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

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Product Model List

The following table lists mapping between the product model and structure.

Table –1 Mapping between product model and structure

Structure	Model (Three Phase 380–480 V)	Model (Three Phase 200–240 V)	Model (Single Phase 200-240 V)
T1	MD520-4T0.4B(S) MD520-4T0.7B(S) MD520-4T1.1B(S) MD520-4T1.5B(S) MD520-4T2.2B(S) MD520-4T3.0B(S)	MD520-2T0.4B(S) MD520-2T0.7B(S) MD520-2T1.1B(S) MD520-2T1.5B(S)	-
T2	MD520-4T3.7B(S) MD520-4T5.5B(S)	MD520-2T2.2B(S) MD520-2T3.7B(S)	MD520-2S0.4B(S) MD520-2S0.7B(S) MD520-2S1.5B(S) MD520-2S2.2B(S)
T3	MD520-4T7.5B(S) MD520-4T11B(S)	MD520-2T5.5B(S)	-
T4	MD520-4T15B(S)	MD520-2T7.5B(S)	-
T5	MD520-4T18.5(B)(S)(-T) MD520-4T22(B)(S)(-T)	MD520-2T11(B)(S)(-T)	-
T6	MD520-4T30(B)(S) MD520-4T37(B)(S)	MD520-2T15(B)(S) MD520-2T18.5(B)(S)	-
T7	MD520-4T45(B)(S) MD520-4T55(B)(S)	MD520-2T22(B)(S) MD520-2T30(B)(S)	-
T8	MD520-4T75(B)(S) MD520-4T90(S) MD520-4T110(S)	MD520-2T37(B)(S) MD520-2T45(S) MD520-2T55(S)	-
T9	MD520-4T132(S) MD520-4T160(S)	MD520-2T75(S)	-
T10	MD520-4T200(S)(-L) MD520-4T220(S)(-L)	MD520-2T90(S) MD520-2T110(S)	-
T11	MD520-4T250(S)(-L) MD520-4T280(S)(-L)	MD520-2T132(S)	-
T12	MD520-4T315(S)(-L) MD520-4T355(S)(-L) MD520-4T400(S)(-L)	MD520-2T160(S) MD520-2T200(S)	-
<p>Note:</p> <ul style="list-style-type: none"> ● (B): with the braking unit ● (S): with the safe torque off (STO) function ● (-T): with the DC reactor ● (-L): with the AC output reactor 			

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.



- 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



- 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.



- 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



- 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 shavings, 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

- Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Labels

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

Safety Label	Description
	<ul style="list-style-type: none"> • Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock.

1 Product Information

1.1 Characteristics

The MD520 series AC drive is designed to be a general-purpose high-performance drive featuring rich functions, convenient operations, and aesthetic appearance. Leveraging the current vector control technology, it precisely controls and regulates the speed and torque of three-phase AC asynchronous motors and permanent magnet synchronous motors. The MD520 is suitable for various industries, such as cable, machine tool, petrochemical, and natural gas.

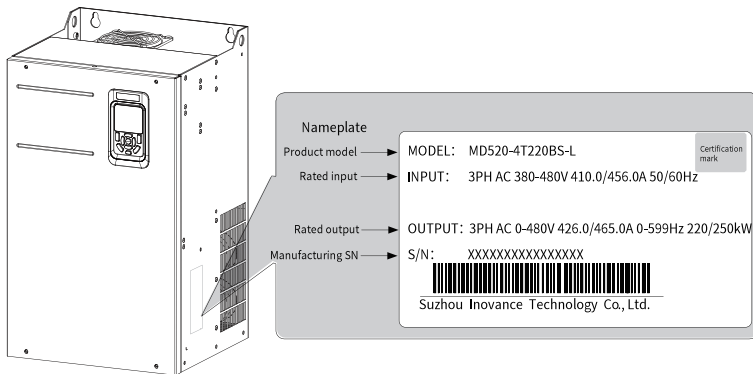


Figure 1-1 Product appearance

The MD520 highlights the following:

- Drives the three-phase AC asynchronous motor and permanent magnet synchronous motor.
- 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.
- Addresses technical- and performance-related problems of equipment in industries such as cables, machine tools, metal products, petrochemicals, natural gas, lifting, pulping and paper making, textile, printing and dyeing, and ceramics.
- Supports the VVC algorithm to simplify and stabilize the synchronous motor, especially at high speed.
- Inherits functions of the MD500-PLUS, MD500, MD500E, MD290, and MD330 and be compatible with MD500-PLUS options, including PG cards, communication cards, I/O extension cards, and brackets.

1.2 Nameplate and Model Number



MD520 - 4T 220 B S -L

Code	Product Name
MD520	AC drive series

Code	Voltage Level
4T	Three phase 380-480 V
2T	Three phase 200-240 V
2S	Single phase 200-240 V

Code	Power Rating (kW)
0.4	0.4
...	...
400	400

Code	Reactor
None	Without reactor
-T	With DC reactor; applicable to T5 models
-L	With AC output reactor; applicable to T10 to T12 models

Code	STO
None	STO not supported
S	STO supported

Code	Braking Unit
None	Without braking unit
B	With braking unit

Figure 1-2 Nameplate and designation rule

Note

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

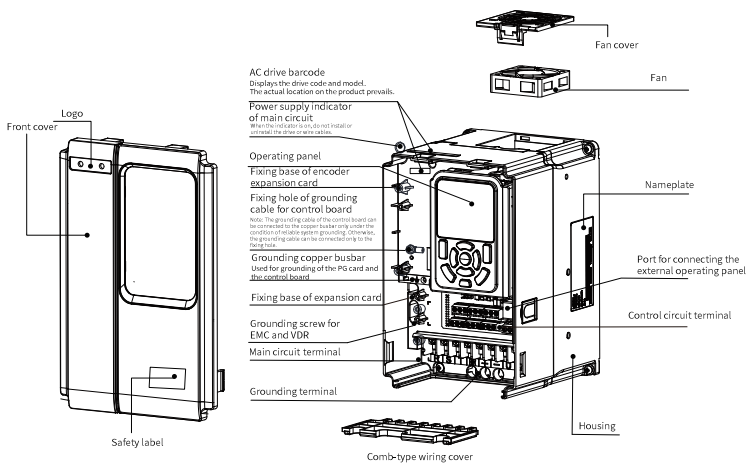
2 Components

2.1 Overview

The AC drive is structured in either of the following types:

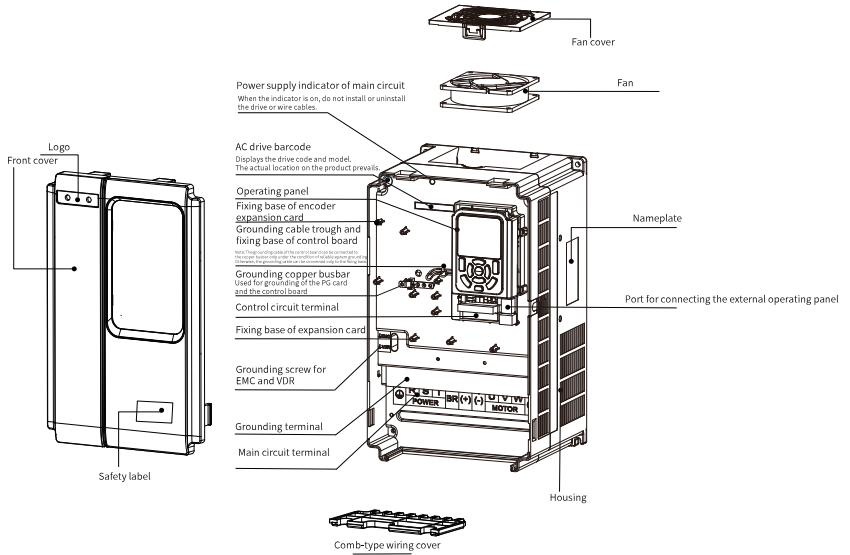
- Plastic structure for T1 to T6 models
- Sheet metal structure for T7 to T12 models

2.2 Components of T1 to T6 Models



Safety Label	Description
	Caution label. Read through this guide before installation and operation.
	Danger label. Do not remove the front cover when the drive is powered on or within 10 minutes after the drive is powered off.

Figure 2-1 Components of T1 to T4 models





Safety Label	Description
	Caution label. Read through this guide before installation and operation.
	Danger label. Do not remove the front cover when the drive is powered on or within 10 minutes after the drive is powered off.

Figure 2-2 Components of T5 to T6 models

2.3 Components of T7 to T9 Models

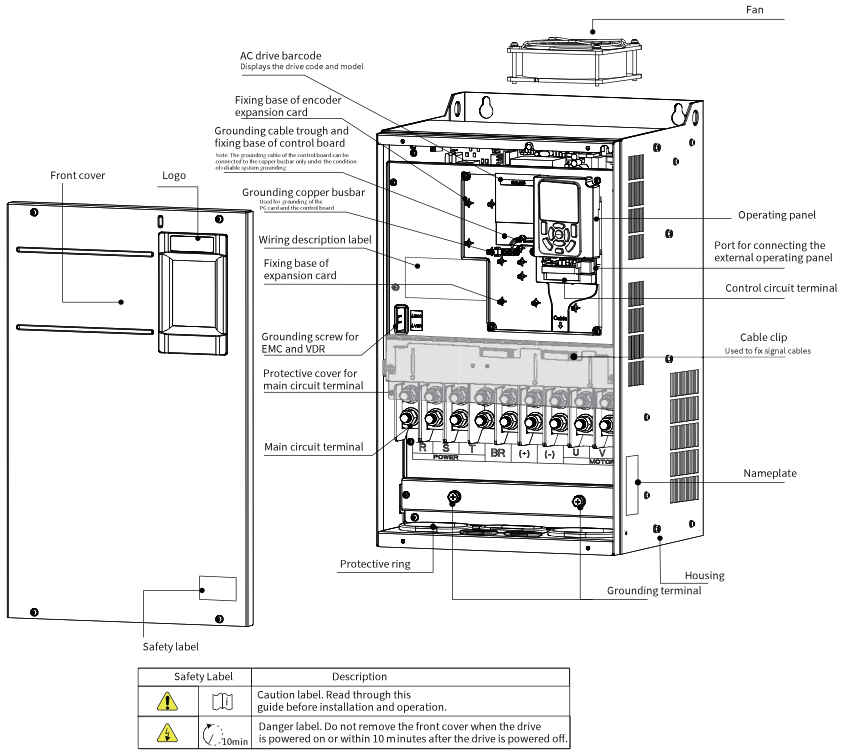


Figure 2-3 Components of T7 to T9 models

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

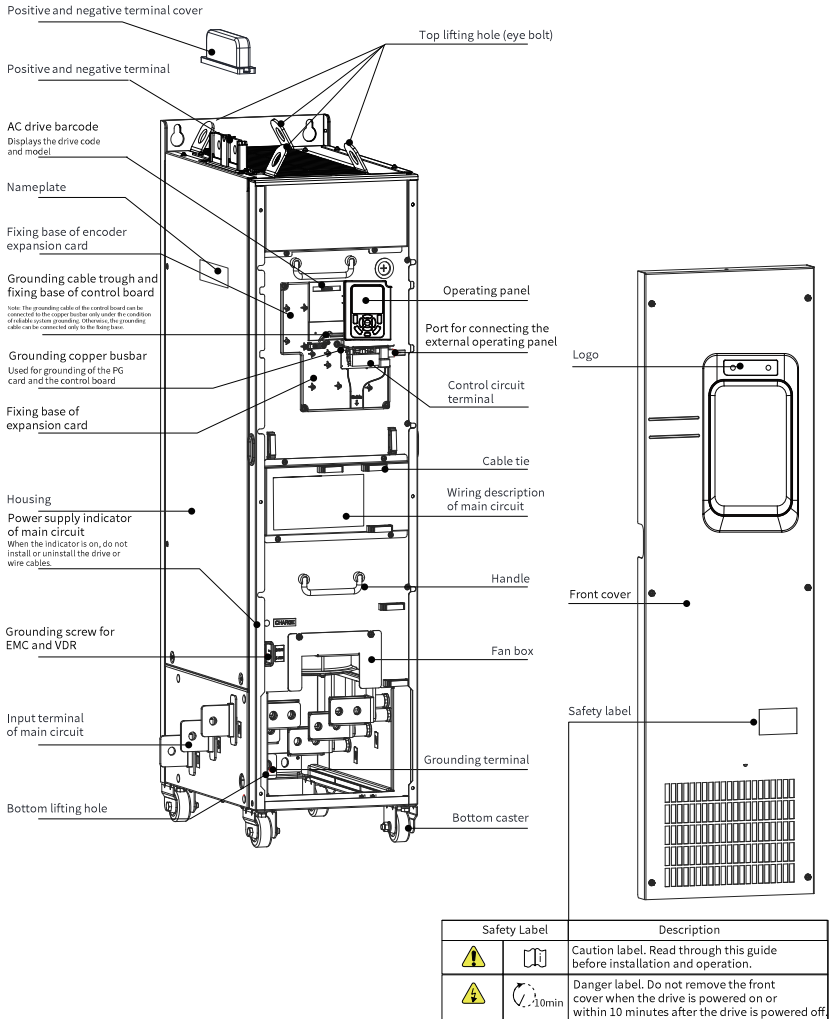


Figure 2-4 Components of T10 to T12 models (without AC output reactor)

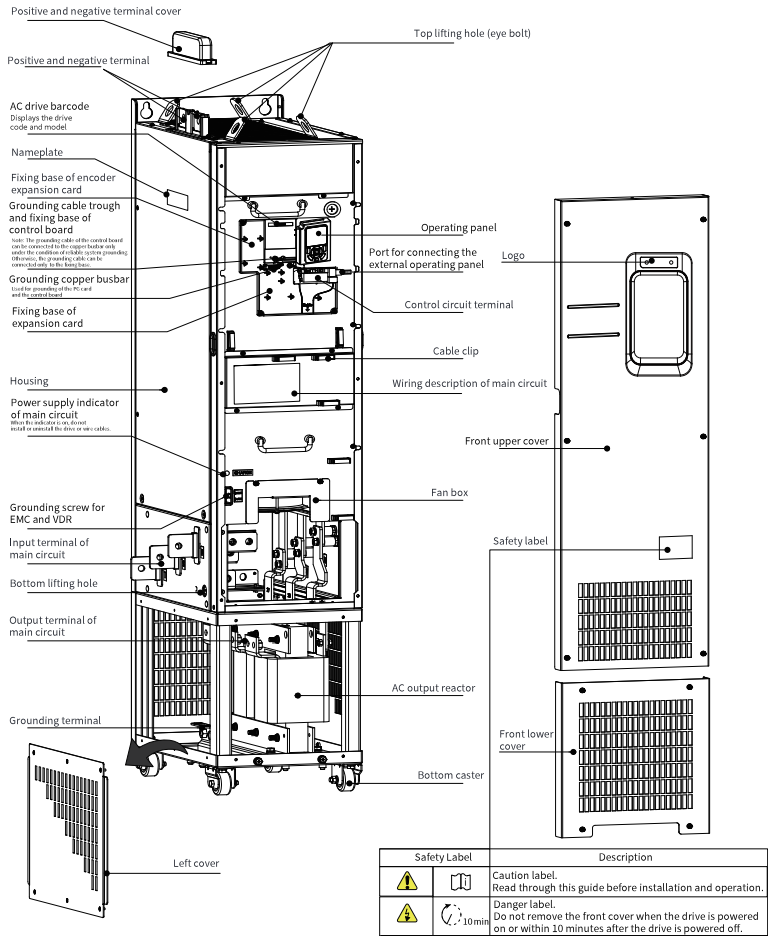


Figure 2-5 Components of T10 to T12 models (with AC output reactor)

3 System Structure

3.1 System Connection Diagram

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

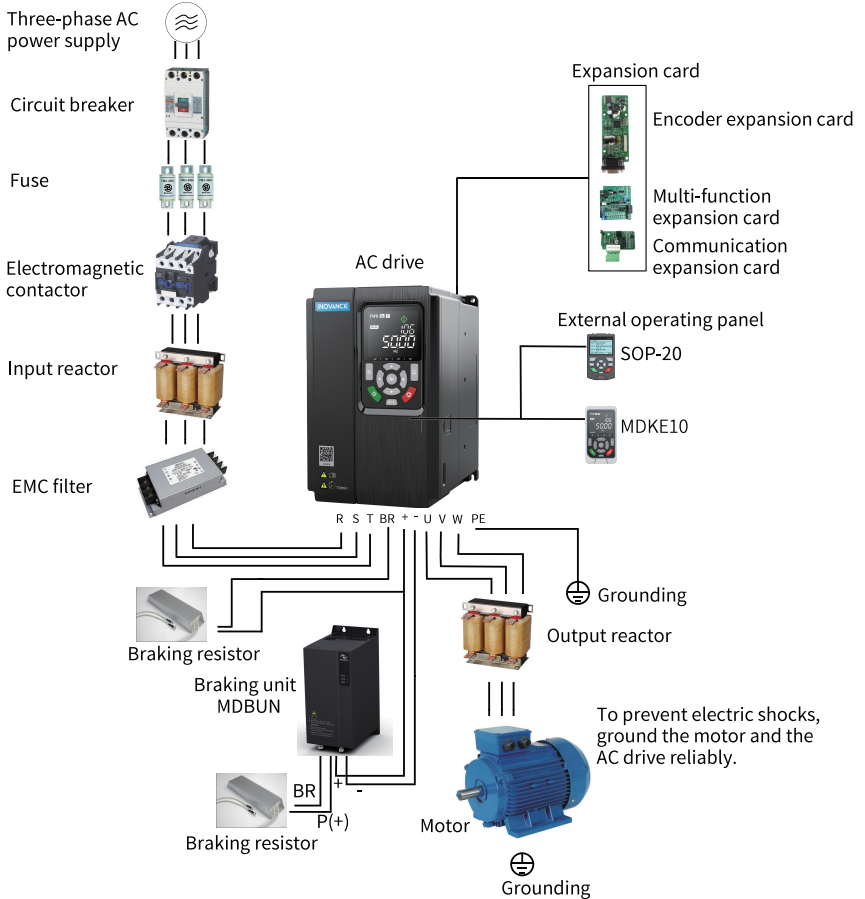


Figure 3-1 System connection diagram

Table 3-1 Usage description of peripheral electrical devices

Device	Description
Circuit breaker	<p>It is installed between the power supply and the AC drive input side.</p> <ul style="list-style-type: none"> ● Circuit breaker for protection against short circuit: It cuts off the power supply when overcurrent occurs on downstream devices. ● Earth leakage circuit breaker: It provides protection against potential leakage current during AC drive running to prevent electric shock and even a fire. Select proper earth leakage circuit breakers as needed.
Fuse	It protects downstream semiconductor components in case of short circuit.
Electromagnetic contactor	It is used to switch on or off the AC drive. Do not use the contactor to power on or off the AC drive frequently (time interval \geq one hour) or use the contactor to directly start the AC drive.
AC input reactor	<p>It provides the following functions:</p> <ul style="list-style-type: none"> ● Improves the input-side power factor. ● Eliminates high-order harmonics at the input side effectively and prevents other devices from being damaged caused by distortion of voltage waveform. ● Eliminates input current unbalance caused by unbalance between the power supply phases.
EMC filter	<p>It provides the following functions:</p> <ul style="list-style-type: none"> ● Reduces external conduction and radiation interference of the AC drive. ● Reduces conduction interference from the power supply to the AC drive, thereby improving the anti-interference capacity of the AC drive.
Simple filter	It reduces external conduction and radiation interference of the AC drive.
Braking resistor	For AC drive models containing letter B, the braking resistor is optional. It dissipates regenerative energy during motor deceleration.
Braking unit	For AC drive models not containing letter B, use a braking unit (MDBUN) or recommended braking resistor of Inovance. The braking unit dissipates regenerative energy during motor deceleration.
Active front end (AFE) unit	An AFE is an optional unit used to feed the energy generated by the motor during braking back to the mains. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE features energy efficiency, low noise, low harmonic, and high power factor.

Device	Description
DC reactor	<p>It is optional for T5 models, and standard for T6 models and above.</p> <p>The DC reactor provides the following functions:</p> <ul style="list-style-type: none"> • Improves the input-side power factor. • Improves the efficiency and thermal stability of the AC drive. • Eliminates the impact of high-order harmonics at the input side on the AC drive. • Reduces external conduction and radiation interference
Output reactor	<p>T10 and T12 models with letter L are delivered with an output reactor.</p> <p>The output side of the AC drive generally has large high-order harmonics. When a motor is far away from the AC drive, much distributed capacitance exists in the circuit and certain harmonics may cause resonance in the circuit. This will cause the following effects:</p> <ul style="list-style-type: none"> • Deterioration of motor insulation, damaging the motor in the long run • Large leakage current, causing frequent protective trips of the AC drive. <p>The output reactor protects motor insulation and reduces bearing current.</p>
Magnetic ring and buckle	<p>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.</p>
Motor	<p>Select an applicable motor.</p>
External operating panel	<p>External LED operating panel MDKE10 and LCD operating panel SOP-20 are supported.</p>
<p>Note: For selection of peripheral electrical devices, see "Options".</p>	

3.2 Electrical Wiring Diagram

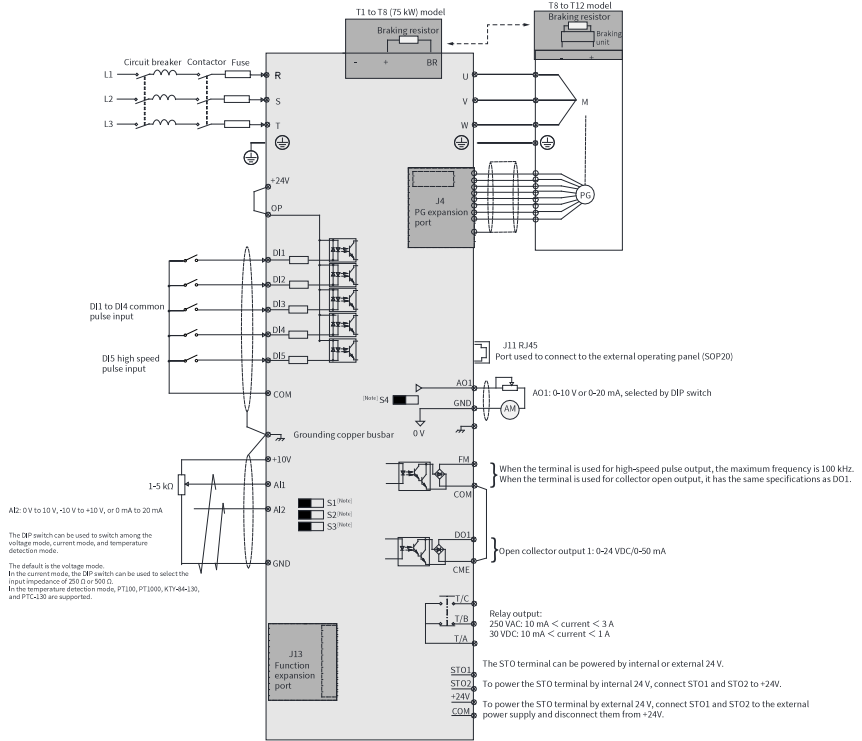


Figure 3-2 Standard wiring

Note

- For details on S1 to S4 DIP switches, see ["Table 3-4 Description of control circuit terminals" on page 27](#).
- For three-phase 380–480 VAC drives, a 0.4–75 kW model differs from a 90–450 kW model in the wiring detail marked by the double arrows in the figure.
- For three-phase 200–240 VAC drives, a 0.4–37 kW model differs from a 45–200 kW model in the wiring detail marked by the double arrows in the figure.

3.3 Main Circuit Terminals

T1 to T9 models

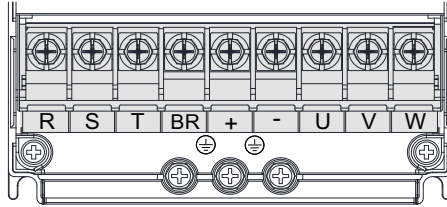


Figure 3-3 Main circuit terminals of T1 to T4 models

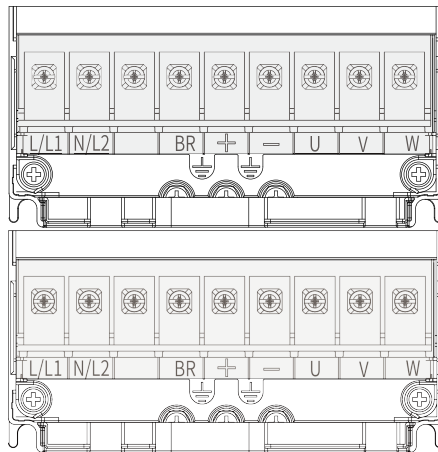


Figure 3-4 Main circuit terminals of T2 models (single phase)

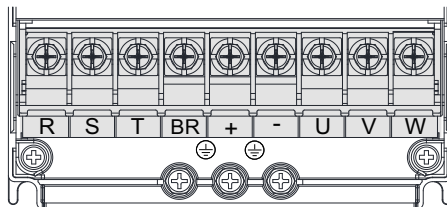


Figure 3-5 Main circuit terminals of T1 to T4 models

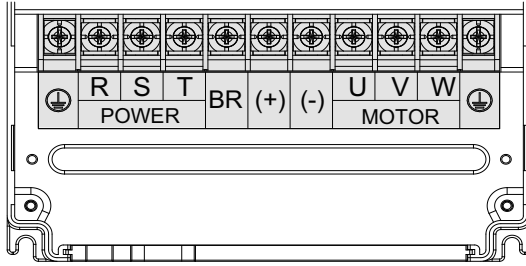


Figure 3-6 Main circuit terminals of T5 to T8 models

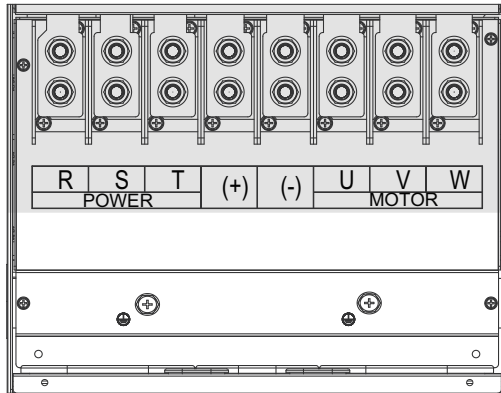



Figure 3-7 Main circuit terminals of T9 models

Table 3-2 Description of main circuit terminals

Mark	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, 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 T9 models

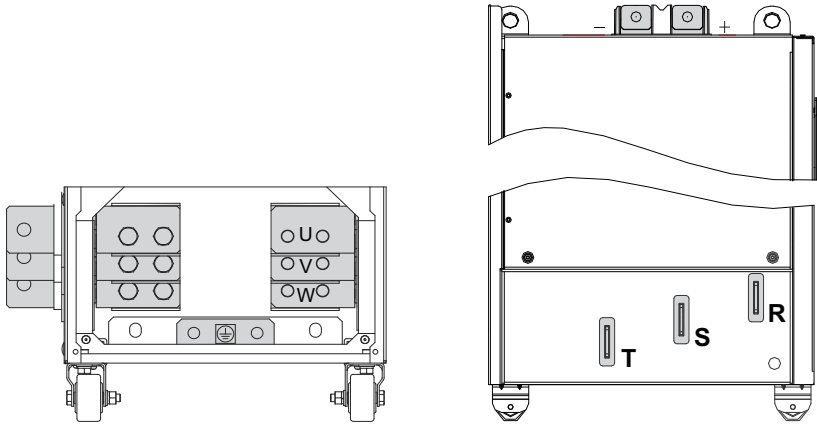



Figure 3-8 Main circuit terminals of T10 to T12 models

Table 3-3 Descriptions of main circuit terminals

Mark	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, 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

"Table 3-5" on page 29 describes control circuit terminals.

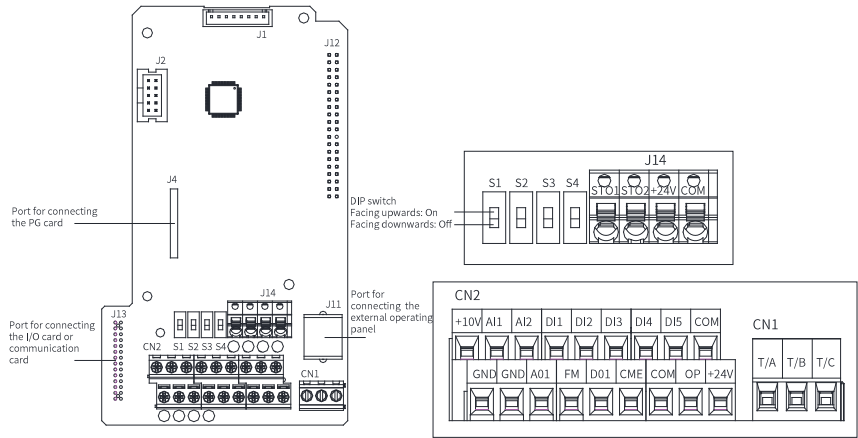


Figure 3-9 Control circuit terminals

Table 3-4 Description of control circuit terminals

Type	Mark	Name	Function Description
Power supply	+10V-GND	External +10 V power supply	The terminal is used to provide +10 V power supply to an external unit with the maximum output current 10 mA. Generally, it is used to power an external potentiometer with resistance ranging from 1 kΩ to 5 kΩ.
	+24V-COM	External +24 V power supply	The terminal is used to provide +24 V power supply to an external unit. Generally, it is used to power DI/DO terminals and external sensors. The maximum output current is 200 mA ^[Note 1] .
	OP	Input terminal for external power supply	It is connected to +24V by default. To use an external signal to drive terminals DI1 to DI5, disconnect OP from +24V and connect it to an external power supply.
Analog input	AI1-GND	Analog input terminal 1	Input voltage range: -10 VDC to +10 VDC Input impedance: 22 kΩ
	AI2-GND	Analog input terminal 2	The terminal supports voltage input (default), current input, and temperature input. When used as voltage/current input, the terminal supports 0 V to 10 V, -10 V to +10 V, or 0 mA to 20 mA with the resolution 12-bit and the correction accuracy 0.3%. The input impedance is 22 kΩ for voltage input and 500 Ω or 250 Ω for current input, which is set by S2 and S3 DIP switches ^{Note [2]} .

Type	Mark	Name	Function Description
Digital input	DI1-OP	Digital input 1	Photocoupler isolation and bipolar input Input impedance: 1.72 k Ω Voltage range for effective level input: 9 V to 30 V
	DI2-OP	Digital input 2	
	DI3-OP	Digital input 3	
	DI4-OP	Digital input 4	
	DI5-OP	Digital input 5	Besides features of DI1 to DI4, DI5 can also be used for high-speed pulse input. Input impedance: 1.16 k Ω Maximum input frequency: 100 kHz Operating voltage range: 15 V to 30 V
Analog output	AO1-GND	Analog output 1	The DIP switch on the control board is used to determine voltage output (default) or current output. Output voltage range: 0–10 V Output current range: 0–20 mA
Digital output	DO1-CME	Digital output 1	Photocoupler isolation and bipolar open collector output Output voltage range: 0–24 V Output current range: 0–50 mA Note that CME and COM are internally insulated, but are shorted externally by jumper as the factory settings. In this case, DO1 is driven by +24V. To drive DO1 by external power supply, remove the jumper between CME and COM.
	FM-COM	High-speed pulse output	The terminal is set by F5-00 (FM terminal output selection). When the terminal is used for high-speed pulse output, the maximum frequency is 100 kHz. When the terminal is used for collector open output, it has the same specifications as DO1.
Relay output	T/A	Common terminal	Contact driving capacity: 250 VAC, 3 A, COS ϕ = 0.4 30 VDC, 1 A
	T/B	Normally closed terminal	
	T/C	Normally open terminal	


Type	Mark	Name	Function Description
Auxiliary ports	J13	Expansion card terminal	It is a 28-conductor terminal used to connect optional cards, such as bus cards
	J4	PG card terminal	It is used to connect the resolver, differential, and 23-bit encoders.
	J11	Port for external operating panel	It is used to connect the LCD operating panel (SOP-20) and the LED operating panel (MDKE-10).
DIP switches	S1		For details, see "Table 3-5 Description of control circuit terminals 2" on page 29.
	S2		For details, see "Table 3-5 Description of control circuit terminals 2" on page 29.
	S3		For details, see "Table 3-5 Description of control circuit terminals 2" on page 29.
	S4		It is used to determine whether AO1 supports the current mode. If S4 is closed, AO1 supports the current mode.

Table 3-5 Description of control circuit terminals 2

Mark	DIP Switch			Description
	S1	S2	S3	
Name	OFF	OFF	OFF	Voltage mode for AI2
	ON	OFF	OFF	Temperature mode for AI2. The temperature sensor type can be set by F9-57.
	OFF	ON	OFF	Current mode for AI2 with the input impedance 500 Ω
	OFF	ON	ON	Current mode for AI2 with the input impedance 250 Ω

Note

- [Note 1] If the ambient temperature exceeds 23°C, the output current must be derated by 1.8 mA for every additional 1°C. The maximum output current is 170 mA at 40°C. When OP and 24V are shorted, the maximum output current is calculated by the following formula: 170 mA minus current over the DI.
 - [Note 2] Based on the maximum output voltage of the signal source, select 500 Ω or 250 Ω impedance. For example, if 500 Ω is selected, the maximum output voltage cannot be lower than 10 V so that AI2 can measure 20 mA current.
-

4 Dimension Drawings

4.1 Dimensions of T1 to T9 Models

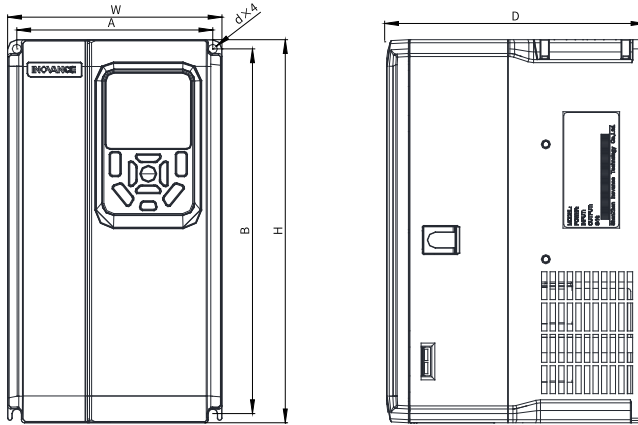


Figure 4-1 Outline dimensions and mounting dimensions of T1 to T4 models

Table 4-1 Outline dimensions and mounting dimensions of T1 to T4 models

Structure	Mounting Hole Spacing mm (in.)		Outline Dimension mm (in.)			Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	W	D		
T1	119 (4.7)	189 (7.5)	200 (7.9)	130 (5.1)	150 (6.0)	Ø5 (0.2)	1.6 (3.5)
T2	119 (4.7)	189 (7.5)	200 (7.9)	130 (5.1)	160 (6.4)	Ø5 (0.2)	2.0 (4.4)
T3	128 (5.0)	238 (9.4)	250 (9.9)	140 (5.5)	168.3 (6.7)	Ø6 (0.2)	3.3 (7.3)
T4	166 (6.5)	266 (10.5)	280 (11.0)	180 (7.1)	169 (6.7)	Ø6 (0.2)	4.3 (9.5)

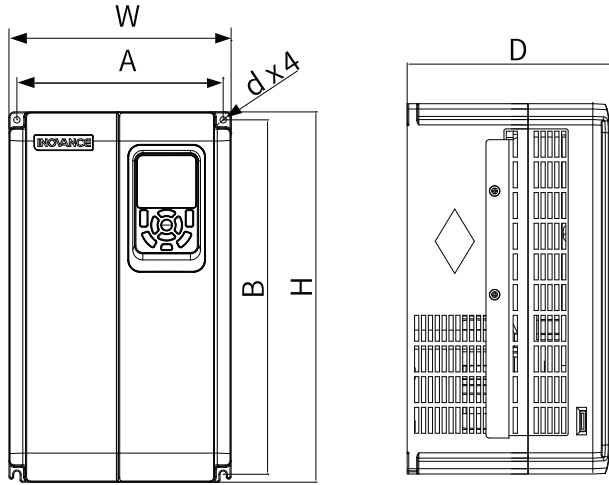


Figure 4-2 Outline dimensions and mounting dimensions of T5 to T6 models

Table 4-2 Outline dimensions and mounting dimensions of T5 to T6 models

Structure	Mounting Hole Spacing mm (in.)		Outline Dimension 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)	193.4 (7.6)	Ø6 (0.2)	7.6 (16.8)
T5 (-T, with the DC reactor)	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	193.4 (7.6)	Ø6 (0.2)	10.0 (22.0)
T6	230 (9.1)	380 (15.0)	400 (15.8)	-	250 (9.9)	220.8 (8.7)	Ø7 (0.3)	17.5 (38.6)

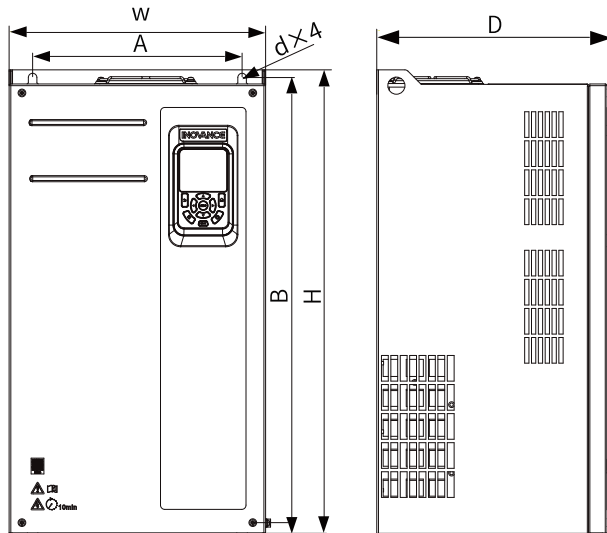


Figure 4-3 Outline dimensions and mounting dimensions of T7 to T9 models

Table 4-3 Outline dimensions and mounting dimensions of T7 to T9 models

Structure	Mounting Hole Spacing mm (in.)		Outline Dimension 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 Dimensions of T10 to T12 Models (Without AC Output Reactor)

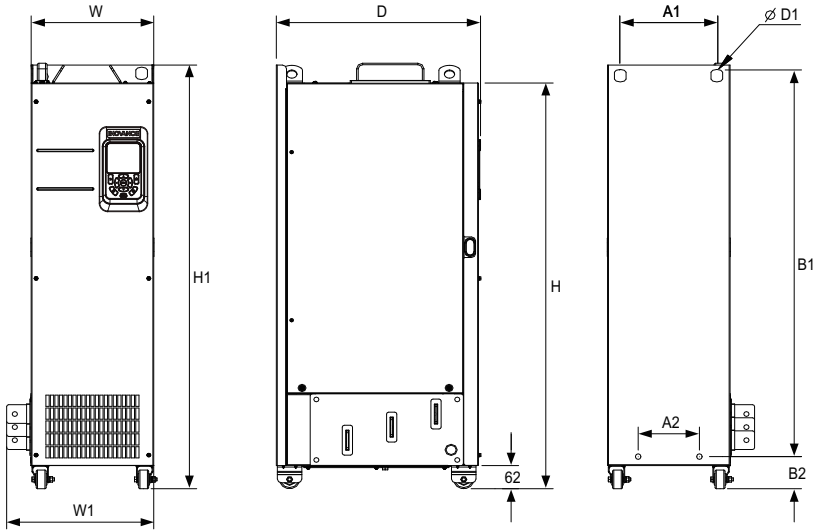


Figure 4-4 Outline dimensions and mounting dimensions of T10 to T12 models (without AC output reactor)

Table 4-4 Outline dimensions and mounting dimensions of T10 to T12 models (without AC output reactor)

Appearance Structure	Mounting Hole Spacing mm (in.)				Outline Dimension 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	390 -15.4	545 -21.5	φ13(0.5)	155 (341.7)	
T12	240 -9.5	200 -7.9	1280 -50.4	101 -4	1355 -53.4	1405 -55.4	340 -13.4	400 -15.8	545 -21.5	φ16(0.6)	185 (407.9)	

4.3 Dimensions of T10 to T12 Models (with AC Output Reactor)

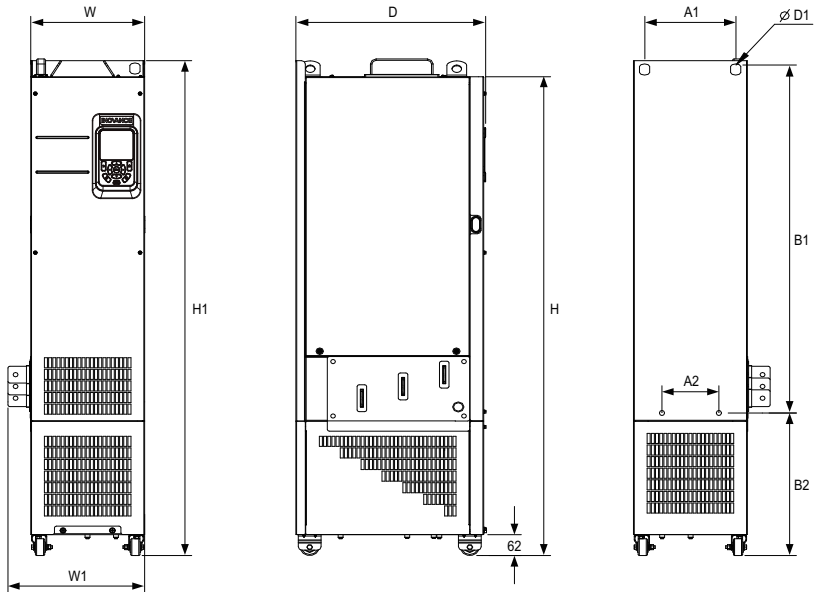


Figure 4-5 Outline dimensions and mounting dimensions of T10 to T12 models (with AC output reactor)

Table 4-5 Outline dimensions and mounting dimensions of T10 to T12 models (with AC output reactor)

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

5 Options

5.1 List of Options

Optional peripherals include braking units, function expansion 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 Drive Models	Description
Braking components	External braking unit [1]	MDBUN-60-T	1013133	All models	60 A 380 VAC series
		MDBUN-60-5T	0101AR57	All models	60 A 480 VAC series
		MDBUN-90-T	1013126	All models	90 A 380 VAC series
		MDBUN-90-5T	0101AR58	All models	90 A 480 VAC series
		MDBUN-200-T	1040104	All models	200 A 380 VAC series
		MDBUN-200-5T	1040160	All models	200 A 480 VAC series
	Built-in braking unit	Models containing letter "B"	/	T1 to T8 (75 kW)	Three phase 380-480 V models. For T1 to T4 models, the built-in braking unit is standard. For T5 to T8 (75 kW), the braking unit is optional.
Expansion cards	I/O expansion card 1	MD38IO1	1013098	T4 to T12	The following can be added: five DIs, one relay output terminal, and one DO. Modbus and CANlink are supported
	I/O expansion card 2	MD38IO2	1013103	All models	Three DIs can be added.
	I/O expansion card 3	MD38IO3	1040051	All models	The following can be added: three DIs, one RS-485 communication signal isolation input terminal, and one normally open relay output terminal.
	RS-485 communication card	MD38TX1	1013112	All models	Modbus communication adapter card with the isolation feature

Device		Model	Order No.	Supported Drive Models	Description
Continued	CANopen/CANlink communication expansion card	MD38CAN1	1013100	All models	CANopen/CANlink communication adapter card
	PROFIBUS DP communication card	MD-SI-DP1	1040172	T1 to T3	PROFIBUS DP communication card
	PROFIBUS DP communication card	MD38DP2	1013144	T4 to T12	PROFIBUS DP communication card
	PROFINET communication expansion card	MD500-PN1	1040098	All models	PROFINET communication adapter card
	EtherCAT communication expansion card	MD500-ECAT	1040113	All models	EtherCAT communication adapter card
Continued	Ethernet/IP communication expansion card	MD500-EN1	01040167	All models	Ethernet/IP communication adapter card
	User programmable card	MD38PC1	1013104	T4–T12	User programmable expansion card; compatible with H1U series PLCs of Inovance
	Resolver interface card	MD38PG4	1013081	All models	Applicable 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. Select a resolver with a maximum of four pole pairs. Otherwise, MD38PG4 will be overloaded.

Device		Model	Order No.	Supported Drive Models	Description
Continued	MD38PGMD multi-function encoder card	MD38PGMD	1013147	All models	Collector and differential encoder interface card with an optional multiplied frequency-division output; adaptable to 5 V/15 V power supply This card supports differential input, collector input, and push-pull input; supports differential output and collector output. In addition, it supports a variety of interfaces such as encoder interfaces and host controller A/B phase input interfaces.
	23-bit PG card	ES510-PG-CT1	1320007	All models	Applicable to 23-bit encoders of Inovance; with a DB9 interface
Mounting accessories	Through-hole mounting bracket	MD500-AZJ-A1T1	1040072	T1	The option meets requirements of through-hole mounting. It applies only to T1 to T9 models.
		MD500-AZJ-A1T2	1040073	T2	
		MD500-AZJ-A1T3	1040074	T3	
		MD500-AZJ-A1T4	1040075	T4	
		MD500-AZJ-A1T5	1040001	T5	
Continued	Continued	MD500-AZJ-A1T6	1040002	T6	Continued
		MD500-AZJ-A1T7	1040003	T7	
		MD500-AZJ-A1T8	1040004	T8	
		MD500-AZJ-A1T9	1040005	T9	
Continued	Grounding bracket of cable shield	MD500-AZJ-A2T1	1040085	T1	The option is used for secondary fixing of power cables and stable grounding of the shield. It applies only to T1 to T9 models.
		MD500-AZJ-A2T2	1040088	T2	
		MD500-AZJ-A2T3	1040083	T3	
		MD500-AZJ-A2T4	1040082	T4	
		MD500-AZJ-A2T5	1040081	T5	
		MD500-AZJ-A2T6	1040086	T6	
		MD500-AZJ-A2T7	1040087	T7	
		MD500-AZJ-A2T8	1040084	T8	
		MD500-AZJ-A2T9	1040089	T9	

Device		Model	Order No.	Supported Drive Models	Description
Continued	Guide rail	MD500-AZJ-A3T10	1040009	T10 to T12	The option is used for installing the AC drive in a cabinet. For T10 models and models above T10, it is recommended that a guide rail be used to push the AC drive into the cabinet.
	UVW output copper busbar	MD500-TP-T10	01040125	T10	MD520 models excluding that with the base (-L) are delivered with the UVW output copper busbar.
		MD500-TP-T11	01040126	T11	
		MD500-TP-T12	01040127	T12	
Cables	Main circuit cable	Lugs manufactured by Suzhou Yuanli are recommended. For details of recommended lugs, see "5.3.1 Main Circuit Cable" on page 54.			It is recommended that the input and output main circuit cables and power cables use symmetrical shielded cables. Compared with four-conductor cables, symmetrical shielded cables can reduce electromagnetic radiation in the whole transmission system.
	Control circuit cable	All control circuit cables must be shielded cables. Use a separate shielded cable for each type of analog signal. It is recommended that digital signal cables use shielded twisted pair (STP) cables.			
	External LED operating panel	MDKE-10	/	All models	LED display
Continued	External LCD operating panel	SOP-20	1040028	All models	The external LCD operating panel supports parameter copying and English or Chinese display.
	Extension cable	MDCAB	1013008	All models	The standard 8-conductor cable in three meters can connect to LED operating panel MDKE10 and LCD operating panel SOP-20.
		MDCAB-1.5	15048471	All models	1.5-meter cable used to connect the external operating panel

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
MD500-AZJ-A1T8	T8
MD500-AZJ-A1T9	T9

Mounting-hole dimensions

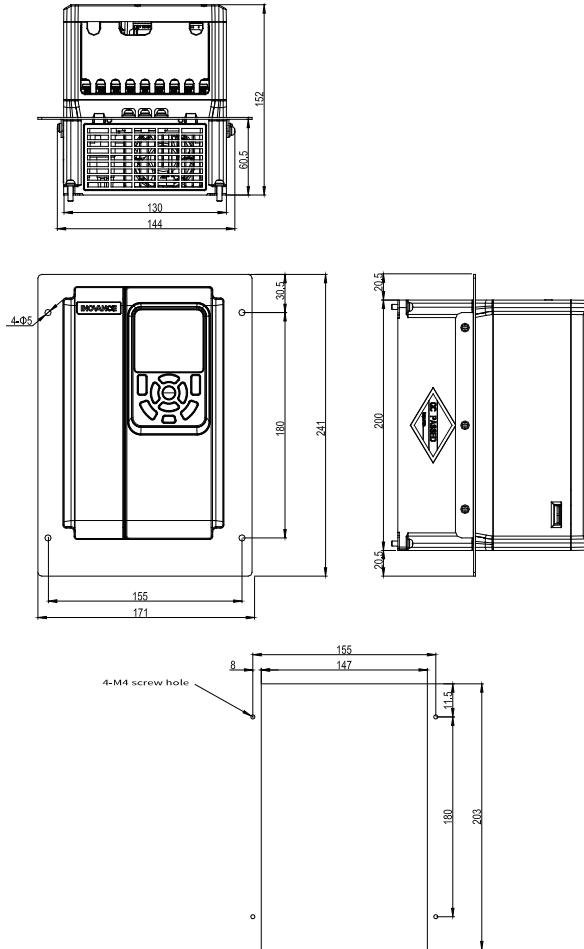


Figure 5-1 Dimensions of MD500-AZJ-A1T1 through-hole mounting bracket and holes (mm)

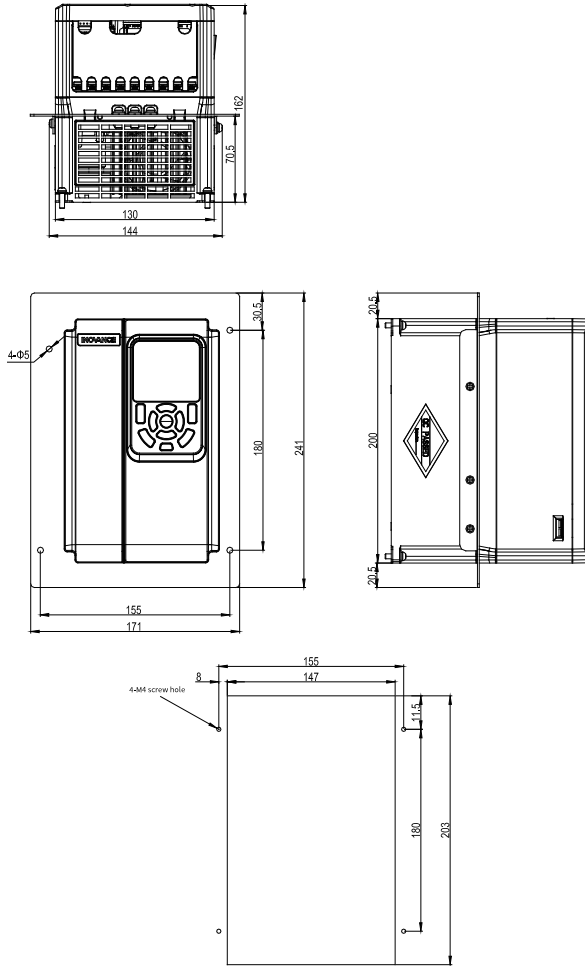


Figure 5-2 Dimensions of MD500-AZJ-A1T2 through-hole mounting bracket and holes (mm)

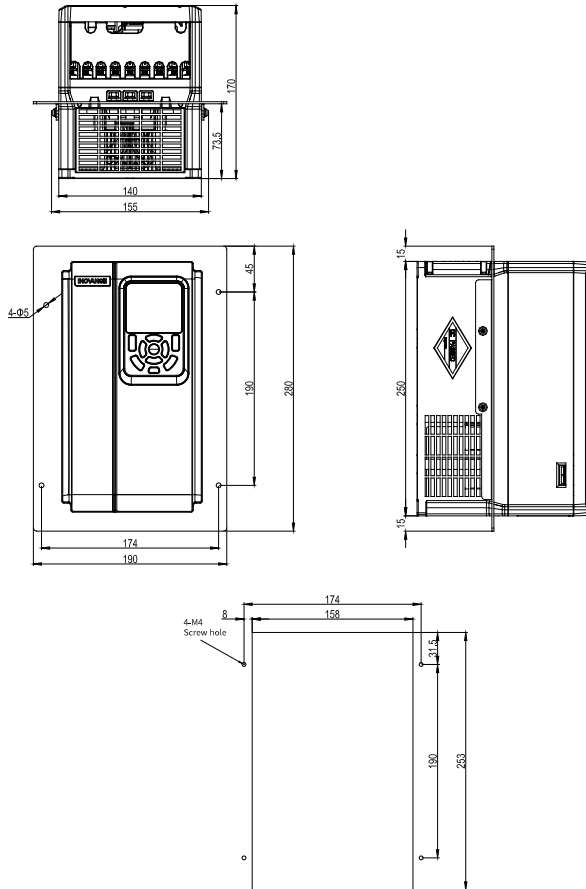


Figure 5-3 Dimensions of MD500-AZJ-A1T3 through-hole mounting bracket and holes (mm)

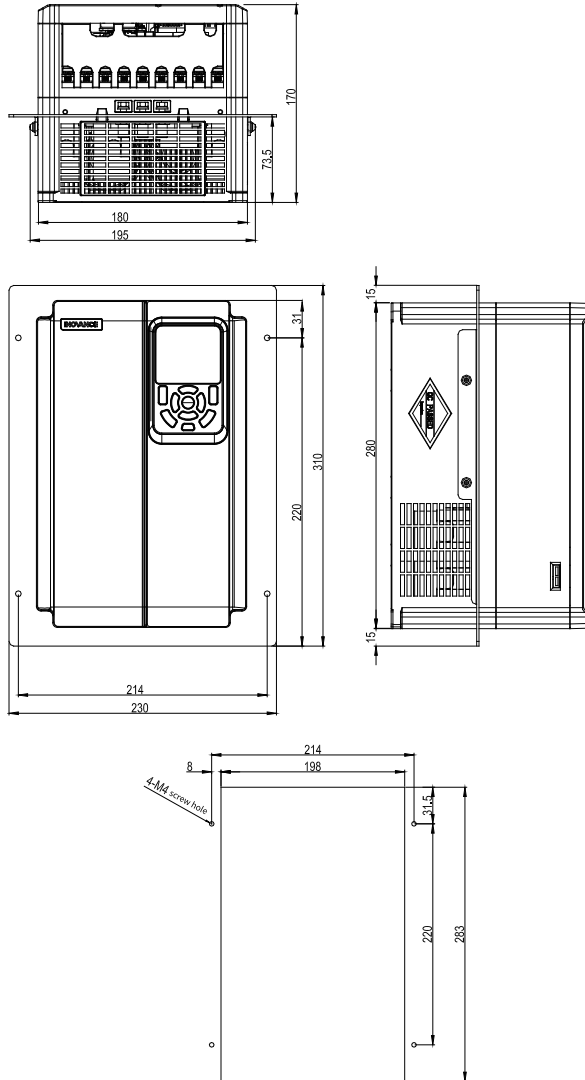


Figure 5-4 Dimensions of MD500-AZJ-A1T4 through-hole mounting bracket and holes (mm)

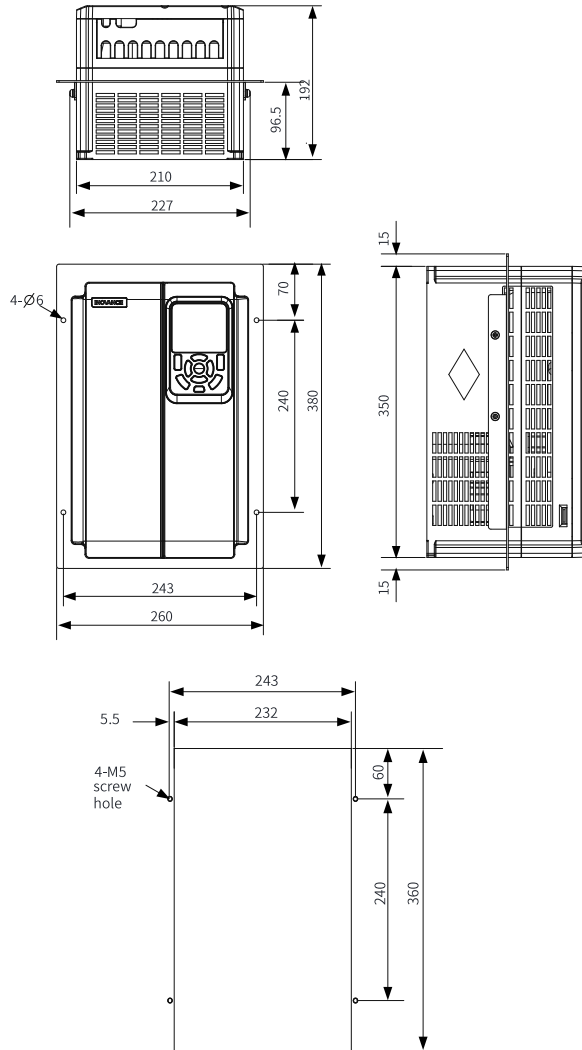


Figure 5-5 Dimensions of MD500-AZJ-A1T5 through-hole mounting bracket and holes (mm)

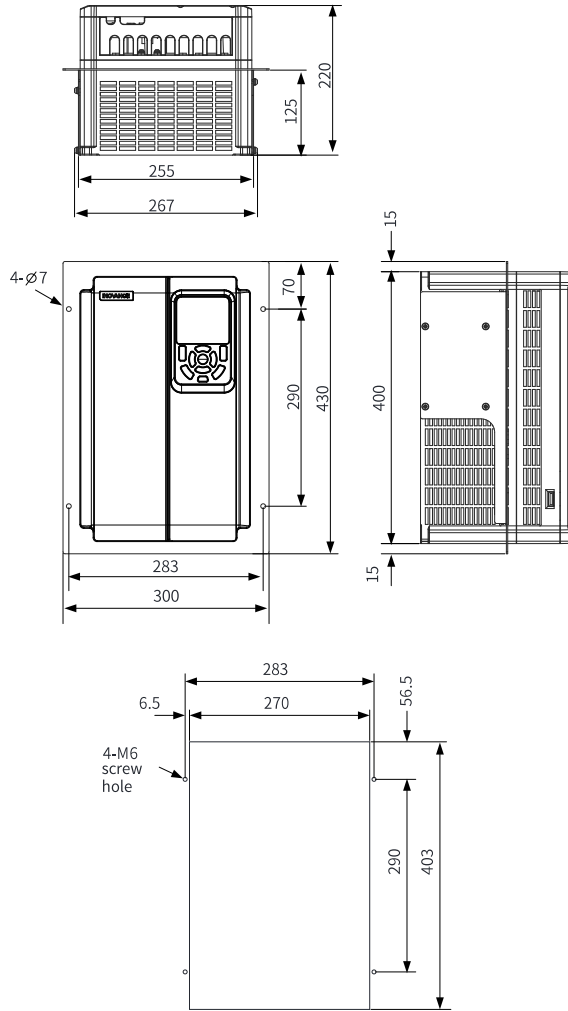


Figure 5-6 Dimensions of MD500-AZJ-A1T6 through-hole mounting bracket and holes (mm)

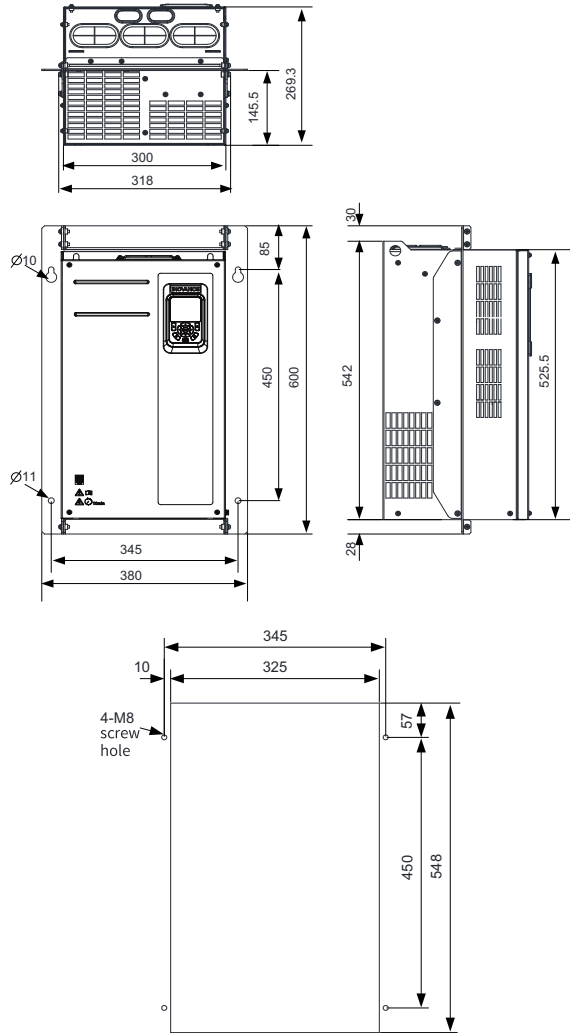


Figure 5-7 Dimensions of MD500-AZJ-A1T7 through-hole mounting bracket and holes (mm)

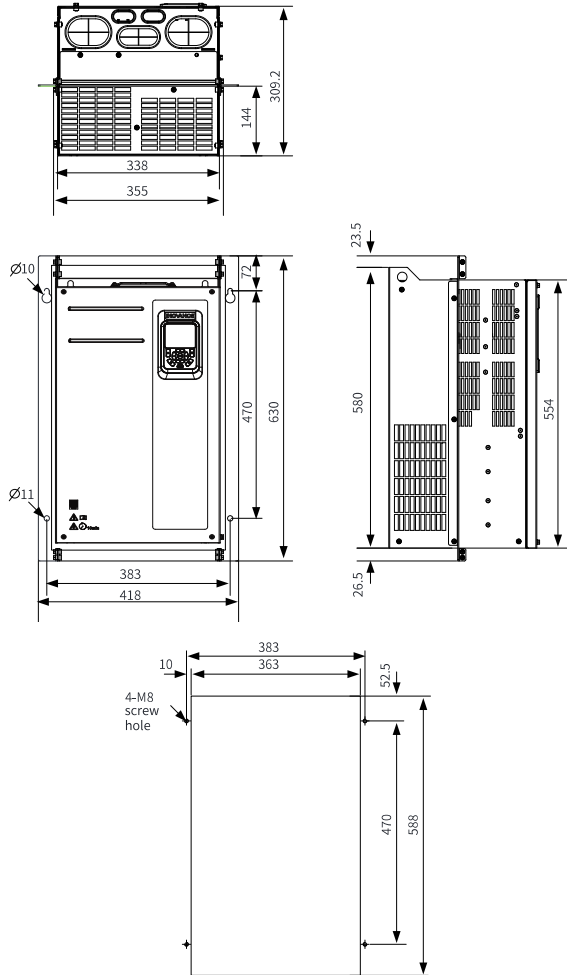


Figure 5-8 Dimensions of MD500-AZJ-A1T8 through-hole mounting bracket and holes (mm)

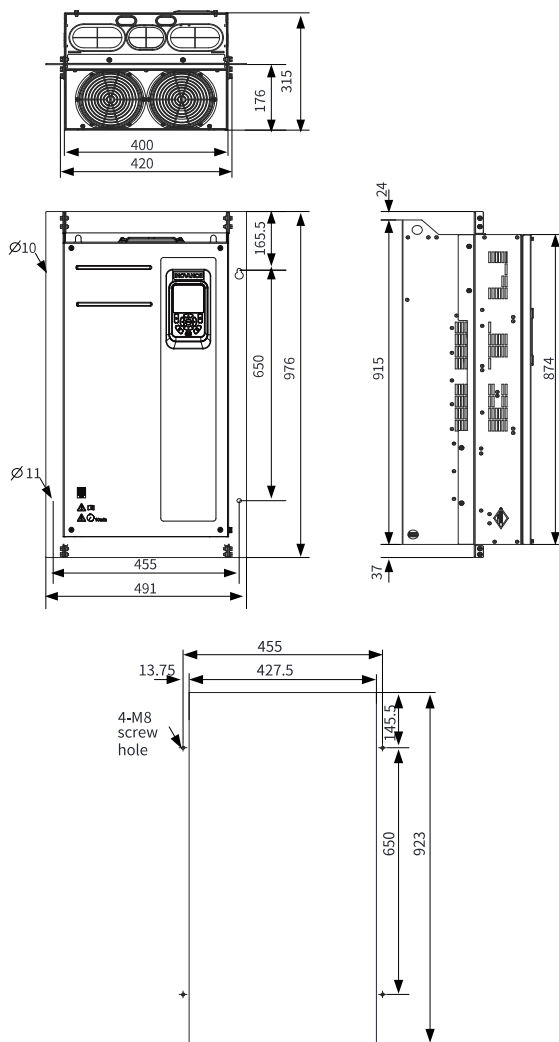


Figure 5-9 Dimensions of MD500-AZJ-A1T9 through-hole mounting bracket and holes (mm)

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 Invoence.

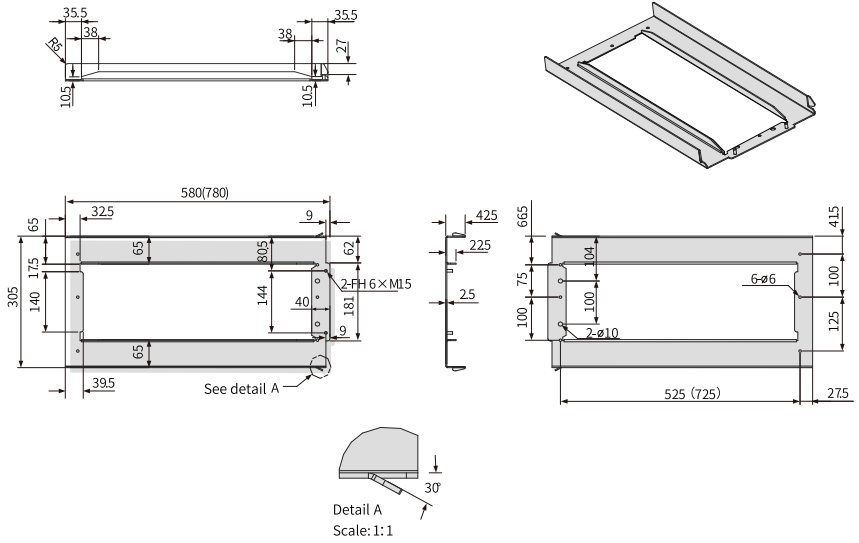


Figure 5-10 Dimensions of bottom mounting bracket for T10 models (mm)

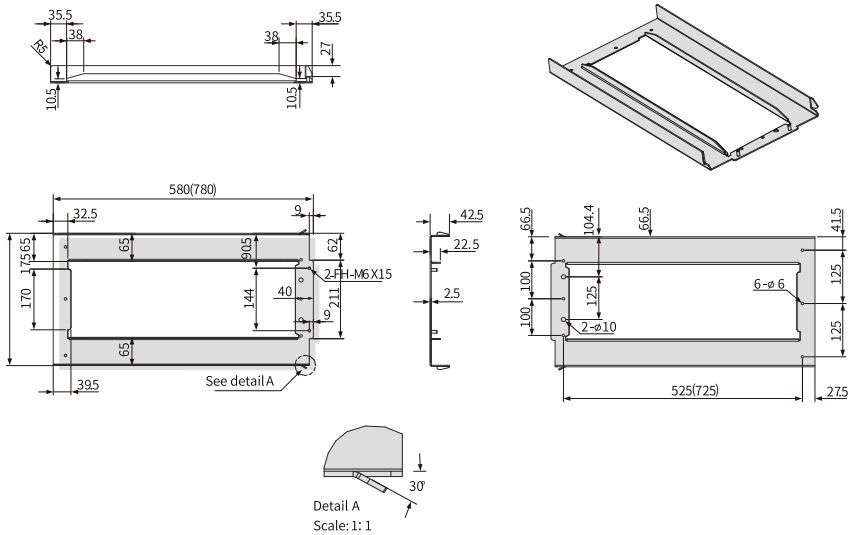


Figure 5-11 Dimensions of bottom mounting bracket for T11 models (mm)

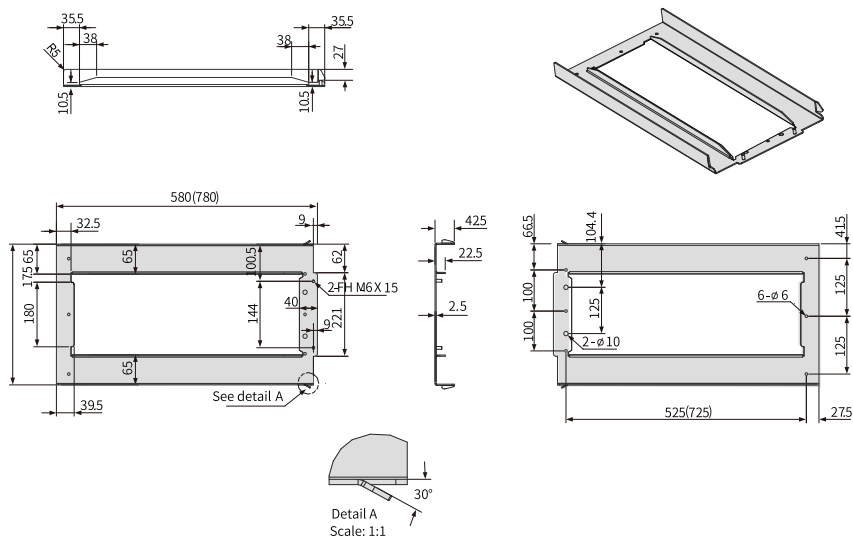


Figure 5-12 Dimensions of bottom mounting bracket for T12 models (mm)

Note

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

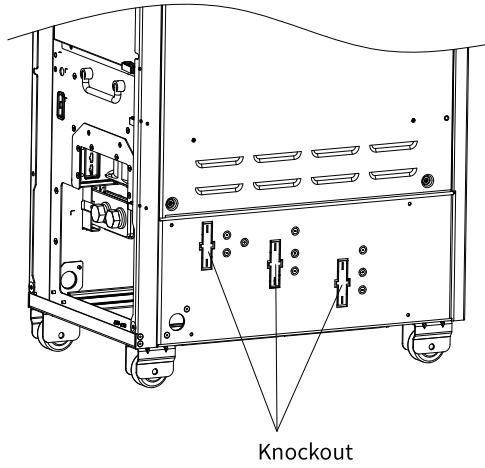
5.2.3 Guide Rail

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

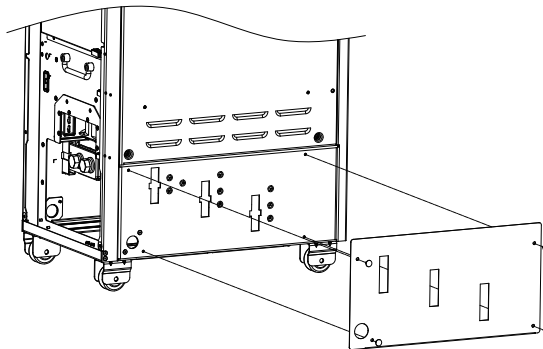
5.2.4 Installing the UVW Output Copper Busbar

All MD520 models excluding that with the base (-L) are delivered with the UVW output copper busbar. To install the UVW output copper busbar, do as follows:

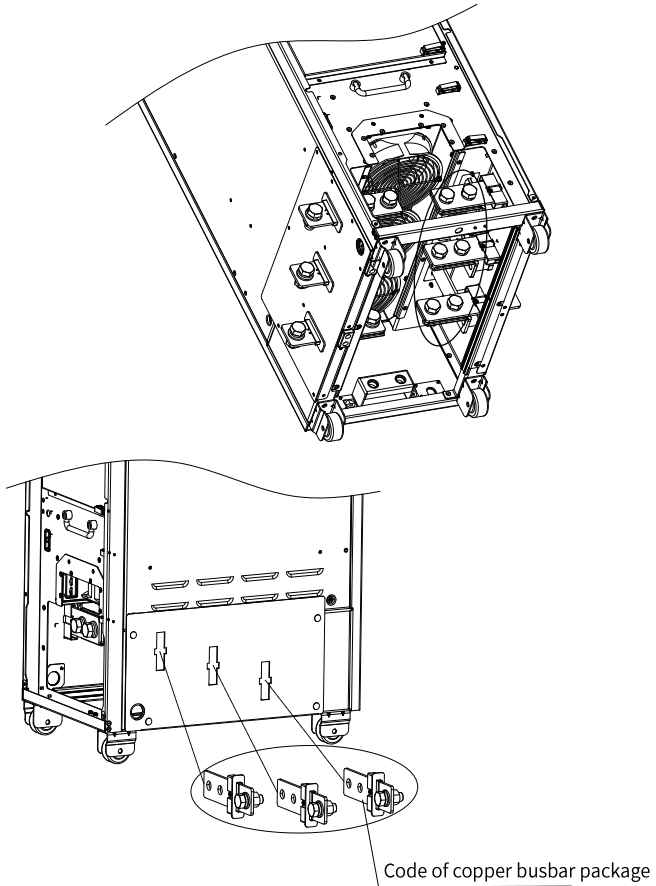
1. Use the screwdriver or cutting pliers to remove the three knockouts.



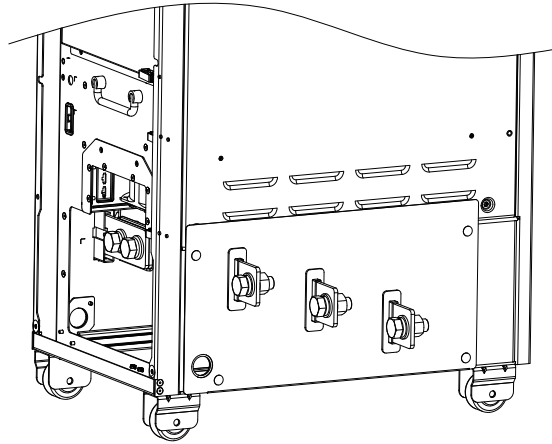
2. Use the four plastic snap-fit joints in the packing box to fasten the insulating paper to the chassis through the four holes on the paper.



3. Remove the six screws on the drive, install the copper busbars, and then fasten the six screws.



The following figures shows the installed copper busbar.



5.3 Cables

5.3.1 Main Circuit Cable

Power cable selection requirements

For the selection of power cables, follow national or regional regulations. Selection of IEC cables is based on the following:

- EN 60204-1 and IEC 60364-5-52 standards
- PVC cable with copper conductors
- Working properly when the ambient temperature is equal to or lower than 40°C and the cable surface temperature is equal to or lower than 70°C (Note: Contact the manufacturer if the ambient temperature exceeds 40°C.)
- Symmetrical cable with copper mesh shield

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

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

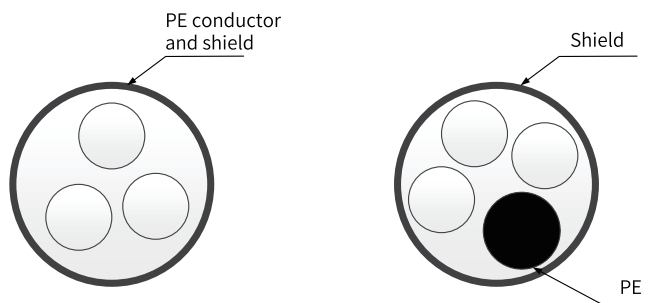


Figure 5-13 Recommended power cable types

Recommended cables

Table 5-3 Cable selection (three phase 380-480 V)

Structure	Model	RST/UWV		Grounding Wire		Screw	Tightening Torque N·m (lb.in)	
		Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	Recom mended Cable (mm ²) ^{<1>}	Recommend ed Cable Lug			
T1	MD520-4T0.4B(S)	3 x 0.75	TNR0.75-4	0.75	TNR5.5-5	M4	1.2 (10.6)	
	MD520-4T0.7B(S)	3 x 0.75	TNR0.75-4	0.75	TNR8-5	M4		
	MD520-4T1.1B(S)	3 x 0.75	TNR0.75-4	0.75	TNR5.5-5	M4		
	MD520-4T1.5B(S)	3 x 0.75	TNR0.75-4	0.75	TNR8-5	M4		
	MD520-4T2.2B(S)	3 x 0.75	TNR0.75-4	0.75	TNR5.5-5	M4		
	MD520-4T3.0B(S)	3 x 1.5	TNR1.25-4	1.5	TNR8-5	M4		
T2	MD520-4T3.7B(S)	3 x 2.5	TNR2-4	2.5	TNR5.5-5	M4	2.8 (24.8)	
	MD520-4T5.5B(S)	3 x 4	TNR3.5-5	4	TNR8-5	M5		
T3	MD520-4T7.5B(S)	3 x 6	TNR5.5-5	6	TNR5.5-5	M5		
	MD520-4T11B(S)	3 x 10	TNR8-5	10	TNR8-5	M5		
T4	MD520-4T15B(S)	3 x 10	TNR8-5	10	TNR8-5	M5		
T5	MD520-4T18.5(B)(S)	3 x 16	GTNR16-6	16	GTNR16-6	M6		4.8 (45.2)
	MD520-4T18.5(B) (S)-T	3 x 16	GTNR16-6	16	GTNR16-6	M6		
	MD520-4T22(B) (S)	3 x 16	GTNR16-6	16	GTNR16-6	M6		
	MD520-4T22(B) (S)-T	3 x 16	GTNR16-6	16	GTNR16-6	M6		
T6	MD520-4T30(B) (S)	3 x 25	GTNR25-6	16	GTNR16-6	M6	13 (115.2)	
	MD520-4T37(B) (S)	3 x 35	GTNR35-6	16	GTNR16-6	M6		
T7	MD520-4T45(B) (S)	3 x 50	GTNR50-8	25	GTNR25-8	M8		
	MD520-4T55(B) (S)	3 x 70	GTNR70-8	35	GTNR35-8	M8		

Structure	Model	RST/UWW		Grounding Wire		Screw	Tightening Torque N·m (lb.in)
		Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug				
Recom mended Cable (mm ²) ^{<1>}	Recommended Cable Lug	Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug				
T8	MD520-4T75(B) (S)	3 x 95	GTNR95-12	50	GTNR50-12	M12	35 (310.1)
	MD520-4T90(S)	3 x 120	GTNR120-12	70	GTNR70-12	M12	
	MD520-4T110(S)	3 x 150	GTNR150-12	95	GTNR95-12	M12	
T9	MD520-4T132(S)	3 x 185	BC185-12	95	BC95-12	M12	
	MD520-4T160(S)	2 x (3 x 95)	BC95-12	95	BC95-12	M12	
T10	MD520-4T200(S) (-L)	2 x (3 x 120)	BC120-12	120	BC120-12	M12	
	MD520-4T220(S) (-L)	2 x (3 x 150)	BC150-12	150	BC150-12	M12	
T11	MD520-4T250(S) (-L)	2 x (3 x 185)	BC185-16	185	BC185-16	M16	85 (753.1)
	MD520-4T280(S) (-L)	2 x (3 x 185)	BC185-16	185	BC185-16	M16	
T12	MD520-4T315(S) (-L)	2 x (3 x 240)	BC240-16	240	BC240-16	M16	
	MD520-4T355(S) (-L)	2 x (3 x 240)	BC240-16	240	BC240-16	M16	
	MD520-4T400(S) (-L)	2 x (3 x 300)	BC300-16	300	BC300-16	M16	

Table 5-4 Cable selection (three phase 380-480 V) (with UL certification)

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommend ed Cable (AWG/mil) ^{<2>}	Recommend ed Cable Lug	Recommend ed Cable (AWG/kcmil) ^{<2>}	Recommend ed Cable Lug	
T1	MD520-4T0.4B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-4T0.7B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-4T1.1B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-4T1.5B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-4T2.2B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-4T3.0B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
T2	MD520-4T3.7B(S)	10	TLK6-4	2 x 10	TLK6-4	M4
	MD520-4T5.5B(S)	10	TLK6-5	2 x 10	TLK6-5	M5
T3	MD520-4T7.5B(S)	8	TLK10-5	2 x 8	TLK10-5	M5
	MD520-4T11B(S)	6	TLK16-5	6	TLK16-5	M5
T4	MD520-4T15B(S)	6	TLK16-5	6	TLK16-5	M5
T5	MD520-4T18.5(B)(S)	4	TLK25-6	4	TLK25-6	M6
	MD520-4T18.5(B) (S)-T	4	TLK25-6	4	TLK25-6	M6
T6	MD520-4T22(B) (S)	3	TLK35-6	4	TLK25-6	M6
	MD520-4T22(B) (S)-T	2	TLK35-6	4	TLK25-6	M6

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommend ed Cable (AWG/mil) ^{<2>}	Recommend ed Cable Lug	Recommend ed Cable (AWG/kcmil) ^{<2>}	Recommend ed Cable Lug	
T7	MD520-4T30(B) (S)	1/0	TLK50-8	3	TLK35-8	M8
	MD520-4T37(B) (S)	3/0	TLK95-10	1	TLK50-8	M8
T8	MD520-4T45(B) (S)	4/0	TLK120-12	1/0	TLK70-12	M12
	MD520-4T55(B) (S)	300	SQNBS180-12	3/0	TLK95-12	M12
	MD520-4T75(B) (S)	400	SQNBS250-12	4/0	TLK120-12	M12
T9	MD520-4T90(S)	500	SQNBS250-12	250	TLK300-12	M12
	MD520-4T110(S)	2 x 250	SQNBS150-12	250	SQNBS150-12	M12
T10	MD520-4T132(S)	2 x 300	TLK185-12	300	TLK185-12	M12
	MD520-4T160(S)	2 x 350	TLK185-12	350	TLK185-12	M12
T11	MD520-4T200(S) (-L)	2 x 350	TLK185-12	350	TLK185-12	M12
	MD520-4T220(S) (-L)	2 x 500	SQNBS325-16	500	SQNBS325-16	M16
T12	MD520-4T250(S) (-L)	2 x 700	TLK400-16	700	TLK400-16	M16
	MD520-4T280(S) (-L)	4 x 300	TLK185-16	2 x 300	TLK185-16	M16
	MD520-4T400(S) (-L)	4 x 300	TLK185-16	2 x 300	TLK185-16	M16

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

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	
T1	MD520-2T0.4B(S)	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4
	MD520-2T0.7B(S)					
	MD520-2T1.1B(S)					
	MD520-2T1.5B(S)	3 x 1	TNR1.25-4	1	TNR1.25-4	
T2	MD520-2T2.2B(S)	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	M4
	MD520-2T3.7B(S)	3 x 2.5	TNR2-4	2.5	TNR2-4	M4
T3	MD520-2T5.5B(S)	3 x 6	TNR5.5-5	6	TNR5.5-5	M5
T4	MD520-2T7.5B(S)	3 x 10	TNR8-5	10	TNR8-5	M5
T5	MD520-2T11(B)(S)	3 x 16	GTNR16-6	16	GTNR16-6	M6
T6	MD520-2T15(B)(S)	3 x 16	GTNR16-6	16	GTNR16-6	M6
	MD520-2T18.5(B)(S)	3 x 25	GTNR25-6	16	GTNR16-6	M6
T7	MD520-2T22(B)(S)	3 x 35	GTNR35-8	16	GTNR16-8	M8
	MD520-2T30(B)(S)	3 x 50	GTNR50-8	25	GTNR25-8	M8
T8	MD520-2T37(B)(S)	3 x 70	GTNR70-12	35	GTNR35-12	M12
	MD520-2T45(S)	3 x 95	GTNR95-12	50	GTNR50-12	M12
	MD520-2T55(S)	3 x 120	GTNR120-12	70	GTNR70-12	M12
T9	MD520-2T75(S)	2 x (3 x 95)	BC95-12	95	BC95-12	M12

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	
T10	MD520-2T90(S)	2 x (3 x 120)	BC120-12	120	BC120-12	M12
	MD520-2T110(S)	2 x (3 x 150)	BC150-12	150	BC150-12	M12
T11	MD520-2T132(S)	2 x (3 x 185)	BC185-16	185	BC185-16	M16
T12	MD520-2T160(S)	2 x (3 x 240)	BC240-16	240	BC240-16	M16
	MD520-2T200(S)	2 x (3 x 240)	BC240-16	240	BC240-16	M16

Table 5-6 Cable selection (single phase 200-240 V)

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	Recommend ed Cable (mm ²) ^{<1>}	Recommend ed Cable Lug	
T2	MD520-2S0.4B(S)	0.75	TNR0.75-4	0.75	TNR8-5	M4
	MD520-2S0.7B(S)	1.5	TNR0.75-4	1.5	TNR8-5	
	MD520-2S1.5B(S)	2.5	TNR1.25-4	1.5	TNR8-5	
	MD520-2S2.2B(S)	4	TNR2-4	2.5	TNR8-5	

Table 5-7 Cable selection (single phase 200-240 V) (with UL certification)

Structure	Model	RST/UWW		Grounding Wire		Screw
		Recommended Cable (AWG)	Cable Lug Model	Recommended Cable (AWG)	Cable Lug Model	
T2	MD520-2S0.4B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	M4
	MD520-2S0.7B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	
	MD520-2S1.5B(S)	14	TLK2.5-4	2 x 14	TLK2.5-4	
	MD520-2S2.2B(S)	10	TLK6-4	2 x 10	TLK6-4	

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

Recommended lug

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

Table 5-8 Appearances, models, and dimensions of TNR series lugs (unit: mm)

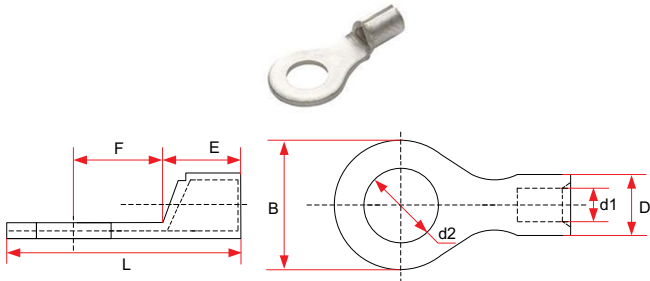
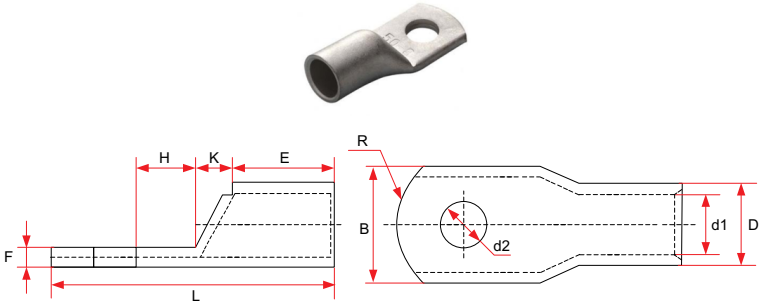
Model	Cable Range		D	d1	E	F	B	d2	L	Current (A)	Crimping Tool
	AWG/MCM	mm ²									
											
TNR0.75-4	22-16	0.25-1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8
TNR1.25-4	22-16	0.25-1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	AK-1M

Table 5-9 Appearances, models, and dimensions of GTNR series cable lug (unit: mm)

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
											
GTNR1.5-5	4.0	2.2	5.0	5.0	2.0	8.0	5.3	1.0	16.0	5	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	

Options

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
GTNR16-6	7.8	5.8	12.0	8.0	4.0	12.4	6.4	1.3	31.0	7	CT-38 CT-100
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	RYC-150
GTNR120-12	19.8	15.0	22.0	14.0	10.0	28.0	13.0	4.7	60.0	16	
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 5-10 Appearances, 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
240-10				26				21		37.7
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	
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.

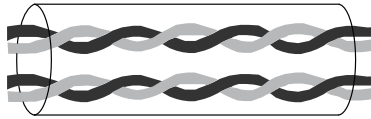


Figure 5-14 Shielded twisted pair cable

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

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

Table 5-11 Selection of fuses, contactors, and circuit breakers (three phase 380-480 V)

Structure	Model	Fuse Bussmann UL certification		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD520-4T0.4B(S)	5	FWP-5B	9	4
	MD520-4T0.7B(S)	10	FWP-10B	9	6
	MD520-4T1.1B(S)	10	FWP-10B	9	6
	MD520-4T1.5B(S)	10	FWP-10B	9	10
	MD520-4T2.2B(S)	15	FWP-15B	12	13
T2	MD520-4T3.0B(S)	20	FWP-20B	16	16
	MD520-4T3.7B(S)	30	FWP-30B	26	25
T3	MD520-4T5.5B(S)	40	FWP-40B	26	32
	MD520-4T7.5B(S)	60	FWP-60B	38	50
T4	MD520-4T11B(S)	70	FWP-70B	50	63
	MD520-4T15B(S)	70	FWH-70B	50	63
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	100	FWH-100B	65	80
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	125	FWH-125B	80	80
T6	MD520-4T30(B)(S)	125	FWH-125B	80	100
	MD520-4T37(B)(S)	150	FWH-150B	95	160
T7	MD520-4T45(B)(S)	200	FWH-200B	115	160
	MD520-4T55(B)(S)	250	FWH-250A	150	250
T8	MD520-4T75(B)(S)	275	FWH-275A	170	250
	MD520-4T90(S)	325	FWH-325A	205	250
	MD520-4T110(S)	400	FWH-400A	245	400
T9	MD520-4T132(S)	500	FWH-500A	300	400
	MD520-4T160(S)	600	FWH-600A	410	500
T10	MD520-4T200(S)(-L)	800	FWH-800A	475	630
	MD520-4T220(S)(-L)	800	FWH-800A	620	800
T11	MD520-4T250(S)(-L)	1000	170M5016	620	800
	MD520-4T280(S)(-L)	1000	170M5016	620	800
T12	MD520-4T315(S)(-L)	1400	170M6017	800	1000
	MD520-4T355(S)(-L)	1400	170M6017	800	1000
	MD520-4T400(S)(-L)	1400	170M6017	1000	1250

Table 5-12 Selection of fuses, contactors, and circuit breakers (three phase 200-240 V)

Structure	Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T1	MD520-2T0.4B(S)	10	FWP-10B	9	6
	MD520-2T0.7B(S)	10	FWP-10B	9	10
	MD520-2T1.1B(S)	15	FWP-15B	12	13
	MD520-2T1.5B(S)	20	FWP-20B	16	16
T2	MD520-2T2.2B(S)	30	FWP-30B	26	25
	MD520-2T3.7B(S)	40	FWP-40B	26	32
T3	MD520-2T5.5B(S)	70	FWP-70B	50	63
T4	MD520-2T7.5B(S)	70	FWH-70B	50	63
T5	MD520-2T11(B)(S)	125	FWH-125B	80	80
T6	MD520-2T15(B)(S)	125	FWH-125B	80	100
	MD520-2T18.5(B)(S)	150	FWH-150B	95	160
T7	MD520-2T22(B)(S)	200	FWH-200B	115	160
	MD520-2T30(B)(S)	250	FWH-250A	150	250
T8	MD520-2T37(B)(S)	275	FWH-275A	170	250
	MD520-2T45(S)	325	FWH-325A	205	250
	MD520-2T55(S)	400	FWH-400A	245	400
T9	MD520-2T75(S)	600	FWH-600A	410	500
T10	MD520-2T90(S)	600	FWH-600A	410	500
	MD520-2T110(S)	700	FWH-700A	410	630
T11	MD520-2T132(S)	800	FWH-800A	475	630
T12	MD520-2T160(S)	1000	170M5016	620	800
	MD520-2T200(S)	1400	170M6017	800	1000

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

Structure	Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T2	MD520-2S0.4B(S)	10	FWP-10B	9	10
	MD520-2S0.7B(S)	15	FWP-15B	12	13
	MD520-2S1.5B(S)	20	FWP-20B	16	16
	MD520-2S2.2B(S)	30	FWP-30B	30	32

Note

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

5.4.2 AC Input Reactor

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

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

Models and dimensions (Inovance)

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

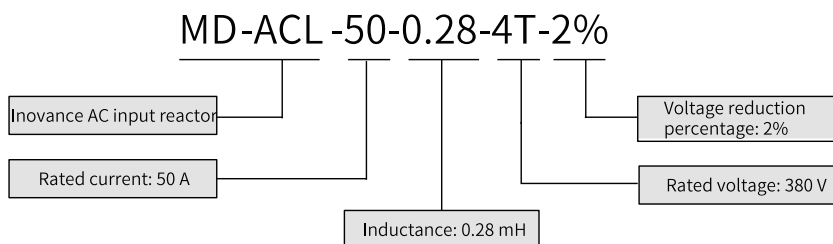


Figure 5-15 AC input reactor model

Table 5-14 Selection of Inovance AC input reactors (three phase 380-480 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-4T0.4B(S)	MD-ACL-10-5-4T	5	50
	MD520-4T0.7B(S)	MD-ACL-10-5-4T	5	50
	MD520-4T1.1B(S)	MD-ACL-10-5-4T	5	50
	MD520-4T1.5B(S)	MD-ACL-10-5-4T	5	50
	MD520-4T2.2B(S)	MD-ACL-10-5-4T	5	50
	MD520-4T3.0B(S)	MD-ACL-10-5-4T	5	50
T2	MD520-4T3.7B(S)	MD-ACL-15-3-4T	3	50
	MD520-4T5.5B(S)	MD-ACL-15-3-4T	3	50
T3	MD520-4T7.5B(S)	MD-ACL-40-1.45-4T	1.45	100
	MD520-4T11B(S)	MD-ACL-40-1.45-4T	1.45	100
T4	MD520-4T15B(S)	MD-ACL-50-1.2-4T	1.2	150
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	MD-ACL-50-0.28-4T-2%	0.28	-
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	MD-ACL-60-0.24-4T-2%	0.24	-
T6	MD520-4T30(B)(S)	MD-ACL-80-0.17-4T-2%	0.17	-
	MD520-4T37(B)(S)	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD520-4T45(B)(S)	MD-ACL-120-0.12-4T-2%	0.12	-
	MD520-4T55(B)(S)	MD-ACL-150-0.095-4T-2%	0.095	-

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T8	MD520-4T75(B)(S)	MD-ACL-200-0.07-4T-2%	0.07	-
	MD520-4T90(S)	MD-ACL-250-0.056-4T-2%	0.056	-
	MD520-4T110(S)	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD520-4T132(S)	MD-ACL-330-0.042-4T-2%	0.042	-
	MD520-4T160(S)	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD520-4T200(S)(-L)	MD-ACL-490-0.028-4T-2%	0.028	-
	MD520-4T220(S)(-L)	MD-ACL-490-0.028-4T-2%	0.028	-
T11	MD520-4T250(S)(-L)	MD-ACL-490-0.028-4T-2%	0.028	-
	MD520-4T280(S)(-L)	MD-ACL-660-0.028-4T-2%	0.021	-
T12	MD520-4T315(S)(-L)	MD-ACL-660-0.021-4T-2%	0.021	-
	MD520-4T355(S)(-L)	MD-ACL-800-0.017-4T-2%	0.017	-
	MD520-4T400(S)(-L)	MD-ACL-800-0.017-4T-2%	0.017	-

Table 5–15 Selection of Inovance AC input reactors (three phase 200-240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-2T0.4B(S)	MD-ACL-10-5-4T	5	50
	MD520-2T0.7B(S)	MD-ACL-10-5-4T	5	50
	MD520-2T1.1B(S)	MD-ACL-10-5-4T	5	50
	MD520-2T1.5B(S)	MD-ACL-10-5-4T	5	50
T2	MD520-2T2.2B(S)	MD-ACL-15-3-4T	3	50
	MD520-2T3.7B(S)	MD-ACL-15-3-4T	3	50
T3	MD520-2T5.5B(S)	MD-ACL-40-1.45-4T	1.45	100
T4	MD520-2T7.5B(S)	MD-ACL-50-1.2-4T	1.2	150
T5	MD520-2T11(B)(S)	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD520-2T15(B)(S)	MD-ACL-80-0.17-4T-2%	0.17	-
	MD520-2T18.5(B)(S)	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD520-2T22(B)(S)	MD-ACL-120-0.12-4T-2%	0.12	-
	MD520-2T30(B)(S)	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD520-2T37(B)(S)	MD-ACL-200-0.07-4T-2%	0.07	-
	MD520-2T45(S)	MD-ACL-250-0.056-4T-2%	0.056	-
	MD520-2T55(S)	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD520-2T75(S)	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD520-2T90(S)	MD-ACL-490-0.028-4T-2%	0.028	-
	MD520-2T110(S)	MD-ACL-490-0.028-4T-2%	0.028	-
T11	MD520-2T132(S)	MD-ACL-660-0.021-4T-2%	0.028	-
T12	MD520-2T160(S)	MD-ACL-660-0.021-4T-2%	0.021	-
	MD520-2T200(S)	MD-ACL-800-0.017-4T-2%	0.017	-

Dimensions

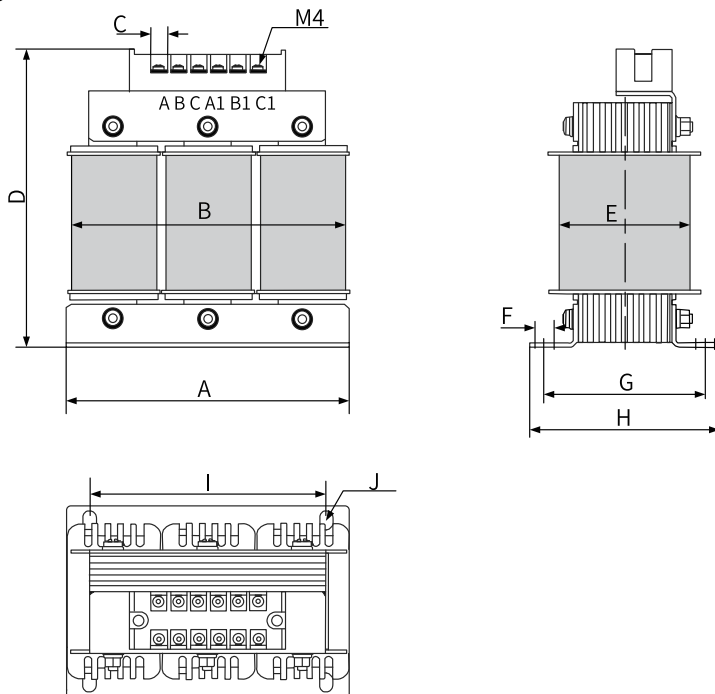


Figure 5-16 Dimensions of 10 A/15 A AC input reactors

Table 5-16 Dimensions of 10 A/15 A AC input reactors (unit: mm)

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

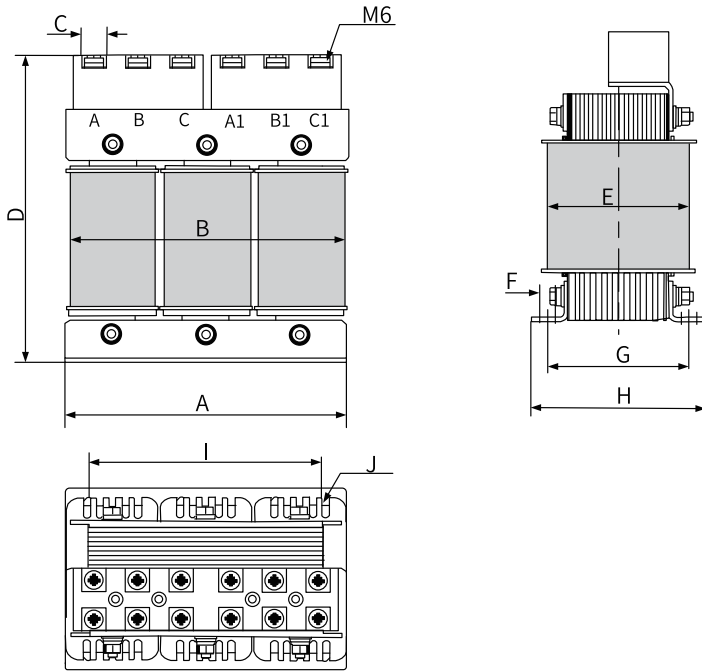


Figure 5-17 Dimensions of 40 A/50 A AC input reactors (1.2 mH)

Table 5-17 Dimensions of 40 A/50 A AC input reactors (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

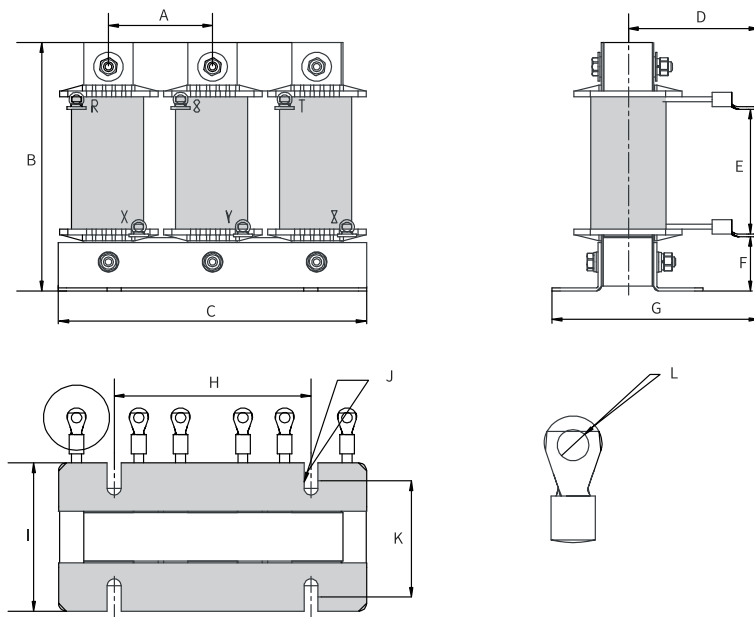


Figure 5-18 Dimensions of 50 A (0.28 mH)/60 A AC input reactors

Table 5-18 Dimensions of 50 A (0.28 mH)/60 A AC input reactors (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

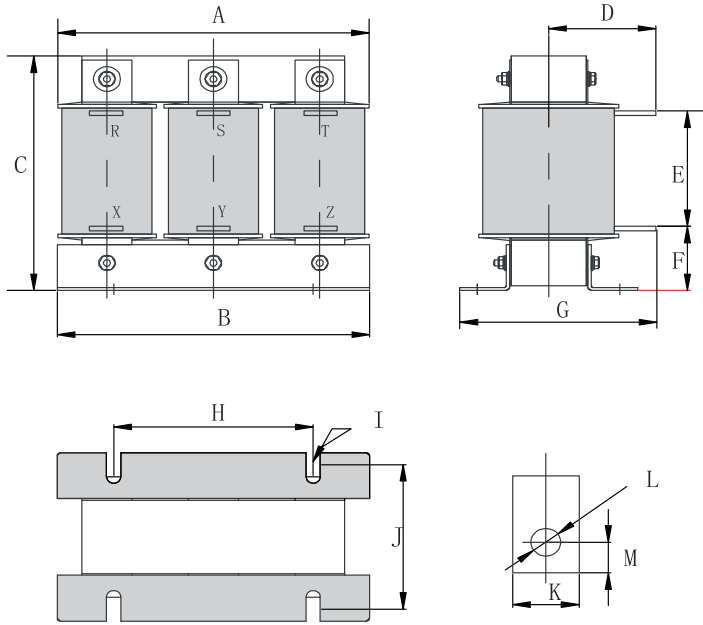


Figure 5-19 Dimensions of 80-120 A AC input reactors

Table 5-19 Dimensions of 80-120 A AC input reactors (unit: mm)

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

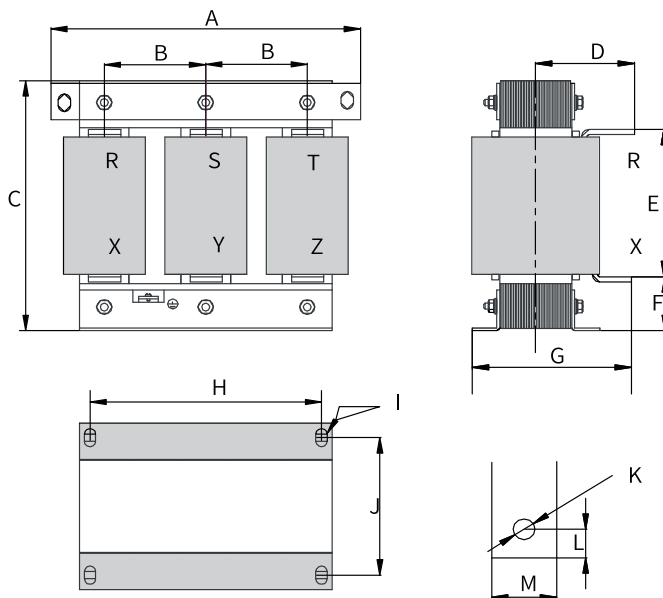


Figure 5-20 Dimensions of 150-330 A AC input reactors

Table 5-20 Dimensions of 150-330 A AC input reactors (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

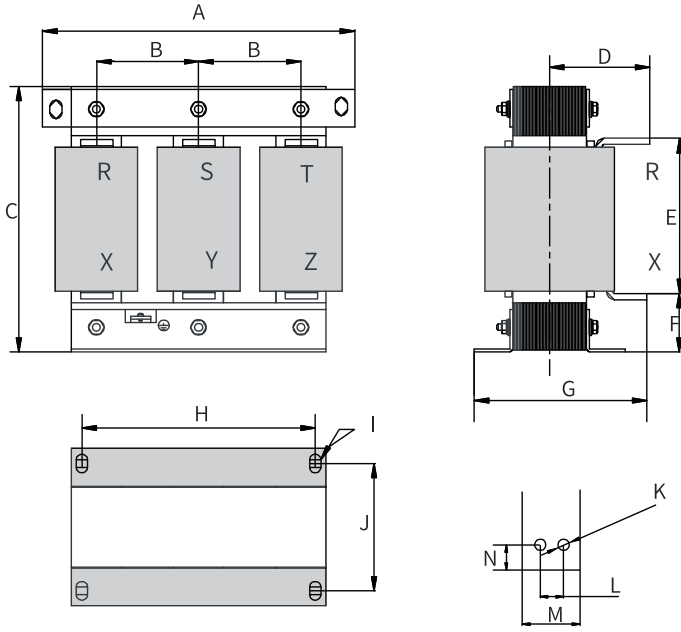


Figure 5-21 Dimensions of 490 A/660 AAC input reactors

Table 5-21 Dimensions of 490 A/660 A AC input reactors (unit: mm)

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

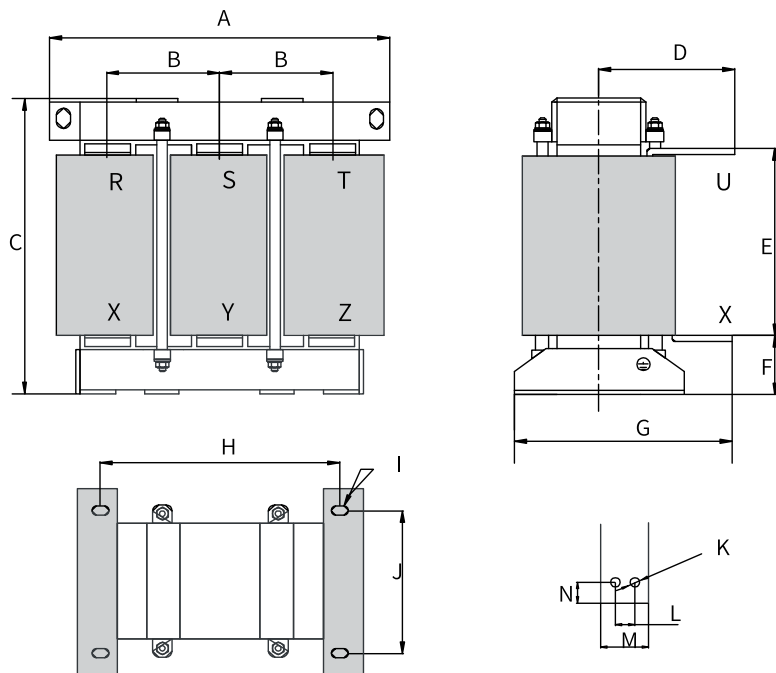


Figure 5-22 Dimensions of 800 A/1000 A AC input reactors

Table 5-22 Dimensions of 800 A/1000 A AC input reactors (unit: mm)

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

Note

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

Models and dimensions (Schaffner)

Table 5-23 Selection of Schaffner AC input reactors (three phase 380-480 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-4T0.4B(S)	RWK 3044-3.5-88-E0XXX	8.3	32
	MD520-4T0.7B(S)	RWK 3044-3.5-88-E0XXX	8.3	32
	MD520-4T1.1B(S)	RWK 3044-6.5-88-E0XXX	4.6	47
	MD520-4T1.5B(S)	RWK 3044-6.5-88-E0XXX	4.6	47
	MD520-4T2.2B(S)	RWK 3044-6.5-88-E0XXX	4.6	47
	MD520-4T3.0B(S)	RWK 3044-12-88-E0XXX	2.44	69
T2	MD520-4T3.7B(S)	RWK 3044-12-88-E0XXX	2.44	69
	MD520-4T5.5B(S)	RWK 3044-18-89-E0XXX	1.67	103
T3	MD520-4T7.5B(S)	RWK 3044-24-89-E0XXX	1.22	106
	MD520-4T11B(S)	RWK 3044-35-92-E0XXX	0.83	151
T4	MD520-4T15B(S)	RWK 3044-48-92-E0XXX	0.61	172
T5	MD520-4T18.5(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
	MD520-4T18.5(B)(S)-T			
	MD520-4T22(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
T6	MD520-4T30(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
	MD520-4T37(B)(S)	RWK 3044-72-99-E0XXX	0.41	294
T7	MD520-4T45(B)(S)	RWK 3044-120-99-E0XXX	0.24	324
	MD520-4T55(B)(S)	RWK 3044-120-99-E0XXX	0.24	324
T8	MD520-4T75(B)(S)	RWK 3044-140-99-E0XXX	0.2	399
	MD520-4T90(S)	RWK 3044-180-99-E0XXX	0.17	456
	MD520-4T110(S)	RWK 3044-210-99-E0XXX	0.14	553
T9	MD520-4T132(S)	RWK 3044-260-99-E0XXX	0.11	593
	MD520-4T160(S)	RWK 3044-320-99-E0XXX	0.092	747
T10	MD520-4T200(S)(-L)	RWK 3044-400-99-E0XXX	0.073	1055
	MD520-4T220(S)(-L)	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD520-4T250(S)(-L)	RWK 3044-510-99-E0XXX	0.058	1069
	MD520-4T280(S)(-L)	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD520-4T315(S)(-L)	RWK 3044-570-99-E0XXX	0.052	1181
	MD520-4T355(S)(-L)	RWK 3044-640-99-E0XXX	0.046	1116
	MD520-4T400(S)(-L)	RWK 3044-800-99-E0XXX	0.037	1280

Table 5-24 Selection of Schaffner AC input reactors (three phase 200-240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-2T0.4B(S)	RWK 3044-3.5-88-E0XXX	8.3	32
	MD520-2T0.7B(S)	RWK 3044-6.5-88-E0XXX	4.6	47
	MD520-2T1.1B(S)	RWK 3044-6.5-88-E0XXX	4.6	47
	MD520-2T1.5B(S)	RWK 3044-12-88-E0XXX	2.44	69
T2	MD520-2T2.2B(S)	RWK 3044-12-88-E0XXX	2.44	69
	MD520-2T3.7B(S)	RWK 3044-18-89-E0XXX	1.67	103
T3	MD520-2T5.5B(S)	RWK 3044-35-92-E0XXX	0.83	151
T4	MD520-2T7.5B(S)	RWK 3044-48-92-E0XXX	0.61	172
T5	MD520-2T11(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
T6	MD520-2T15(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
	MD520-2T18.5(B)(S)	RWK 3044-72-99-E0XXX	0.41	294
T7	MD520-2T22(B)(S)	RWK 3044-59-92-E0XXX	0.5	206
	MD520-2T30(B)(S)	RWK 3044-120-99-E0XXX	0.24	324
T8	MD520-2T37(B)(S)	RWK 3044-140-99-E0XXX	0.2	399
	MD520-2T45(S)	RWK 3044-180-99-E0XXX	0.17	456
	MD520-2T55(S)	RWK 3044-210-99-E0XXX	0.14	553
T9	MD520-2T75(S)	RWK 3044-320-99-E0XXX	0.092	747
T10	MD520-2T90(S)	RWK 3044-400-99-E0XXX	0.073	1055
	MD520-2T110(S)	RWK 3044-510-99-E0XXX	0.058	1069
T11	MD520-2T132(S)	RWK 3044-510-99-E0XXX	0.058	1069
T12	MD520-2T160(S)	RWK 3044-570-99-E0XXX	0.052	1181
	MD520-2T200(S)	RWK 3044-800-99-E0XXX	0.037	1280






5.4.3 EMC filter

Overview

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the EMC filter. The following EMC filters can be used.

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

Table 5-25 Standard EMC filter models and appearances

Filter Model		Appearance
Schaffner series	FN2090 series	
	FN3258 series	
	FN3359 series	
Jianli series	TH series	
	EBK5 series	

Models and dimensions of Schaffner filters

Table 5-26 Selection of Schaffner filters (three phase 380-480 V)

Structure	Model	Filter Model	Loss (W)
T1	MD520-4T0.4B(S)	FN 3258-7-44	3.8
	MD520-4T0.7B(S)	FN 3258-7-44	3.8
	MD520-4T1.1B(S)	FN 3258-7-44	3.8
	MD520-4T1.5B(S)	FN 3258-7-44	3.8
	MD520-4T2.2B(S)	FN 3258-7-44	3.8
	MD520-4T3.0B(S)	FN 3258-16-44	6.1
T2	MD520-4T3.7B(S)	FN 3258-16-44	6.1
	MD520-4T5.5B(S)	FN 3258-30-33	11.8
T3	MD520-4T7.5B(S)	FN 3258-30-33	11.8
	MD520-4T11B(S)	FN 3258-42-33	15.7
T4	MD520-4T15B(S)	FN 3258-42-33	15.7
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	FN 3258-55-34	25.9
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	FN 3258-75-34	31.2
T6	MD520-4T30(B)(S)	FN 3258-75-34	32.2
	MD520-4T37(B)(S)	FN 3258-75-34	32.2
T7	MD520-4T45(B)(S)	FN 3258-100-35	34.5
	MD520-4T55(B)(S)	FN 3258-130-35	43.1
T8	MD520-4T75(B)(S)	FN 3258-180-40	58.3
	MD520-4T90(S)	FN 3258-180-40	58.3
	MD520-4T110(S)	FN 3359-250-28	49
T9	MD520-4T132(S)	FN 3359-250-28	49
	MD520-4T160(S)	FN 3359-320-99	19
T10	MD520-4T200(S)(-L)	FN 3359-400-99	29
	MD520-4T220(S)(-L)	FN 3359-600-99	44
T11	MD520-4T250(S)(-L)	FN 3359-600-99	44
	MD520-4T280(S)(-L)	FN 3359-600-99	44
T12	MD520-4T315(S)(-L)	FN 3359-600-99	44
	MD520-4T355(S)(-L)	FN 3359-800-99	39
	MD520-4T400(S)(-L)	FN 3359-800-99	39

Table 5-27 Selection of Schaffner filters (three phase 200-240 V)

Structure	Model	Filter Model	Loss (W)
T1	MD520-2T0.4B(S)	FN 3258-7-44	3.8
	MD520-2T0.7B(S)	FN 3258-7-44	3.8
	MD520-2T1.1B(S)	FN 3258-7-44	3.8
	MD520-2T1.5B(S)	FN 3258-16-44	6.1
T2	MD520-2T2.2B(S)	FN 3258-16-44	6.1
	MD520-2T3.7B(S)	FN 3258-30-33	11.8
T3	MD520-2T5.5B(S)	FN 3258-42-33	15.7
T4	MD520-2T7.5B(S)	FN 3258-42-33	15.7
T5	MD520-2T11(B)(S)	FN 3258-75-34	31.2
T6	MD520-2T15(B)(S)	FN 3258-75-34	31.2
	MD520-2T18.5(B)(S)	FN 3258-75-34	31.2
T7	MD520-2T22(B)(S)	FN 3258-100-35	34.5
	MD520-2T30(B)(S)	FN 3258-130-34	43.1
T8	MD520-2T37(B)(S)	FN 3258-180-40	58.3
	MD520-2T45(S)	FN 3258-180-40	58.3
	MD520-2T55(S)	FN 3359-250-28	49
T9	MD520-2T75(S)	FN 3359-320-99	19
T10	MD520-2T90(S)	FN 3359-400-99	29
	MD520-2T110(S)	FN 3359-600-99	44
T11	MD520-2T132(S)	FN 3359-600-99	44
T12	MD520-2T160(S)	FN 3359-600-99	44
	MD520-2T200(S)	FN 3359-800-99	39

Table 5-28 Selection of Schaffner filters (single phase 220 V)

Structure	Model	Filter Model	Loss (W)
T2	MD520-2S0.4B(S)	FN 2090-8-06	-
	MD520-2S0.7B(S)	FN 2090-12-06	-
	MD520-2S1.5B(S)	FN 2090-20-08	-
	MD520-2S2.2B(S)	FN 2090-30-08	-

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

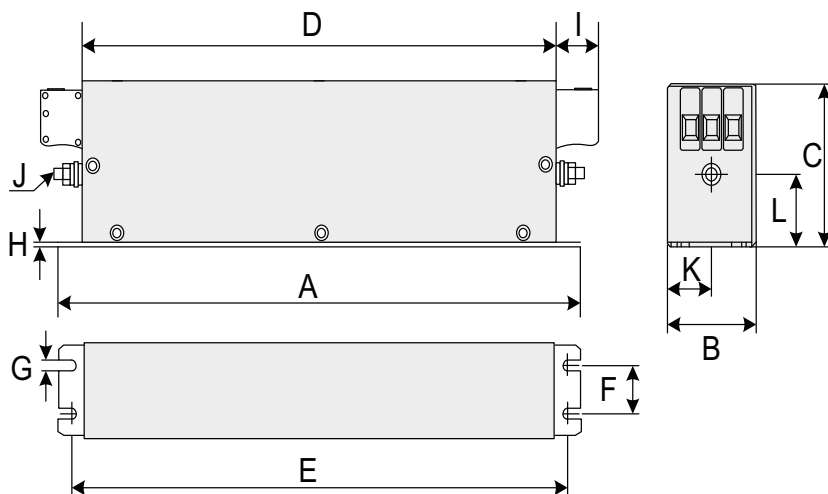


Figure 5-23 Dimensions of FN 3258 series filters (50-180 A)

Table 5-29 Dimensions of FN 3258 series filters (50-180 A) (unit: mm)

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

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

150-250A

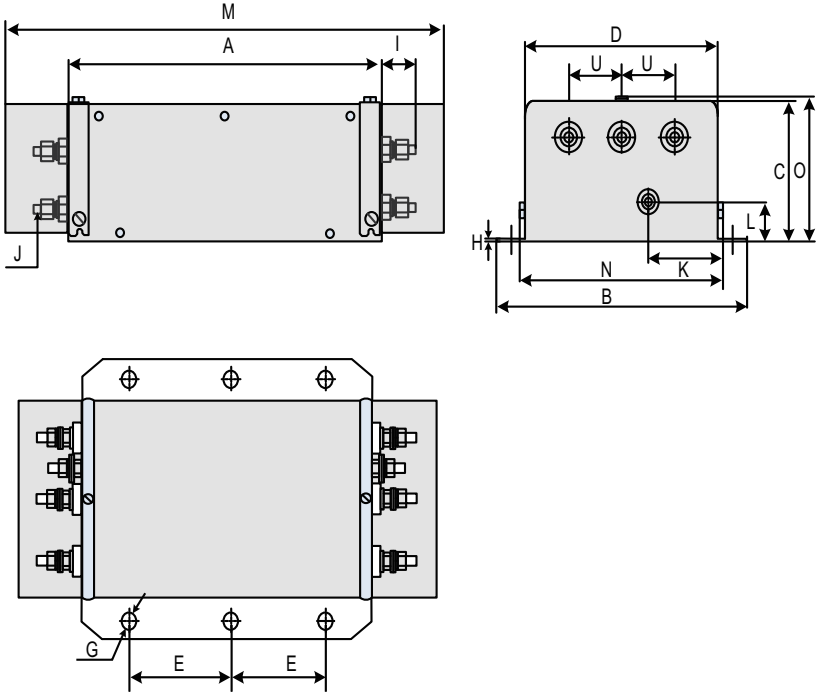


Figure 5-24 Dimensions of FN 3359 series filters (150-250 A)

Table 5-30 Dimensions of FN 3359 series filters (150-250 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	-	-	-

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

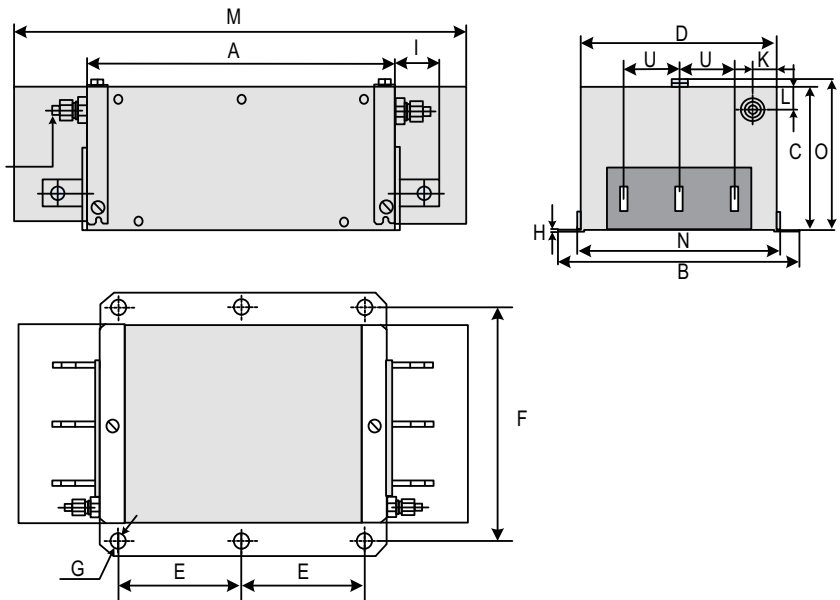


Figure 5-25 Dimensions of FN 3359 series filters (320-2500 A)

The following figure shows dimensions of copper busbars.

320~1000A

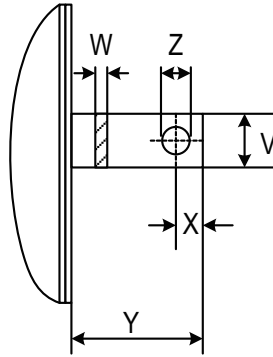


Figure 5-26 Dimensions of copper busbars

Table 5-31 Dimensions of FN 3359 series filters (320-2500 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 5-32 Selection of Jianli filters (three phase 380-480 V)

Structure	Model	Filter Model	Loss (W)
T1	MD520-4T0.4B(S)	DL-5EBK5	6.9
	MD520-4T0.7B(S)	DL-5EBK5	6.9
	MD520-4T1.1B(S)	DL-5EBK5	6.9
	MD520-4T1.5B(S)	DL-5EBK5	6.9
	MD520-4T2.2B(S)	DL-10EBK5	6.9
	MD520-4T3.0B(S)	DL-10EBK5	6.9
T2	MD520-4T3.7B(S)	DL-16EBK5	8.5
	MD520-4T5.5B(S)	DL-25EBK5	9.4
T3	MD520-4T7.5B(S)	DL-25EBK5	11
	MD520-4T11B(S)	DL-35EBK5	19.2
T4	MD520-4T15B(S)	DL-50EBK5	21.7
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	DL-50EBK5	21.7
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	DL-65EBK5	27.4
T6	MD520-4T30(B)(S)	DL-65EBK5	27.4
	MD520-4T37(B)(S)	DL-80EBK5	32.6
T7	MD520-4T45(B)(S)	DL-100EBK5	33
	MD520-4T55(B)(S)	DL-130EBK5	37.5
T8	MD520-4T75(B)(S)	DL-160EBK5	38.4
	MD520-4T90(S)	DL-200EBK5	34
	MD520-4T110(S)	DL-250EBK5	49
T9	MD520-4T132(S)	DL-300EBK3	49
	MD520-4T160(S)	DL-400EBK3	19
T10	MD520-4T200(S)(-L)	DL-400EBK3	29
	MD520-4T220(S)(-L)	DL-600EBK3	44
T11	MD520-4T250(S)(-L)	DL-600EBK3	44
	MD520-4T280(S)(-L)	DL-600EBK3	44
T12	MD520-4T315(S)(-L)	DL-600EBK3	44
	MD520-4T355(S)(-L)	DL-700EBK3	39
	MD520-4T400(S)(-L)	DL-700EBK3	39

Table 5-33 Selection of Jianli filters (three phase 200-240 V)

Structure	Model	Filter Model	Loss (W)
T1	MD520-2T0.4B(S)	DL-5EBK5	6.9
	MD520-2T0.7B(S)	DL-5EBK5	6.9
	MD520-2T1.1B(S)	DL-10EBK5	6.9
	MD520-2T1.5B(S)	DL-10EBK5	6.9
T2	MD520-2T2.2B(S)	DL-16EBK5	8.5
	MD520-2T3.7B(S)	DL-25EBK5	9.4
T3	MD520-2T5.5B(S)	DL-35EBK5	19.2
T4	MD520-2T7.5B(S)	DL-50EBK5	21.7
T5	MD520-2T11(B)(S)	DL-65EBK5	27.4
T6	MD520-2T15(B)(S)	DL-65EBK5	27.4
	MD520-2T18.5(B)(S)	DL-80EBK5	32.6
T7	MD520-2T22(B)(S)	DL-100EBK5	33
	MD520-2T30(B)(S)	DL-130EBK5	37.5
T8	MD520-2T37(B)(S)	DL-160EBK5	38.4
	MD520-2T45(S)	DL-250EBK5	49
	MD520-2T55(S)	DL-250EBK5	49
T9	MD520-2T75(S)	DL-300EBK3	49
T10	MD520-2T90(S)	DL-400EBK3	29
	MD520-2T110(S)	DL-600EBK3	44
T11	MD520-2T132(S)	DL-600EBK3	44
T12	MD520-2T160(S)	DL-600EBK3	44
	MD520-2T200(S)	DL-700EBK3	39

Table 5-34 Selection of Jianli filters (single phase 220 V)

Structure	Model	Filter Model	Loss (W)
T2	MD520-2S0.4B(S)	DL-10TH1	-
	MD520-2S0.7B(S)	DL-20TH1	-
	MD520-2S1.5B(S)	DL-20TH1	-
	MD520-2S2.2B(S)	DL-30TH1	-

The following figure shows the dimensions of Jianli filters (50-200 A).

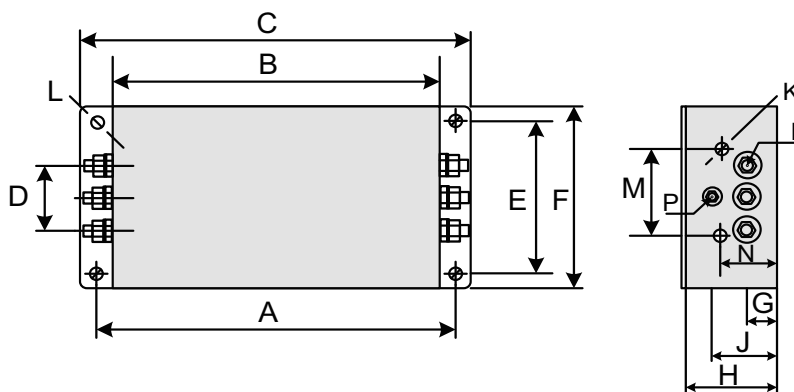
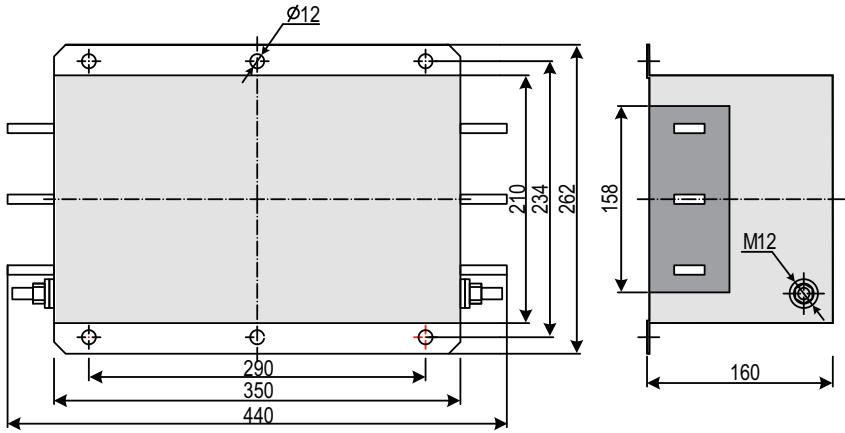


Figure 5-27 Dimensions of Jianli filters (50-200 A)

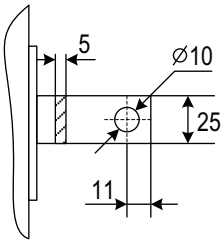
Table 5-35 Dimensions of Jianli filters (50-200 A) (unit: mm)

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

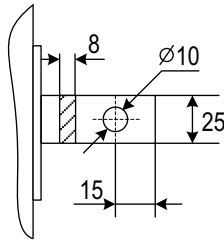
The following figure shows the dimensions of Jianli series filter (250-800 A).



250~300A



400~600A



700~800A

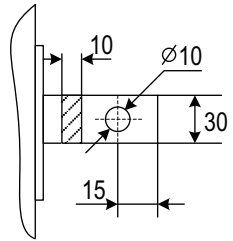


Figure 5-28 Dimensions of Jianli filters (250-800 A) (unit: mm)

Dimensions of Jianli filters (1000 A)

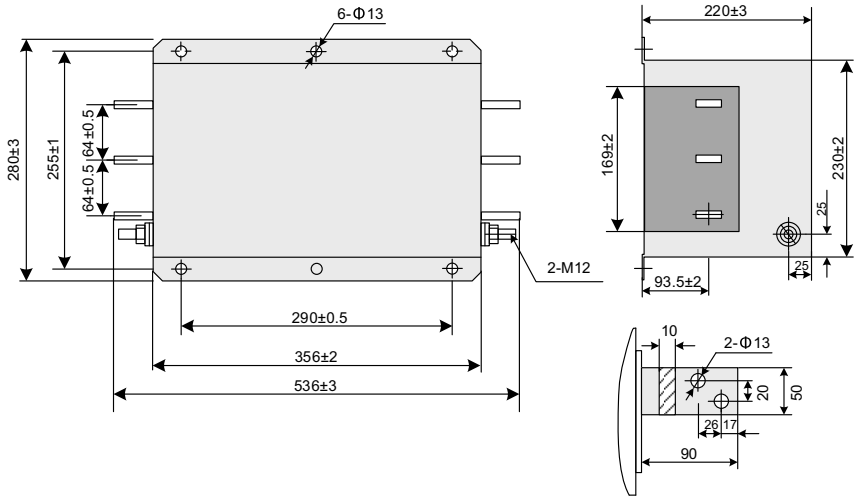


Figure 5-29 Dimensions of Jianli filters (1000 A) (unit: mm)

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

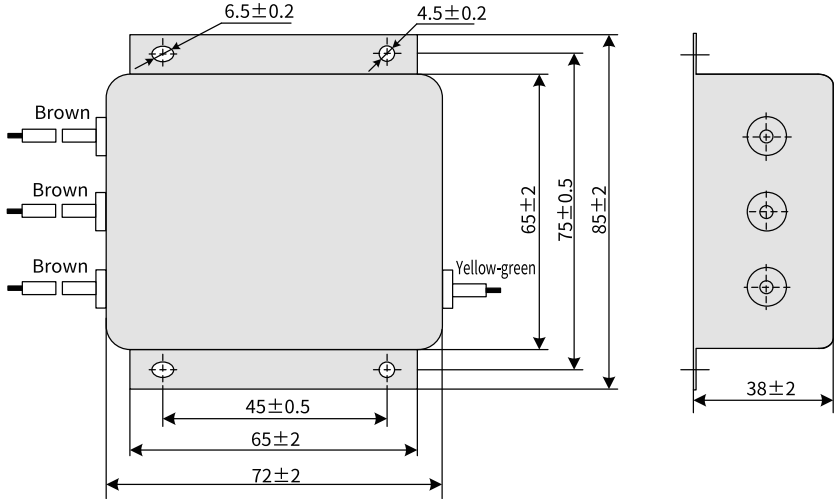


Figure 5-30 Dimension drawing of the simple filter

Table 5-36 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

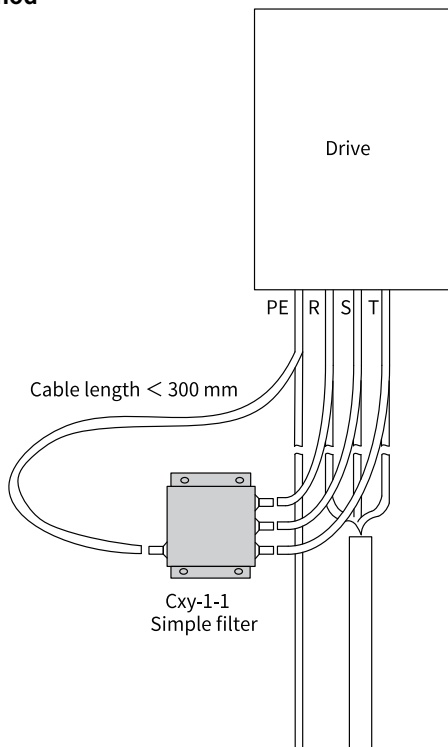


Figure 5-31 Installation of simple filter

5.4.5 Braking Components

Resistance of braking resistors

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

U indicates the braking voltage used to stabilize the system braking. The value of U varies with systems. The default braking voltage of the MD520 is 760 V, which can be adjusted through F9-08.

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, in consideration of the derating coefficient K, the power of the braking resistor is calculated by the following formula: $K \times P_r = P_b \times D$.

K is set to a value around 50%.

Pr indicates the power of the braking resistor.

D indicates the braking frequency, that is, percentage of the regenerative process to the whole working process.

The following equations are obtained according to 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 Pr can be calculated accordingly.

K is the derating coefficient of the braking resistor. A small value of K prevents the braking resistor from overheat. Increase K moderately if heat can be well dissipated, but in no case should K exceed 50%. Failure to comply may result in braking resistor overheat and fire.

Braking frequency (D) is determined by applications. Typical values of braking frequency in different applications are listed in "Table 5-37" on page 90.

Table 5-37 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%

Dimensions of braking units

The following figures show dimensions of two braking unit series.

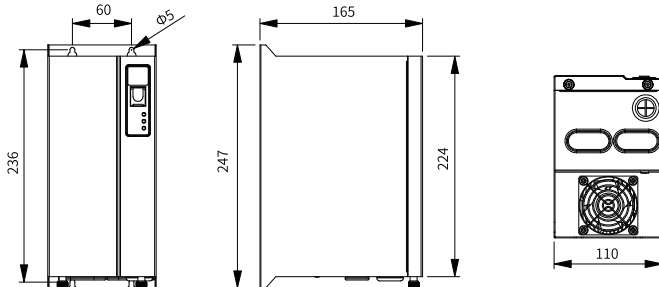


Figure 5-32 Dimensions of MDBUN series braking units (MDBUN-45-2T to MDBUN-90-2T; MDBUN-45-T to MDBUN-90-T; MDBUN-45-5T to MDBUN-90-5T) (mm)

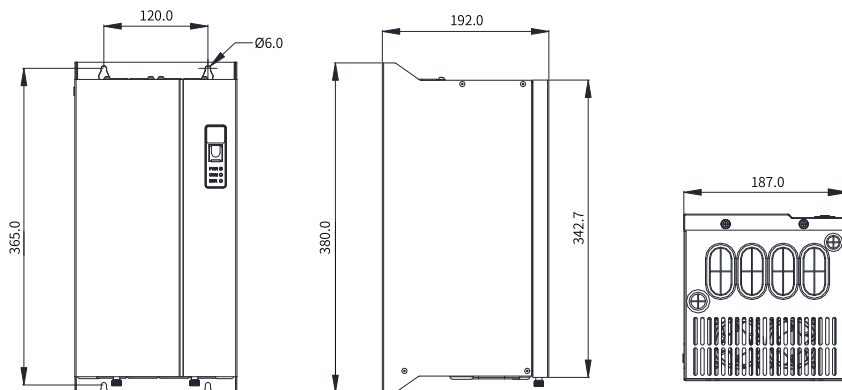


Figure 5-33 Dimensions of MDBUN series braking units (MDBUN-200-T, MDBUN-200-5T, MDBUN-200-7T) (mm)

Braking unit models

Note

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

Table 5-38 Selection of braking components (three phase 380-480 V)

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Qty.	Braking Resistor Specification	Qty.		
MD520-4T0.4B(S)	Built-in (standard)		80 W, 1450 Ω	1	AC drive models containing letter "B"	96
MD520-4T0.7B(S)			140 W, 800 Ω	1		96
MD520-4T1.1B(S)			220 W, 500 Ω	1		96
MD520-4T1.5B(S)			300 W, 380 Ω	1		96
MD520-4T2.2B(S)			440 W, 260 Ω	1		64
MD520-4T3.0B(S)			600 W, 190 Ω	1		64
MD520-4T3.7B(S)			740 W, 150 Ω	1		32
MD520-4T5.5B(S)			1100 W, 100 Ω	1		32
MD520-4T7.5B(S)			1500 W, 75 Ω	1		32
MD520-4T11B(S)			2200 W, 50 Ω	1		24
MD520-4T15B(S)			3000 W, 38 Ω	1		24
MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	Built-in (optional)		4000 W, 32 Ω	1	AC drive models containing letter "B"	24
MD520-4T22(B)(S) MD520-4T22(B)(S)-T			4500 W, 27 Ω	1		24
MD520-4T30(B)(S)			6000 W, 20 Ω	1		19.2
MD520-4T37(B)(S)			7000 W, 16 Ω	1		14.8
MD520-4T45(B)(S)			9000 W, 13 Ω	1		12.8
MD520-4T55(B)(S)			11000 W, 10.5 Ω	1		9.6
MD520-4T75(B)(S)			15000 W, 7.7 Ω	1		6.8
MD520-4T90(S)	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
MD520-4T110(S)	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
MD520-4T132(S)	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
MD520-4T160(S)	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
MD520-4T200(S) (-L)	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

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Qty.	Braking Resistor Specification	Qty.		
MD520-4T220(S) (-L)	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
MD520-4T250(S) (-L)	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
MD520-4T280(S) (-L)	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
MD520-4T315(S) (-L)	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
MD520-4T355(S) (-L)	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
MD520-4T400(S) (-L)	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

Table 5-39 Selection of braking components (three phase 200-240 V)

Model	Braking Unit		125% Braking Torque (10% ED; Max. 10s)		Remark	Min. Braking Resistance (Ω)
	Model	Qty.	Braking Resistor Specification	Qty.		
MD520-2T0.4B(S)	Built-in (standard)		90 W, 300 Ω	1	AC drive models containing letter "B"	48
MD520-2T0.7B(S)			160 W, 170 Ω	1		48
MD520-2T1.1B(S)			250 W, 110 Ω	1		32
MD520-2T1.5B(S)			340 W, 80 Ω	1		32
MD520-2T2.2B(S)			500 W, 55 Ω	1		16
MD520-2T3.7B(S)			800 W, 33 Ω	1		16
MD520-2T5.5B(S)			1300 W, 22 Ω	1		10
MD520-2T7.5B(S)			1700 W, 16 Ω	1		10
MD520-2T11(B)(S)	Built-in (optional)		2300 W, 12 Ω	1		12
MD520-2T15(B)(S)			3000 W, 9 Ω	1		9
MD520-2T18.5(B)(S)			3900 W, 7 Ω	1		7
MD520-2T22(B)(S)			4600 W, 6 Ω	1		6
MD520-2T30(B)(S)			5500 W, 5 Ω	1		5
MD520-2T37(B)(S)			6800 W, 4 Ω	1		4
MD520-2T45(S)	MDBUN-60-2T	2	5000 W, 5.4 Ω	2	-	4.9
MD520-2T55(S)	MDBUN-60-2T	2	6000 W, 4.4 Ω	2	-	4
MD520-2T75(S)	MDBUN-90-2T	2	7500 W, 4.0 Ω	2	-	3.7
MD520-2T90(S)	MDBUN-90-2T	3	6000 W, 4.0 Ω	3	-	3.7
MD520-2T110(S)	MDBUN-90-2T	3	7500 W, 4.0 Ω	3	-	3.7
MD520-2T132(S)	MDBUN-90-2T	4	7000 W, 4.0 Ω	4	-	3.7
MD520-2T160(S)	MDBUN-90-2T	5	6500 W, 4.0 Ω	5	-	3.7
MD520-2T200(S)	MDBUN-90-2T	6	7000 W, 4.0 Ω	6	-	3.7

Table 5-40 Selection of braking components (single phase 200-240 V)

Model	Braking Unit	125% Braking Torque (10% ED; Max. 10s)		Remark	Min. Braking Resistance (Ω)
		Braking Resistor Specification	Qty.		
MD520-2S0.4B(S)	Built-in (standard)	80 W, 200 Ω	1	AC drive models containing letter "B"	64
MD520-2S0.7B(S)		80 W, 150 Ω	1		64
MD520-2S1.5B(S)		100 W, 100 Ω	1		32
MD520-2S2.2B(S)		100 W, 70 Ω	1		32

- The default initial braking voltages of built-in braking units are 760 V and 350 V for the 380-480 V models and 200-240 V models, respectively.
- The default initial braking voltage of the external braking units MDBUN-60-T, MDBUN-90-T, and MDBUN-200-T is 670 V. These braking units apply to grids with

the input voltage lower than or equal to 440 VAC. The default initial braking voltage of the external braking units MDBUN-60-5T, MDBUN-90-5T, and MDBUN-200-5T is 760 V. These braking units apply to grids with the input voltage higher than 440 VAC. You can adjust the initial braking voltage based on the grid voltage. Higher initial braking voltage requires higher braking resistance.

- The preceding table is only for reference. 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. Select the braking resistor based on the generation power of the motor in the actual system, system inertia, deceleration time, and potential energy load.
- Larger system inertia requires shorter deceleration time and more frequent braking. In this case, select a braking resistor with higher power and lower resistance.
- For details on how to install and use the MDBUN, see *MDBUN Series Braking Unit User Guide*.

5.4.6 AFE Unit

The active front end (AFE) is an optional unit used to feed the energy generated by the motor during braking back to the mains. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE features energy efficiency, low noise, low harmonic wave, and high power factor.

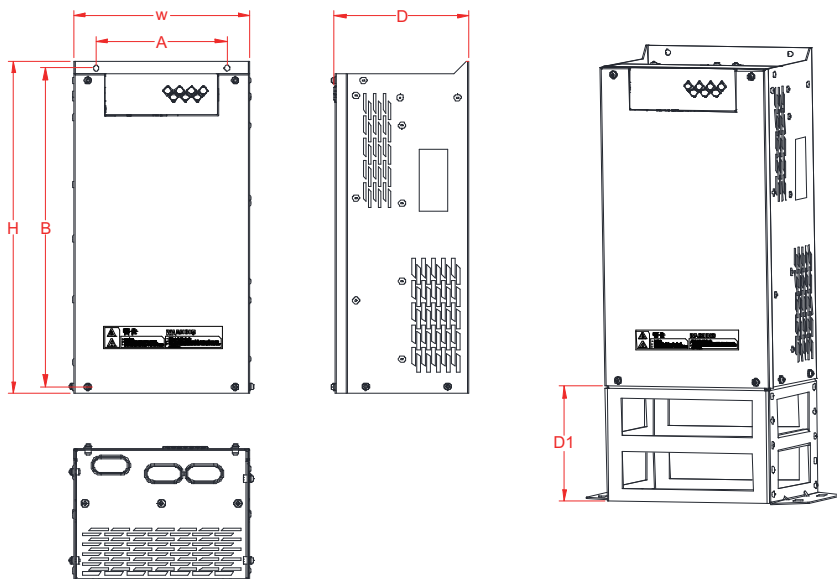


Figure 5-34 Dimensions of MD051 series AFE (unit: mm)

Table 5-41 Dimensions of MD051 series AFE

Model	Dimensions (mm)			Bracket D1	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

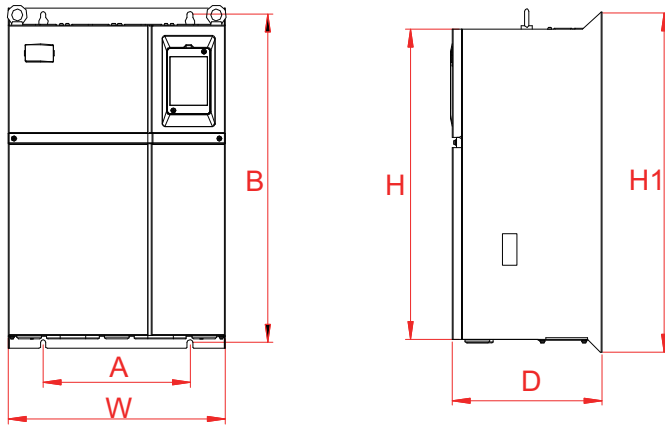


Figure 5-35 Dimensions of MD050 series AFE (unit: mm)

Table 5-42 Dimensions of MD050 series AFE

Model	Dimensions (mm)				Mounting Hole (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	H1	W	D	A	B		
MD050-T37G	549	600	385	265	260	580	10	32
MD050-T45G								
MD050-T55G								
MD050-T75G	660	700	473	307	343	678	10	47
MD050-T90G								
MD050-T110G	880	930	579	380	449	903	10	90
MD050-T132G								
MD050-T160G								

Model	Dimensions (mm)				Mounting Hole (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	H1	W	D	A	B		
MD050-T200G	983	1060	650	377	420	1030	12	130
MD050-T220G								
MD050-T250G								
MD050-T280G								
MD050-T315G	1203	1358	800	400	520	1300	14	200
MD050-T355G								
MD050-T400G								
MD050-T450G								

Note

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

5.4.7 Output Reactor

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

Table 5-43 Minimum cable length with the output reactor configured (three phase 380-480 V)

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

Table 5-44 Minimum cable length with the output reactor configured (three phase 200-240 V)

AC Drive Power (kW)	Rated Voltage (V)	Min. Cable Length (m)
0.4-3	200-500	50
3.7	200-500	70

AC Drive Power (kW)	Rated Voltage (V)	Min. Cable Length (m)
5.5	200–500	110
7.5	200–500	125
≥ 11	200–500	150

Models and dimensions (Inovance)

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

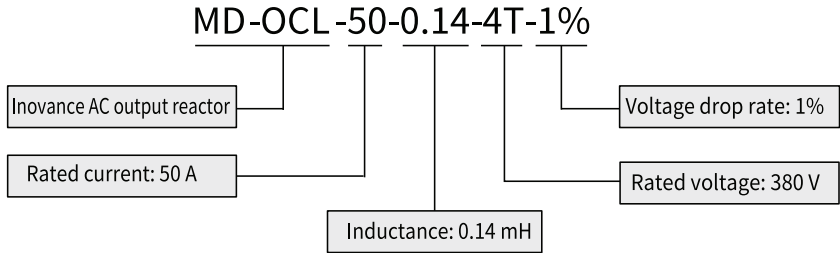


Figure 5-36 AC output reactor model

Note

- The following recommended AC output reactors are applicable only to T1 to T9 models.
- For T10 to T12 models, purchase AC output reactors with the model name containing "-L".

Table 5–45 Selection of Inovance AC output reactors (three phase 380-480 V)

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T1	MD520-4T0.4B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-4T0.7B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-4T1.1B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-4T1.5B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-4T2.2B(S)	MD-OCL-7-1.0-4T-1%	1.0	-
	MD520-4T3.0B(S)	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD520-4T3.7B(S)	MD-OCL-10-0.7-4T-1%	0.7	-
	MD520-4T5.5B(S)	MD-OCL-15-0.47-4T-1%	0.47	-
T3	MD520-4T7.5B(S)	MD-OCL-20-0.35-4T-1%	0.35	-
	MD520-4T11B(S)	MD-OCL-30-0.23-4T-1%	0.23	-
T4	MD520-4T15B(S)	MD-OCL-40-0.18-4T-1%	0.18	-

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	MD-OCL-50-0.14-4T-1%	0.14	-
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD520-4T30(B)(S)	MD-OCL-80-0.087-4T-1%	0.087	-
	MD520-4T37(B)(S)	MD-OCL-90-0.078-4T-1%	0.078	-
T7	MD520-4T45(B)(S)	MD-OCL-120-0.058-4T-1%	0.058	-
	MD520-4T55(B)(S)	MD-OCL-150-0.047-4T-1%	0.047	-
T8	MD520-4T75(B)(S)	MD-OCL-200-0.035-4T-1%	0.035	-
	MD520-4T90(S)	MD-OCL-250-0.028-4T-1%	0.028	-
	MD520-4T110(S)	MD-OCL-250-0.028-4T-1%	0.028	-
T9	MD520-4T132(S)	MD-OCL-330-0.021-4T-1%	0.021	-
	MD520-4T160(S)	MD-OCL-330-0.021-4T-1%	0.021	-

Note:

For T10 to T12 models, purchase AC output reactors with the model name contains "-L".

Table 5-46 Selection of Inovance AC output reactors (three phase 200-240 V)

Structure	AC Drive Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-2T0.4B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-2T0.7B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-2T1.1B(S)	MD-OCL-7-1.0-4T-1%	1.0	-
	MD520-2T1.5B(S)	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD520-2T2.2B(S)	MD-OCL-10-0.7-4T-1%	0.7	-
	MD520-2T3.7B(S)	MD-OCL-15-0.47-4T-1%	0.47	-
T3	MD520-2T5.5B(S)	MD-OCL-30-0.23-4T-1%	0.23	-
T4	MD520-2T7.5B(S)	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD520-2T11(B)(S)	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD520-2T15(B)(S)	MD-OCL-80-0.087-4T-1%	0.087	-
	MD520-2T18.5(B)(S)	MD-OCL-90-0.078-4T-1%	0.078	-
T7	MD520-2T22(B)(S)	MD-OCL-120-0.058-4T-1%	0.058	-
	MD520-2T30(B)(S)	MD-OCL-150-0.047-4T-1%	0.047	-
T8	MD520-2T37(B)(S)	MD-OCL-200-0.035-4T-1%	0.035	-
	MD520-2T45(S)	MD-OCL-250-0.028-4T-1%	0.028	-
	MD520-2T55(S)	MD-OCL-250-0.028-4T-1%	0.028	-
T9	MD520-2T75(S)	MD-OCL-330-0.021-4T-1%	0.021	-

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

Structure	AC Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T2	MD520-2S0.4B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-2S0.7B(S)	MD-OCL-5-1.4-4T-1%	1.4	-
	MD520-2S1.5B(S)	MD-OCL-7-0.7-4T-1%	0.7	-
	MD520-2S2.2B(S)	MD-OCL-10-0.7-4T-1%	0.7	-

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

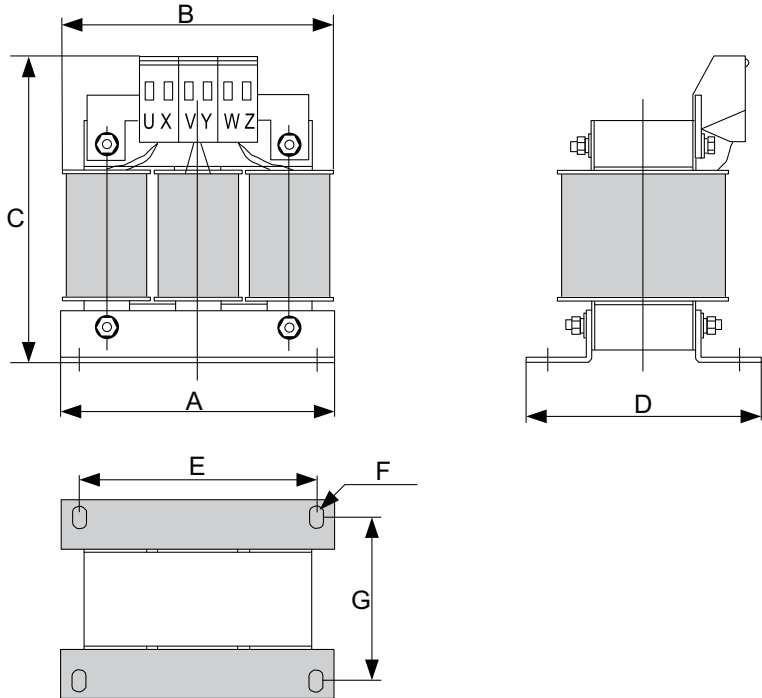


Figure 5-37 Dimensions of the AC output reactor (5-15 A)

Table 5-48 Dimensions of the AC output reactor (5-15 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

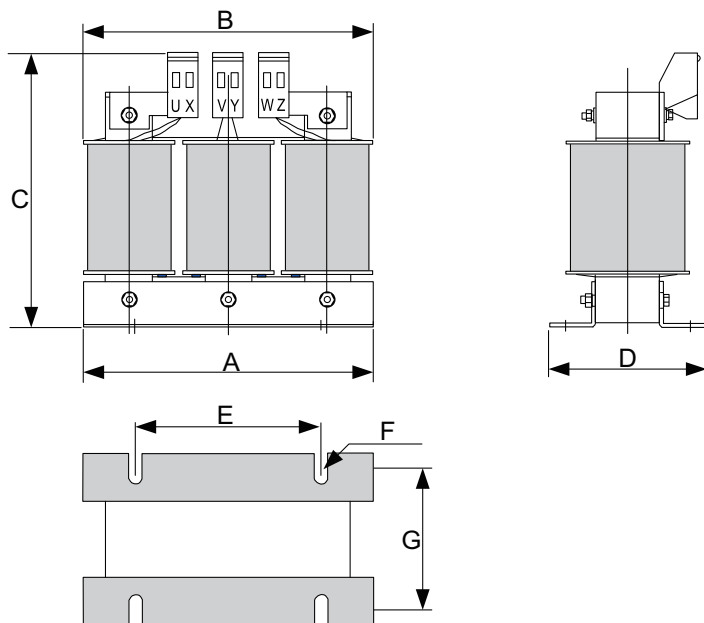


Figure 5-38 Dimensions of the AC output reactor (15 A)

Table 5-49 Dimensions of AC output reactor (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

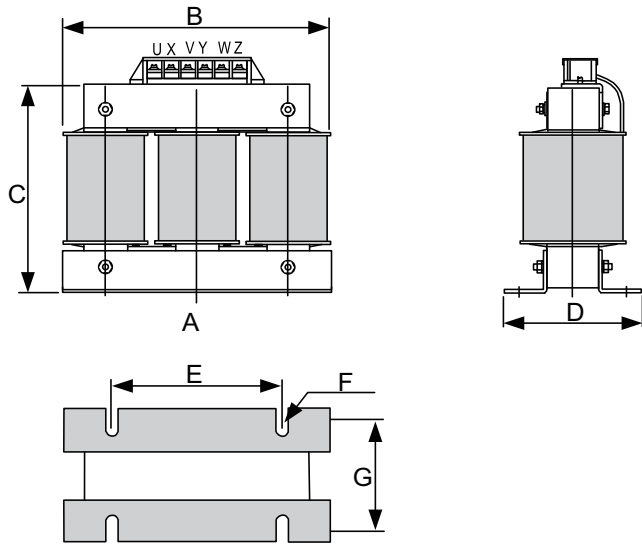


Figure 5-39 Dimensions of the AC output reactor (20 A)

Table 5-50 Dimensions of the AC output reactor (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

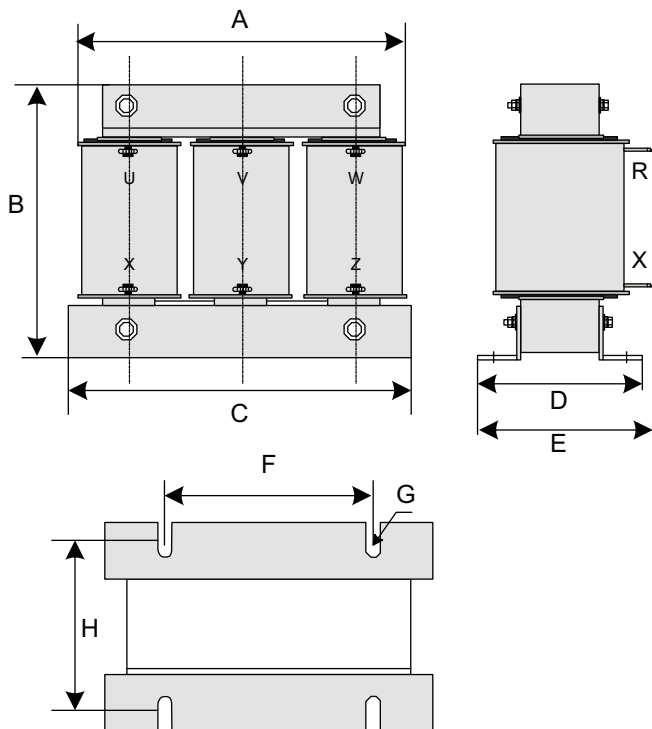


Figure 5-40 Dimensions of the AC output reactors (30-60 A)

Table 5-51 Dimensions of the AC output reactors (30-60 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

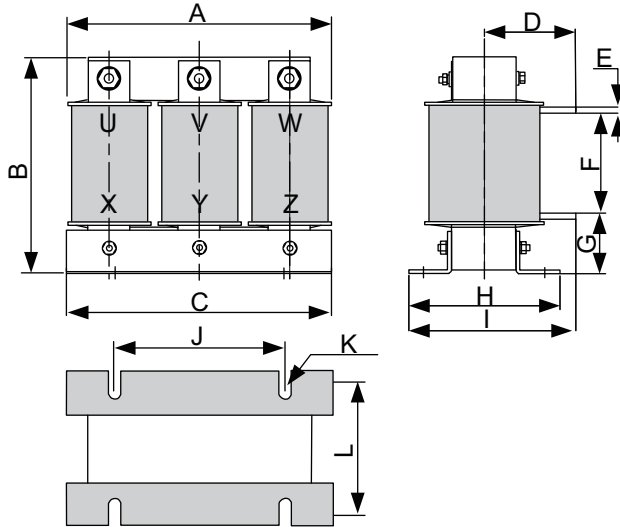


Figure 5-41 Dimensions of the AC output reactor (80-120 A)

Table 5-52 Dimensions of the AC output reactor (80-120 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

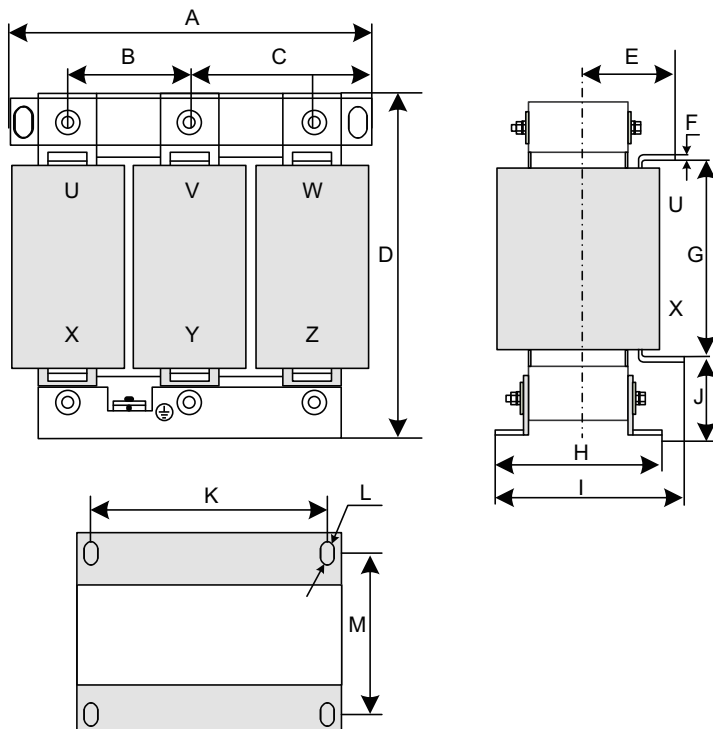


Figure 5-42 Dimensions of the AC output reactor (150-250 A)

Table 5-53 Dimensions of the AC output reactor (150-250 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±10	5	140±5	113±2	170	42±5	182±1	Φ11 x 18	87±2
200	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11 x 18	97±2
250	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11 x 18	97±2

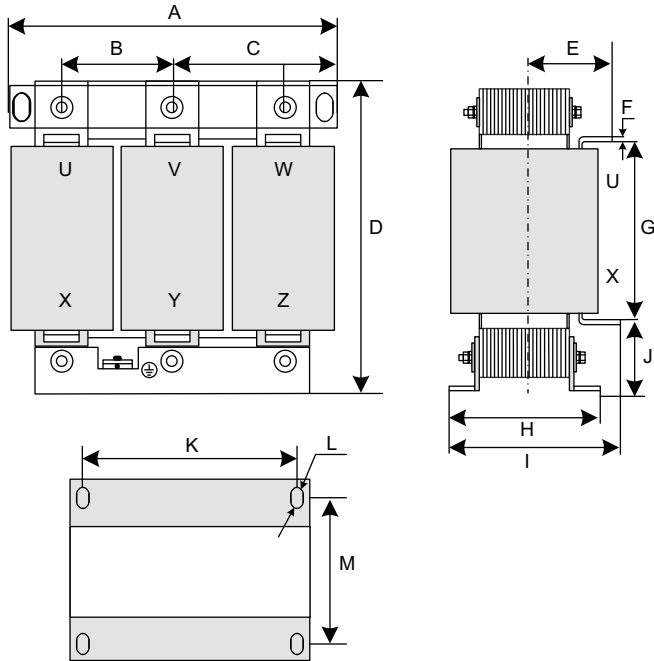


Figure 5-43 Dimensions of the AC output reactor (330 A)

Table 5-54 Dimensions of the AC output reactor (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 (Schaffner)

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

Table 5–55 Selection of Schaffner output reactors

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-4T0.4B(S)	RWK 305-4-KL	1.47	22
	MD520-4T0.7B(S)	RWK 305-4-KL	1.47	22
	MD520-4T1.1B(S)	RWK 305-4-KL	1.47	22
	MD520-4T1.5B(S)	RWK 305-4-KL	1.47	22
	MD520-4T2.2B(S)	RWK 3057.8-KL	0.754	25
	MD520-4T3.0B(S)	RWK 3057.8-KL	0.754	25
T2	MD520-4T3.7B(S)	RWK 305-10-KL	0.588	30
	MD520-4T5.5B(S)	RWK 305-14-KL	0.42	34
T3	MD520-4T7.5B(S)	RWK 305-17-KL	0.364	38
	MD520-4T11B(S)	RWK 305-32-KL	0.184	55
T4	MD520-4T15B(S)	RWK 305-32-KL	0.184	55
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	RWK 305-45-KL	0.131	60
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	RWK 305-45-KL	0.131	60
T6	MD520-4T30(B)(S)	RWK 305-60-KL	0.098	65
	MD520-4T37(B)(S)	RWK 305-90-KL	0.065	75
T7	MD520-4T45(B)(S)	RWK 305-110-KL	0.053	90
	MD520-4T55(B)(S)	RWK 305-156-KS	0.038	120
T8	MD520-4T75(B)(S)	RWK 305-182-KS	0.032	140
	MD520-4T90(S)	RWK 305-230-KS	0.026	180
	MD520-4T110(S)	RWK 305-280-KS	0.021	220
T9	MD520-4T132(S)	RWK 305-330-KS	0.018	240
	MD520-4T160(S)	RWK 305-400-S	0.015	330
T10	MD520-4T200(S) (-L)	RWK 305-500-S	0.012	340
	MD520-4T220(S) (-L)	RWK 305-600-S	0.01	380
T11	MD520-4T250(S) (-L)	RWK 305-600-S	0.01	380
	MD520-4T280(S) (-L)	RWK 305-680-S	0.009	410
T12	MD520-4T315(S) (-L)	RWK 305-790-S	0.007	590
	MD520-4T355(S) (-L)	RWK 305-910-S	0.006	740
	MD520-4T400(S) (-L)	RWK 305-910-S	0.006	740

Table 5–56 Selection of Schaffner output reactors (three phase 200-240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T1	MD520-2T0.4B(S)	RWK 305-4-KL	1.47	22
	MD520-2T0.7B(S)	RWK 305-7.8-KL	0.754	25
	MD520-2T1.1B(S)	RWK 305-7.8-KL	0.754	25
	MD520-2T1.5B(S)	RWK 305-10-KL	0.588	30
T2	MD520-2T2.2B(S)	RWK 305-14-KL	0.42	34
	MD520-2T3.7B(S)	RWK 305-17-KL	0.364	38
T3	MD520-2T5.5B(S)	RWK 305-32-KL	0.184	55
T4	MD520-2T7.5B(S)	RWK 305-45-KL	0.131	60
T5	MD520-2T11(B)(S)	RWK 305-60-KL	0.098	65
T6	MD520-2T15(B)(S)	RWK 305-72-KL	0.082	70
	MD520-2T18.5(B)(S)	RWK 305-90-KL	0.065	75
T7	MD520-2T22(B)(S)	RWK 305-110-KL	0.053	90
	MD520-2T30(B)(S)	RWK 305-156-KS	0.038	120
T8	MD520-2T37(B)(S)	RWK 305-182-KS	0.032	140
	MD520-2T45(S)	RWK 305-230-KS	0.026	180
	MD520-2T55(S)	RWK 305-280-KS	0.021	220
T9	MD520-2T75(S)	RWK 305-330-KS	0.018	240
T10	MD520-2T90(S)	RWK 305-400-S	0.015	330
	MD520-2T110(S)	RWK 305-500-S	0.012	340
T11	MD520-2T132(S)	RWK 305-500-S	0.012	340
T12	MD520-2T160(S)	RWK 305-600-S	0.01	380
	MD520-2T200(S)	RWK 305-790-S	0.007	590

Table 5–57 Selection of Schaffner output reactors (single phase 200-240 V)

Structure	Model	Applicable Reactor	Inductance (mH)	Loss (W)
T2	MD520-2S0.4B(S)	RWK 305-4-KL	1.47	22
	MD520-2S0.7B(S)	RWK 305-7.8-KL	0.754	22
	MD520-2S1.5B(S)	RWK 305-10-KL	0.588	25
	MD520-2S2.2B(S)	RWK 305-14-KL	0.42	30

Models of 4 A to 45 A

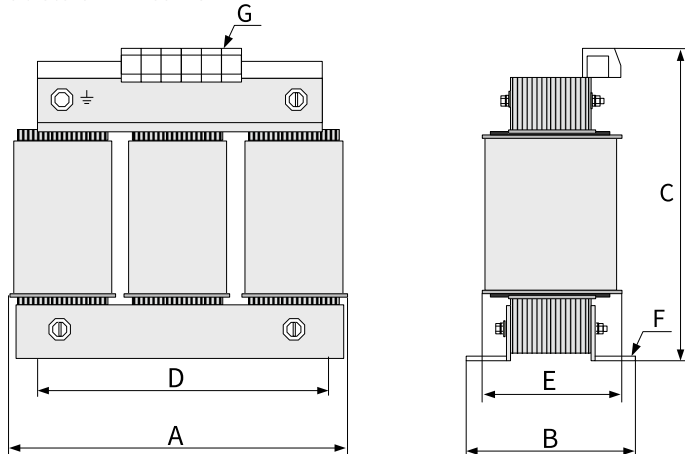


Figure 5-44 Dimensions of the output reactor (4-45 A)

Table 5-58 Dimensions of the output reactor (4-45 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

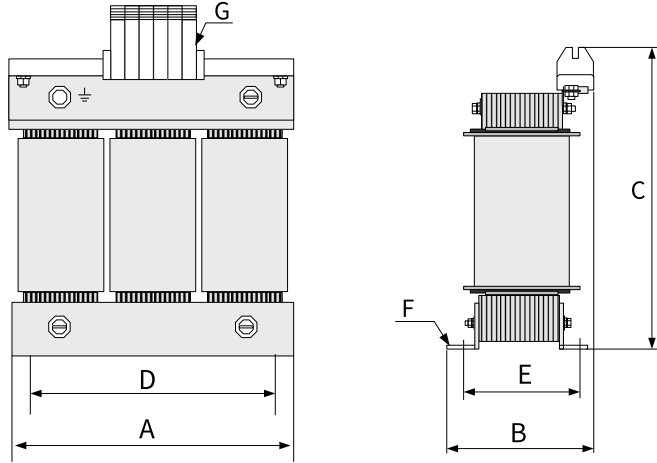


Figure 5-45 Dimensions of the output reactor (60–110 A)

Table 5-59 Dimensions of the output reactor (60–110 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 1100 A

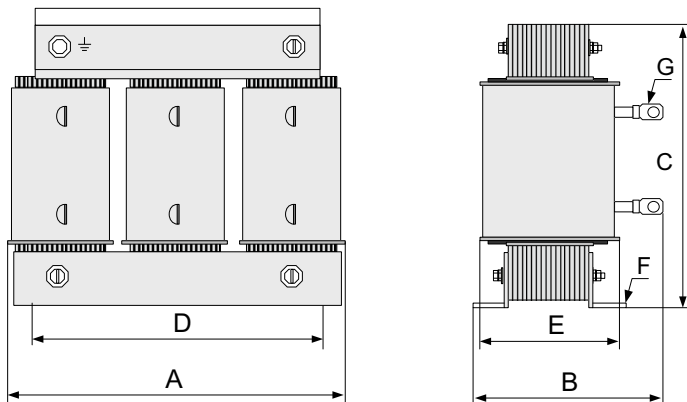


Figure 5-46 Dimensions of the output reactor (124–1100 A)

Table 5-60 Dimensions of the output reactor (124–1100 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 5-61 Appearance and models of magnetic rings and ferrite clamp

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

Dimensions

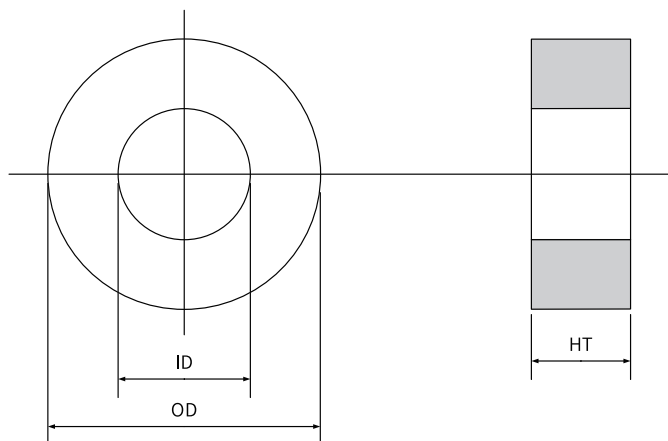


Figure 5-47 Dimension drawing of magnetic ring

Table 5-62 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

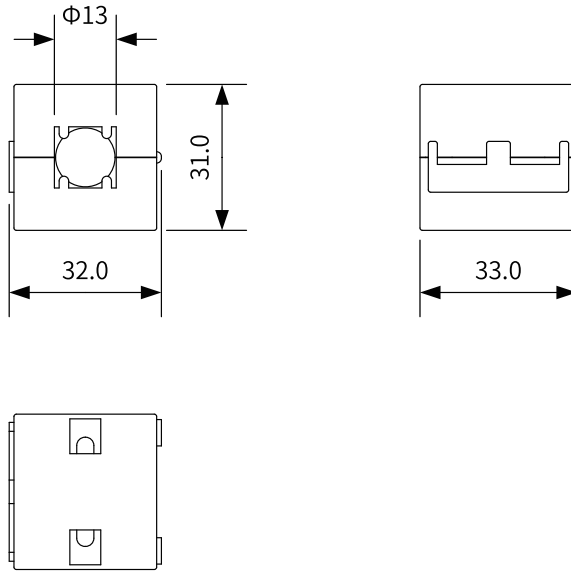




Figure 5-48 Dimension drawing of ferrite clamp

5.5 Operating Panel

Model	Description	Appearance
MDKE-10	<p>It is an optional LED operating panel that supports copy, download, and modification of parameters. It supports English and Chinese.</p> <p>The dimensions are shown below.</p>	 <p>The MDKE-10 is a compact, handheld device with a blue LED display. The screen shows 'FWD' at the top, a battery icon, and a green arrow pointing up. Below the display, the number '5000' is shown in large digits, with 'Hz' underneath. The device features a central 'OK' button surrounded by four directional arrows (up, down, left, right). There are also two large buttons on the sides, one green with a diamond icon and one red with a circle icon. At the bottom, there is a USB port.</p>
SOP-20	<p>It is an optional LCD operating panel that supports copy, download, and modification of parameters. It supports English and Chinese.</p> <p>The dimensions are shown below.</p>	 <p>The SOP-20 is a larger, handheld device with a black LCD screen. The screen displays '1: Inverter' at the top, followed by a list of options: '01 Parameters', '02 Fault Records', '03 Shortcut', and '04 Authority'. At the bottom of the screen, it shows 'Back Loc 10:00:00 Select'. The device has a central 'OK' button with four directional arrows. There are also two large buttons on the sides, one green with a diamond icon and one red with a circle icon. At the bottom, there is a USB port.</p>

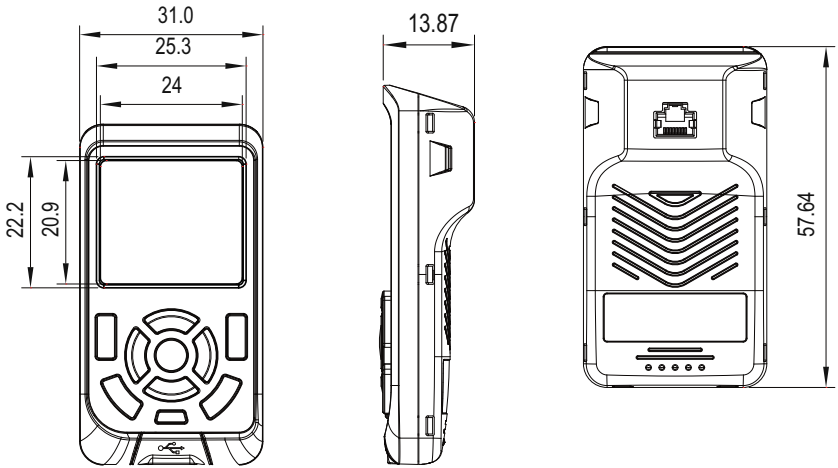


Figure 5-49 Dimensions of MDKE-10 (unit: mm)

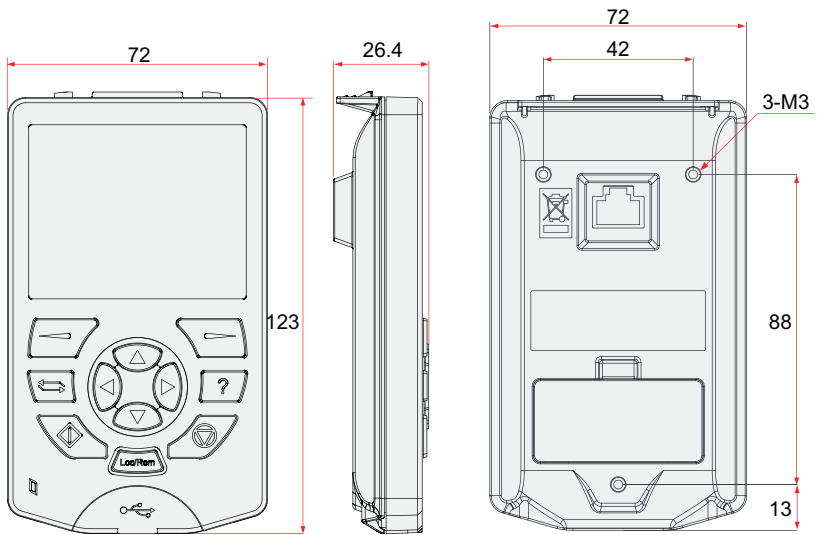


Figure 5-50 Dimensions of SOP-20 (unit: mm)

6 Expansion Cards

6.1 List of Expansion Cards

The MD520 supports different types of expansion cards including communication cards and encoder cards. The former is used to communicate with field buses, and the latter is used to connect multiple types of encoders. All the expansion cards support secondary development. For details on the functions and configurations of expansion cards, see their user guides.

Table 6–1 List of expansion cards

Name	Model	Function	Remarks
I/O expansion card 1	MD38IO1	The following can be added: five DIs, one relay output terminal, and one DO. Modbus and CANlink are supported. When this kind of I/O expansion card is used, AIs and AOs cannot be added.	Applicable to T4 models and above
I/O expansion card 2	MD38IO2	Three DIs can be added.	Applicable to all models
I/O expansion card 3	MD38IO3	The following can be added: three DIs, one RS-485 communication signal isolation input terminal, and one normally open relay output terminal.	Applicable to all models
RS-485 communication card	MD38TX1	Modbus communication adapter card with the isolation feature	Applicable to all models
CANlink communication expansion card	MD38CAN1	CANlink communication adapter card	Applicable to all models
CANopen communication expansion card	MD38CAN2	CANopen communication adapter card	Applicable to all models
PROFIBUS DP communication card	MD-SI-DP1	PROFIBUS DP communication card	Applicable to all models
PROFIBUS DP communication card	MD38DP2	PROFIBUS DP communication card	Applicable to T4 to T12 models
PROFINET communication expansion card	MD500-PN1	PROFINET communication adapter card	Applicable to all models
EtherCAT communication expansion card	MD500-ECAT	EtherCAT communication adapter card	Applicable to all models
Ethernet/IP communication expansion card	MD500-EN1	Ethernet/IP communication adapter card	Applicable to all models

Name	Model	Function	Remarks
Resolver interface card	MD38PG4	Applicable 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. Select a resolver with a maximum of four pole pairs. Otherwise, MD38PG4 will be overloaded.	Applicable to all models
MD38PGMD multi-function encoder card	MD38PGMD	Collector and differential encoder interface card with an optional multiplied frequency-division output; adaptable to 5 V/15 V power supply. Supports differential input, collector input, and push-pull input; supports differential output and collector output; supports a variety of interfaces such as encoder interfaces and host controller A/B phase input interfaces.	Applicable to all models
23-bit PG card	ES510-PG-CT1	Applicable to 23-bit encoder of Inovance; with a DB9 interface	Applicable to all models

6.2 Installing the Expansion Card

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

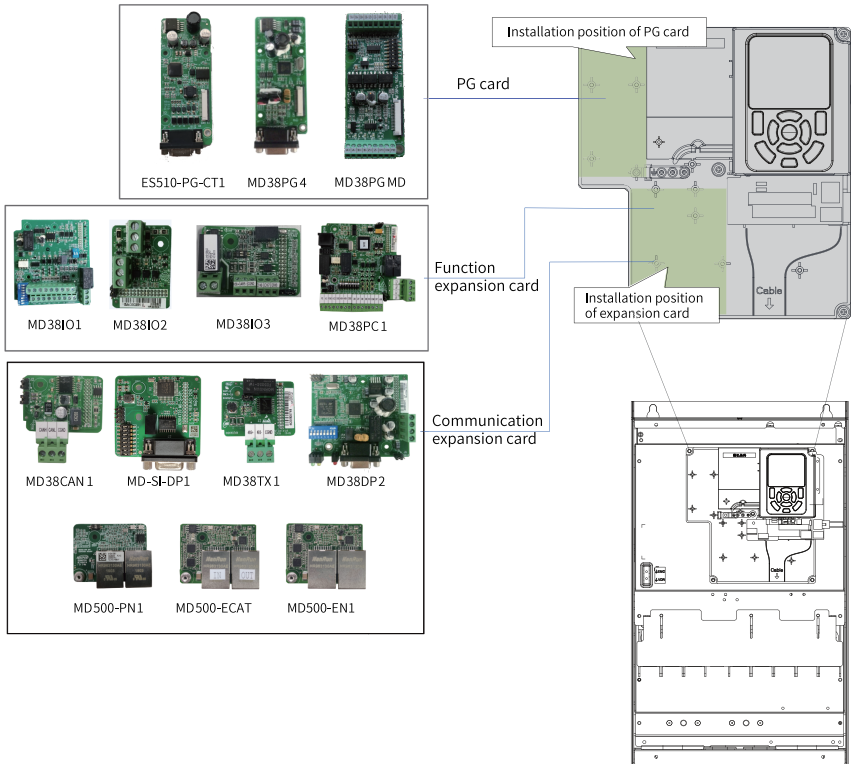


Figure 6-1 Installation position of expansion cards

7 Technical Data

7.1 Electrical Specifications

Note

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

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

Three phase 380-480 V

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

Item		Specification					
Model: MD520-4Txxxx		0.4B(S)	0.7B(S)	1.1B(S)	1.5B(S)	2.2B(S)	3.0B(S)
Structure		T1					
Output	Power (kW) (heavy load)	0.4	0.75	1.1	1.5	2.2	3
	Power (kW) (light load)	0.75	1.1	1.5	2.2	3	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
	Output voltage	Three phase, 0 V to input voltage					
	Max. output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)					
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC					
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz					
	Power supply capacity (kVA) (heavy load)	2	2.8	4.1	5	6.7	9.5
	Power supply capacity (kVA) (light load)	2.8	4.1	5	6.7	9.5	12

Item		Specification					
Model: MD520-4Txxxx		0.4B(S)	0.7B(S)	1.1B(S)	1.5B(S)	2.2B(S)	3.0B(S)
Heat dissipation 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)	0.046	0.057	0.068	0.081	0.109	0.138
	Air flow (CFM)	-	-	-	9	9	9
Overvoltage class	OVCIll						
Pollution degree	PD2						
IP rating	IP20 (open type, for IEC-certified products) Type 1 (enclosed type, for UL-certified products)						

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

Item		Specifications				
Model: MD520-4Txxxx		3.7B(S)	5.5B(S)	7.5B(S)	11B(S)	15B(S)
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 parameter)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)				
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC				
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz				
	Power supply capacity (kVA) (heavy load)	12	17.5	22.8	33.4	42.8
	Power supply capacity (kVA) (light load)	17.5	22.8	33.4	42.8	45

Item		Specifications				
Model: MD520-4Txxxx		3.7B(S)	5.5B(S)	7.5B(S)	11B(S)	15B(S)
Heat dissipation design	Thermal design power (kW) (heavy load)	0.138	0.201	0.24	0.355	0.454
	Thermal design power (kW) (light load)	0.201	0.24	0.355	0.454	0.478
	Air flow (CFM)	20	24	30	40	42
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20 (open type, for IEC-certified products) Type 1 (enclosed type, for UL-certified products)					

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

Item		Specifications					
Model: MD520-4Txxxx		18.5(B)(S)	22(B)(S)	18.5(B)(S)-T	22(B)(S)-T	30(B)(S)	37(B)(S)
Structure		T5				T6	
Output	Power (kW) (heavy load)	18.5	22	18.5	22	30	37
	Power (kW) (light load)	22	18.5	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 parameter)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)					
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC					
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz					
	Power supply capacity (kVA) (heavy load)	36	44	33	39	52	63
	Power supply capacity (kVA) (light load)	44	59	39	52	65	79

Item		Specifications					
Model: MD520-4Txxxx		18.5(B)(S)	22(B)(S)	18.5(B)(S)-T	22(B)(S)-T	30(B)(S)	37(B)(S)
Heat dissipation 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)	0.551	0.694	0.551	0.694	0.815	1.01
	Air flow (CFM)	51.9	57.4	51.9	57.4	118.5	118.5
Overvoltage class	OVCIII						
Pollution degree	PD2						
IP rating	IP20 (open type, for IEC-certified products) Type 1 (enclosed type, for UL-certified products)						

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

Item		Specifications						
Model: MD520-4Txxxx		45(B)(S)	55(B)(S)	75(B)(S)	90(S)	110(S)	132(S)	160(S)
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 parameter)						
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)			0.8 kHz to 6.0 kHz (automatically adjusted according to the load)			
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz						
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC						
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz						
	Power supply capacity (kVA) (heavy load)	81	97	127	150	179	220	263
	Power supply capacity (kVA) (light load)	97	127	150	179	220	263	334

Item		Specifications						
Model: MD520-4Txxxx		45(B)(S)	55(B)(S)	75(B)(S)	90(S)	110(S)	132(S)	160(S)
Heat dissipation 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)	1.21	1.57	1.81	2.14	2.85	3.56	4.15
	Air flow (CFM)	122.2	122.2	218.6	287.2	354.2	547	627
Overvoltage class	OVCIII							
Pollution degree	PD2							
IP rating	IP20 (open type, for IEC-certified products)							

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

Item		Specifications			
Model: MD520-4Txxxx		200(S)(-L)	220(S)(-L)	250(S)(-L)	280(S)(-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 parameter)			
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)			
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC			
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz			
	Power supply capacity (kVA) (heavy load)	334	375	404	453
	Power supply capacity (kVA) (light load)	404	453	517	565

Item		Specifications			
Model: MD520-4Txxxx		200(S)(-L)	220(S)(-L)	250(S)(-L)	280(S)(-L)
Heat dissipation design	Thermal design power (kW) (heavy load)	4.15	4.55	5.06	5.33
	Thermal design power (kW) (light load)	5.06	5.33	5.69	6.31
	Air flow (CFM)	638.4	722.5	789.4	882
Overvoltage class	OVCIII				
Pollution degree	PD2				
IP rating	IP20 (open type, for IEC-certified products)				

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

Item		Specifications		
Model: MD520-4Txxxx		315(S)(-L)	355(S)(-L)	400(S)(-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 parameter)		
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)		
	Overload capacity	60s at 150% the 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 380-480 VAC, 50/60 Hz		
	Allowable voltage fluctuation range	-15% to +10%, or 323-528 VAC		
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz		
	Power supply capacity (kVA) (heavy load)	517	565	629
	Power supply capacity (kVA) (light load)	629	716	952

Item		Specifications		
Model: MD520-4Txxxxx		315(S)(-L)	355(S)(-L)	400(S)(-L)
Heat dissipation design	Thermal design power (kW) (heavy load)	5.69	6.31	6.91
	Thermal design power (kW) (light load)	6.91	7.54	9.94
	Air flow (CFM)	645	860	860
Overvoltage class	OVCIII			
Pollution degree	PD2			
IP rating	IP20 (open type, for IEC-certified products)			

Three phase 200–240 V

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

Item		Specifications					
Model: MD520-2Txxxxx		0.4B(S)	0.7B(S)	1.1B(S)	1.5B(S)	2.2B(S)	3.7B(S)
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)	3.8	5.1	7.2	9	13	17
	Output voltage	Three phase, 0 V to input voltage					
	Max. output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)					
	Overload capacity	60s at 150% the 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 200-240 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10% or 170-264 VAC					
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz					
	Power supply capacity (kVA) (heavy load)	1.1	2.1	2.9	4.1	5.2	7.6
	Power capacity (kVA) (light load)	2.1	2.9	4.1	5.2	7.6	14.7

Item		Specifications					
Model: MD520-2Txxxx		0.4B(S)	0.7B(S)	1.1B(S)	1.5B(S)	2.2B(S)	3.7B(S)
Heat dissipation 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)	0.068	0.081	0.109	0.138	0.201	0.355
	Air flow (CFM)	-	9	9	9	20	24
Overvoltage class	OVCIll						
Pollution degree	PD2						
IP rating	IP20						

Table 7–8 Electrical parameters of T3 to T6 models (three phase 200–240 V)

Item		Specifications				
Model: MD520-2Txxxx		5.5B(S)	7.5B(S)	11(B)(S)	15(B)(S)	18.5(B)(S)
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	45	60	75	91
	Output voltage	Three phase, 0 V to input voltage				
	Max. output frequency	599 Hz (editable through parameter)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)				
	Overload capacity	60s at 150% the 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 200-240 VAC, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10% or 170-264 VAC				
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz				
	Power supply capacity (kVA) (heavy load)	14.7	18.9	27	26.1	31.6
	Power supply capacity (kVA) (light load)	18.9	27	26.1	31.6	40.7

Item		Specifications				
Model: MD520-2Txxxx		5.5B(S)	7.5B(S)	11(B)(S)	15(B)(S)	18.5(B)(S)
Heat dissipation design	Thermal design power (kW) (heavy load)	0.355	0.454	0.551	0.694	0.815
	Thermal design power (kW) (light load)	0.454	0.551	0.694	0.815	1.01
	Air flow (CFM)	40	42	57.4	118.5	118.5
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20					

Table 7-9 Electrical parameters of T7 to T8 models (three phase 200-240 V)

Item		Specifications				
Model: MD520-2Txxxx		22(B)(S)	30(B)(S)	37(B)(S)	45(S)	55(S)
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 parameter)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)				
	Overload capacity	60s at 150% the rated current				
Input	Rated input current (A) (heavy load)	89	106	139	164	196
	Rated input current (A) (light load)	111	153	167	198	239
	Rated voltage/frequency	Three phase 200-240 VAC, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10% or 170-264 VAC				
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz				
	Power supply capacity (kVA) (heavy load)	40.7	48.5	63.6	75	89.6
	Power supply capacity (kVA) (light load)	48.5	63.6	75	89.6	109

Item		Specifications				
Model: MD520-2Txxxx		22(B)(S)	30(B)(S)	37(B)(S)	45(S)	55(S)
Heat dissipation design	Thermal design power (kW) (heavy load)	1.01	1.21	1.57	1.81	2.14
	Thermal design power (kW) (light load)	1.21	1.57	1.81	2.14	3.56
	Air flow (CFM)	122.2	122.2	218.6	287.2	354.2
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20					

Table 7-10 Electrical parameters of T9 to T12 models (three phase 200-240 V)

Item		Specifications					
Model: MD520-2Txxxx		75(S)	90(S)	110(S)	132(S)	160(S)	200(S)
Structure		T9	T10		T11	T12	
Output	Power (kW) (heavy load)	75	90	110	132	160	200
	Power (kW) (light load)	90	110	132	160	200	220
	Rated output current (A) (heavy load)	304	377	426	465	585	725
	Rated output current (A) (light load)	377	426	465	585	725	880
	Output voltage	Three phase, 0 V to input voltage					
	Max. output frequency	599 Hz (editable through parameter)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)					
	Overload capacity	60s at 150% the 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 200-240 VAC, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10% or 170-264 VAC					
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz					
	Power supply capacity (kVA) (heavy load)	131	167	187	202	258	314
	Power supply capacity (kVA) (light load)	164	209	232	256	324	384

Item		Specifications					
Model: MD520-2Txxxx		75(S)	90(S)	110(S)	132(S)	160(S)	200(S)
Heat dissipation 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	7.61
	Air flow (CFM)	627	638.4	722.5	882	645	860
Overvoltage class	OVCIII						
Pollution degree	PD2						
IP rating	IP20						

Single phase 200-240 V

Table 7-11 Electrical parameters of T2 models (single phase 200-240 V)

Item		Specifications			
Model: MD520-2Sxxxx		0.4B(S)	0.7B(S)	1.5B(S)	2.2B(S)
Structure		T2			
Output	Power (kW) (heavy load)	0.4	0.75	1.5	2.2
	Power (kW) (light load)	0.75	1.5	2.2	3.0
	Rated output current (A) (heavy load)	2.3	4	7	9.6
	Rated output current (A) (light load)	4	7	9.6	12
	Output voltage	Three phase 0 V to 240 V (subject to input voltage)			
	Max. output frequency	599 Hz (editable through parameter)			
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load)			
	Overload capacity	60s at 150% the rated current			
Input	Rated input current (A) (heavy load)	5.4	8.2	14	20
	Rated input current (A) (light load)	8.2	14	20	27
	Rated voltage/frequency	Single phase 200-240 V, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10% or 170-264 VAC			
	Allowable frequency fluctuation range	±5% or 47.5-63 Hz			
	Power supply capacity (kVA) (heavy load)	1.4	2.2	3.7	6
	Power supply capacity (kVA) (light load)	2.2	3.7	6	9.6

Item		Specifications			
Model: MD520-2Sxxxx		0.4B(S)	0.7B(S)	1.5B(S)	2.2B(S)
Heat dissipation design	Thermal design power (kW) (heavy load)	0.043	0.065	0.097	0.121
	Thermal design power (kW) (light load)	0.065	0.097	0.121	0.155
	Air flow (CFM)	20	20	20	20
Overvoltage class	OVCIII				
Pollution degree	PD2				
IP rating	IP20 (open type, for IEC-certified products) Type 1 (enclosed type, for UL-certified products)				

7.2 Technical Specifications

Table 7-12 AC drive technical specifications

Item		Specification
Basic functions	Input frequency resolution	Set by digital signal: 0.01 Hz Set by analog signal: maximum frequency x 0.025%
	Control mode	Sensorless vector control (SVC), feedback vector control (FVC), voltage/frequency (V/f) control, and PMVVC control
	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	FVC: ±3% SVC: ±5% for above 5 Hz
	Torque boost	Automatic boost; manual boost: 0.1 % to 30.0 %
	V/f curve	Straight-line V/f curve; multi-point V/f curve; complete V/f separation; half V/f separation

Item		Specification
Continued	Acceleration/deceleration curve	Straight-line or S-curve acceleration/deceleration Four groups of acceleration/deceleration time ranging from 0.0s to 6500.0s are supported.
	DC braking	Starting frequency of DC braking: 0.00 Hz to the maximum frequency Braking time: 0.0s to 36.0s Braking current level: 0.0% to 100.0%
	Jog control	Frequency range of jog running: 0.00 Hz to 50.00 Hz Acceleration/deceleration time of jog running: 0.0s to 6500.0s
	Simple PLC, multi-speed running	The product supports up to 16 speeds with the built-in PLC or control terminal.
	Built-in proportional-integral-derivative (PID)	The function facilitates closed-loop control of process control.
	Auto voltage regulation (AVR)	When the mains voltage changes, the output voltage keeps constant automatically.
	Overvoltage/overcurrent stall control	The function limits the current and voltage automatically during operation to prevent frequent trips caused by overvoltage or overcurrent.
	Fast current limit	The function helps minimize overcurrent faults.
	Torque limit and control	The function limits the torque automatically during operation to prevent frequent trips caused by overcurrent. Torque control can be implemented in vector control mode.
Customized functions	Power dip ride-through	Load regenerative energy compensates for voltage reduction during instantaneous power failure, allowing the AC drive to continue operating for a short time.
	Virtual I/O	Five groups of virtual digital inputs/outputs (Dis/DOs) support simple logic control.
	Timing control	Time range: 0.0–6500.0 minutes
	Multi-thread bus	Six buses are supported, including Modbus (Modbus-RTU, Modbus-ASCII, Modbus-TCP/IP), PROFIBUS DP, CANlink, CANopen, PROFINET, EtherCAT, and Ethernet/IP.
	Encoder type	Encoders of the following types are supported: differential, collector, push-pull, resolver, and 23-bit.
	Advanced software tool	The tool supports operations of AC drive parameters and virtual oscillograph function, through which the state inside the AC drive is monitored.
	Motor overheat protection	AI2 can input signals of the motor temperature sensor (PT100, PT1000, KTY-84-130, and PTC-130).

Item		Specification
Running	Running command	Running commands can be given through the operating panel, control terminal, or serial port communication, which can be switched over in various ways.
	Frequency reference	The drive supports 10 frequency references, which can be set through digital settings, analog voltage, analog current, pulse, or serial port communication. These setting sources can be switched over in various ways.
	Auxiliary frequency reference	The drive supports 10 auxiliary frequency references. It can implement fine tuning of the auxiliary frequency and frequency synthesis.
	Input terminal	Standard: Five DIs Two AIs, AI1 and AI2. AI1 supports only -10 V to +10 V voltage input, and AI2 supports -10 V to +10 V voltage input, 0 mA to 20 mA current input, and temperature input, which can be switched over through the DIP switch. Extension capability: Five DIs
	Output terminal	Standard: One DO One relay output terminal One FM (can be set with high-speed pulse output or common DO function) One AO, supporting 0 mA to 20 mA current output or 0 V to 10 V voltage output Extension capability: One DO One relay output terminal
Display and operation on the operating panel	LED display	It displays parameters.
	LCD display	Optional and two languages (Chinese or English) available
	Parameter copy	Quick parameter copy through the optional LCD operating panel
	Key locking and function selection	The function can be used to lock the keys partially or completely and limit the availability of some keys to prevent accidental operation.

Item		Specification
Protection functions	Phase loss protection	Input and output phase loss protection
	Instantaneous overcurrent protection	When the current exceeds 250% of the rated output current, the AC drive stops.
	Overvoltage protection	When the DC voltage of the main circuit is above 820 V, the AC drive stops. This function applies to three-phase 380 V models. When the DC voltage of the main circuit is above 410 V, the AC drive stops. This function applies to three-phase 220 V and single-phase 220 V models.
	Undervoltage protection	When the DC voltage of the main circuit is below 350 V, the AC drive stops. This function applies to three-phase 380 V models. When the DC voltage of the main circuit is below 190 V, the AC drive stops. This function applies to three-phase 220 V and single-phase 220 V models.
	Overheat protection	Protection is triggered when the inverter bridge gets overheated.
	Overload protection	The AC drive stops after running at 150% of rated current for 60 seconds.
	Overcurrent protection	When the current exceeds 2.5 times of rated current, the AC drive stops.
	Braking protection	Braking unit overload protection and braking resistor short circuit protection
	Short circuit protection	Protection against output interphase short circuit and protection against output short circuit to ground
	Environment	Installation environment
Altitude		For altitude equal to or below 1000 m, derating is not required. For altitude ranging from 1000 m to 3000 m, derate 1% for every additional 100 m. For altitude above 3000 m, contact Inovance. (Note: The maximum altitude for T1 models is 2000 m. For use at the altitude higher than 2000 m, contact Inovance.)
Ambient temperature		-10°C to +50°C. For temperature ranging from 40°C to 50°C, derate 1.5% for every additional 1°C.
Humidity		Lower than 95% RH, no condensation
Vibration		Lower than 5.9 m/s ² (0.6g)
Storage temperature		-20°C to +60°C

8 Routine Maintenance and Inspection

8.1 Routine Inspection Items

8.1.1 Daily Inspection Items

Influence of ambient temperature, humidity, dust, and vibration will cause aging of components in the device, resulting in potential faults or shortened service life of the device. Therefore, carry out daily and periodic maintenance. More frequent maintenance is required if the device is used in harsh environments, including the following:

- High ambient temperature
- Frequent start and stop
- Fluctuations in the AC power supply or load
- Excessive vibrations or shocks
- Dust, metal dust, hydrochloric acid, and other corrosive articles

Check the following items daily to avoid deterioration in performance or product damage. Print the checklist and sign the "Checked" column after each inspection.

Item	Description	Solution	Checked
Motor	Check whether abnormal sounds and vibration occur on the motor.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● 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 is clogged. ● Check whether the ambient temperature is within the permissible range. 	
Installation environment	Check whether the cabinet and cable ducts are normal.	<ul style="list-style-type: none"> ● Check for insulation damage of input and output cables. ● Check for the mounting bracket vibration. ● Check whether copper busbars and cable terminals become loose or get corroded. 	

Item	Description	Solution	Checked
Load	Check whether the running current of the AC drive exceeds the rated current of the AC drive and motor.	<ul style="list-style-type: none"> ● Check whether the motor parameters are set correctly. ● Check whether the motor is overloaded. ● Check whether the mechanical vibration is severe (allowed value: < 0.6 g). 	
Input voltage	Check whether the voltage of the main circuit power supply and the control circuit power supply is normal.	<ul style="list-style-type: none"> ● Check whether the input voltage is within the permissible range. ● Check whether startup of heavy load exists. 	

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.

Inspection Item	Description	Solution	Checked
General	Check for waste, dirt, and dust on the surface of the AC drive.	<ul style="list-style-type: none"> ● Check whether the controller cabinet is powered off. ● Use a vacuum cleaner to suck up waste and dust to avoid direct touching. ● Wipe stubborn stains with alcohol and do not operate the AC drive until the alcohol completely evaporates. 	
Cables	<ul style="list-style-type: none"> ● Check power cables and connections for discoloration. ● Check wiring insulation for aging or wear. 	<ul style="list-style-type: none"> ● Replace cracked cables. ● Replace damaged terminals. 	

Inspection Item	Description	Solution	Checked
Peripheral devices such as electromagnetic contactor	<ul style="list-style-type: none"> • Check devices for loose connection and abnormal noise during operation. • Check peripheral devices for short circuit, water stains, swelling, and cracks. 	Replace abnormal peripheral devices.	
Ventilation	<ul style="list-style-type: none"> • Check whether ventilation and heatsink are clogged. • Check whether the fan is damaged. 	<ul style="list-style-type: none"> • Clean the ventilation. • Replace the fan. 	
Control circuit	<ul style="list-style-type: none"> • Check control elements for loose contact. • Check for loose terminal screws. • Check control cables for cracked insulation. 	<ul style="list-style-type: none"> • Clear foreign matters on the surface of control cables and terminals. • Replace damaged or corroded control cables. 	

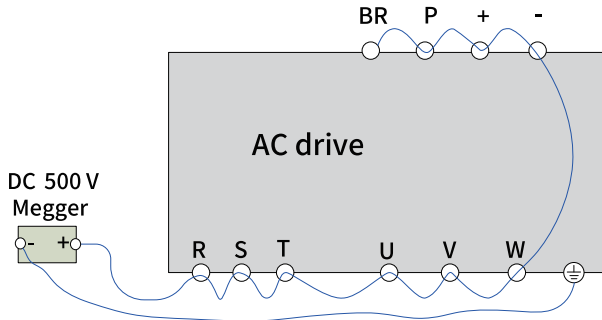
8.2 Main Circuit Insulation Test



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 lifetime is related to the operating environment and maintenance. 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

Quantity of cooling fans

- Possible damage causes: bearing worn and blade aging.
- Diagnosis: cracks on the blade, abnormal vibration noise upon startup, and abnormal running of fan blades
- Replacement: Press the snap-fit joint on the fan plastic cover and pull the fan outward. After replacement, check that the air flows upwards.

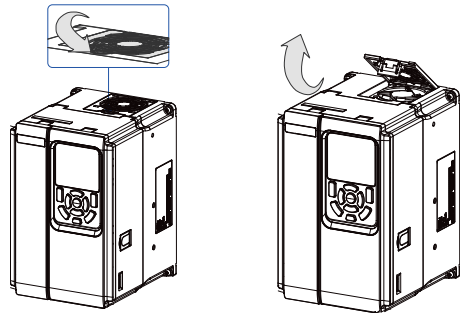
Table 8-1 Quantity of cooling fans

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

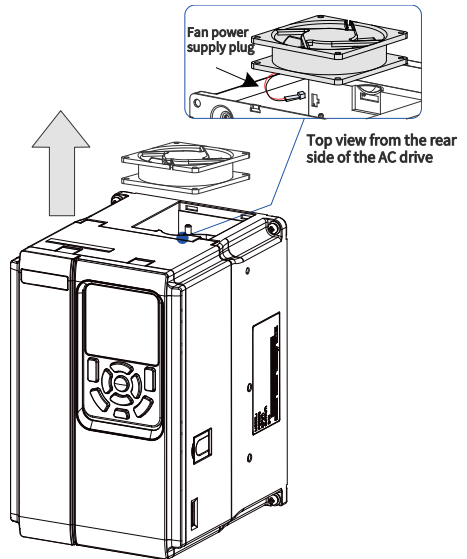
Removing and Installing Cooling Fans of T1 to T6 Models

Removing

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



2. Pull the fan upward and disconnect the plug of the power cable.

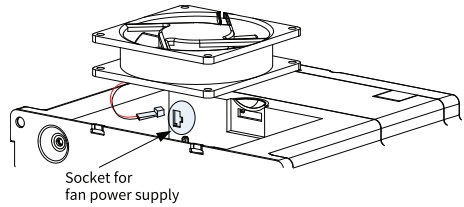


Installing

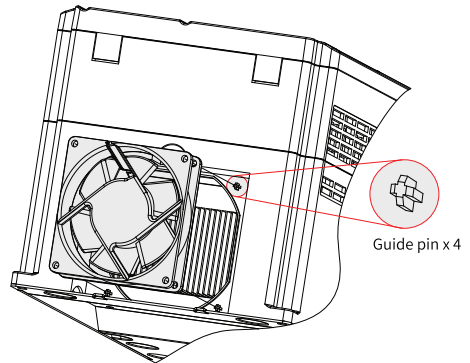
Note

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

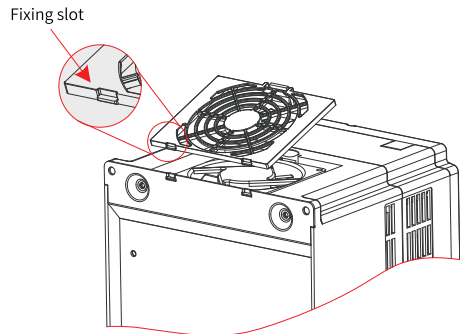
1. Plug the power cable plug of the fan into the fan socket.



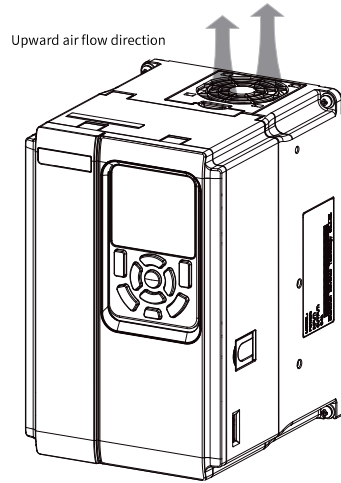
2. Align the four fixing holes at the bottom of the fan with the positioning pins on the drive to place the fan.



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.
-



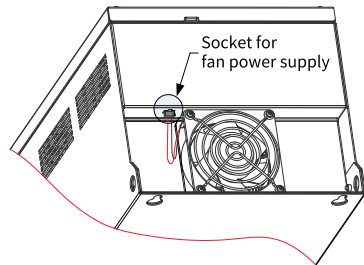
Removing and installing cooling fans of T7 to T9 Models

Note

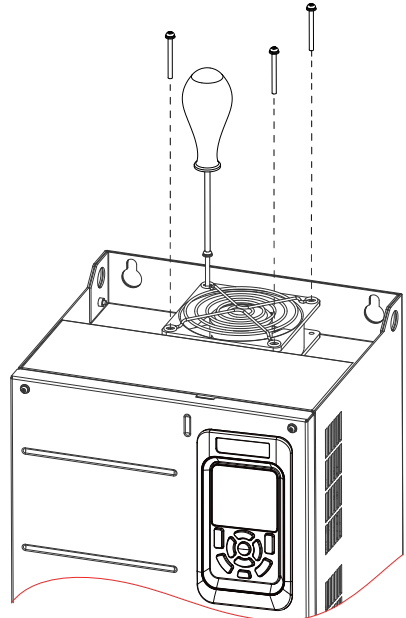
The quantity and layout of cooling fans vary with models, but the fans can be removed or installed in the same way.

Removing

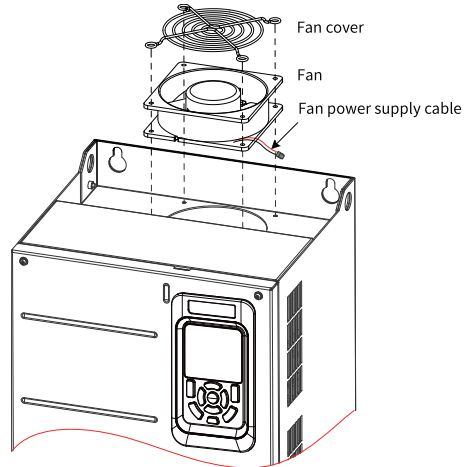
1. Disconnect the power cable plug of the fan from the fan socket (top view).
-



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.
-

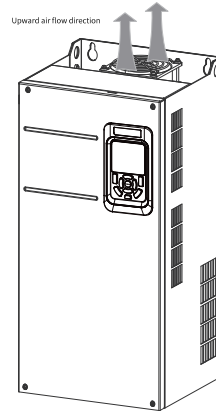


Installing

1. Install the fan in reverse order of removal and ensure the correct direction of the fan.
-

2. Align the fixing holes of the fan cover and the fan with those on the AC drive to install them.
-

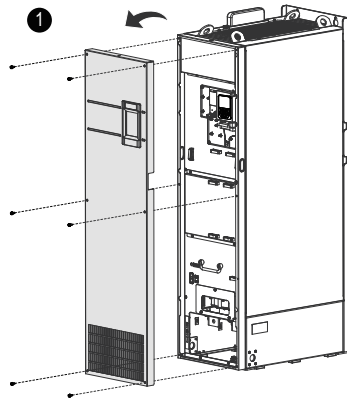
3. After replacement, check that the air flows upwards.
-



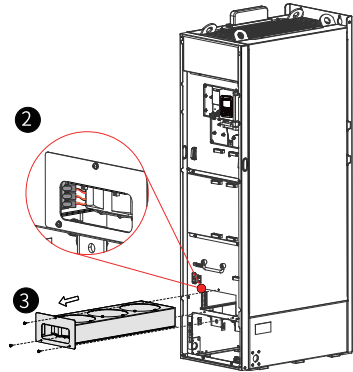
Removing and installing cooling fans of T10 to T12 models

Removing

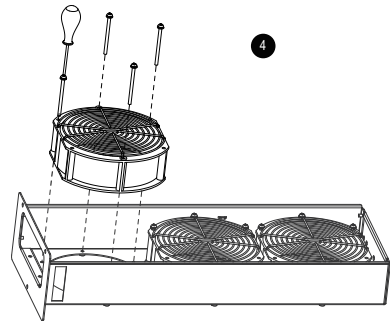
1. Remove the six fixing screws from the cover, hold the cover with two hands, and lift it along the arrow direction to remove it.
-



2. Disconnect the power cable plug of all fans. Remove the three fixing screws from the fan box and pull out the fan box in the direction of arrow.
-



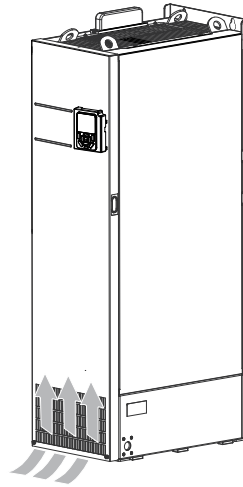
3. Remove the four fixing screws from each fan cover and remove the fan.
-



Installing

1. Install the fan in reverse order of removal and ensure the correct direction of the fan.
-
2. Align the fan box with the rail and push it into the AC drive.
-

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



8.3.3 Replacing the Filter Electrolytic Capacitor

- Possible damage causes: poor input power supply, high ambient temperature, frequent load jumping, and electrolyte aging.
- Diagnosis: Check whether there is liquid leakage and whether the safety valve has protruded. Measure the static capacitance and the insulating resistance.
- Replacement: To avoid damage to other components, contact Inovance for replacing the filter electrolytic capacitor.

8.4 Storage and Warranty

Storage

To store the AC drive properly, observe the following:

- For storage, pack the AC drive with the original packing box provided by Inovance.
- Avoid exposing the AC drive to moisture, high temperature, or outdoor direct sunlight for an extended period.
- The electrolytic capacitor will deteriorate after the AC drive is stored for a long time. Therefore, energize the AC drive once for at least five hours every six months. Use a regulator to increase the input voltage gradually to the rated value. For any problem, contact Inovance.

Warranty

Free warranty only applies to the AC drive itself.

Inovance provides an 18-month free warranty to the equipment from the date of manufacturing (subject to the barcode on the AC drive or contract if any) for failures

or damages under normal use conditions. When the warranty period expires, a reasonable repair fee will be charged.

Within the 18-month warranty period, a reasonable repair fee will be charged for damages caused by the following:

- Operations not following the user instructions
- Fire, flood, or abnormal voltage
- Using the AC drive for any non-recommended function
- Using the AC drive beyond recommended specifications
- Force majeure (natural disaster, earthquake, and lightning strike) and secondary damages

The repair fee is charged according to Inovance's standardized price list. If there is an agreement, the agreement prevails.

9 Compliance

9.1 Compliance List

The following table lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification Name	Directive Name		Standard
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 Certification	-		UL61800-5-1
			C22.2 No.274-17
Function safety certification (STO)	Machinery directive	2006/42/EC	EN 61800-5-2 EN 62061 :2005/A2 EN ISO 13849-1 EN 61508 ed.2
KCC Certification	Korea radio law		KN 11

Note

The product meets the requirements of the latest instructions and standards of the CE/UL/cUL/KCC certification.

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 Requirement for Compliance with EMC Directive

- The drive is applicable to the first and second environment and complies with EMC directive 2014/30/EU and standard EN IEC 618003.



When applied in the first environment, this product may generate radio interference. Besides the CE compliance, take measures to avoid the radio interference if required.

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



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

EMC specifications

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 conduction and radiation interference.

Table 9-1 Maximum allowable motor cable length

Product Model	Maximum Cable Length for Conducted Emission				Maximum Cable Length for Radiation Conduction			
	C2		C3		C2		C3	
	Embedded Filter	External EMC Filter	Embedded Filter	External EMC Filter	Embedded Filter	External EMC Filter	Embedded Filter	External EMC Filter
T1	-	3m	3m	-	-	3m	3m	-
T2-T4	-	1m*	1m	-	-	1m	1m	-
T5-T8	-	3m	-	-	-	3m	-	-
T9-T12	-	3m	3m	-	-	3m	3m	-

Note*: For single-phase T2 models, install a DY644020H magnetic ring on the input side of the filter.

Introduction to EMC standards

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences nearby 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 electromagnetic interference in the environment and can work properly in the environment with electromagnetic interference, which is described as electromagnetic sensitivity.

EN IEC 61800-3 defines the following two environments:

- First environment: It includes domestic premises. It also includes establishments directly connected without intermediate transformer to a low-voltage power supply network which supplies buildings used for domestic purposes.
- Second environment: It 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 environment, the products are divided into the following four categories:

- Category C1: a PDS with rated voltage less than 1000 V and intended for use in the first environment
- Category C2: a PDS with rated voltage less than 1000 V, which is neither a plug in device nor a movable device and is intended to be installed and commissioned only by a professional.
- Category C3: a PDS with rated voltage less than 1000 V and intended for use in the second environment.
- Category C4: a PDS with 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 Requirements for Compliance with the LVD

The drive has been tested in accordance with EN61800-5-1 and has complied with the low voltage directive (LVD). To enable devices with the drive integrated to comply with the LVD, ensure the following requirements are met.

Installation location

Install the drive in a place with overvoltage category III and pollution degree 1 or 2 as specified by IEC 606641-1.

Installation environment

For requirements on installation environment, see the section of installation environment in *MD520 Series General-Purpose AC Drive Installation Guide*.

Installation protection

- The drive serves as a part of a final system. Install the drive as the system component in a fireproof cabinet that provides effective electrical and mechanical protection, and install it in accordance with local laws and regulations and relevant IEC standards.
- To install a cabinet-mounted drive (IP20), ensure that no foreign objects can access the cabinet from the top and the front.

Main circuit wiring

For wiring requirements of main circuit terminals, see the section of main circuit wiring requirements in *MD520 Series General-Purpose AC Drive Installation Guide*.

Protective devices

To comply with EN 61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit. Use a fuse that matches the maximum input current of the AC drive. For selection of fuses, see "[5.4.1 Fuse, Contactor, and Circuit Breaker](#)" on page 62.

9.3 UL or cUL Certification



Figure 9-2 UL/cUL mark

- The UL/cUL mark commonly applies to products sold in the United States and Canada. It indicates that UL has performed product tests and evaluation, and determined that their stringent standards have been met. To obtain the UL/cUL

certification, an electrical product and its main built-in components must all be UL certified.

- The drive has been tested in accordance with UL 61800–5–1 and CSA C22.2 No. 274-17 standards and has complied with UL/cUL standards. To enable devices with the drive integrated to comply with UL/cUL standards, ensure the following requirements are met.

Installation location

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

Ambient temperature

According to the IP rating requirements, the ambient temperature must be maintained within the following range:

- T1 to T9 models (Type 1, enclosed type): –10°C to +50°C
- T1 to T12 models (open type): –10°C to +50°C

Installation requirements

- T1 to T9 models are enclosed-type, which must be installed according to the following requirements:
 - The enclosure protection must meet requirements of UL Type 1.
 - Drill the holes according to the mounting dimensions. For details of mounting dimensions, see the section of mounting dimensions in *MD520 Series General-Purpose AC Drive Installation Guide*.
- T1 to T12 models are open-type, which must be installed inside a cabinet according to the following requirements:

The drive serves as a part of a final system. Install the drive as the system component in a fireproof cabinet that provides effective electrical and mechanical protection, and install it in accordance with local laws and regulations and relevant NEC standards.

Main circuit wiring



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

- Terminals BR, (-), and (+) are used to connect options. Do not connect the terminals 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 the internal safety extra-low voltage (SELV) circuit, which must be insulated and isolated from other circuits. Make sure that the control circuit is connected to the external SELV circuit.
- Prevent foreign objects from entering the wiring part of the terminal block.
- Avoid welding when using stranded wires.
- The tightening torque may vary with terminals. Tighten terminal screws with the specified tightening torque. Use screwdrivers, ratchets, or wrenches to tighten screws as required.
- When using an electric tool to tighten the terminal screws, set the tool to a low speed to avoid damage to the terminal screws.
- Tighten the terminal screws at an angle within 5 degrees. Failure to comply may result in screw damage.

Control circuit wiring

Wire the control circuit in accordance with UL508.

Specifications of main circuit cables

For the selection of cable 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.
- The recommended cables for the main circuit are 600 V Class 2 heat-resistant indoor PVC cables that can work under temperature of 75°C continuously. The following conditions are used as premises:
 - Ambient temperature: < 40°C
 - Normal operating rating

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 54](#).

Protective devices

- To meet UL requirements, install a fuse/circuit breaker on the input side to prevent accidents caused by short circuit in the internal circuit.
- Install sufficient protective devices against short circuit in branch circuits according to applicable regulations and this guide. The drive is applicable to circuits with a rated breaking capacity lower than 100000 A and a maximum

voltage of 480 VAC (400 V class). For selection of recommended fuses, see ["5.4.1 Fuse, Contactor, and Circuit Breaker" on page 62.](#)

9.4 KCC Certification



Applicant Suzhou Inovance Technology Co., Ltd.

AC Drive

Model MD520 series

Made In China

Manufacturer

Suzhou Inovance Technology Co.,Ltd.

A 급기기 (업무용 방송통신기자재)

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