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MD520 Series General-Purpose AC Drive

Hardware Guide

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

Data code 19011713A04

Preface

Introduction

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. 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 system composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), expansion cards, routine inspection and maintenance, certifications, and standards of the AC drive.

More documents

Document Name	Data Code	Description
MD520 Series General-Purpose AC Drive User Guide	PS00012134	This guide describes product selection, mechanical design, electrical design, installation, communication, commissioning, function application, faults, parameters, certifications, and standards.
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 system composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), expansion cards, routine inspection and maintenance, 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 common EMC troubleshooting suggestions.
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.

Document Name	Data Code	Description
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 Safety Function Guide	19011717	This guide describes function applications, communication, fault codes, and parameters of the AC drive.
MD520 Series General-Purpose AC Drive Safety Function Guide	19011795	This guide describes the safety information, instructions for mechanical and electrical installation, commissioning and maintenance guidance, and safety-related parameters of the AC drive.

Revision History

Date	Version	Description
November 2023	A04	**Modified the following sections:** • Updated *"3.4 Descriptions of Control Circuit Terminals" on page 40*. • Updated *"4.1 Dimensions of T1 and T9 Models" on page 44*. • Updated *"4.2 Dimensions of T10 to T12 Models (Without AC Output Reactor)" on page 47*. • Updated *"4.3 Dimensions of T10 to T12 Models (with AC Output Reactor)" on page 48*. • Updated *"5.5 External Operating Panel" on page 140*. • Made minor corrections.
May 2023	A03	• Added T13 models to the product model list. • Added section 2.5 Components of T13 Models. • Added the electrical wiring diagram for T13 models in 3.2 Electrical Wiring Diagram. • Added descriptions of main circuit terminals for T13 models in 3.3 Main Circuit Terminals. • Added descriptions of STO terminals in 3.4 Main Circuit Terminals. • Updated 4.4 Dimensions of T13 Models (Without Auxiliary Power Distribution Cabinet) and Dimensions of T13 Models (with Auxiliary Power Distribution Cabinet). • Added information of T13 models to 5.1 List of Options. • Added information of T13 models to 5.3.1 Main Circuit Cable. • Added information of T13 models to 5.4 Peripheral Electrical Devices. • Added information of T13 models to 6 Expansion Cards. • Added information of T13 models to 7.2 Technical Specifications. • Added information of T13 models to 8.3.2 Replacing the Cooling Fan. • Added 9.4 KCC Certification. • Added 9.5 Safety Function Certification. • Made minor corrections.

Date	Version	Description
December 2022	A02	• Updated the preface. • Updated the fundamental safety instructions. • Updated the component diagram in 2 Components. • Updated 3.1 System Structure. • Updated 3.2 Electrical Wiring Diagram and 3.3 Main Circuit Terminals. • Updated 4 Dimension Drawings. • Updated 5.1 List of Options. • Updated 5.3.1 Main Circuit Cable. • Updated 5.4.2 AC Input Reactor and 5.4.7 Output Reactor. • Added information of the MD520IO1, MD520-PG-S1, MD38DW1, and MD38DW2 cards to 6 Expansion Cards. • Added information of sin-cos encoder expansion cards to 7.2 Technical Specifications. • Updated the EMC specification table in 9.2.2 Requirement for Compliance with EMC Directive. • Made minor corrections.
June 2022	A01	• Updated 1.2 Nameplate and Model. • Updated the component diagram in 2 Components. • Updated 3.2 Electrical Wiring Diagram and 3.3 Main Circuit Terminals. • Updated 5.2.1 Through-Hole Mounting Bracket. • Updated 5.4.2 AC Input Reactor and 5.4.7 Output Reactor. • Updated 7.1 Electrical Specifications. • Updated 9.2.2 Requirement for Compliance with EMC Directive. • Made minor corrections.
January 2022	A00	First release

Access to the Guide

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

- Visit *http://www.inovance.com*, go to Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install the app, where you can search for and download manuals.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period,maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

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

For details, see the Product Warranty Card.

Table of Contents

Product Model List

The following table lists the mapping between product models and structures.

Table –1 Mapping between product models and structures

Structure	Product Model		
	Three-Phase 380 V to 480 V	Three-Phase 200 V to 240 V	Single-Phase 200 V to 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)	-
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)	-
T13 (without the auxiliary power distribution cabinet)	MD520-4T500 MD520-4T500(S) MD520-4T560 MD520-4T560(S) MD520-4T630 MD520-4T630(S)	-	-

Structure	Product Model		
	Three-Phase 380 V to 480 V	Three-Phase 200 V to 240 V	Single-Phase 200 V to 240 V
T13 (with the auxiliary power distribution cabinet)	MD520-4T500-A MD520-4T500(S)-A MD520-4T560-A MD520-4T560(S)-A MD520-4T630-A MD520-4T630(S)-A	-	-

Note:

- (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

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

Safety Levels and Definitions

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

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

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

General Safety Instructions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Users must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking

- 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. Non-professionals are not allowed.

- 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 equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

CAUTION

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

Wiring

DANGER

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

WARNING

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

- Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on

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

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

Operation

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

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

Maintenance

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

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

Repair

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

- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal 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 label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the meaning of the safety labels.

Safety Label		Description
T12 Models and Below	T13 Models	
		• 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 (for T12 models and below) or 15 min (for T13 models) after power-off. Failure to comply will result in an electric shock.

1 Product Information

1.1 Product Positioning and Features

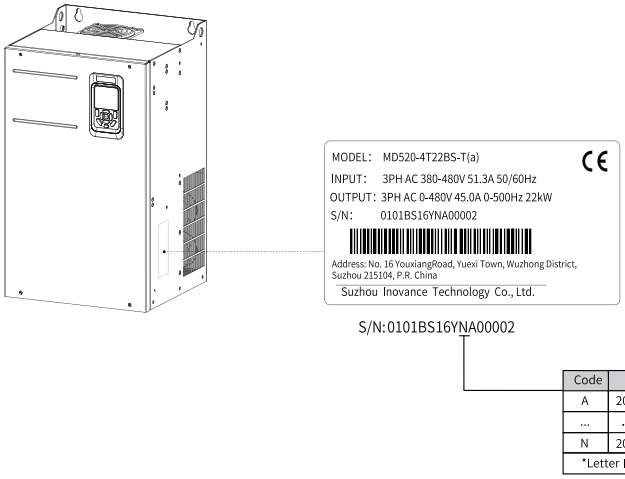
The MD520 series AC drive is designed to be a general-purpose high-performance current vector drive. It is mainly used to control and regulate the speed and torque of three-phase AC asynchronous motors and three-phase AC permanent magnet motors. With the high-performance current vector technology, the MD520 feature rich functions, convenient operations, and aesthetic appearance.

Figure 1-1 Product appearance

The AC drive highlights the following:

- Drives three-phase AC asynchronous motors and three-phase AC permanent magnet motors.
- 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 control, especially at high speed.
- Upgraded based on the MD500-PLUS, MD500, MD500E, MD290, and MD330 and compatible with MD500-PLUS options, including PG cards, communication cards, I/O expansion card, and bracket.

1.2 Nameplate and Model



MD520 - 4T 22 B S -T (a)
① ② ③ ④ ⑤ ⑥ ⑦

① **Product name** MD520 series AC drive	⑤ **Safety function** Null: without the STO function S: with the STO function
② **Voltage class** 4T: three-phase 380 V to 480 V 2T: three-phase 200 V to 240 V 2S: single-phase 200 V to 240 V	⑥ **Reactor** Null: See the note below. -T: with the DC reactor; applicable to the T5 models -L: with the AC output reactor; applicable to the T10 to T12 models -A: with the auxiliary power distribution box; applicable to the T13 models
③ **Power rating (kW)** 0.4: 0.4 ... 630: 630	⑦ **Customer mark** Null: without the customer mark (A): with the customer mark, suffixed by "XXXXXXXXXX". The suffix can be null or contains digits, letters, or customer marks.
④ **Braking unit** Null: without the braking unit B: with the braking unit	- -

Note

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

2 Components

2.1 Overview

The 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

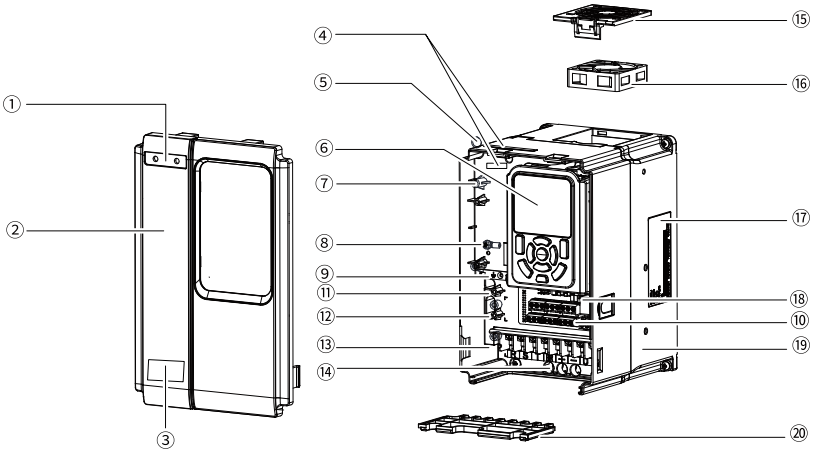


Figure 2-1 Components of T1 to T4 models

No.	Name	No.	Name	No.	Name
①	Logo	②	Front cover	③	Mark Symbol / Description Note: Read through the user guide before installation and operation. Danger: Do not remove the upper cover with power ON or within 10 min after power-off. (10min)
④	Equipment bar code It allows you to check the product code and model. The actual position may vary with models.	⑤	Main circuit power supply indicator Do not disassemble the machine or perform wiring when this indicator is ON.	⑥	Operating panel

No.	Name	No.	Name	No.	Name
⑦	Encoder expansion card fixing base	⑧	Cable tray and fixing base for the control board ground cable Note: Connect the control board ground cable to the grounding bar only when the system is reliably grounded; otherwise, connect the ground cable to the fixing hole.	⑨	Grounding copper busbar It is used to ground the PG card and control board.
⑩	Control circuit terminal	⑪	Base for fixing the expansion card	⑫	Grounding screws for safety capacitor and voltage dependent resistor
⑬	Main circuit terminal	⑭	Grounding terminal	⑮	Fan cover
⑯	Fan	⑰	Nameplate	⑱	External operating panel interface
⑲	Enclosure	⑳	Comb-type wiring cover	-	-

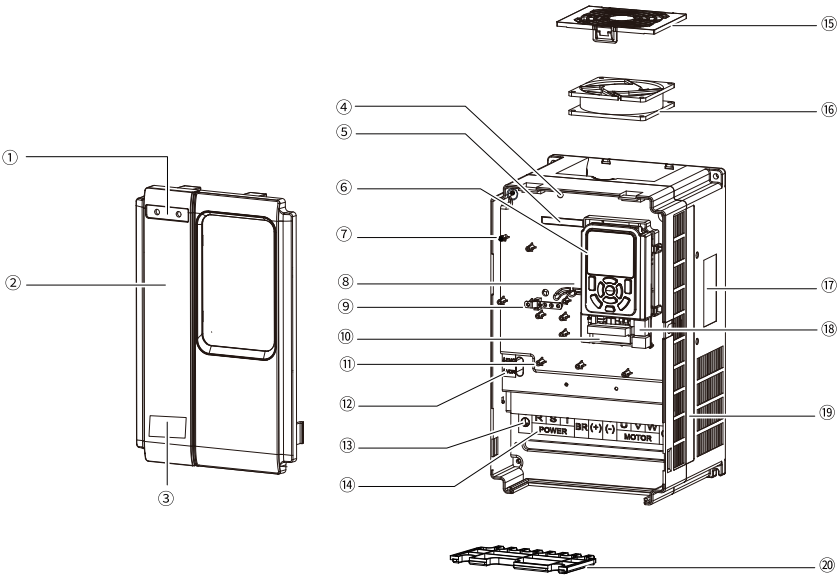


Figure 2-2 Components of T5 and T6 models

No.	Name	No.	Name	No.	Name
①	Logo	②	Front cover	③	Mark Symbol / Description Note: Read through the user guide before installation and operation. Danger: Do not remove the upper cover with power ON or within 10 min after power-off.
④	Main circuit power supply indicator Do not disassemble the machine or perform wiring when this indicator is ON.	⑤	Equipment bar code It allows you to check the product code and model. The actual position may vary with models.	⑥	Operating panel

No.	Name	No.	Name	No.	Name
⑦	Encoder expansion card fixing base	⑧	Cable tray and fixing base for the control board ground cable Note: Connect the control board ground cable to the grounding bar only when the system is reliably grounded; otherwise, connect the ground cable to the fixing hole.	⑨	Grounding copper busbar It is used to ground the PG card and control board.
⑩	Control circuit terminal	⑪	Base for fixing the expansion card	⑫	Grounding screws for safety capacitor and voltage dependent resistor
⑬	Grounding terminal	⑭	Main circuit terminal	⑮	Fan cover
⑯	Fan	⑰	Nameplate	⑱	External operating panel interface
⑲	Enclosure	⑳	Comb-type wiring cover	-	-

2.3 Components of T7 to T9 Models

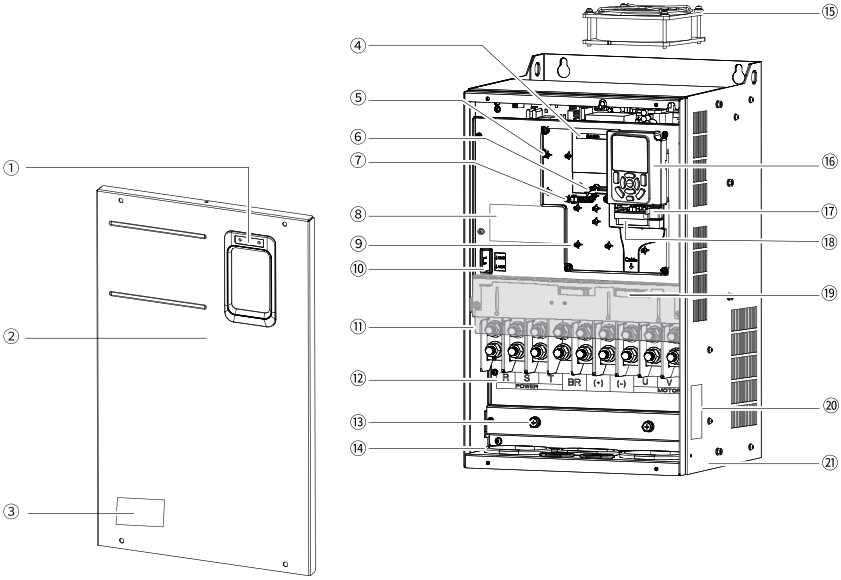


Figure 2-3 Components of T7 to T9 models

No.	Name	No.	Name	No.	Name
①	Logo	②	Front cover	③	Mark Symbol / Description Note: Read through the user guide before installation and operation. 10min Danger: Do not remove the upper cover with power ON or within 10 min after power-off.
④	Equipment bar code It allows you to check the product code and model. The actual position may vary with models.	⑤	Encoder expansion card fixing base	⑥	Cable tray and fixing base for the control board ground cable Note: Connect the control board ground cable to the grounding bar only when the system is reliably grounded; otherwise, connect the ground cable to the fixing hole.
⑦	Grounding copper busbar It is used to ground the PG card and control board.	⑧	Wiring description	⑨	Base for fixing the expansion card

No.	Name	No.	Name	No.	Name
⑩	Grounding screws for safety capacitor and voltage dependent resistor	⑪	Protective cover of the main circuit terminal	⑫	Main circuit terminal
⑬	Grounding terminal	⑭	Grommet	⑮	Fan
⑯	Operating panel	⑰	External operating panel interface	⑱	Control circuit terminal
⑲	Cable tie It is used to fix the signal cable.	⑳	Nameplate	㉑	Enclosure

Note

The quantity and positions of cooling fans vary with AC drive models.

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

2.4 Components of T10 to T12 Models

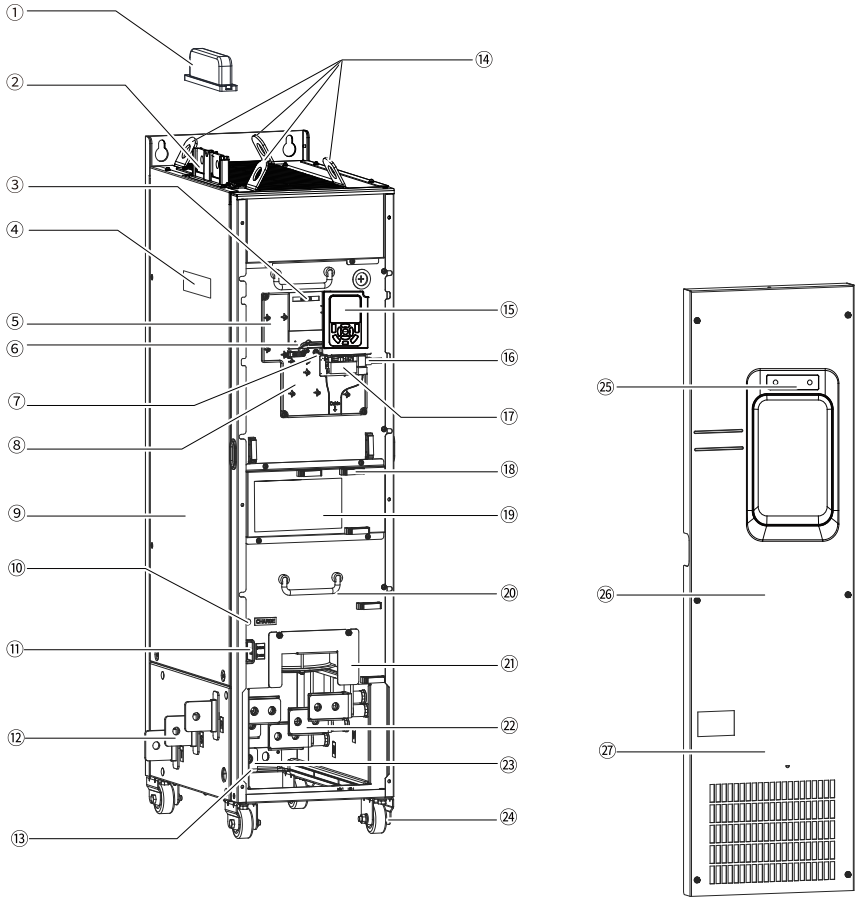


Figure 2-4 Components of T10 to T12 models (without an output AC reactor)

No.	Name	No.	Name	No.	Name
①	Protective cover for positive and negative terminals	②	Positive and negative terminals of the DC bus	③	Equipment bar code It allows you to check the product code and model.
④	Nameplate	⑤	Encoder expansion card fixing base	⑥	Cable tray and fixing base for the control board ground cable Note: Connect the control board ground cable to the ground copper bar only when the system is reliably grounded; otherwise, connect it to the fixing base.
⑦	Grounding copper busbar It is used to ground the PG card and control board.	⑧	Base for fixing the expansion card	⑨	Enclosure
⑩	Main circuit power supply indicator Do not disassemble the machine or perform wiring when this indicator is ON.	⑪	Grounding screws for safety capacitor and voltage dependent resistor	⑫	Main circuit input terminals
⑬	Bottom hoisting position	⑭	Top hoisting position (lifting lug)	⑮	Operating panel
⑯	External operating panel interface	⑰	Control circuit terminal	⑱	Cable tie
⑲	Wiring description	⑳	Handle	㉑	Fan box
㉒	Main circuit output terminal	㉓	Grounding terminal	㉔	Caster
㉕	Logo	㉖	Upper front cover	㉗	Mark Symbol / Description Note: Read through the user guide before installation and operation. Danger: Do not remove the upper cover with power ON or within 10 min after power-off.

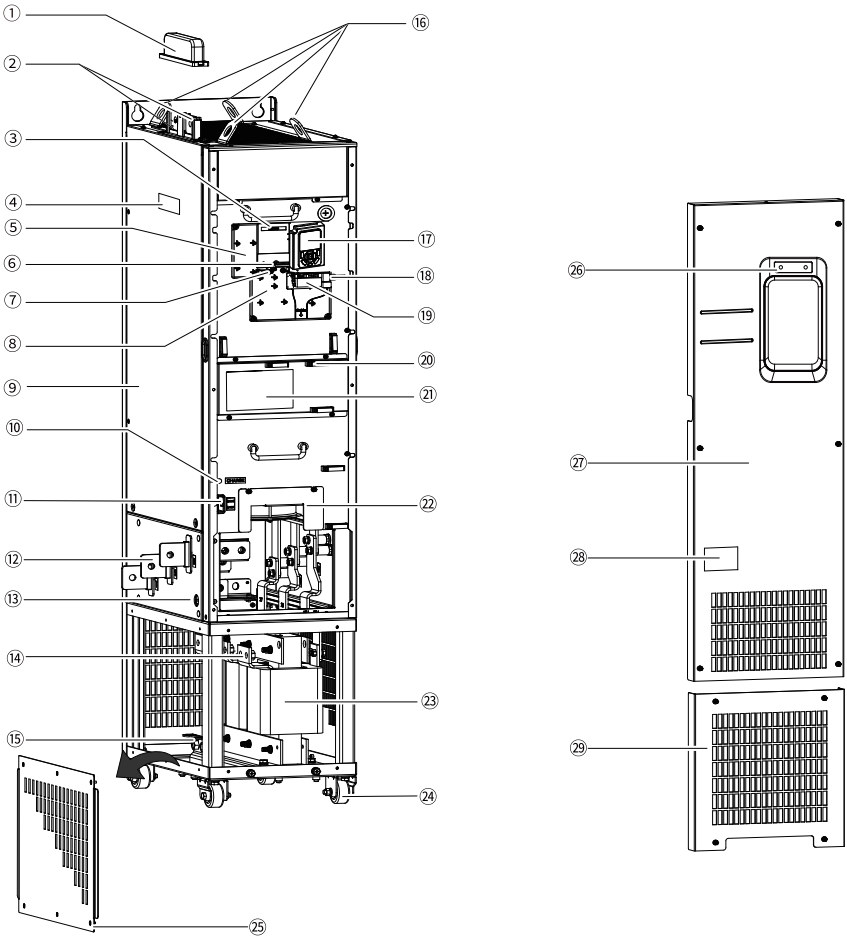
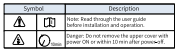


Figure 2-5 Components of T10 to T12 models (with an output AC reactor)

No.	Name	No.	Name	No.	Name
①	Protective cover for positive and negative terminals	②	Positive and negative terminals of the DC bus	③	Equipment bar code It allows you to check the product code and model.
④	Nameplate	⑤	Encoder expansion card fixing base	⑥	Cable tray and fixing base for the control board ground cable Note: Connect the control board ground cable to the ground copper bar only when the system is reliably grounded; otherwise, connect it to the fixing base.
⑦	Grounding copper busbar It is used to ground the PG card and control board.	⑧	Base for fixing the expansion card	⑨	Enclosure
⑩	Main circuit power supply indicator Do not disassemble the machine or perform wiring when this indicator is ON.	⑪	Grounding screws for safety capacitor and voltage dependent resistor	⑫	Main circuit input terminal
⑬	Bottom hoisting position	⑭	Main circuit output terminal	⑮	Grounding terminal
⑯	Top hoisting position (lifting lug)	⑰	Operating panel	⑱	External operating panel interface
⑲	Control circuit terminal	⑳	Cable tie	㉑	Wiring description
㉒	Fan box	㉓	AC output reactor	㉔	Casters
㉕	Left cover of the base	㉖	Logo	㉗	Upper front cover
㉘	Mark  	㉙	Front lower cover	-	-

2.5 Components of T13 Models

T13 models include two types in terms of structures: models with a standard cabinet and models with a standard cabinet including an auxiliary power distribution cabinet. For components of each structure, see *"Figure 2–6 Components of the standard cabinet" on page 30* and *"Figure 2–7 Components of the standard cabinet with auxiliary power distribution cabinet" on page 31*.

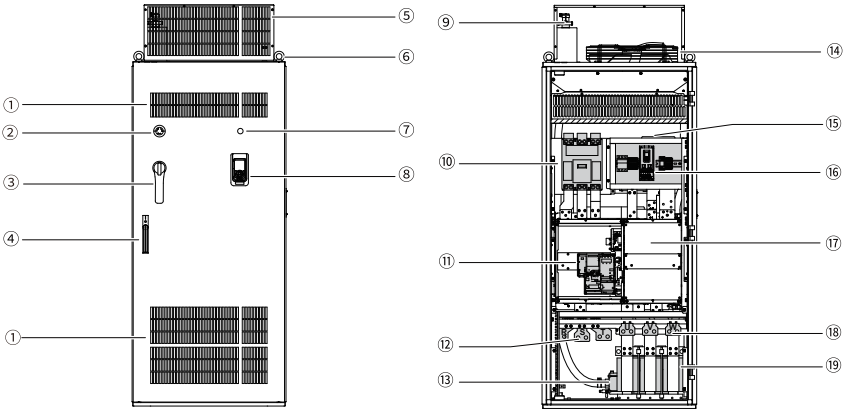


Figure 2-6 Components of the standard cabinet

No.	Name	No.	Name	No.	Name
①	Air inlet	②	Emergency stop button	③	Circuit breaker operating handler
④	Door lock	⑤	Top protective cover	⑥	Lifting lug
⑦	Power supply indicator	⑧	Operating panel	⑨	Coolant inlet
⑩	Main circuit breaker	⑪	Control board	⑫	R/S/T terminal block
⑬	Input reactor	⑭	Top fan	⑮	DC reactor
⑯	Water cooling system controller	⑰	AC drive	⑱	U/V/W terminal block
⑲	Output reactor	-	-	-	-

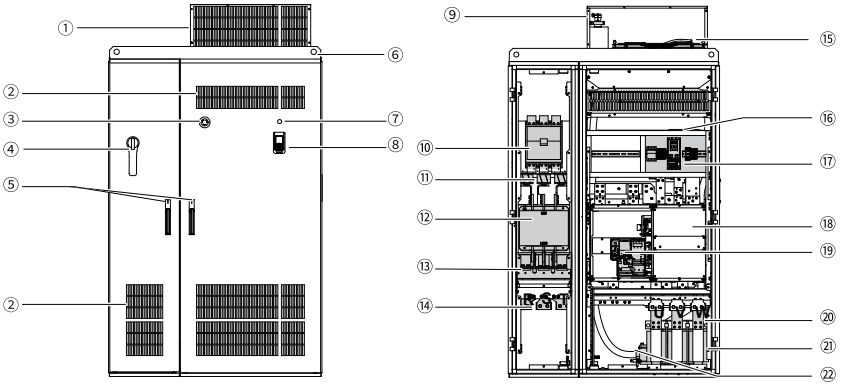


Figure 2-7 Components of the standard cabinet with auxiliary power distribution cabinet

No.	Name	No.	Name	No.	Name
①	Top protective cover	②	Air inlet	③	Emergency stop button
④	Circuit breaker operating handler	⑤	Door lock	⑥	Lifting beam
⑦	Power supply indicator	⑧	Operating panel	⑨	Coolant inlet
⑩	Main circuit breaker	⑪	Fuse	⑫	EMC filter
⑬	Input reactor	⑭	R/S/T terminal block	⑮	Top fan
⑯	DC reactor	⑰	Water cooling system controller	⑱	AC drive
⑲	Control board	⑳	U/V/W terminal block	㉑	Output reactor
㉒	Water pump	-	-	-	-

3 System Composition

3.1 System Composition 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 composition.

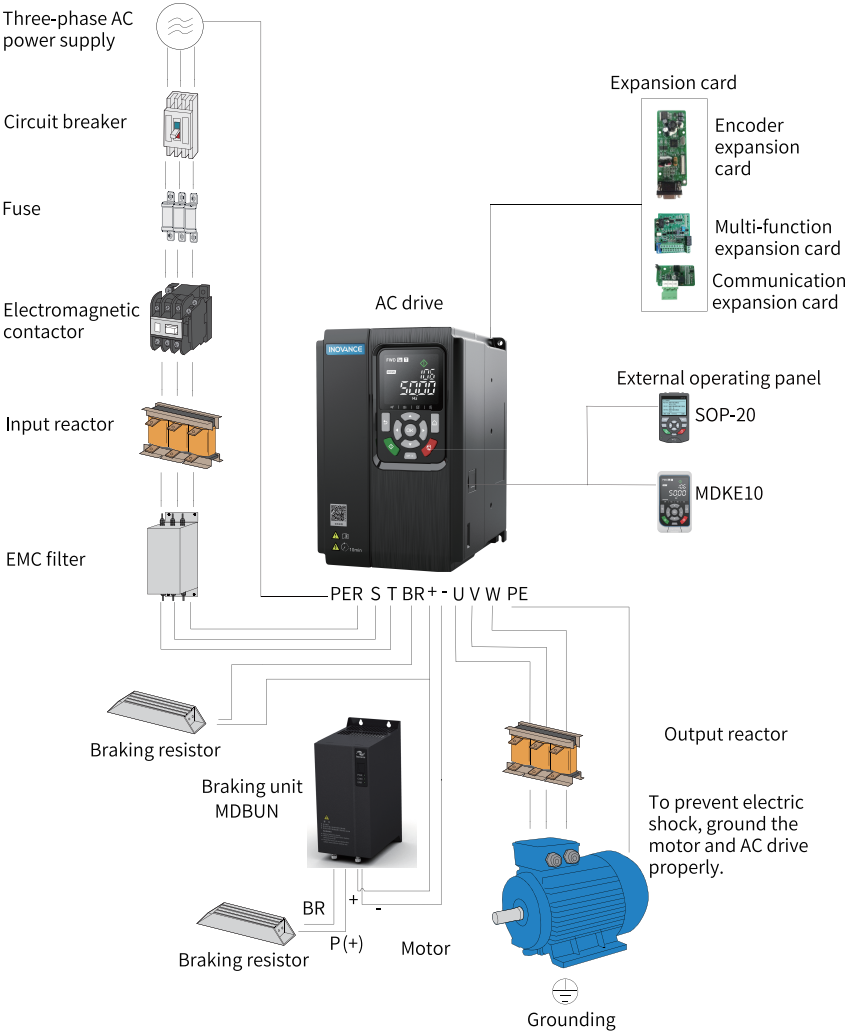


Figure 3-1 System composition

Table 3–1 Usage of peripheral electrical components

Name	Installation Position	Function
Circuit breaker	Input side of the drive, and between the power supply and the drive	Short circuit breaker: It cuts off the power supply when overcurrent occurs on downstream devices, so as to prevent accidents. Earth leakage circuit breaker (ELCB): The AC drive may generate high-frequency leakage current during running. To prevent electric shock or even a fire, install a proper ELCB based on actual applications.
Fuse	Input side of the drive	It protects downstream semiconductor components in case of short circuit.
Contactor	Input side of the drive	It controls energization and de-energization of the drive. Do not use the contactor to power on or off the drive frequently (minimal interval of one hour) or use the contactor to directly start the drive.
AC input reactor	Input side of the drive	It is used to eliminate the higher harmonics of the input side effectively and improve the power factor of the input side.
EMC filter	Input side of the drive	It reduces the conduction and radiation interference generated by the AC drive to external devices.
Simple filter	Input side of the drive	It reduces the conduction and radiation interference generated by the AC drive to external devices.
Braking resistor	Input side of the drive	For AC drive models with the name containing letter B, the braking resistor is optional. The braking resistor consumes regenerative energy generated during motor deceleration.
Braking unit	Input side of the drive	For AC drive models with the name not containing letter B, use the braking unit MDBUN of Inovance and the recommended braking resistor. The braking resistor consumes regenerative energy generated during motor deceleration.
Active front end (AFE) unit	Input side of the drive	An AFE is an optional unit used to feed the energy generated by the motor during braking back to the power grid. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE units feature energy saving, low noise, low harmonics pollution, and high power factor.
DC reactor	Output side of the drive	It is optional for T5 models, and standard for T6 models and above. The DC reactor provides the following functions: Improves the power factor on the input side. Improves the efficiency and thermal stability of the AC drive. Eliminates the impact of high-order harmonics on the input side of the AC drive and reduces external conduction and radiation interference.
Output reactor	Output side of the drive	It ensures motor insulation and prolongs the service life of the motor.
Magnetic ring and ferrite clamp	Output side of the drive	It reduces interferences to the outside and the bearing current.
	Signal cable	It improves the anti-interference performance of signals.
Motor	Output side of the drive	Use a proper motor.

Name	Installation Position	Function
External operating panel	Connecting the external operating panel interface to the J11 interface	The external LED operating panel MDKE-10 and the LCD operating panel SOP-20–810 are supported.
Note: For selection of peripheral electrical devices, see "Options".		

3.2 Electrical Wiring Diagram

T1-T12 models

"Figure 3–2 " on page 34 shows a typical wiring method of T1 to T12 models.

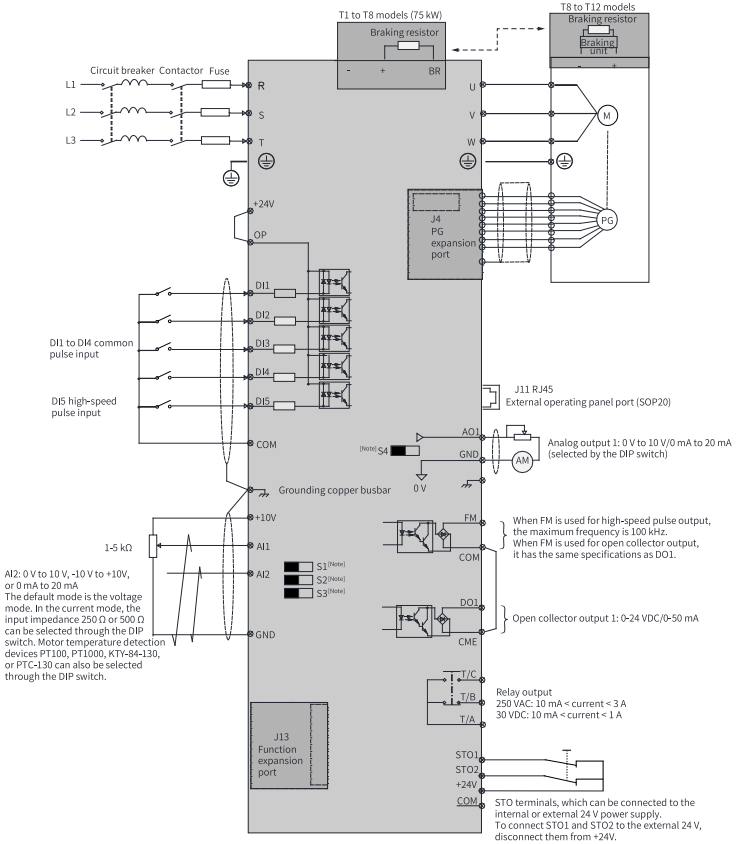


Figure 3-2 Standard wiring diagram (T1 to T12)

Note

- For details on S1 to S4 DIP switches, see *"Table 3–5 Function description of control circuit terminals " on page 41*.
- For three-phase 380–480 V AC 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 V AC 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.

T13 models

"Figure 3–3 " on page 35 shows the electrical connection in the cabinet.

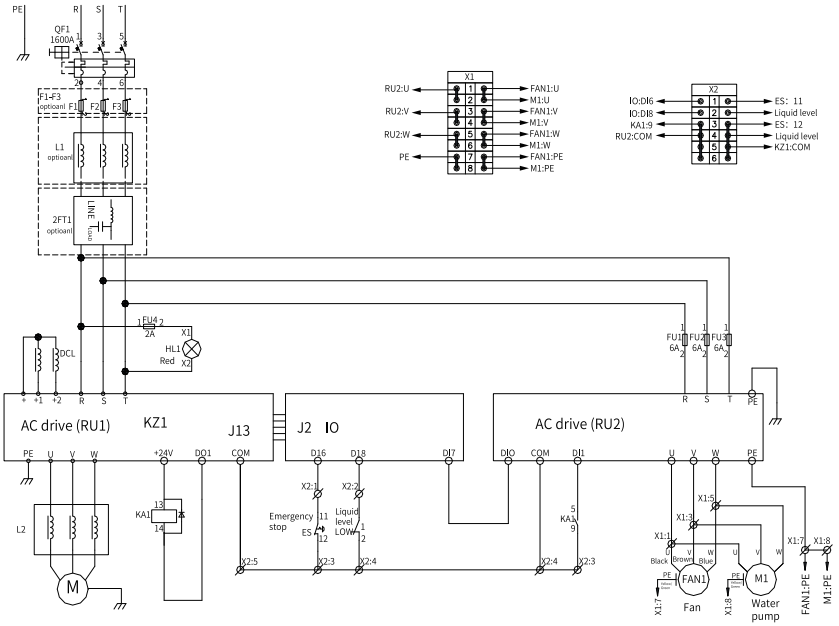


Figure 3-3 Electrical connection in the cabinet (T13)

T13

- The cabinet-housed devices operate under high voltage. Do not attempt to connect any wires while the voltage is live.
- The cabinet can be operated only by qualified professionals.
- Take caution when operating the cabinet disconnected from the power supply as external supply voltage may still be present. The main circuit and control circuit terminals may be live even when the motor is in the stop state.

- Do cut off input and output power, and wait at least 15 minutes until the power indicator is off before further operation.
- Ensure that the motors, cabinets, and other components are installed and connected in accordance with the national technical rules and other applicable regional regulations. Pay special attention to regulations on cable dimensions, fuses, grounding, open circuits, isolation, and overcurrent protection.
- If the safety device trips in a branch circuit, the fault current may have been disconnected. To reduce the risk of fire and electric shocks, check the conductive parts and other components of the cabinet and replace the damaged ones. Find the cause of the tripped fuse and make sure the problem is solved.

3.3 Main Circuit Terminals

T1 to T9 models

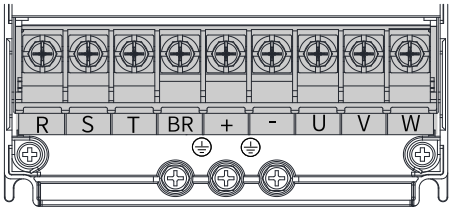


Figure 3-4 Layout of main circuit terminals for T1 to T4 models (three phase)

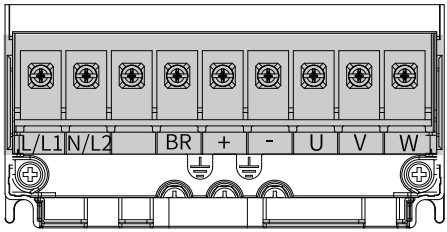


Figure 3-5 Layout of main circuit terminals for T2 models (single phase)

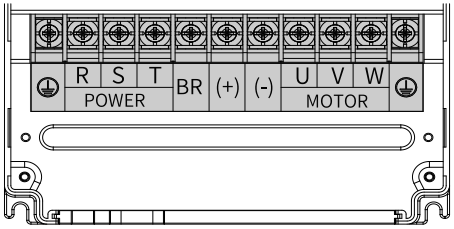


Figure 3-6 Layout of main circuit terminals for T5 to T8 models

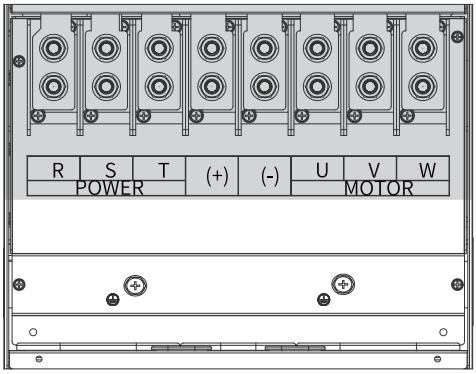


Figure 3-7 Layout of main circuit terminals for T9 models

Table 3–2 Descriptions of main Circuit terminals

Terminal Identification	Terminal Name	Function
R, S, T	Three-phase power supply input terminals	Connected to a three-phase AC input power supply
(+), (-)	Positive and negative terminals of the DC bus	Common DC busbar input; connected to the external braking unit of T9 models and above.
(+), BR	Braking resistor connection terminals	Used to connect to the braking resistor of T8 models and below Note: Only models with the name containing "B" are equipped with brake resistance terminals. For models with the name excluding "B", external brake units are required.
U, V, W	Output terminals	Connected to a three-phase motor
⏚	Grounding terminal (PE)	Used for protective grounding

T10 to T12 models

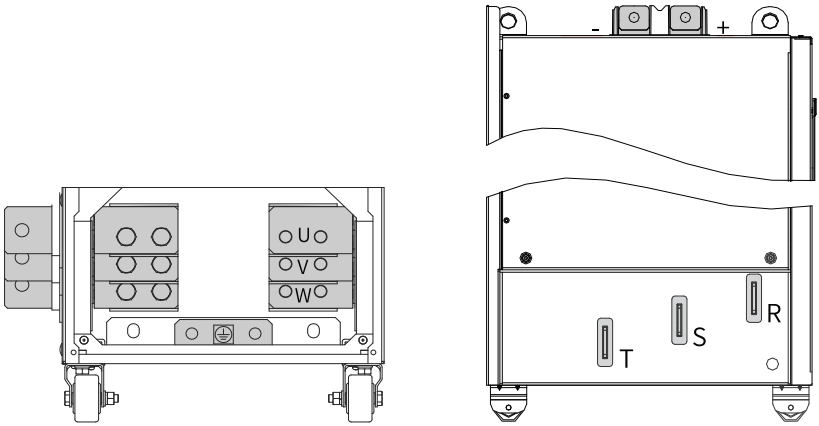


Figure 3-8 Layout of main circuit terminals for T10 to T12 models

Table 3–3 Descriptions of main circuit terminals

Terminal Identification	Terminal Name	Function
R, S, T	Three-phase power supply input terminals	Connected to a three-phase AC input power supply
+, -	Positive and negative terminals of the 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

T13 models

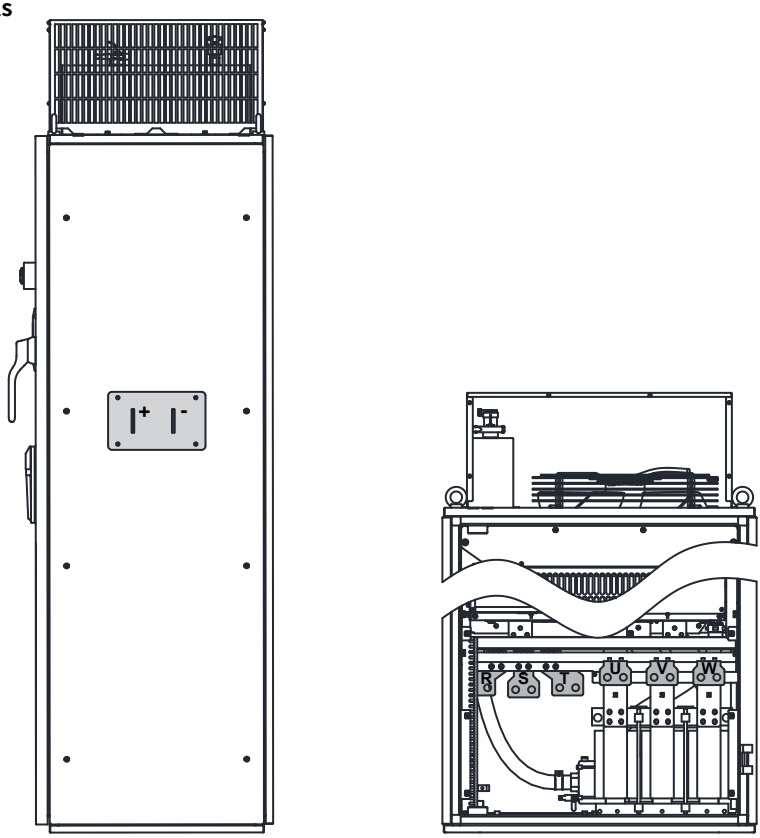


Figure 3-9 Layout of main circuit terminals for T13 models

Table 3–4 Descriptions of main circuit terminals

Terminal Identification	Terminal Name	Function
R, S, T	Three-phase power supply input terminals	Connected to a three-phase AC input power supply
+, -	Positive and negative terminals of the 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 Descriptions of Control Circuit Terminals

"Table 3–7 " on page 43 shows the layout of control circuit terminals.

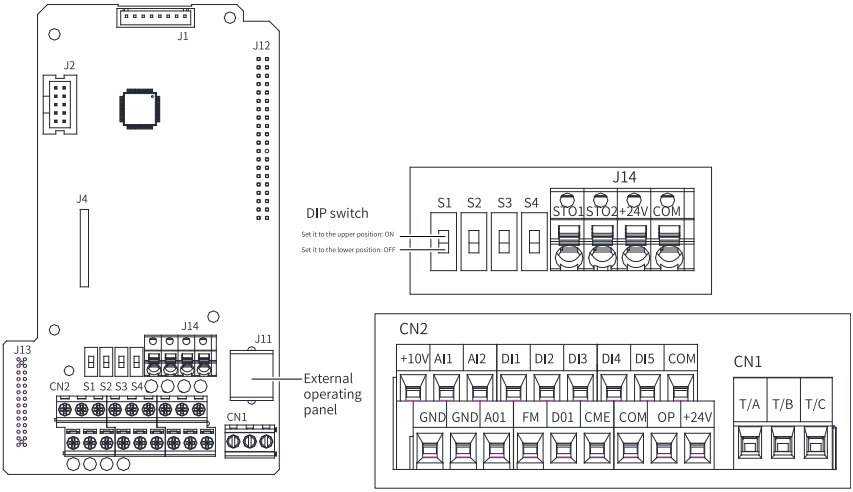


Figure 3-10 Layout of control circuit terminals

Table 3–5 Function description of control circuit terminals

Type	Terminal Symbol	Terminal Name	Function
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 external devices. Generally, it is used to power the DI/DO and external sensor. The maximum output current is 200 mA[Note 1].
	OP	Input terminal for external power supply	It is connected to +24V by default. When DI1 to DI5 are driven by external signals, OP must be disconnected from +24 V and connected to the external power supply.
Analog input	AI1-GND	AI1	Input voltage range: -10 VDC to + 10 VDC Input impedance: 22 kΩ
	AI2-GND	AI2	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, and supports 12-bit resolution and the correction accuracy of 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].
Digital input	DI1-OP	DI1	Photocoupler isolation and bipolar input Input impedance: 1.72 kΩ Voltage range for effective level input: 9 V to 30 V
	DI2- OP	DI2	
	DI3- OP	DI3	
	DI4- OP	DI4	
	DI5- OP	DI5	Besides features of DI1 to DI4, DI5 can also be used for high-speed pulse input. • Input impedance: 1.16 kΩ • Maximum input frequency: 100 kHz • Operating voltage range: 15 V to 30 V
Analog output	AO1-GND	AO1	The DIP switch on the control board is used to determine voltage output (default) or current output. • Operating voltage range: 0 V to 10 V • Output current range: 0 mA to 20mA

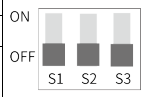
Type	Terminal Symbol	Terminal Name	Function
Digital output	DO1-CME	DO1	Photocoupler isolation and bipolar open collector output • Operating voltage range: 0 V to 24 V • Output current range: 0 mA to 50mA Note that digital output ground CME and digital input ground COM are internally insulated, but are shorted externally by jumper as the factory settings. In this case, DO1 is driven by +24V by default. 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	Driving capacity of the contact: • 250 VAC, 3 A, COSØ=0.4 • 30 VDC, 1 A
	T/B	Normally closed (NC) terminal	
	T/C	Normally open terminal	
Auxiliary interface	J4	Local PG card interface	It is used to connect the resolver, differential, and 23-bit encoders.
	J11	External operating panel interface	It is used to connect the external LCD operating panel (SOP-20-810) or the LED operating panel (MDKE-10).
	J13	Expansion card interface	28-core terminal for connection with expansion cards, including I/O cards, communication cards, and PG card
	J14	STO terminal	For details, see *"Table 3–6 STO terminal descriptions" on page 43*.
DIP switch	S1		For details, see *"Table 3–7 DIP switch descriptions " on page 43*.
	S2		
	S3		
	S4		Current/Voltage mode selection for AO1 • On: Current output mode • Off: Voltage output mode

Table 3–6 STO terminal descriptions

No.	Terminal Symbol	Terminal Name	Performance Requirements
1	STO1	STO channel 1	Internal connection: By default, STO1 and STO2 are connected to +24V by using a jumper upon factory delivery. External connection: STO1, STO2, and +24V can be connected to an external 24 V power supply. See the STO function for the detailed wiring.
2	STO2	STO channel 2	
3	+24V	STO1 and STO2 power supply+	
4	COM	STO1 and STO2 power supply ground	

Table 3–7 DIP switch descriptions

DIP Switch Status			Function
S1	S2	S3	
OFF	OFF	OFF	Voltage mode with the range of 0 VDC to 10 VDC for AI2
ON	OFF	OFF	Temperature mode for AI2 Set the temperature sensor type through F9-75. 0: No temperature sensor (AI used for analog input) 1: PT100, -25°C to +200°C 2: PT1000, -25°C to +200°C 3: KTY84-130, -40°C to +260°C 4: PTC130, -20°C to +180°C
OFF	ON	OFF	Current mode for AI2; current range: 0 mA to 20 mA; input impedance: 500 Ω
OFF	ON	ON	Current mode for AI2; current range: 0 mA to 40 mA; 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.
- S1, S2, and S3 are combined DIP switches for the AI. S4 is the DIP switch for the AO.

4 AC Drive Dimensions

4.1 Dimensions of T1 and T9 Models

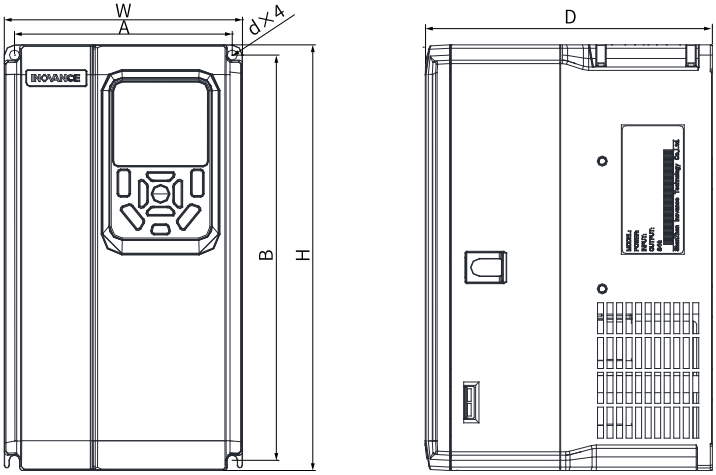


Figure 4-1 Outline dimensions and mounting dimensions of T1 to T4 models

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

Structure	Mounting Hole mm (in.)		Outline Dimension mm (in.)			Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	W	D	d x 4	
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)

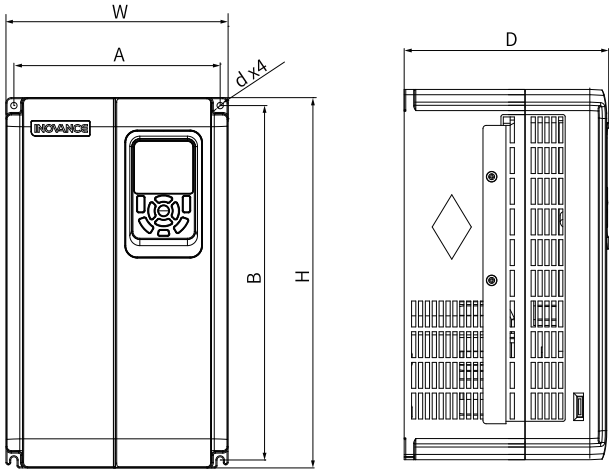


Figure 4-2 Outline dimensions and mounting dimensions of T5 to T6 models

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

Structure	Mounting Hole mm (in.)		Outline Dimension mm (in.)				Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D	d x 4	
T5 (without the 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 models come 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)

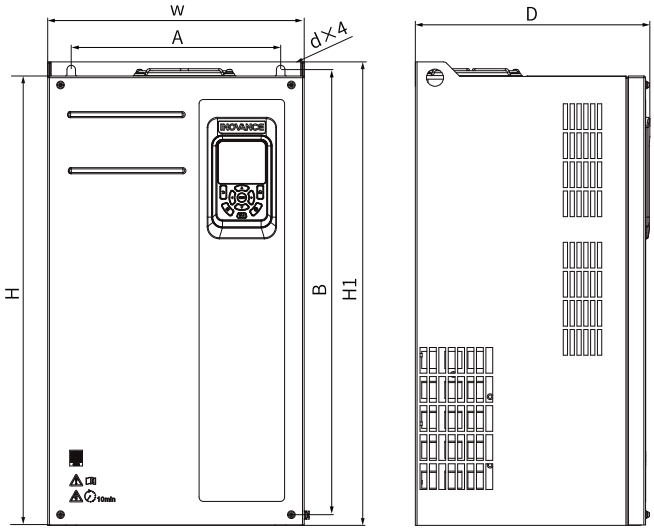


Figure 4-3 Outline dimensions and mounting dimensions of T7 to T9 models

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

Structure	Mounting Hole mm (in.)		Outline Dimension mm (in.)				Mounting Hole Diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D	d x 4	
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)

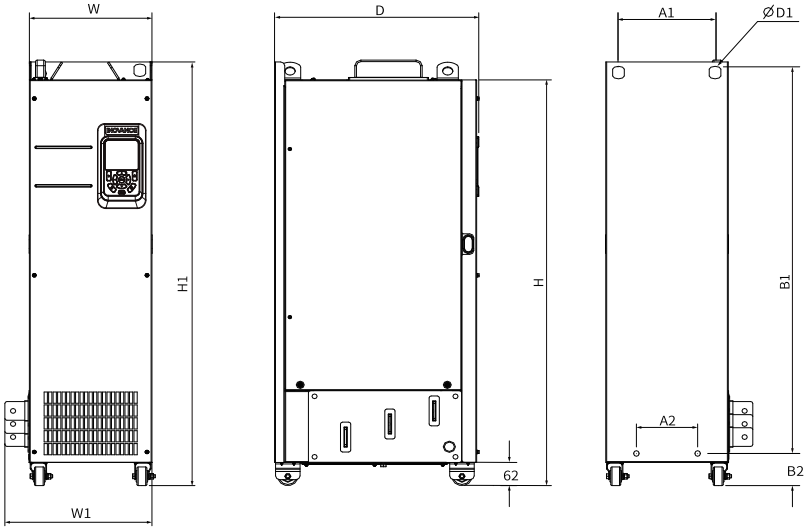


Figure 4-4 Outline dimensions and mounting dimensions of T10 to T12 models (without AC output reactor)

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

Structure	Mounting Hole mm (in.)				Overall 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)

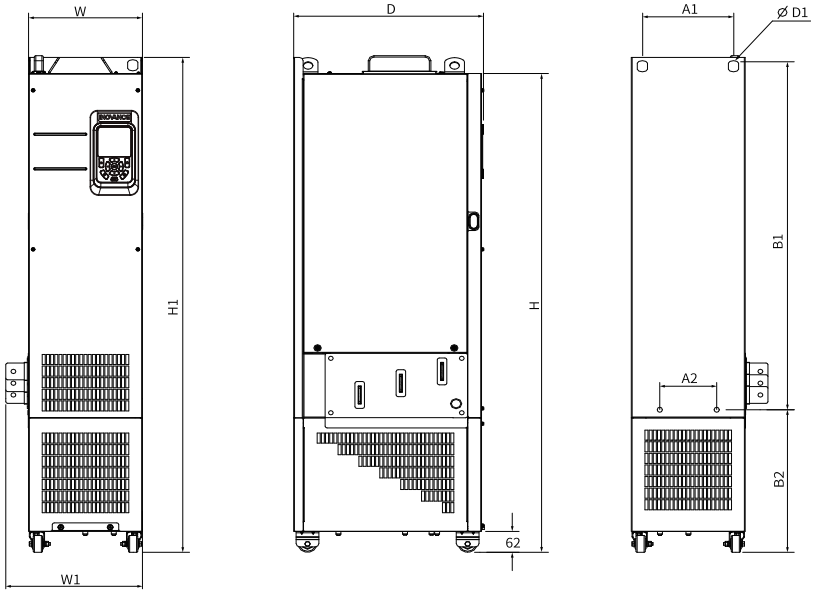


Figure 4-5 Outline dimensions and mounting dimensions of T10 to T12 models (with AC output reactor)

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

Structure	Mounting Hole mm (in.)				Overall 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)

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

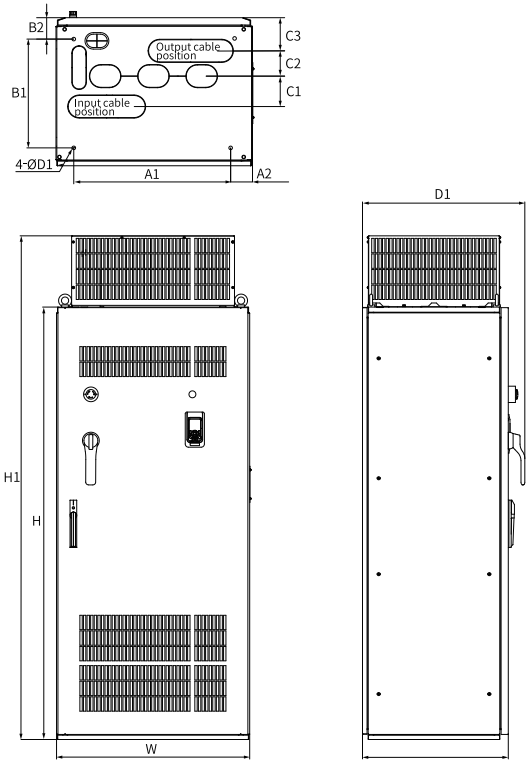


Figure 4-6 Outline dimensions and mounting dimensions of T13 models (without auxiliary power distribution cabinet)

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

Structure	Mounting Hole mm (in.)						
	A1	A2	B1	B2	C1	C2	C3
T13	660 (26.0)	73.5 (2.9)	450 (17.7)	85 (3.3)	125 (4.9)	104 (4.1)	136 (5.4)

Structure	Overall Dimension mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	H	H1	W	D	D1	D2	
T13	1800 (70.9)	2100 (82.7)	805 (31.7)	610 (24.0)	680 (26.8)	15 (0.6)	530 (1168.4)

4.5 Dimensions of T13 Models (with Auxiliary Power Distribution Cabinet)

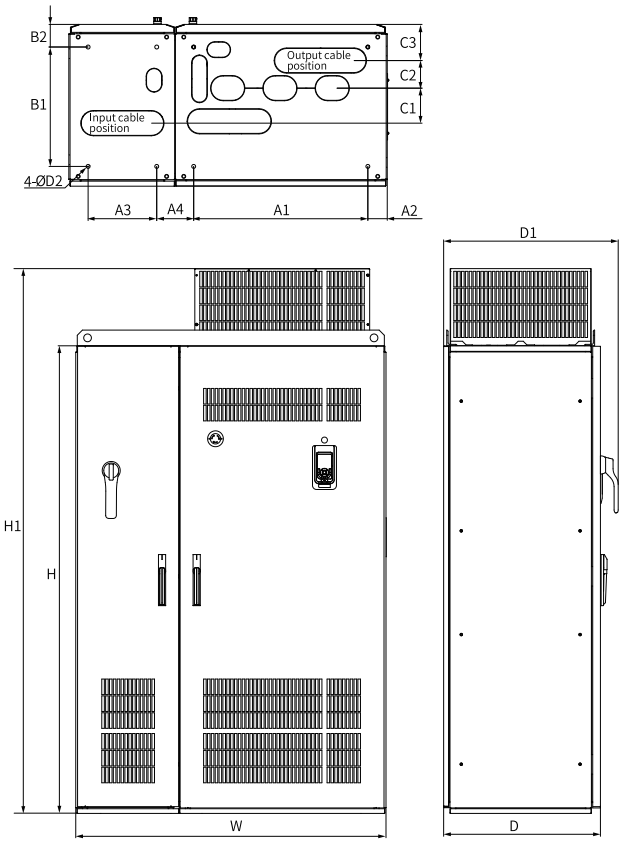


Figure 4-7 Outline dimensions and mounting dimensions of T13 models (with auxiliary power distribution cabinet)

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

Structure	Mounting Hole mm (in.)								
	A1	A2	A3	A4	B1	B2	C1	C2	C3
T13	660 (26.0)	73.5 (2.9)	260 (10.2)	140 (5.5)	450 (17.7)	85 (3.3)	132 (5.2)	104 (4.1)	136 (5.4)

Structure	Overall Dimension mm (in.)					Mounting Hole Diameter mm (in.)	Weight kg (lb)
	H	H1	W	D	D1	D2	
T13	1800 (70.9)	2100 (82.7)	1205 (47.5)	610 (24.0)	680 (26.8)	15 (0.6)	730 (1609.4)

5 Options

5.1 Option List

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

Table 5–1 Option list

Name		Model	Order No.	Supported AC Drive Model	Description
Braking components	External braking unit [1]	MDBUN-60-T	01013133	All models	60 A, 380 VAC series
		MDBUN-60-5T	0101AR57	All models	60 A, 480 VAC series
		MDBUN-90-T	01013126	All models	90 A, 380 VAC series
		MDBUN-90-5T	0101AR58	All models	90 A, 480 VAC series
		MDBUN-200-T	01040104	All models	200 A, 380 VAC series
		MDBUN-200-5T	01040160	All models	200 A, 480 VAC series
	Built-in braking unit	Models with the name 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.

Name		Model	Order No.	Supported AC Drive Model	Description
Expansion card	I/O expansion card 1	MD38IO1	01013098	T4 and above	Five DIs, one DO, one RO, one AO, one AI (PT100/PT1000), one RS485 or CAN communication signal isolation input terminal
	I/O expansion card 2	MD38IO2	01013103	All models	Three DIs
	I/O expansion card 3	MD38IO3	01040051	All models	Three DIs, one RO, one RS485 communication signal isolation input terminal
	I/O expansion card 4	MD520IO1	01040250	All models	Three DIs, one RS485 communication signal isolation input terminal, one normally open relay output terminal, one AO
	RS-485 communication card	MD38TX1	01013112	All models	Modbus communication adaption card with the isolation feature
	CANopen/ CANlink communication card	MD38CAN1	01013100	All models	CANopen/CANlink communication adaption card
	PROFIBUS DP communication card	MD-SI-DP2	01040249	All models	PROFIBUS DP communication card
		MD38DP2	01013144	T4 and above	PROFIBUS DP communication card
	PROFINET communication card	MD500-PN1	01040098	All models	PROFINET communication card
		MD500-PN2	01040198	All models	PROFINET communication card
	EtherCAT communication card	MD500-ECAT	01040113	All models	EtherCAT communication adaption card
	Ethernet/IP communication card	MD500-EN1	01040167	All models	Ethernet/IP communication adaption card
	Modbus TCP communication card	MD500-EM1	01040201	All models	Modbus TCP communication adaption card

Name		Model	Order No.	Supported AC Drive Model	Description
Expansion card	Positioning expansion card	MD38DW1	01013096	T4 and above	Multi-function pulse input expansion card Five DIs, one DO, one RO, one AO, one AI, one RS485 or CAN communication signal isolation input terminal, one differential ABZ terminal
	Positioning expansion card	MD38DW2	01013097	All models	Mini pulse input expansion card One RS485 communication terminal, one differential ABZ terminal (positioning)
	User programmable card	MD38PC1	01013104	T4 and above	Five DIs, two ROs, one CAN communication terminal
	Resolver frequency division encoder card	MD38PG4D	01040008	T4, T7 models and above	The MD38PG4D card is a PG card specially developed for resolvers. Featuring differential frequency division, it is suitable for various applications such as machine tool electric master axis, master-slave control, and synchronous control.
	Resolver interface card	MD38PG4	01013081	All models	It is applicable to the resolver with the excitation frequency of 10 kHz and with the DB9 interface To meet the MD38PG4 requirements, the excitation input DC resistance of the resolver must be greater than 17 Ω. Failure to comply will result in MD38PG4 malfunction. Select a resolver with a maximum of four pole pairs. Otherwise, the MD38PG4 card will be overloaded.

Name		Model	Order No.	Supported AC Drive Model	Description
Expansion card	Multi-function encoder card	MD38PGMD	01013147	All models	The card is an encoder interface card with the optional multiplied frequency division output function and supports 5 V or 15 V power supply. The card supports differential input, collector input, and push-pull input, as well as differential output and collector output; therefore, it can be used to connect to different encoders and supports A/B phase input of the host controller.
	23-bit PG card	ES510-PG-CT1	01320007	All models	Applicable to 23-bit encoders of Inovance; with a DB9 interface
	Sin-cos encoder	MD520-PG-S1	01040237	All models	The MD520-PG-S1 is a PG card that decodes sin-cos encoders. Working with the AC drive, it can measure the motor speed, and realize speed and position closed loop control and encoder frequency division output.

Name		Model	Order No.	Supported AC Drive Model	Description
Mounting accessory	Through-hole mounting bracket	MD500-AZJ-A1T1	01040072	T1	The bracket is used for through-hole mounting. It applies only to T1 to T9 models.
		MD500-AZJ-A1T2	01040073	T2	
		MD500-AZJ-A1T3	01040074	T3	
		MD500-AZJ-A1T4	01040075	T4	
		MD500-AZJ-A1T5	01040001	T5	
		MD500-AZJ-A1T6	01040002	T6	
		MD500-AZJ-A1T7	01040003	T7	
		MD500-AZJ-A1T8	01040004	T8	
		MD500-AZJ-A1T9	01040005	T9	
	Grounding bracket of cable shield	MD500-AZJ-A2T1	01040085	T1	The accessory is used for re-fixing the power cable and stable grounding of the shield in 360°. It applies only to T1 to T9 models.
		MD500-AZJ-A2T2	01040088	T2	
		MD500-AZJ-A2T3	01040083	T3	
		MD500-AZJ-A2T4	01040082	T4	
		MD500-AZJ-A2T5	01040081	T5	
		MD500-AZJ-A2T6	01040086	T6	
		MD500-AZJ-A2T7	01040087	T7	
		MD500-AZJ-A2T8	01040084	T8	
		MD500-AZJ-A2T9	01040089	T9	
	Mounting guide rail	MD500-AZJ-A3T10	01040009	T10 and 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.
	U/V/W output copper busbar	MD500-TP-T10	01040125	T10	MD520 models excluding that with the base (-L) are delivered with the U/V/W output copper busbar.
		MD500-TP-T11	01040126	T11	
		MD500-TP-T12	01040127	T12	

Name		Model	Order No.	Supported AC Drive Model	Description
Cables	Main circuit cable	Lugs manufactured by Suzhou Yuanli are recommended. For details of recommended lugs, see "5.3.1 Main Circuit Cables" on page 73.			It is recommended that the input and output main circuit cables use symmetrical shielded cables. Compared with four-conductor cables, symmetrical shielded cables can reduce electromagnetic radiation in the whole transmission system. It is recommended that power cables also use symmetrical shielded cables.
	Control circuit cables	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	01040182	All models	It supports parameter display and modification.
	External LCD operating panel	SOP-20-810	01040028	All models	It supports parameter copy and download, and supports English and Chinese.
	SOP-20-810 mounting base	CP600–BASE1	01040022	All models	It is used to install the SOP-20-810 to the cabinet door.
	MDKE-10 mounting base	MD580-AZJ1	01040202	All models	It is used to install the MDKE-10 to the cabinet door.
	Extension cable	MDCAB	01013008	All models	It is a standard eight-conductor, three-meter network cable that can be used to connect the LED operating panel MDKE-10 and LCD operating panel SOP-20-810.
		MDCAB-1.5	15048471	All models	1.5-Meter cable for connecting the external operating panel

Note

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

5.2 Mounting Accessories

5.2.1 Through-Hole Mounting Bracket

The through-hole mounting bracket is an option. Purchase a proper model based on actual needs.

Applicable model

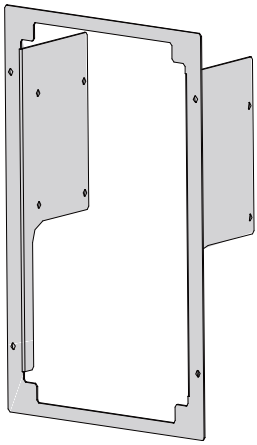


Figure 5-1 Through-hole mounting bracket

Table 5–2 Models of through-hole mounting brackets

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

Mounting hole dimensions

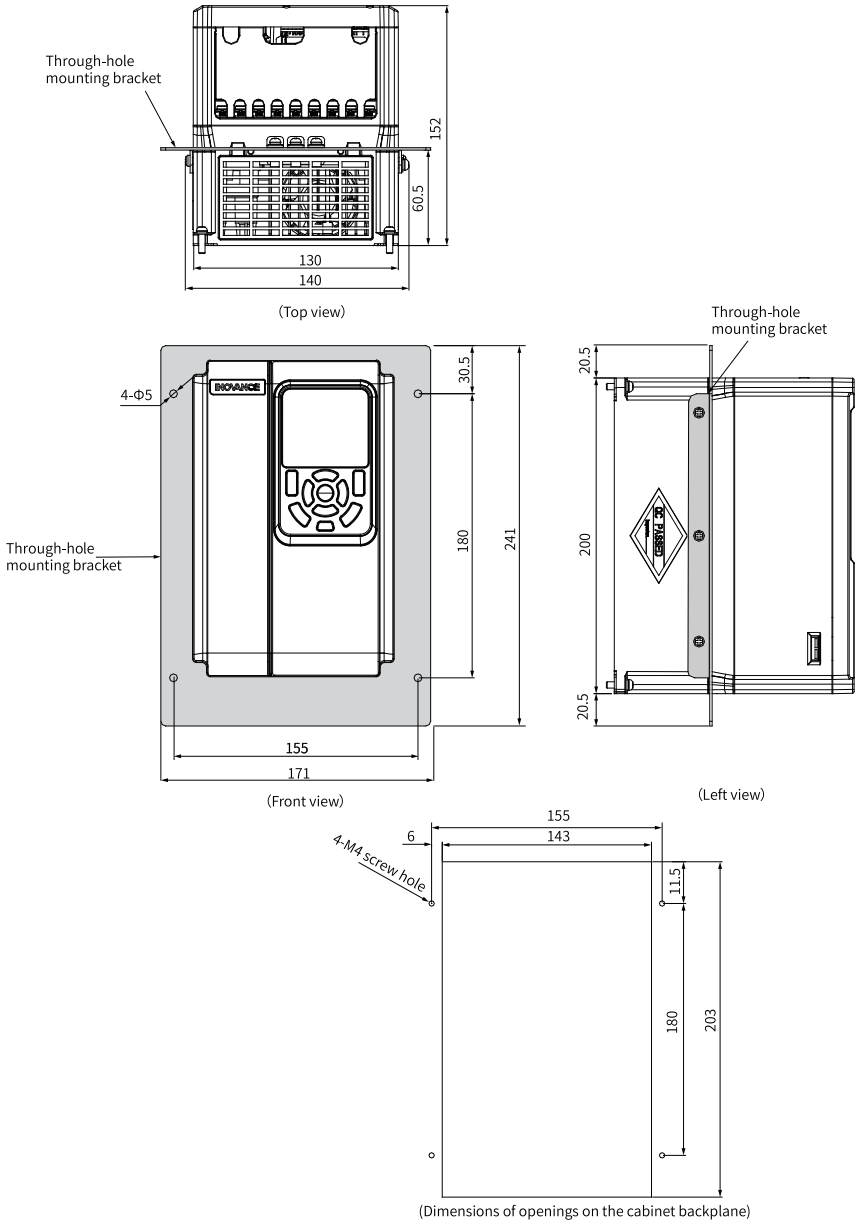


Figure 5-2 MD500-AZJ-A1T1 through-hole mounting bracket and hole dimensions (mm)

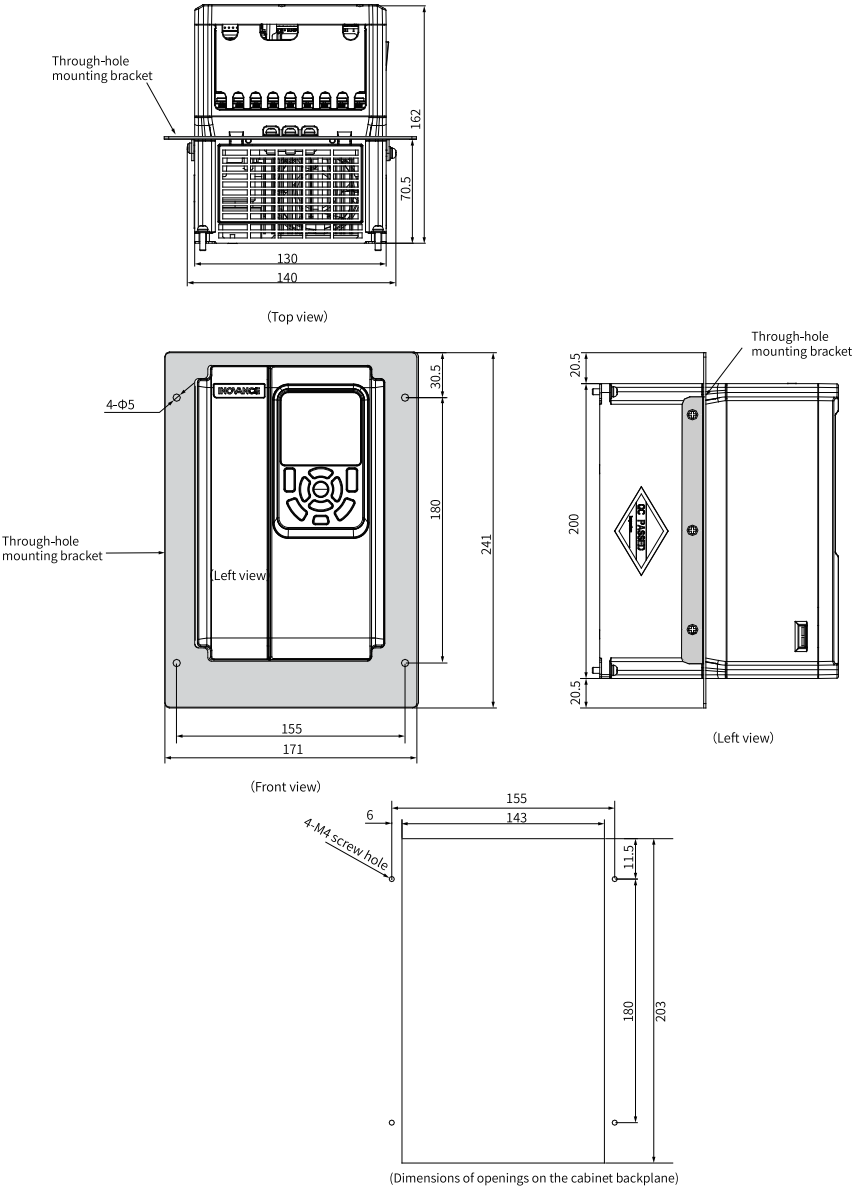


Figure 5-3 MD500-AZJ-A1T2 through-hole mounting bracket and hole dimensions (mm)

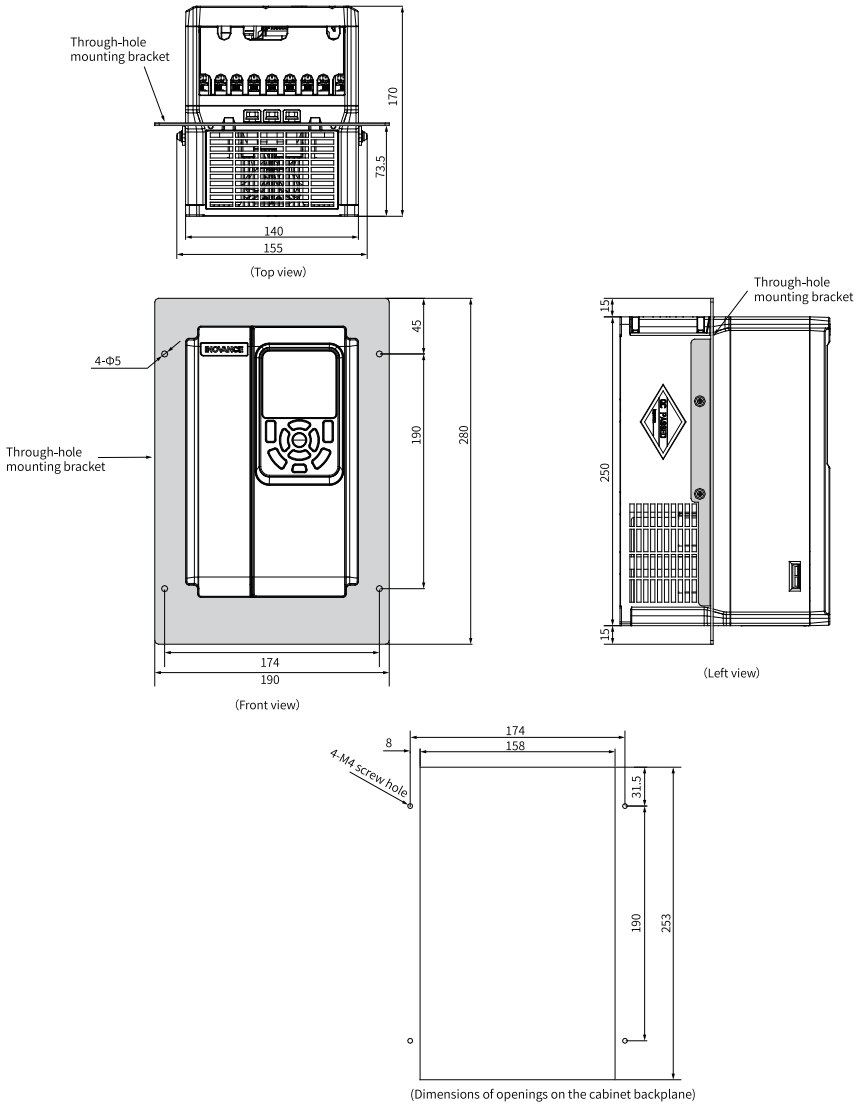


Figure 5-4 MD500-AZJ-A1T3 through-hole mounting bracket and hole dimensions (mm)

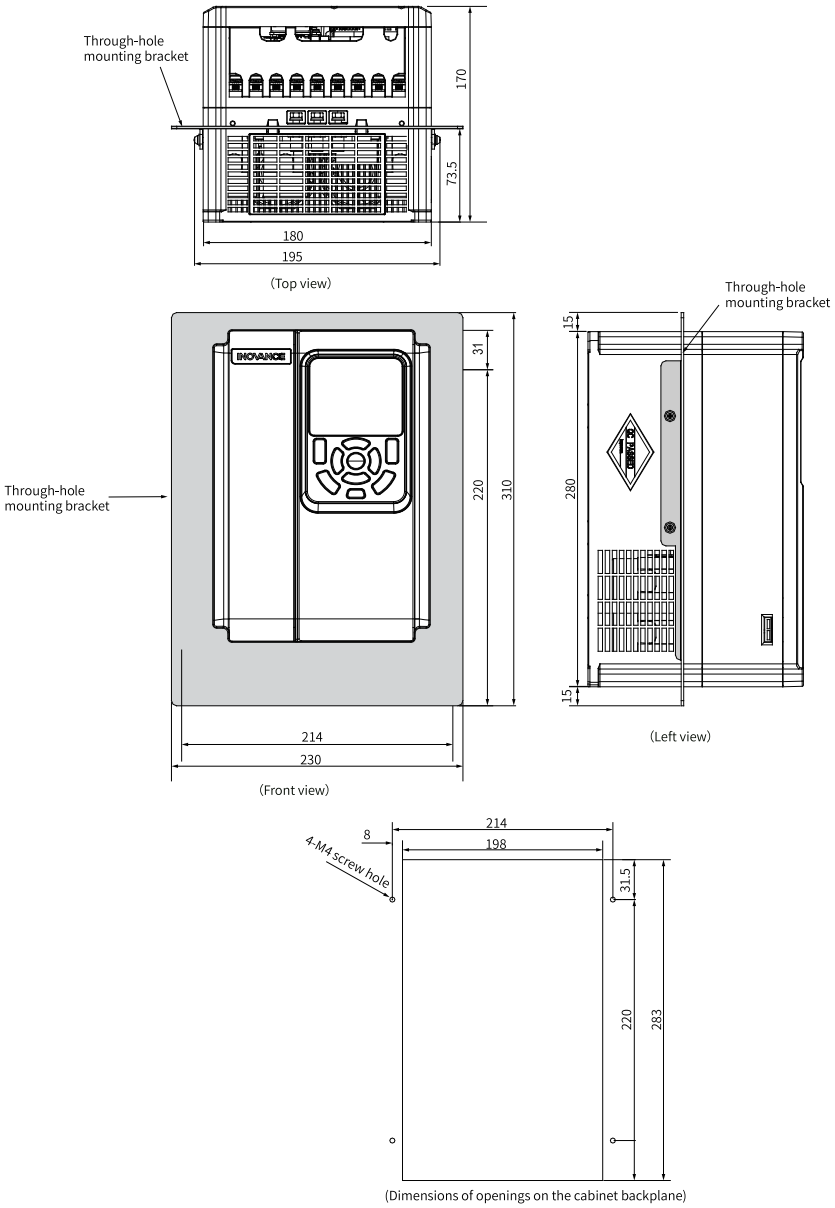


Figure 5-5 MD500-AZJ-A1T4 through-hole mounting bracket and hole dimensions (mm)

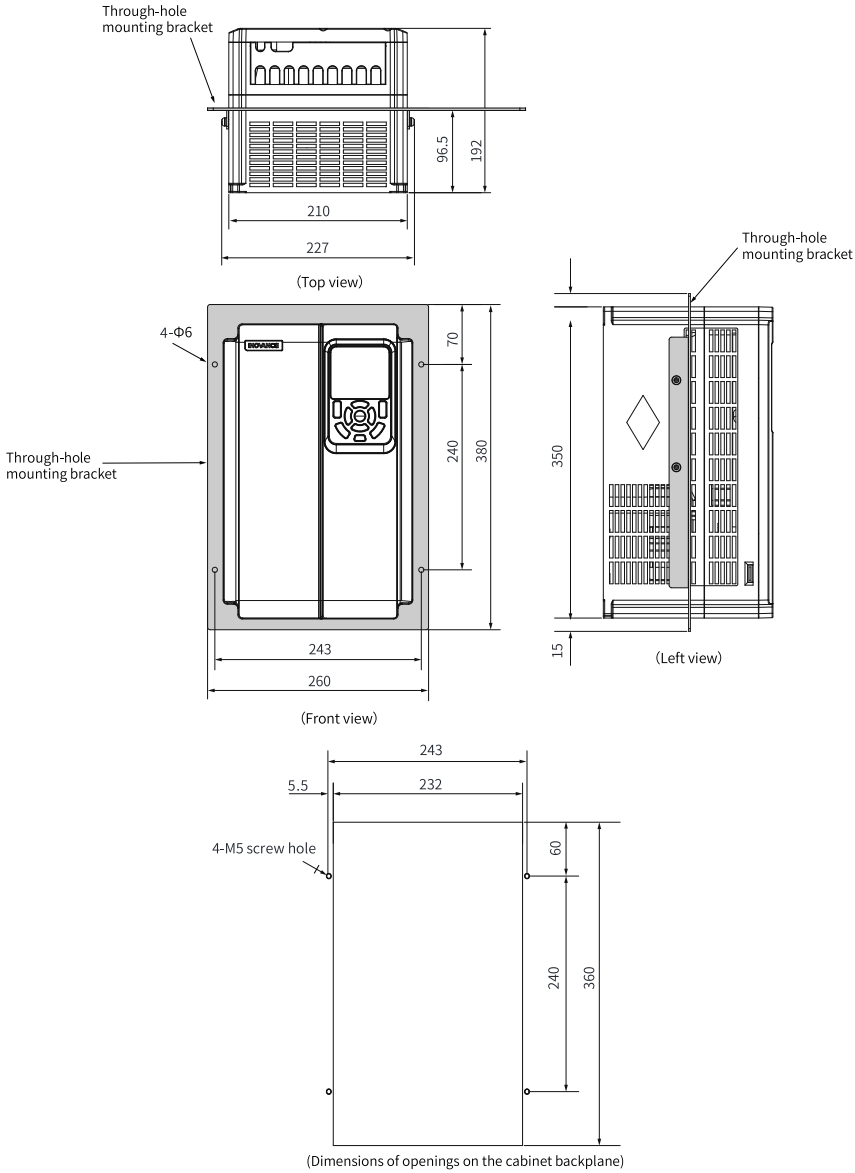


Figure 5-6 MD500-AZJ-A1T5 through-hole mounting bracket and cut-out dimensions (mm)

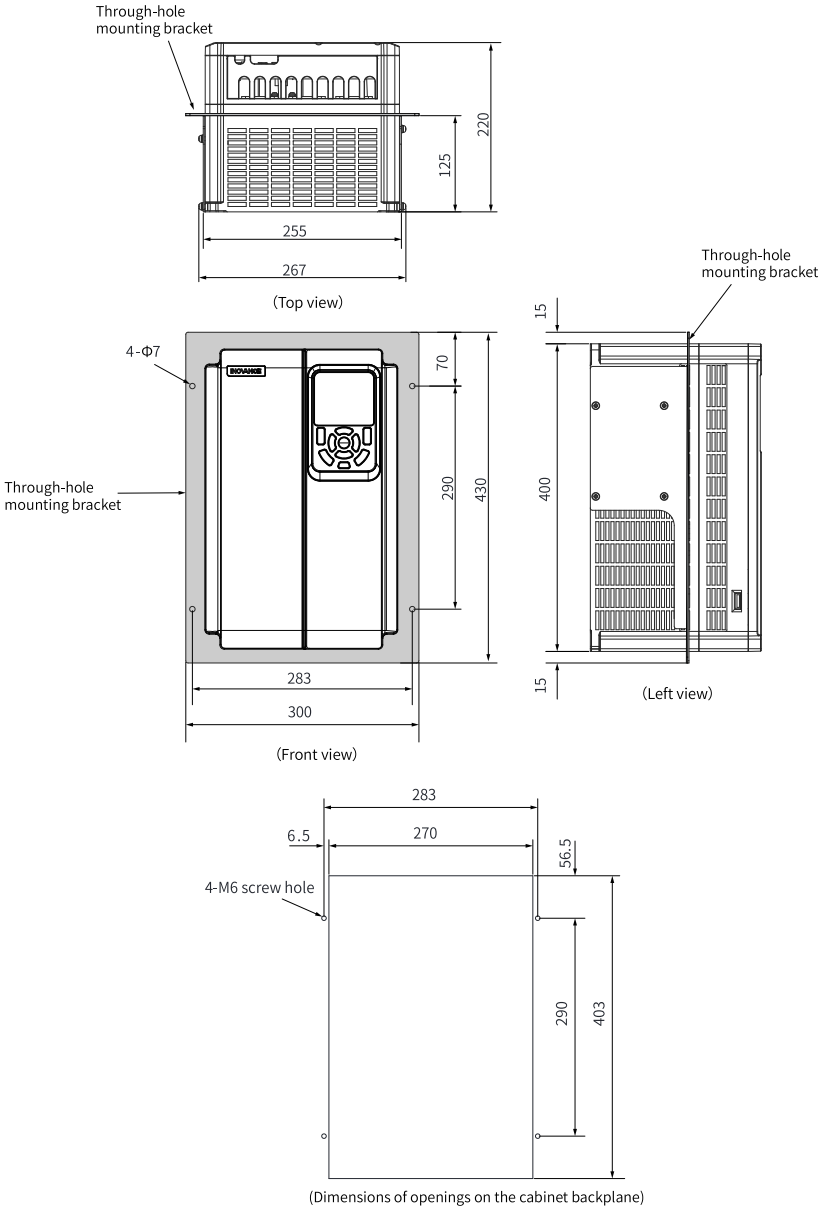


Figure 5-7 MD500-AZJ-A1T6 through-hole mounting bracket and cut-out dimensions (mm)

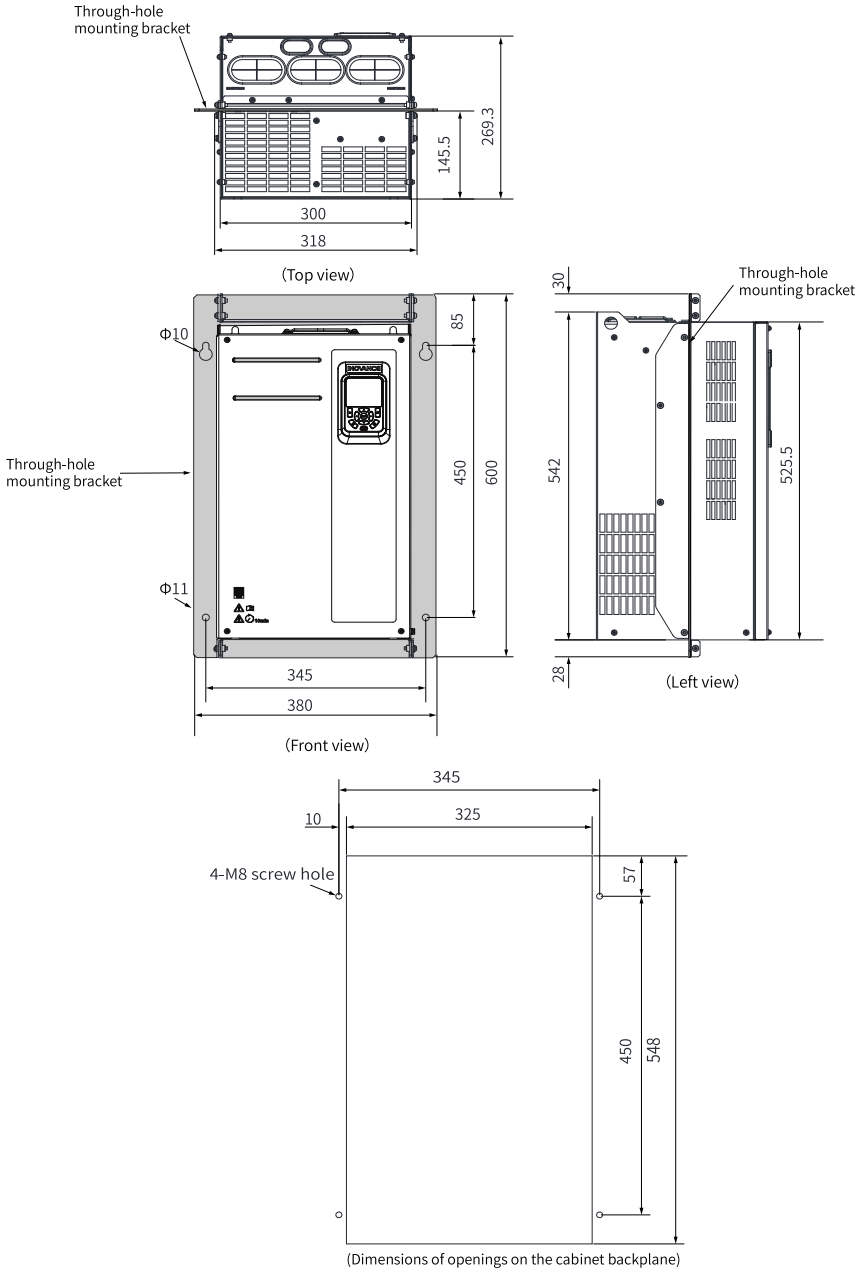


Figure 5-8 MD500-AZJ-A1T7 through-hole mounting bracket and cut-out dimensions (mm)

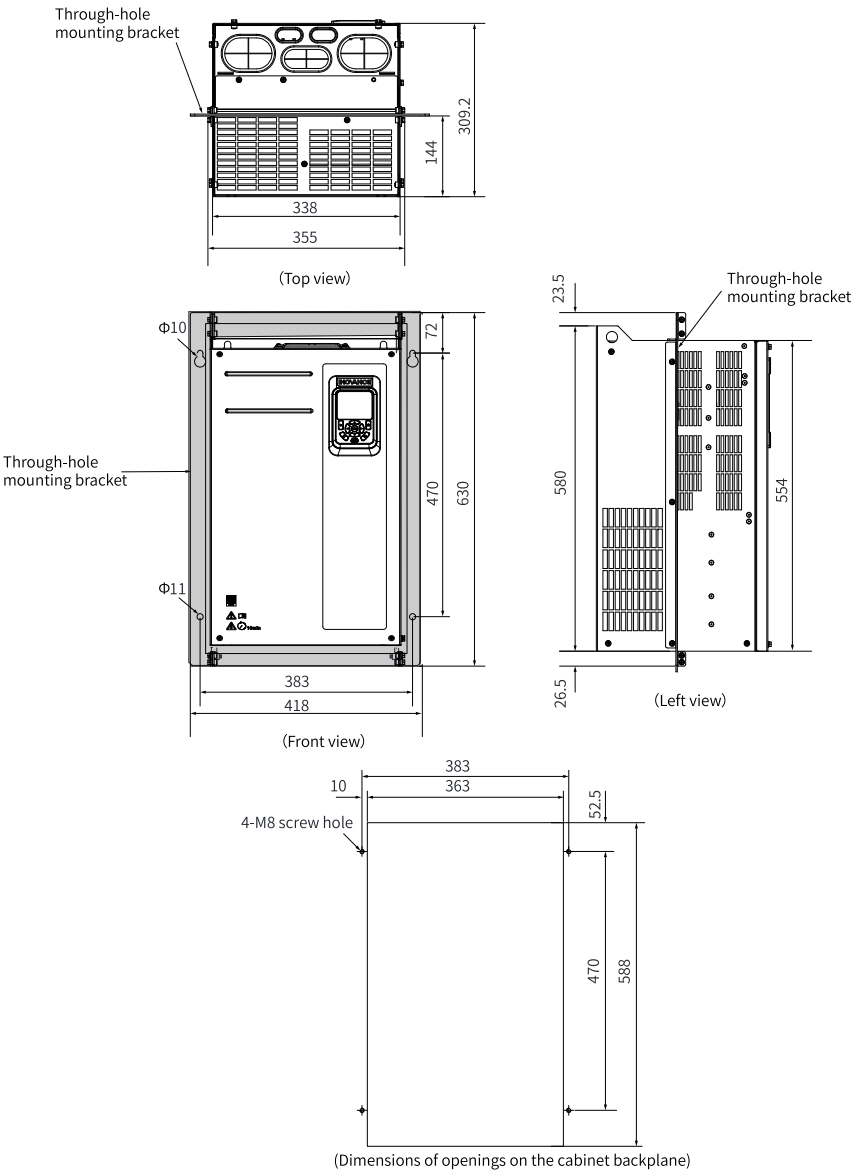


Figure 5-9 MD500-AZJ-A1T8 through-hole mounting bracket and cut-out dimensions (mm)

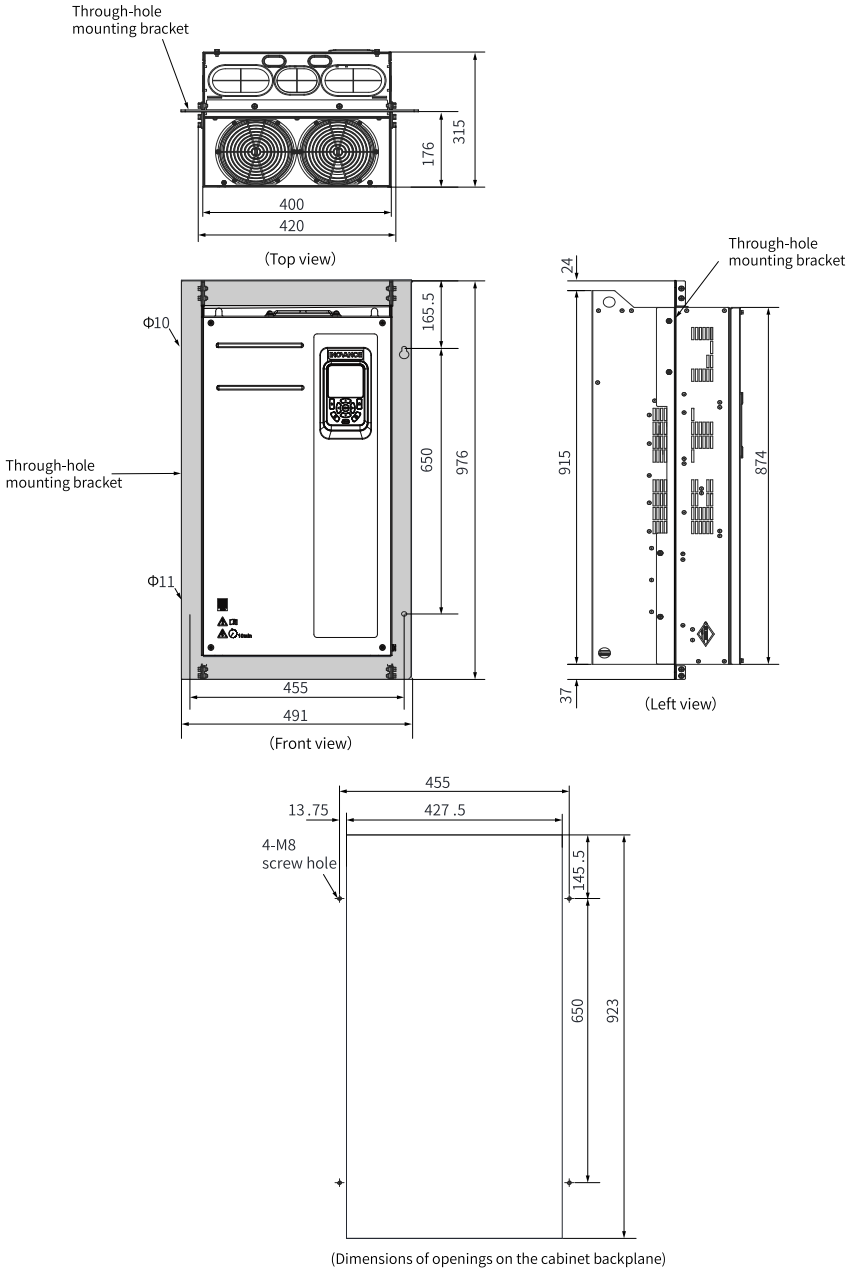


Figure 5-10 MD500-AZJ-A1T9 through-hole mounting bracket and cut-out dimensions (mm)

5.2.2 Grounding Bracket of Cable Shield

The grounding bracket of cable shield is optional and can be purchased separately as required (applicable to T9 models and below).

5.2.3 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.

The bottom mounting bracket delivered with the AC drive is applicable to the cabinet with the height of 600 mm. For the bottom mounting bracket applicable to the cabinet with the height of 800 mm, contact Inovance.

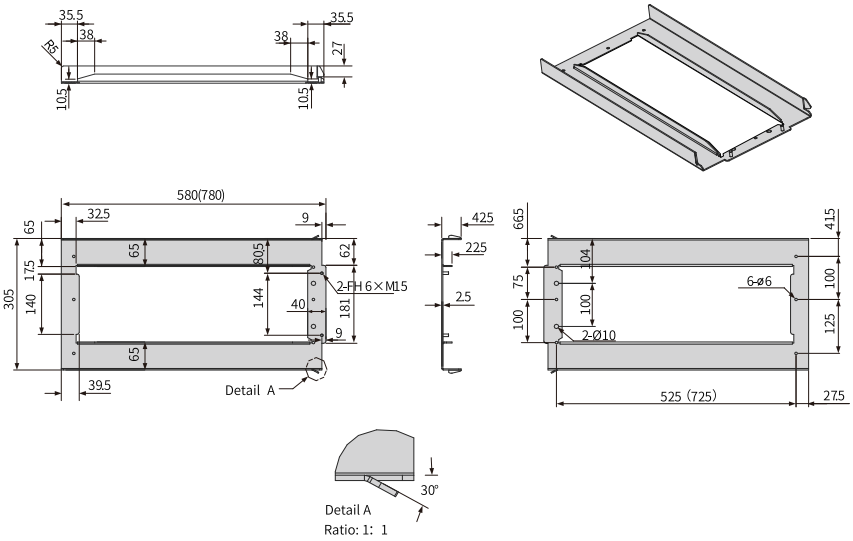


Figure 5-11 Dimensions of the bottom mounting bracket for T10 models

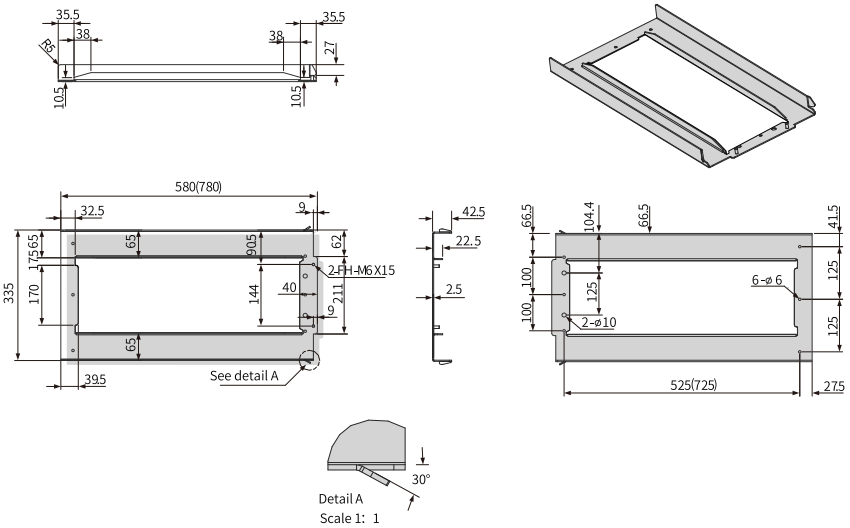


Figure 5-12 Dimensions of the bottom mounting bracket for T11 models

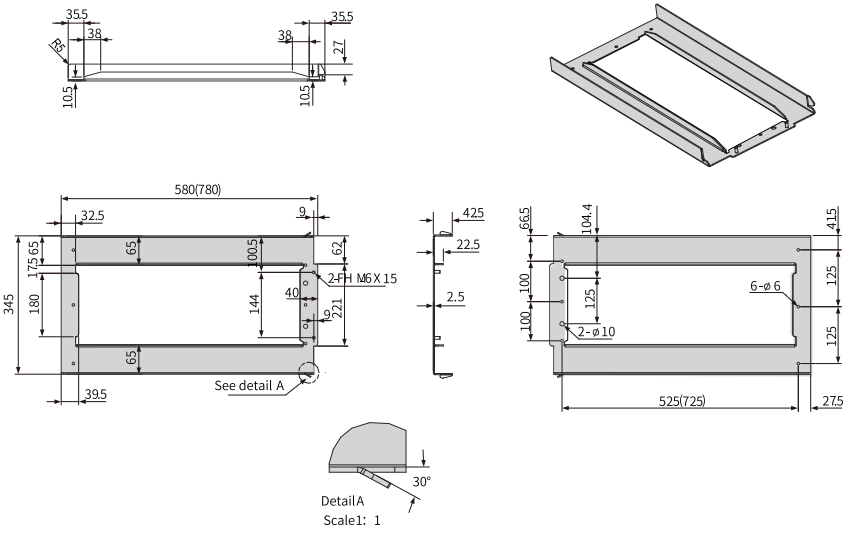


Figure 5-13 Dimensions of the bottom mounting bracket for T12 models

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.

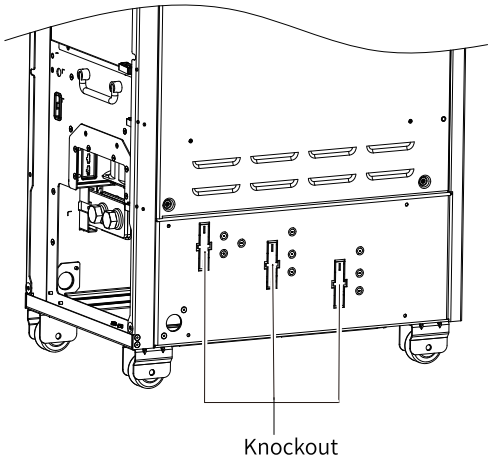
5.2.4 Guide Rail

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

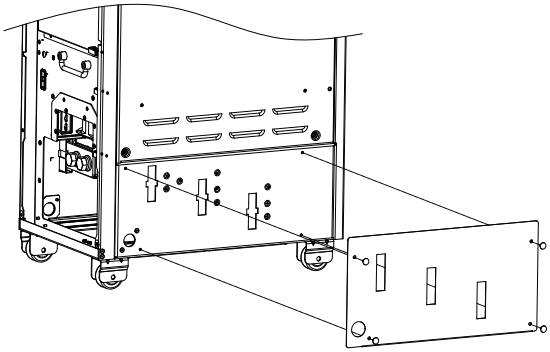
5.2.5 Installing the U/V/W Copper Busbar

All MD520 models excluding those with the base (-L) are delivered with U/V/W output side copper busbars. To install the U/V/W output copper busbars, follow the steps below:

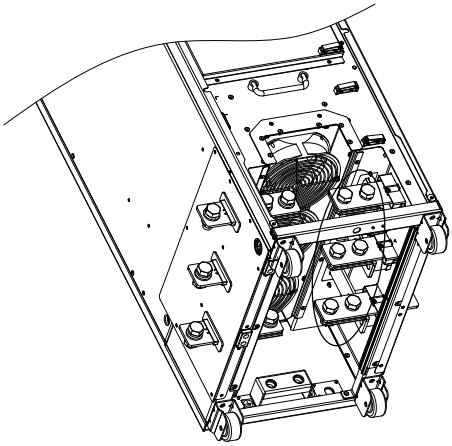
1. Use the screwdriver or cutting pliers to remove the three knockouts.

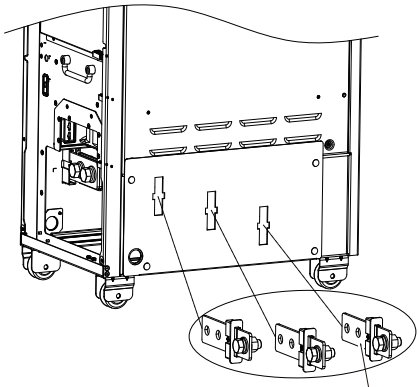


2. Use the four plastic snap-fit joints in the packing box to fasten the insulating paper to the chassis through the four holes on the paper.

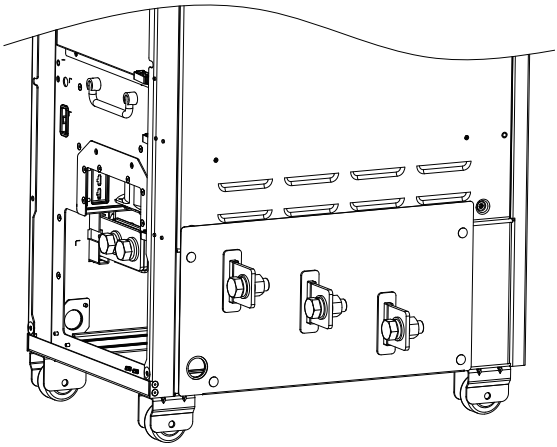


3. Remove the six screws on the drive, install the copper busbars, and then fasten the six screws.





The following figures shows the installed copper busbar.



Note

For selection of the U/V/W output copper busbar, see *"5.1 Option List " on page 52*.

5.3 Cables

5.3.1 Main Circuit Cables

Power cable selection requirements

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

- Compliant with IEC 60204-1 and IEC 60364-5-52 standards
- PVC insulated cables with copper conductors
- Heat resistance: ambient temperature of 40°C and cable surface temperature of 70°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Symmetrical cable with copper mesh shield

If specifications of recommended cables for peripheral devices or options are outside the specification range of the cables applicable to the product, contact Inovance.

To meet the EMC requirements, the cable with the shield must be used. The shielded cables are divided into three-conductor cables and four-conductor cables, as shown below. If the conductivity of the three-conductor cable shield cannot meet requirements, add an independent PE cable. Alternatively, use a four-conductor cable with one conductor as the PE wire. The shield of the shielded cable is comprised of

coaxial cooper braids to suppress radio frequency interference. To enhance the shielding performance and conductivity, the braided density of the shield must be greater than 90%.

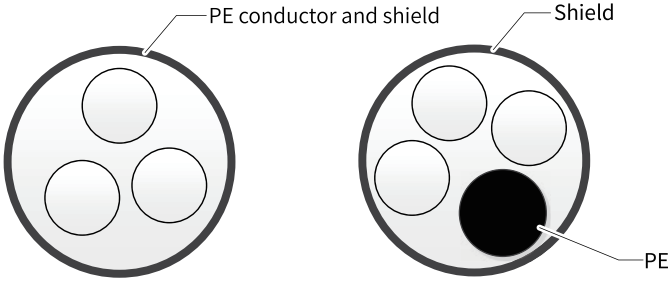


Figure 5-14 Recommended power cable

Recommended cable

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

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T1	MD520-4T0.4B(S)	1.8	3 x 0.75	TNR0.75-4	0.75	TNR0.75 - 4	M4	1.2 (10.6)
	MD520-4T0.7B(S)	2.4	3 x 0.75	TNR0.75-4	0.75	TNR0.75 - 4	M4	1.2 (10.6)
	MD520-4T1.1B(S)	3.7	3 x 0.75	TNR0.75-4	0.75	TNR0.75 - 4	M4	1.2 (10.6)
	MD520-4T1.5B(S)	4.6	3 x 0.75	TNR0.75-4	0.75	TNR0.75 - 4	M4	1.2 (10.6)
	MD520-4T2.2B(S)	6.3	3 x 0.75	TNR0.75-4	0.75	TNR0.75 - 4	M4	1.2 (10.6)
	MD520-4T3.0B(S)	9.0	3 x 1	TNR1.25 - 4	1	TNR1.25 - 4	M4	1.2 (10.6)
T2	MD520-4T3.7B(S)	11.4	3 x 1.5	TNR1.25 - 4	1.5	TNR1.25 - 4	M4	1.2 (10.6)
	MD520-4T5.5B(S)	16.7	3 x 2.5	TNR2-4	2.5	TNR2-4	M4	1.2 (10.6)
T3	MD520-4T7.5B(S)	21.9	3 x 4	TNR3.5 - 5	4	TNR3.5 - 5	M5	2.8 (24.8)
	MD520-4T11B(S)	32.2	3 x 6	TNR5.5 - 5	6	TNR5.5 - 5	M5	2.8 (24.8)
T4	MD520-4T15B(S)	41.3	3 x 10	GTNR8-5	10	GTNR8-5	M5	2.8 (24.8)

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T5	MD520-4T18.5(B) (S)-T	49.5	3 x 10	GTNR10-6	10	GTNR10-6	M6	4.8 (42.5)
	MD520-4T18.5(B)(S)	49.5	3 x 10	GTNR10-6	10	GTNR10-6	M6	4.8 (42.5)
	MD520-4T22(B)(S)-T	59.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
	MD520-4T22(B)(S)	59.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
T6	MD520-4T30(B)(S)	57.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
	MD520-4T37(B)(S)	69.0	3 x 25	GTNR25-6	16	GTNR16-6	M6	4.8 (42.5)
T7	MD520-4T45(B)(S)	89.0	3 x 35	GTNR35-8	16	GTNR16-6	M8	13.0 (115.2)
	MD520-4T55(B)(S)	106.0	3 x 50	GTNR50-8	25	GTNR25-8	M8	13.0 (115.2)
T8	MD520-4T75(B)(S)	139.0	3 x 70	GTNR70-12	35	GTNR35-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-4T90(S)	164.0	3 x 95	GTNR95-12	50	GTNR50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-4T110(S)	196.0	3 x 120	GTNR120-12	70	GTNR70-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
T9	MD520-4T132(S)	240.0	3 x 150	BC150-12	95	BC95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
	MD520-4T160(S)	287.0	3 x 185	BC185-12	95	BC95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
T10	MD520-4T200(S) (-L)	365.0	2 x (3 x 120)	BC120-12	120	BC120-12	M12	35.0 (310.1)
	MD520-4T220(S) (-L)	410.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	35.0 (310.1)

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T11	MD520-4T250(S) (-L)	441.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	35.0 (310.1)
	MD520-4T280(S) (-L)	495.0	2 x (3 x 150)	BC150-12	150	BC150-12	M12	35.0 (310.1)
T12	MD520-4T315(S) (-L)	565.0	2 x (3 x 185)	BC185-16	185	BC185-16	M16	85.0 (753.1)
	MD520-4T355(S) (-L)	617.0	2 x (3 x 185)	BC185-16	185	BC185-16	M16	85.0 (753.1)
	MD520-4T400(S) (-L)	687.0	2 x (3 x 240)	BC240-16	240	BC240-16	M16	85.0 (753.1)
T13	MD520-4T500(S)-(A)	838.1	4 x (3 x 150)	GTNR150-16	2 x 150	GTNR150-16	M16	85.0 (753.1)
	MD520-4T560(S)-(A)	949.6	4 x (3 x 185)	GTNR185-16	2 x 185	GTNR185-16	M16	85.0 (753.1)
	MD520-4T630(S)-(A)	1043.5	4 x (3 x 240)	GTNR240-16	2 x 240	GTNR240-16	M16	85.0 (753.1)

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

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (AWG/mil)<2>	Recommended Cable Lug	Recommended Cable (AWG/mil)<2>	Recommended Cable Lug		
T1	MD520-4T0.4B(S)	1.8	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
	MD520-4T0.7B(S)	2.4	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
	MD520-4T1.1B(S)	3.7	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
	MD520-4T1.5B(S)	4.6	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
	MD520-4T2.2B(S)	6.3	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
	MD520-4T3.0B(S)	9.0	16	TLK1.25-4	18	TLK1.25-4	M4	1.2 (10.6)
T2	MD520-4T3.7B(S)	11.4	16	TLK1.25–4	16	TLK1.25–4	M4	1.2 (10.6)
	MD520-4T5.5B(S)	16.7	14	TLK2-4	14	TLK2-4	M4	1.2 (10.6)

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (AWG/mil)<2>	Recommended Cable Lug	Recommended Cable (AWG/mil)<2>	Recommended Cable Lug		
T3	MD520-4T7.5B(S)	21.9	12	TLK3.5‑5	12	TLK3.5‑5	M5	2.8 (24.8)
	MD520-4T11B(S)	32.2	8	TLK10-5	8	TLK10-5	M5	2.8 (24.8)
T4	MD520-4T15B(S)	41.3	6	TLK16-5	6	TLK16-5	M5	2.8 (24.8)
T5	MD520-4T18.5(B) (S)-T	49.5	6	TLK16-6	6	TLK16-6	M6	4.8 (42.5)
	MD520-4T18.5(B)(S)	49.5	6	TLK16-6	6	TLK16-6	M6	4.8 (42.5)
	MD520-4T22(B)(S)-T	59.0	4	TLK25-6	6	TLK16-6	M6	4.8 (42.5)
	MD520-4T22(B)(S)	59.0	4	TLK25-6	6	TLK16-6	M6	4.8 (42.5)
T6	MD520-4T30(B)(S)	57.0	4	TLK25-6	6	TLK16-6	M6	4.8 (42.5)
	MD520-4T37(B)(S)	69.0	2	TLK35-6	6	TLK16-6	M6	4.8 (42.5)
T7	MD520-4T45(B)(S)	89.0	2	TLK35-8	6	TLK16-8	M8	13.0 (115.2)
	MD520-4T55(B)(S)	106.0	1/0	TLK50-8	4	TLK25-8	M8	13.0 (115.2)
T8	MD520-4T75(B)(S)	139.0	3/0	TLK95-12	1/0	TLK50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-4T90(S)	164.0	3/0	TLK95-12	1/0	TLK50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-4T110(S)	196.0	300	TLK150-12	3/0	TLK95-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (AWG/mil)<2>	Recommended Cable Lug	Recommended Cable (AWG/mil)<2>	Recommended Cable Lug		
T9	MD520-4T132(S)	240.0	350	TLK185-12	3/0	TLK95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
	MD520-4T160(S)	287.0	450	TLK240-12	250	TLK120-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
T10	MD520-4T200(S) (-L)	365.0	4x1/0	TLK50-12	2x1/0	TLK50-12	M12	35.0 (310.1)
	MD520-4T220(S) (-L)	410.0	4x1/0	TLK50-12	2x1/0	TLK50-12	M12	35.0 (310.1)
T11	MD520-4T250(S) (-L)	441.0	4x1/0	TLK50-12	2x1/0	TLK50-12	M12	35.0 (310.1)
	MD520-4T280(S) (-L)	495.0	4x2/0	TLK70-12	2x2/0	TLK70-12	M12	35.0 (310.1)
T12	MD520-4T315(S) (-L)	565.0	4x3/0	TLK95-16	2x3/0	TLK95-16	M16	85.0 (753.1)
	MD520-4T355(S) (-L)	617.0	4 x 250	TLK120-16	2 x 250	TLK120-16	M16	85.0 (753.1)
	MD520-4T400(S) (-L)	687.0	4 x 250	TLK120-16	2 x 250	TLK120-16	M16	85.0 (753.1)
T13	MD520-4T500(S)-(A)	838.1	4x300kcmil	TLK150-16	2x300kcmil	TLK150-16	M16	85.0 (753.1)
	MD520-4T560(S)-(A)	949.6	4x350kcmil	TLK185-16	2x350kcmil	TLK185-16	M16	85.0 (753.1)
	MD520-4T630(S)-(A)	1043.5	4x400kcmil	TLK240-16	2x400kcmil	TLK240-16	M16	85.0 (753.1)

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

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T1	MD520-2T0.4B(S)	2.4	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD520-2T0.7B(S)	4.6	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD520-2T1.1B(S)	6.3	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	M4	1.2 (10.6)
	MD520-2T1.5B(S)	9.0	3 x 1	TNR1.25-4	1	TNR1.25-4	M4	1.2 (10.6)
T2	MD520-2T2.2B(S)	11.4	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	M4	1.2 (10.6)
	MD520-2T3.7B(S)	16.7	3 x 2.5	TNR2-4	2.5	TNR2-4	M4	1.2 (10.6)
T3	MD520-2T5.5B(S)	32.2	3 x 6	TNR5.5-5	6	TNR5.5-5	M5	2.8 (24.8)
T4	MD520-2T7.5B(S)	41.3	3 x 10	TNR8-5	10	TNR8-5	M5	2.8 (24.8)
T5	MD520-2T11(B) (S)	59.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
T6	MD520-2T15(B) (S)	57.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (42.5)
	MD520-2T18.5(B)(S)	69.0	3 x 25	GTNR25-6	16	GTNR16-6	M6	4.8 (42.5)
T7	MD520-2T22(B) (S)	89.0	3 x 35	GTNR35-8	16	GTNR16-8	M8	4.8 (42.5)
	MD520-2T30(B)(S)	106.0	3 x 50	GTNR50-8	25	GTNR25-8	M8	4.8 (42.5)
T8	MD520-2T37(B) (S)	139.0	3 x 70	GTNR70-12	35	GTNR35-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-2T45(S)	164.0	3 x 95	GTNR95-12	50	GTNR50-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)
	MD520-2T55(S)	196.0	3 x 120	GTNR120-12	70	GTNR70-8	M12 (main power)	35.0 (310.1)
							M8 (grounding)	13.0 (115.2)

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T9	MD520-2T75(S)	287.0	3x 185	GTNR185-12	95	GTNR95-10	M12 (main power)	35.0 (310.1)
							M10 (grounding)	20 (117)
T10	MD520-2T90(S)	365.0	2 x (3 x 120)	GTNR120-12	120	GTNR120-12	M12	35.0 (310.1)
	MD520-2T110(S)	410.0	2 x (3 x 150)	GTNR150-12	150	GTNR150-12	M12	35.0 (310.1)
T11	MD520-2T132(S)	441.0	2 x (3 x 150)	GTNR150-12	150	GTNR150-12	M12	35.0 (310.1)
T12	MD520-2T160(S)	565.0	2 x (3 x 185)	GTNR185-16	185	GTNR185-16	M16	85.0 (753.1)
	MD520-2T200(S)	687.0	2 x (3 x 240)	GTNR240-16	240	GTNR240-16	M16	85.0 (753.1)

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

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W			Grounding Cable		Screw	Tightening Torque (N·m) (lb.in)
			Recommended Input Cable (mm^2)<1>	Recommended Output Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T2	MD520-2S0.4B(S)	5.4	0.75	3 x 0.75	TNR0.75‑4	0.75	TNR0.75‑4	M4	1.2 (10.6)
	MD520-2S0.7B(S)	8.2	1	3 x 1	TNR1.25‑4	0.75	TNR1.25‑4		
	MD520-2S1.5B(S)	14	1.5	3 x 1.5	TNR1.25‑4	1.5	TNR1.25‑4		
	MD520-2S2.2B(S)	23	4	3 x 4	TNR3.5‑4	2.5	TNR3.5‑4		

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

Structure	Drive Model	Rated Input Current (A)	R/S/T, U/V/W			Grounding Cable		Screw
			Recommended Input Cable (mm^2)<1>	Recommended Output Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug	
T2	MD520-2S0.4B(S)	5.4	18	18	TLK0.75 - 4	18	TLK0.75 - 4	M4
	MD520-2S0.7B(S)	8.2	18	18	TLK1.25 - 4	18	TLK1.25 - 4	
	MD520-2S1.5B(S)	14	16	16	TLK1.25 - 4	16	TLK1.25 - 4	
	MD520-2S2.2B(S)	23	12	12	TLK3.5 - 4	12	TLK3.5 - 4	

Note

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

Recommended cable lug

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

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

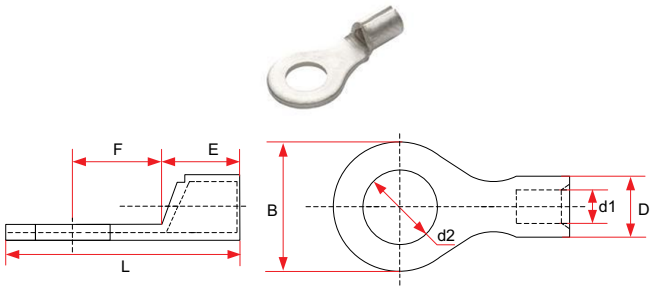
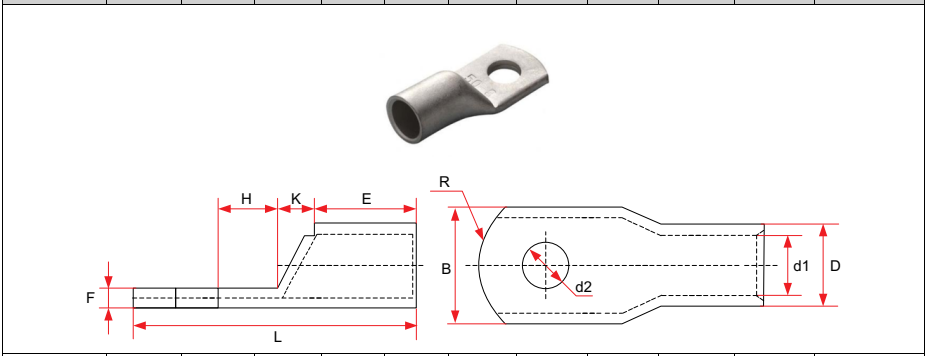
Model	Specification		D	d1	E	F	B	d2	L	Current (A)	Crimping Tool
	AWG/ MCM	mm^2									
											
TNR0.75-4	22–16	0.25–1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8 AK-1M
TNR1.25-4	22–16	0.25–1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	

Table 5–9 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	
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	
GTNR50-8	12.6	9.6	16.0	11.0	6.0	18.0	8.4	2.8	43.5	10	CT-100
GTNR50-10	12.6	9.6	16.0	11.0	6.0	18.0	10.5	2.8	43.5	10	
GTNR70-8	15.0	12.0	18.0	13.0	7.0	21.0	8.4	2.8	50.0	14	
GTNR70-10	15.0	12.0	18.0	13.0	7.0	21.0	10.5	2.8	50.0	14	
GTNR70-12	15.0	12.0	18.0	13.0	7.0	21.0	13.0	2.8	50.0	14	
GTNR95-10	17.4	13.5	20.0	13.0	9.0	25.0	10.5	3.9	55.0	14	
GTNR95-12	17.4	13.5	20.0	13.0	9.0	25.0	13.0	3.9	55.0	14	

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

Table 5–10 Appearance, models, and dimensions of BC series cable lugs (unit: mm)

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

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

5.3.2 Selection of Control Circuit Cables

Note

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

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

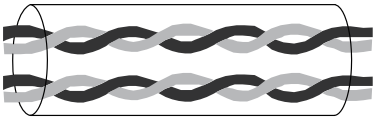


Figure 5-15 Shielded twisted pair cable

5.4 Peripheral Electrical Components

5.4.1 Fuse, Contactor, and Circuit Breaker

Caution

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

To comply with EN 6180051 and UL61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.

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	Drive Model	Fuse Bussmann		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
	MD520-4T3.0B(S)	20	FWP-20B	16	16
T2	MD520-4T3.7B(S)	30	FWP-30B	26	25
	MD520-4T5.5B(S)	40	FWP-40B	26	32
T3	MD520-4T7.5B(S)	60	FWP-60B	38	50
	MD520-4T11B(S)	70	FWP-70B	50	63
T4	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

Structure	Drive Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
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
T13	MD520-4T500(S)(-A)	1400	-	-	-
	MD520-4T560(S)(-A)	1600	-	-	-
	MD520-4T630(S)(-A)	1800	-	-	-
Note: The circuit breaker is configured in the T13 cabinet.					

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

Structure	Drive 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

Structure	Drive Model	Fuse Bussmann		Contactor	Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
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	Drive Model	Fuse Bussmann		Contactor Specification	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

The Bussmann fuse in the following table is only for your reference and is not mandatory. You can select a fuse with higher performance than the recommended fuse.

5.4.2 AC Input Reactor

An AC input reactor is optional and mainly used to reduce harmonics in the input current. In applications where harmonics need to be suppressed, install an external reactor.

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

Models and dimensions (Inovance)

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

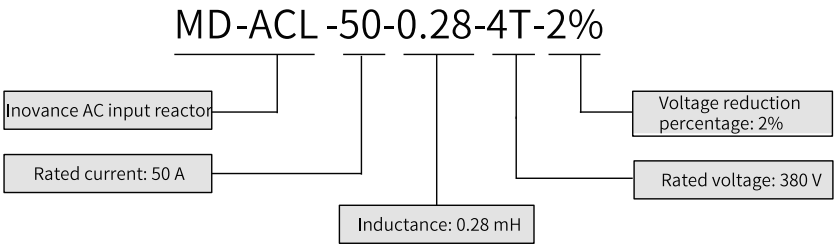


Figure 5-16 AC input reactor model

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

Structure	Drive Model	Reactor Model	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	-
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-660-0.021-4T-2%	0.021	-

Structure	Drive Model	Reactor Model	Inductance (mH)	Loss (W)
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	-
T13	MD520-4T500(S)(-A)	GH-MVT504ZG-L2	0.022	-
	MD520-4T560(S)(-A)	GH-MVT634ZG-L3	0.018	-
	MD520-4T630(S)(-A)	GH-MVT634ZG-L3	0.018	-
Note: For T13 models with the model name containing "-A", the reactor is standard.				

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

Structure	Drive Model	Reactor Model	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%	0.021	-
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

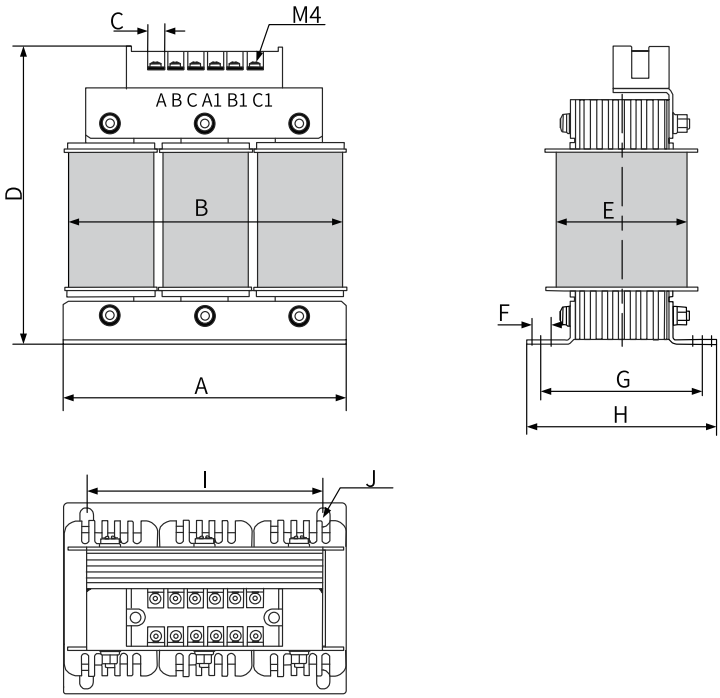


Figure 5-17 Dimensions of AC input reactors (10 A/15 A)

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

Rated Current (A)	A	B	C	D	E	F	G	H	I	J
10	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10
15	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10

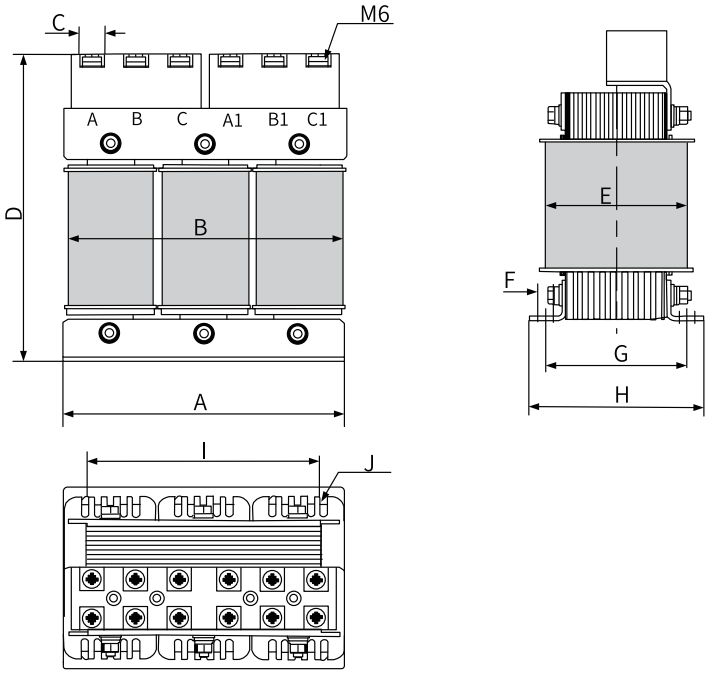


Figure 5-18 Dimensions of 40 A/50 A (1.2 mH) AC input reactors

Table 5–17 Dimensions of 40 A/50 A (1.2 mH) AC input reactors (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J
40	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7x10
50	200±2	210	16	230	110	10	115±2	130±2	170±1	Φ7x10

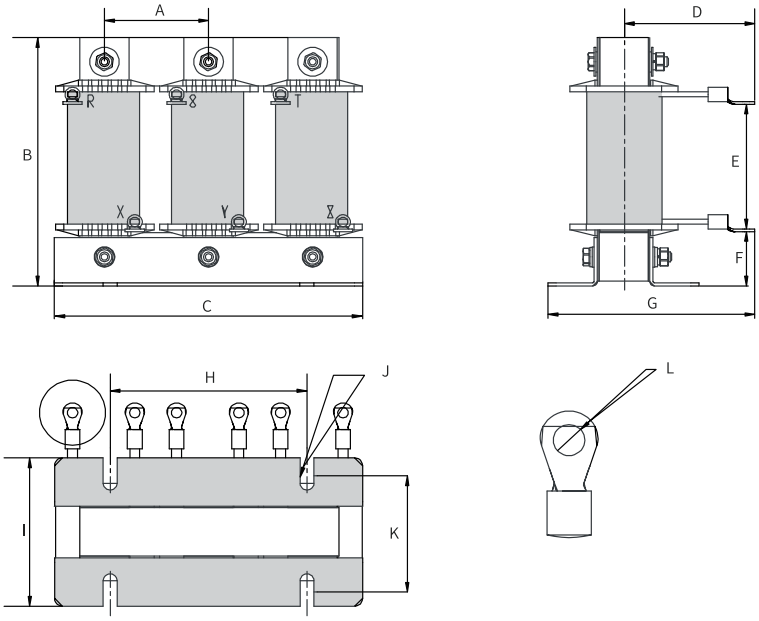


Figure 5-19 Dimensions of 50 A (0.28 mH)/60 A AC input reactors

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	Φ8.5x20	72±2	Φ6.4
60	64	160	195	80±10	75±5	35±5	135	120±1	92±2	Φ8.5x20	72±2	Φ6.4

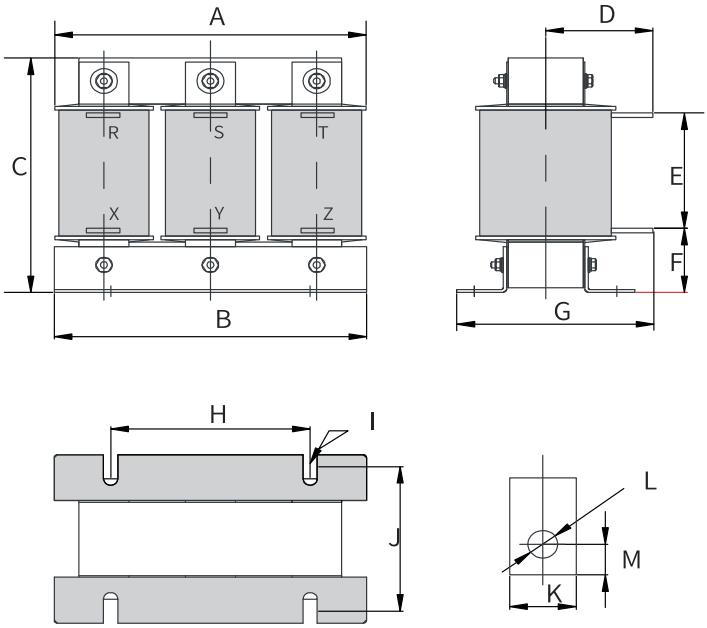


Figure 5-20 Dimensions of AC input reactors (80-120 A)

Table 5–19 Dimensions of AC input reactor (80-120 A) (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	Φ8.5x20	72±2	-	-	-
90	195	188±1	160	-	-	-	150	120±1	Φ8.5x20	72±2	-	-	-
120	195	188±1	160	78±10	79±5	40±5	135	120±1	Φ8.5x20	92±2	20	Φ9	10

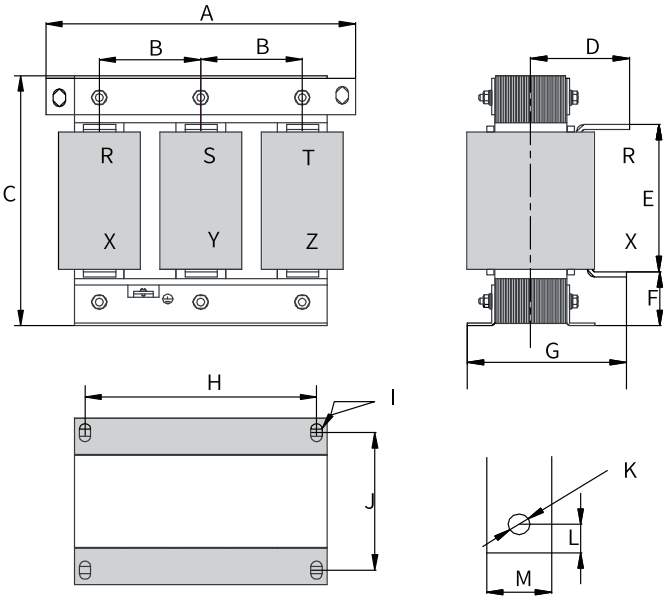


Figure 5-21 Dimensions of AC input reactors (150-330 A)

Table 5–20 Dimensions of AC input reactor (150-330 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81±5	230	92±10	145±5	38±5	155	182±1	Φ11x18	76±2	Φ11	13	25
200	250	81±5	230	102±10	145±5	40±5	175	182±1	Φ11x18	96±2	Φ11	13	25
250	250	81±5	260	102±10	160±5	50±5	175	182±1	Φ11x18	96±2	Φ11	13	25
330	290	95±5	275	107±10	160±5	60±5	180	214±1	Φ11x18	100±2	Φ12	15	30

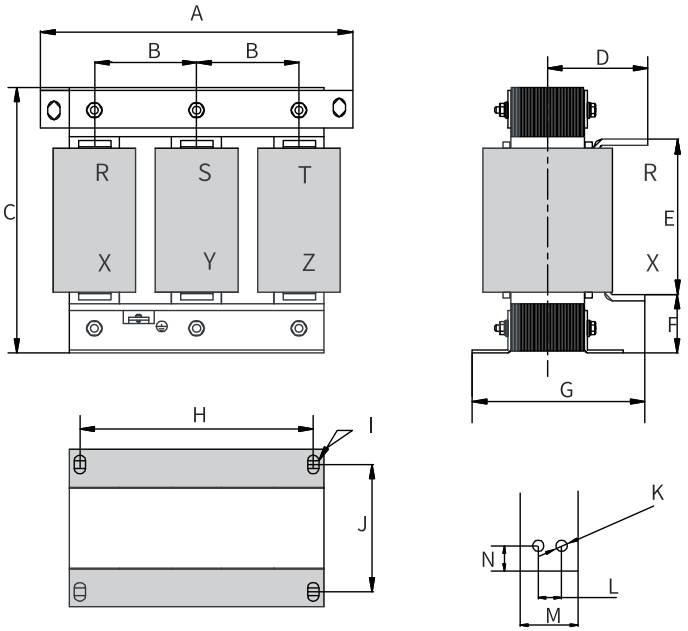


Figure 5-22 Dimensions of AC input reactors (490 A/660 A)

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

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
490	320	106±5	305	137±10	198±5	60±5	220	243±1	Φ12x20	122±2	Φ12	22	50	23
660	320	106±5	305	145±10	203±5	50±5	240	243±1	Φ12x20	137±2	Φ12	22	50	23

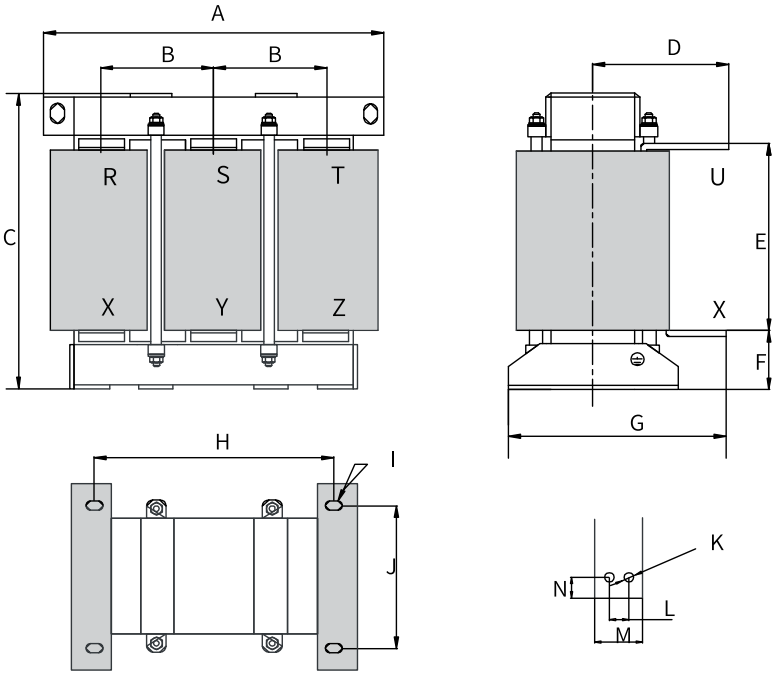


Figure 5-23 Dimensions of AC input reactors (800 A/1000 A)

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

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
800	385	123±5	390	142±10	238±5	70±5	250	260±2	Φ12x20	175±1	Φ12	22	50	23
1000	385	123±5	390	142±10	238±5	70±5	250	260±2	Φ12x20	175±1	Φ12	22	50	23

Note

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

Models and dimensions (Schaffner)

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

Structure	Drive Model	Reactor Model	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) MD520-4T18.5(B)(S)-T	RWK 3044-59-92-E0XXX	0.5	206
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	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
T13	MD520-4T500(S)(-A)	RWK 3044-1000-99-E0XXX	0.029	1167
	MD520-4T560(S)(-A)	RWK 3044-1000-99-E0XXX	0.029	1167
	MD520-4T630(S)(-A)	-	-	-
Note: For T13 models with the model name containing "-A", the reactor is standard.				

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

Structure	Drive Model	Reactor Model	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 listed in the following table.

- For AC drives with the power equal to or lower than 15 kW, built-in filters can meet requirements of EN IEC 61800-3 C3. Therefore, external filters are not required.
- For 18.5 kW to 110 kW AC drives, install external filters to meet requirements of EN IEC 61800-3 C3.
- For AC drives with the power equal to or higher than 132 kW, built-in filters can meet requirements of EN IEC 61800-3 C3. Therefore, external filters are not required.

Table 5–25 Standard EMC filter model and appearance

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

Models and dimensions (Schaffner filters)

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

Structure	Drive 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
T13	MD520-4T500(S)(-A)	FN 3359-1000-99	60
	MD520-4T560(S)(-A)	FN 3359-1000-99	60
	MD520-4T630(S)(-A)	FN 3359-1600-99	131

Structure	Drive Model	Filter Model	Loss (W)
Note: T13 models with the model name containing -A are equipped with the built-in EMC filter 1600EBK1-60-HV.			

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

Structure	Drive 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 200 V to 240 V)

Structure	Drive 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).

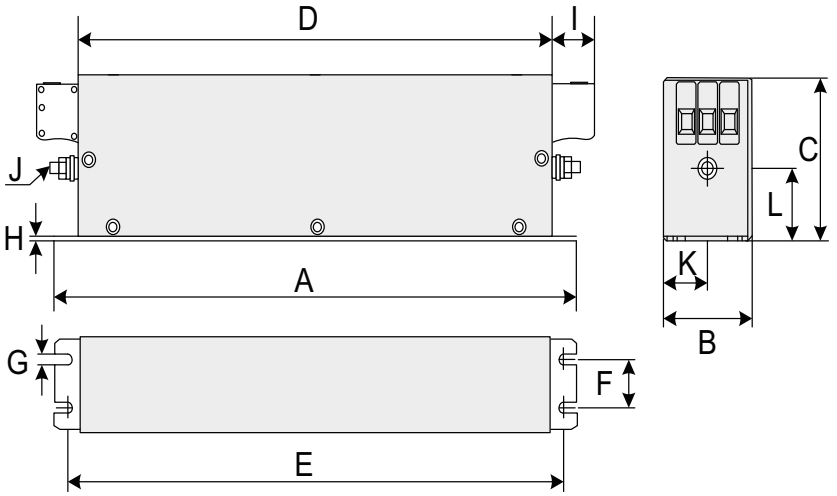


Figure 5-24 Dimensions of FN 3258 series filters (50 A to 180 A)

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).

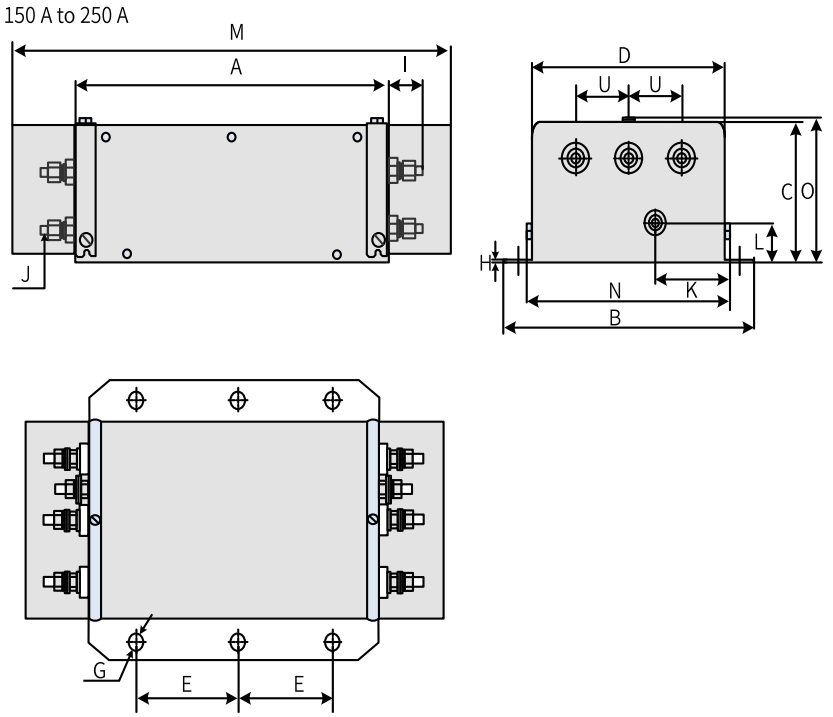


Figure 5-25 Dimensions of FN 3359 series filters (150 A to 250 A)

Table 5–30 Dimensions of FN 3359 series filters (150 A to 250 A, unit: mm)

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

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

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

320 A to 2500 A

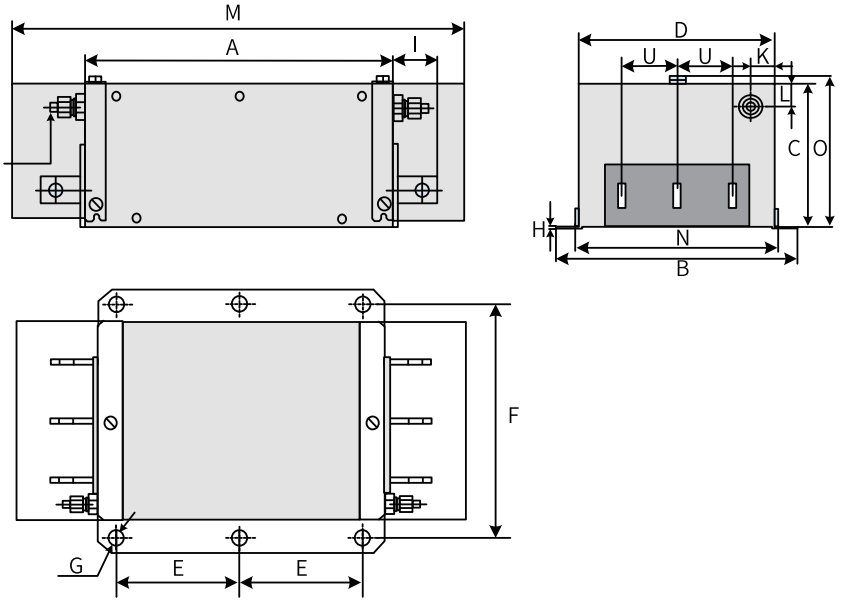


Figure 5-26 Dimensions of FN 3359 series filters (320 A to 2500 A)

The following figure shows the dimensions of the copper busbar.

320 A to 1000 A

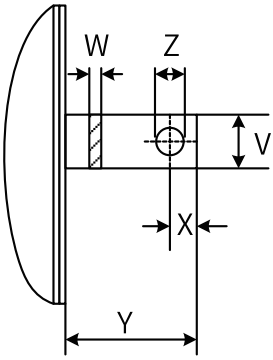


Figure 5-27 Dimensions of the copper busbar

Table 5–31 Dimensions of FN 3359 series filters (320 A to 2500 A, unit: mm)

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

Models and dimensions of Jianli filters

Table 5–32 Selection of Jianli filters (three-phase 380 V to 480 V)

Structure	Drive 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
T13	MD520-4T500(S)(-A)	DL-1000EBK3	60
	MD520-4T560(S)(-A)	DL-1000EBK3	60
	MD520-4T630(S)(-A)	1600EBK1-60-HV	131

Structure	Drive Model	Filter Model	Loss (W)
Note: T13 models with the model name containing -A are equipped with the built-in EMC filter 1600EBK1-60-HV.			

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

Structure	Drive 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	Drive 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).

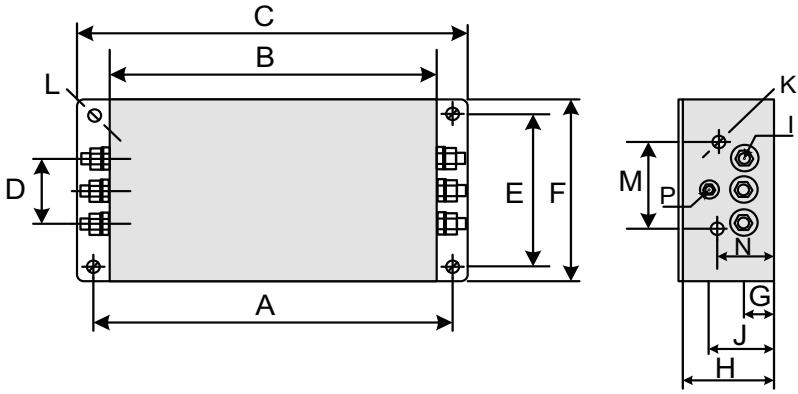


Figure 5-28 Dimensions of Jianli filters (50-200 A)

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 filters (250-800 A).

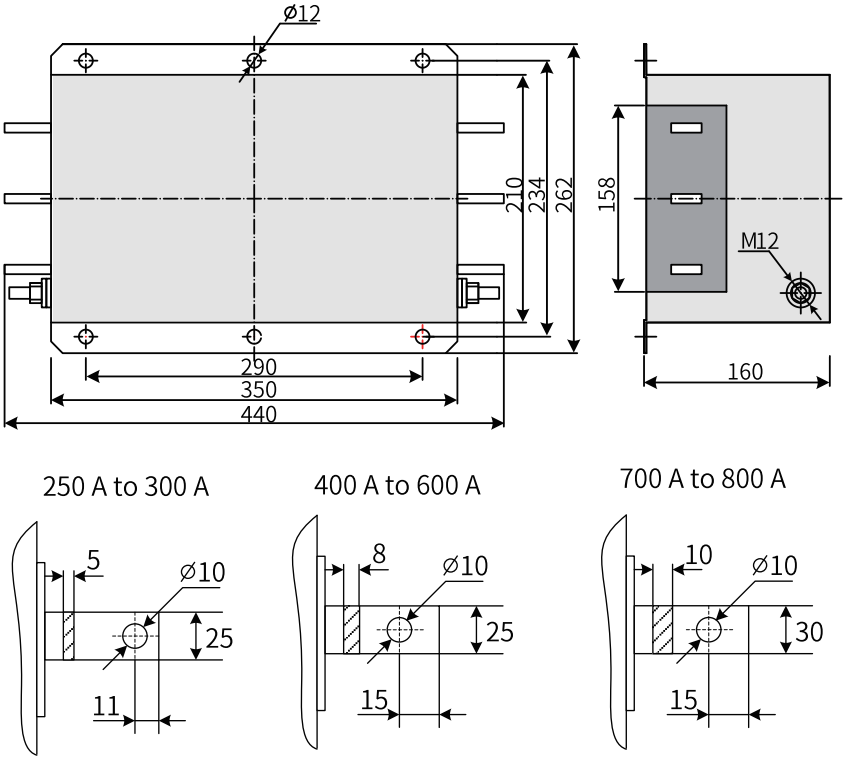


Figure 5-29 Dimensions of Jianli filters (250-800 A, unit: mm)

The following figure shows the dimensions of Jianli filters (1000 A).

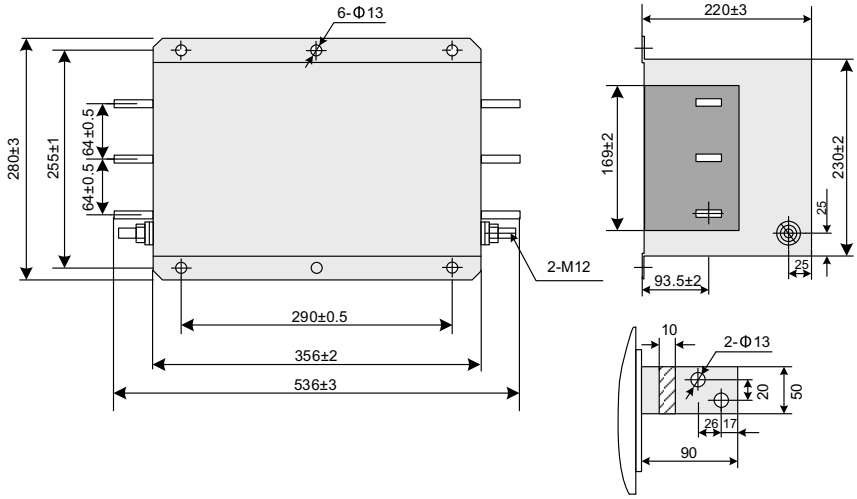


Figure 5-30 Dimensions of Jianli filters (1000 A, unit: mm)

5.4.4 Simple Filter

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

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

Dimensions

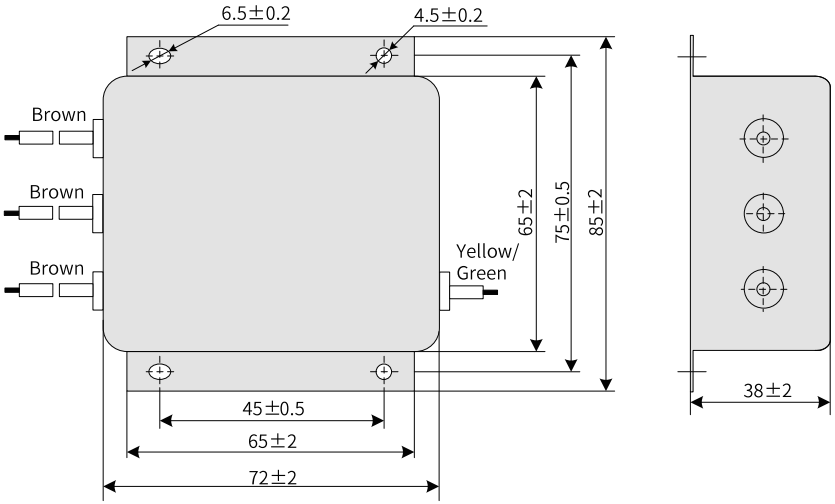


Figure 5-31 Outline dimensions of the simple filter

Table 5–36 Outline dimensions of the simple filter

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

Installation Method

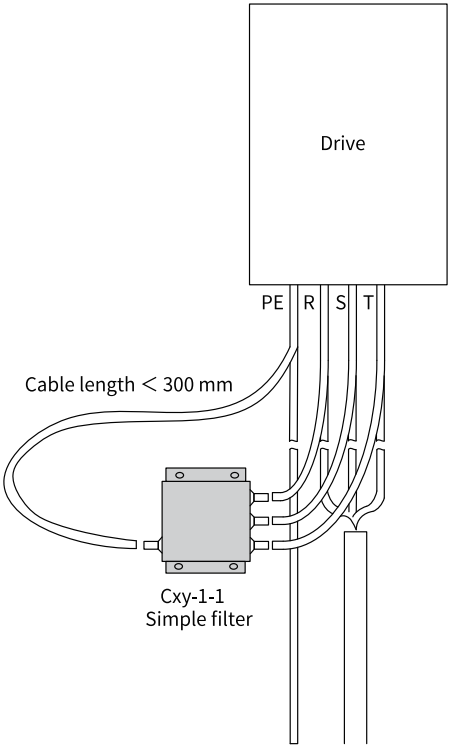


Figure 5-32 Simple filter installation

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 x U/R = Pb.

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

Pb indicates the braking power.

Power of braking resistors

In theory, the power of the 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 x Pr = Pb x D.

K: about 50%

Pr: Power of the braking resistor

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

The following formulas can be generated based on the preceding equations:

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

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

The braking resistor power Pr can be calculated accordingly.

K is the derating factor of the braking resistor. A small K value ensures that the braking resistor does not get overheated. You can increase the value of K properly under favorable heat dissipation conditions of the braking resistor. However, keep the value of K no larger than 50%. Otherwise, the braking resistor will overheat, which may cause a fire.

The braking frequency D is determined based on actual applications. *"Table 5–37 " on page 114* lists the typical values in common applications.

Table 5–37 Typical braking frequencies in different applications

Common Application	Elevator	Winding and Unwinding	Centrifuge	Occasional Braking Load	Regular Applications
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.

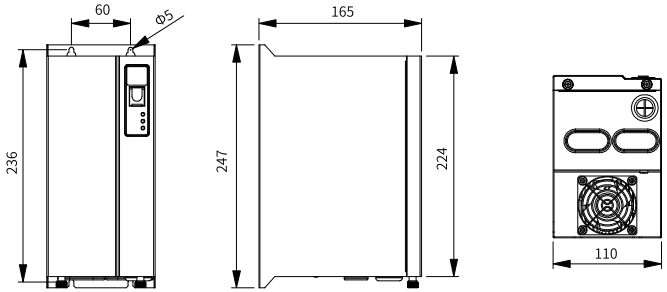


Figure 5-33 Dimensions of MDBUN series braking units (MDBUN-45-2T to MDBUN-90-2T; MDBUN-45-T to MDBUN-90-T; MDBUN-45-5T to MDBUN-90-5T) (mm)

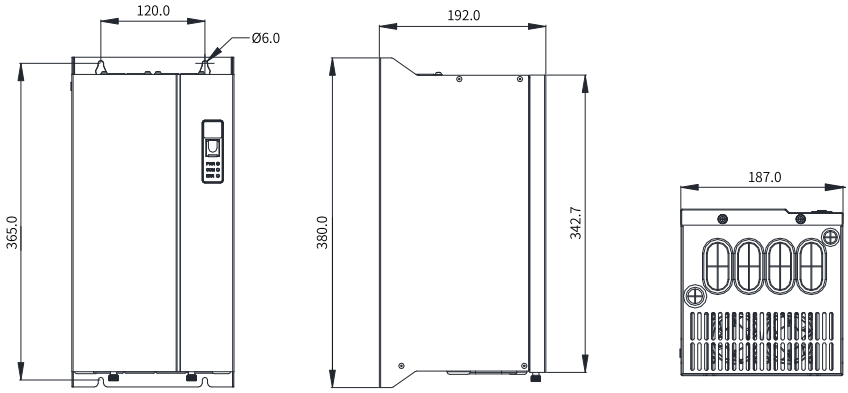


Figure 5-34 Dimensions of MDBUN series braking units (MDBUN-200-T, MDBUN-200-5T, MDBUN-200-7T) (mm)

Braking unit models

Note

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

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

Drive Model	Braking Unit		125% of Braking Torque (ED: 10% ; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Recommended Braking Resistor Specification	Quantity of Braking Resistors		
MD520-4T0.4B(S)	Built-in, standard		80 W, 1450 Ω	1	AC drive model with the model name containing 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 model with the model name containing 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 ⩽ 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 ⩽ 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 ⩽ 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 ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	16000 W, 3.6 Ω	2	Input voltage > 440 VAC	2.8 x 2

Drive Model	Braking Unit		125% of Braking Torque (ED: 10% ; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Recommended Braking Resistor Specification	Quantity of Braking Resistors		
MD520-4T200(S) (-L)	MDBUN-200-T	2	21000 W, 4.1 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	21000 W, 5.3 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD520-4T220(S) (-L)	MDBUN-200-T	2	27000 W, 3.2 Ω	2	Input voltage ⩽ 440 VAC	2.5 x 2
	MDBUN-200-5T	2	27000 W, 4.1 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD520-4T250(S) (-L)	MDBUN-200-T	3	20000 W, 4.3 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	20000 W, 5.5 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD520-4T280(S) (-L)	MDBUN-200-T	3	23000 W, 3.8 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	23000 W, 4.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD520-4T315(S) (-L)	MDBUN-200-T	3	26000 W, 3.4 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	26000 W, 4.3 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD520-4T355(S) (-L)	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD520-4T400(S) (-L)	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ⩽ 440 VAC	2.5 x 3
	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD520-4T500(S) (-A)	MDBU-200-B	4	32000 W, 2.8 Ω	4	Input voltage ⩽ 440 VAC	2.5 x 4
	MDBU-200-C	4	32000 W, 3.7 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD520-4T560(S) (-A)	MDBU-200-B	4	36000 W, 2.5 Ω	4	Input voltage ⩽ 440 VAC	2.5 x 4
	MDBU-200-C	4	39000 W, 3.0 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD520-4T630(S) (-A)	MDBU-200-B	5	32000 W, 2.8 Ω	5	Input voltage ⩽ 440 VAC	2.5 x 5
	MDBU-200-C	5	32000 W, 3.7 Ω	5	Input voltage > 440 VAC	3.0 x 5

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

Drive Model	Braking Unit		125% of Braking Torque (ED: 10% ; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
	Model	Quantity	Recommended Braking Resistor Specification	Quantity of Braking Resistors		
MD520-2T0.4B(S)	Built-in, standard		90 W, 300 Ω	1	AC drive model with the model name containing 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, 6 Ω	2	-	5.5
MD520-2T55(S)	MDBUN-60-2T	2	6000 W, 6 Ω	2	-	5.5
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 phrase 200-240 V)

Drive Model	Braking unit	125% of Braking Torque (ED: 10% ; Max. 10s)		Remarks	Min. Braking Resistance (Ω)
		Recommended Braking Resistor Specification	Quantity of Braking Resistors		
MD520-2S0.4B(S)	Built-in, standard	80 W, 200 Ω	1	AC drive model with the model name containing 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 for the 380-480 V models and 200-240 V models are 760 V and 350 V, 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 data in the preceding table is only for reference. You can select the resistance and power of the braking resistor as required. (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 a higher power rating 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.

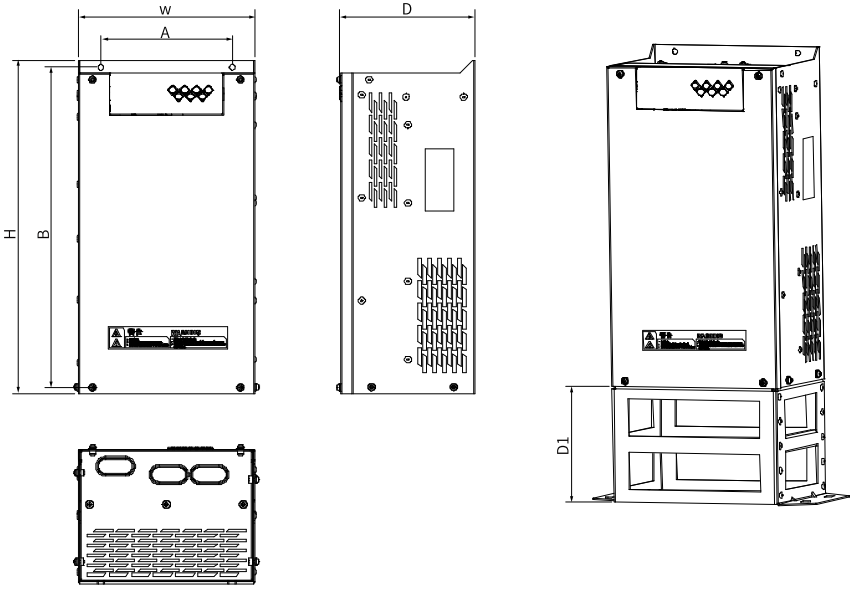


Figure 5-35 Outline dimensions of MD050 series AFE unit (unit: mm)

Table 5–41 Outline dimensions of MD051 series AFE unit

Model	Outline Dimension (mm)			Bracket	Mounting Hole Spacing (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	W	D	D1	A	B		
MD051T5.5G	365	200	153	121	160	350	Φ6.0	8.5
MD051T7.5G								8.7
MD051T11G								9.0
MD051T15G	405	215	165	142	160	390	Φ7.0	14.0
MD051T18.5G								14.8
MD051T22G	505	260	171	161	160	490	Φ7.0	18.2
MD051T30G								20.0

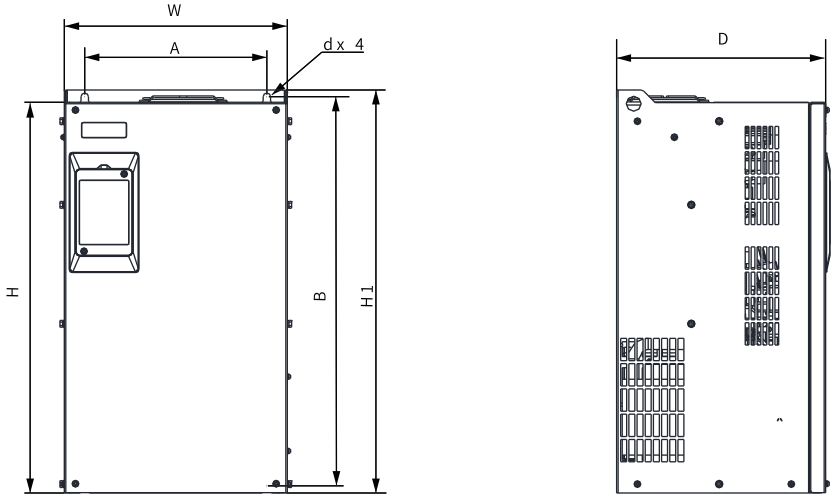


Figure 5-36 Outline and installation dimensions (unit: mm) of MD050NT55G-S to MD050NT160G-S models

Table 5–42 Outline dimensions of MD050NT55G-S to MD050NT160G-S

Model	Dimensions (mm)				Mounting Hole Spacing (mm)		Mounting Hole Diameter (mm)	Weight (kg)
	H	H1	W	D	A	B		
MD050NT55G-S	525	542	300	275	245	523	Φ10	35.0
MD050NT75G-S	554	580	338	315	270	560	Φ10	51.5
MD050NT90G-S								
MD050NT110G-S								
MD050NT132G-S	874	915	400	320	320	890	Φ10	85.0
MD050NT160G-S								

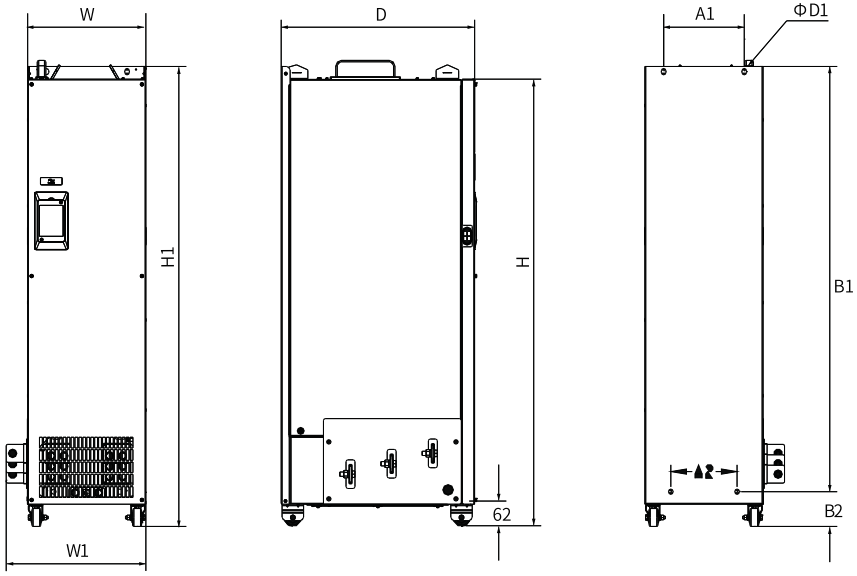


Figure 5-37 Outline and installation dimensions (unit: mm) of MD050NT200G-S to MD050NT400G-S models

Table 5–43 Outline dimensions of MD050NT200G-S to MD050NT400G-S

Model	Dimensions (mm)					Mounting Hole Spacing (mm)				Mounting Hole Diameter (mm)	Weight (kg)
	H	H1	W	W1	D	A1	A2	B1	B2	D1	
MD050NT200G-S	1086	1134	300	360	500	240	150	1035	86	Φ3	110
MD050NT220G-S											
MD050NT250G-S	1248	1284	330	390	545	225	185	1175	97	Φ13	155
MD050NT280G-S											
MD050NT315G-S	1355	1405	340	400	320	240	200	1280	101	Φ16	185
MD050NT355G-S											
MD050NT400G-S											

Note

For installation and use of the energy feedback unit, see *MD051 Series Active Front End (AFE) User Guide* or *MD050N-S Series Active Front End (AFE) User Guide*.

5.4.7 Output Reactors

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

Table 5–44 Minimum cable length when the output reactor is configured (three phase 380–480 V)

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

Table 5–45 Minimum cable length when the output reactor is configured (three phase 200–240 V)

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

Models and dimensions (Inovance)

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

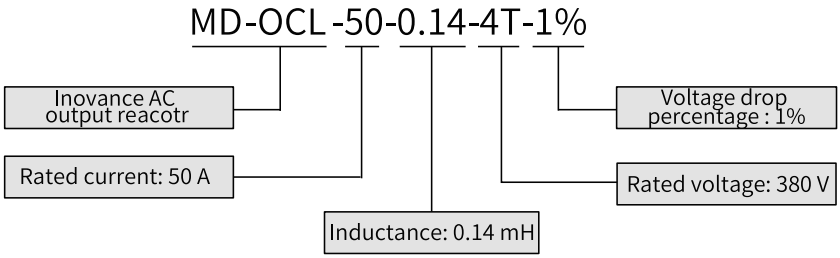


Figure 5-38 AC output reactor model

Note

- The following recommended AC output reactors are applicable only to T1 to T9 models.
- For T10 to T12 models, if AC output reactors are required, purchase the AC output reactors with the model name containing "-L".
- The T13 model is equipped with a built-in output reactor as standard.

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

Structure	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	-
T5	MD520-4T18.5(B)(S) MD520-4T18.5(B)(S)-T	MD-OCL-40-0.18-4T-1%	0.18	-
	MD520-4T22(B)(S) MD520-4T22(B)(S)-T	MD-OCL-50-0.14-4T-1%	0.14	-
T6	MD520-4T30(B) (S)	MD-OCL-60-0.12-4T-1%	0.12	-
	MD520-4T37(B) (S)	MD-OCL-80-0.087-4T-1%	0.087	-
T7	MD520-4T45(B) (S)	MD-OCL-90-0.078-4T-1%	0.078	-
	MD520-4T55(B) (S)	MD-OCL-120-0.058-4T-1%	0.058	-

Structure	Drive Model	Reactor Model	Inductance (mH)	Loss (W)
T8	MD520-4T75(B) (S)	MD-OCL-150-0.047-4T-1%	0.047	-
	MD520-4T90(S)	MD-OCL-200-0.035-4T-1%	0.035	-
	MD520-4T110(S)	MD-OCL-200-0.035-4T-1%	0.035	-
T9	MD520-4T132(S)	MD-OCL-250-0.028-4T-1%	0.028	-
	MD520-4T160(S)	MD-OCL-250-0.028-4T-1%	0.028	-

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

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

Structure	Drive Model	Reactor Model	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-60-0.12-4T-1%	0.12	-
	MD520-2T18.5(B)(S)	MD-OCL-80-0.087-4T-1%	0.087	-
T7	MD520-2T22(B) (S)	MD-OCL-90-0.078-4T-1%	0.078	-
	MD520-2T30(B) (S)	MD-OCL-120-0.058-4T-1%	0.058	-
T8	MD520-2T37(B) (S)	MD-OCL-150-0.047-4T-1%	0.047	-
	MD520-2T45(S)	MD-OCL-200-0.035-4T-1%	0.035	-
	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 5–48 Selection of Inovance AC output reactors (single-phase 200 V to 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-7-1.0-4T-1%	1.0	-
	MD520-2S2.2B(S)	MD-OCL-10-0.7-4T-1%	0.7	-

The following figure and table describe dimensions of the AC output reactor.

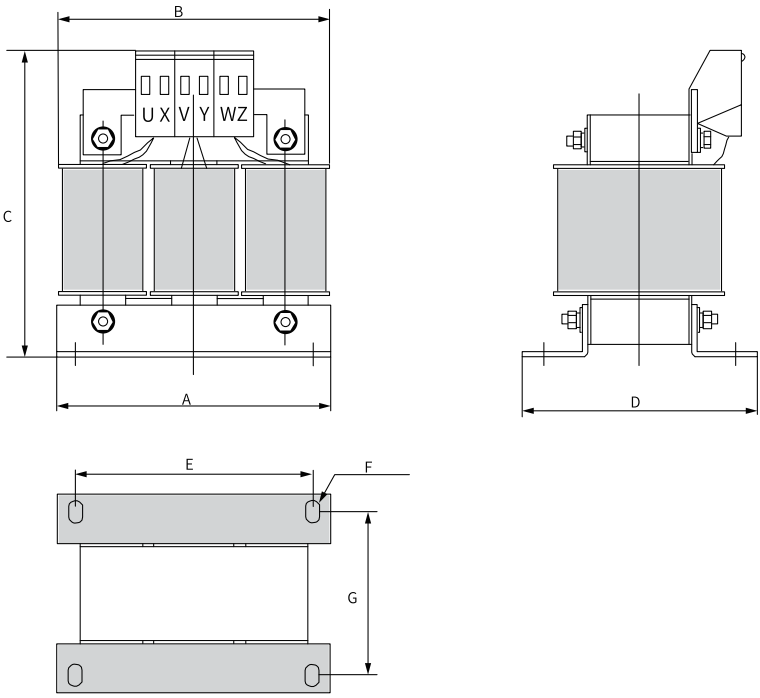


Figure 5-39 Dimensions of AC output reactors (5-10 A)

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

Rated Current (A)	A	B	C	D	E	F	G
5	105±1	110	130	84±2	91±1	Φ6x11	65±2
7	105±1	110	130	84±2	91±1	Φ6x11	65±2
10	105±1	110	130	84±2	91±1	Φ6x11	65±2

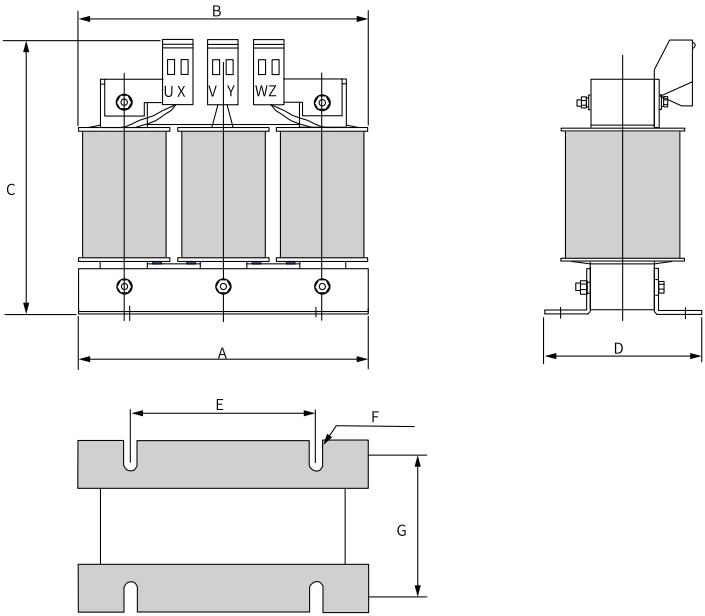


Figure 5-40 Dimensions of AC output reactors (15 A)

Table 5–50 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	Φ6x15	61±2

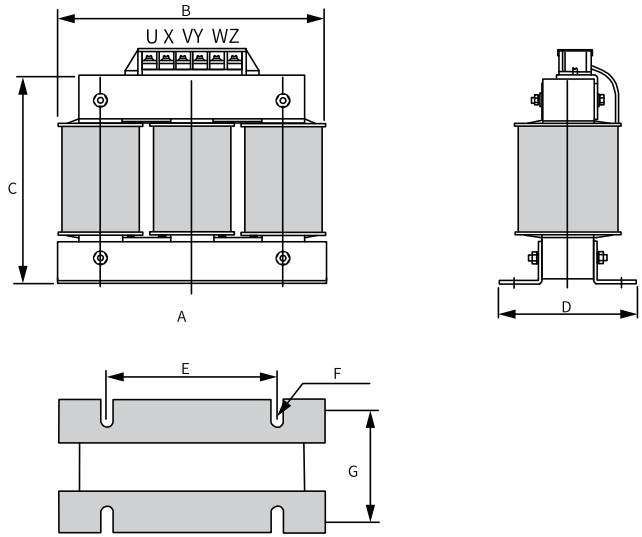


Figure 5-41 Dimensions of AC output reactors (20 A)

Table 5–51 Dimensions of 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	Φ6x15	61±2

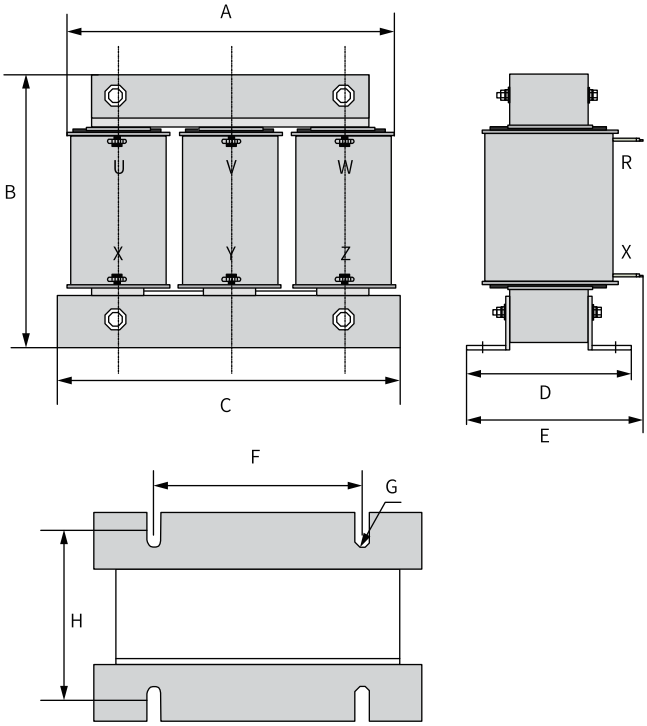


Figure 5-42 Dimensions of AC output reactors (30-60 A)

Table 5–52 Dimensions of AC output reactor (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	Φ6x15	80±2
40	155	130	148±1	95±2	135	95±1	Φ6x15	80±2
50	155	130	148±1	95±2	135	95±1	Φ6x15	80±2
60	195	165	188±1	92±2	130	120±1	Φ8.5x20	72±2

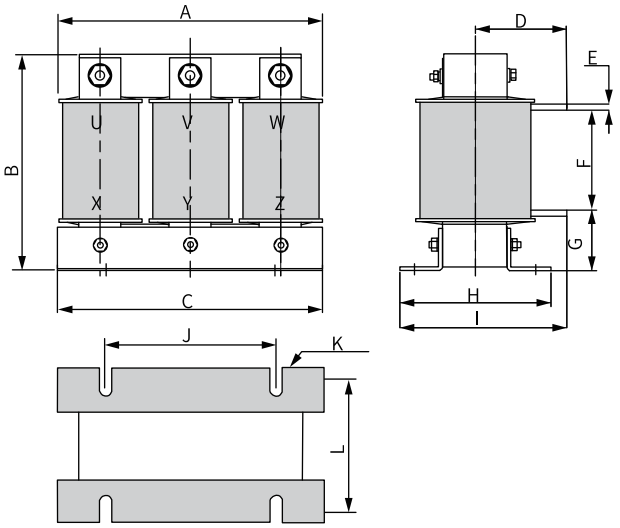


Figure 5-43 Dimensions of AC output reactors (80-120 A)

Table 5–53 Dimensions of 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	Φ8.5x20	72±2
90	195	165	188±1	68±10	4	75±5	40±5	92±2	130	120±1	Φ8.5x20	72±2
120	195	165	188±1	78±10	4	75±5	40±5	112±2	135	120±1	Φ8.5x20	72±2

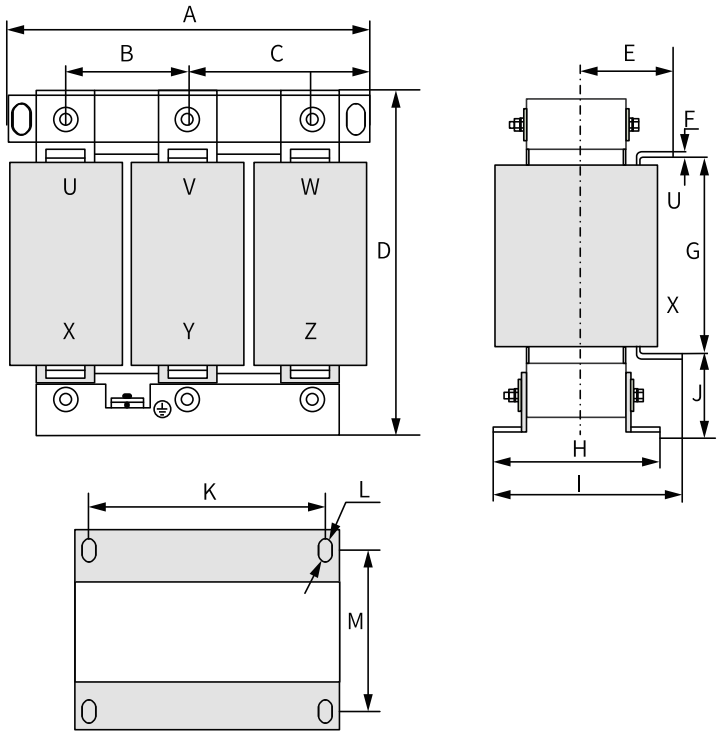


Figure 5-44 Dimensions of AC output reactors (150-250 A)

Table 5–54 Dimensions of 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	Φ11x18	87±2
200	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11x18	97±2
250	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11x18	97±2

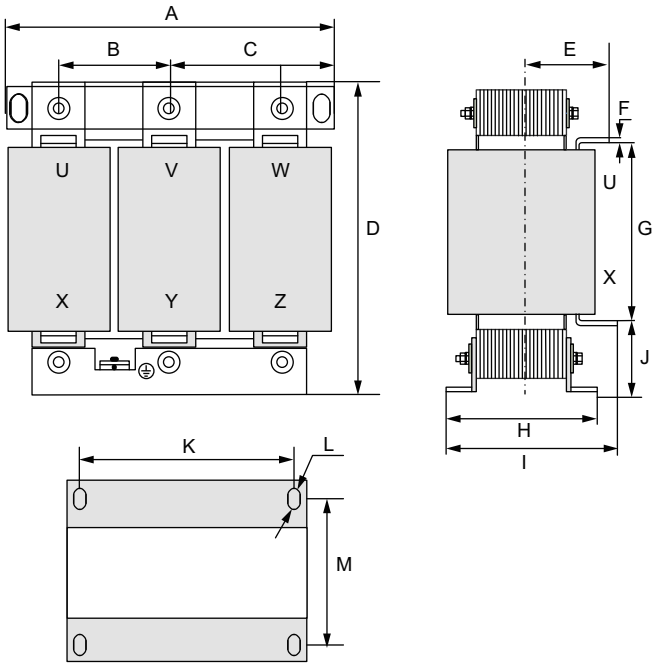


Figure 5-45 Dimensions of AC output reactors (330 A)

Table 5–55 Dimensions of 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	Φ11x18	106±2

Models and dimensions (Schaffner)

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

Table 5–56 Selection of output reactors (Schaffner)

Structure	Drive Model	Reactor Model	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 305-7.8-KL	0.754	25
	MD520-4T3.0B(S)	RWK 305-7.8-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
Note: The T13 model is equipped with an output reactor as standard.				

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

Structure	Drive Model	Reactor Model	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 5–58 Selection of Schaffner output reactors (single-phase 200 V to 240 V)

Structure	Drive Model	Reactor Model	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

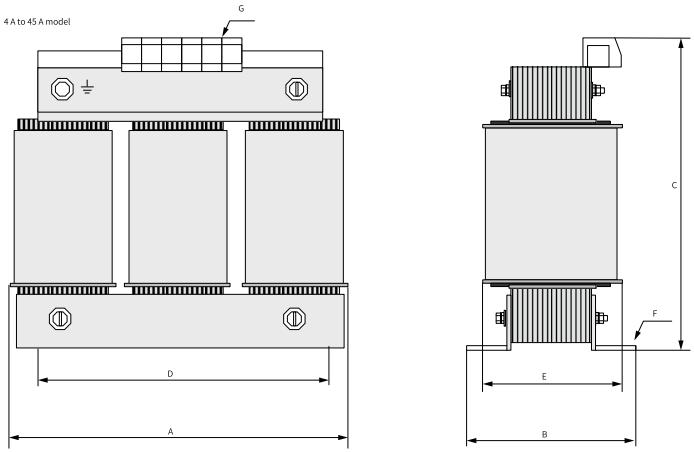


Figure 5-46 Dimensions of output reactors (4–45 A)

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

Series	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

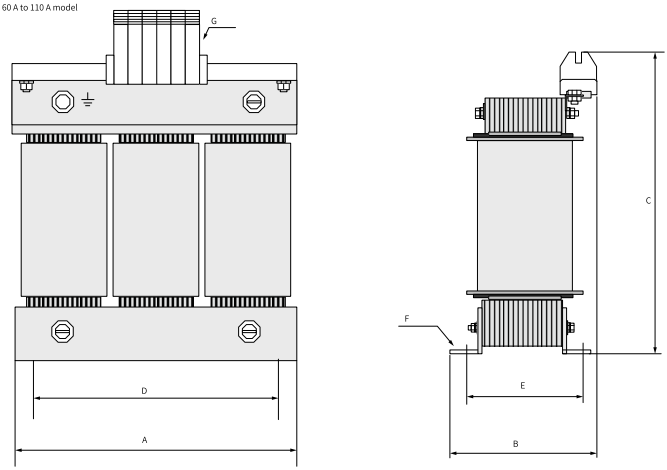


Figure 5-47 Dimensions of output reactors (60–110 A)

Table 5–60 Dimensions of the output reactor (60–110 A, unit: mm)

Series	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

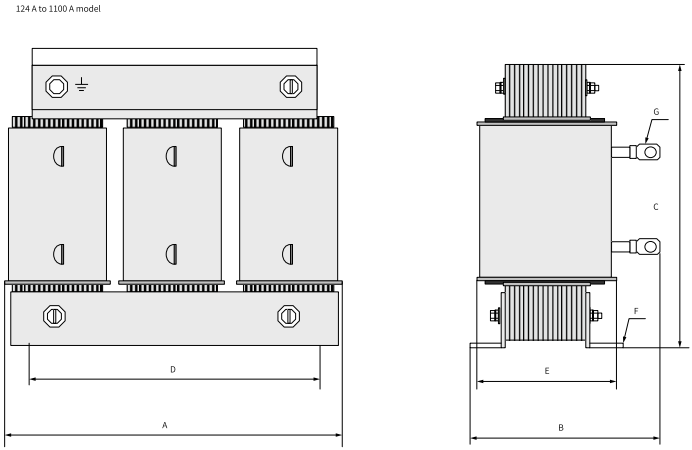


Figure 5-48 Dimensions of output reactors (124–1100 A)

Table 5–61 Dimensions of the output reactor (124–1100 A, unit: mm)

Series	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	220	190	119	11 x 15	Ø12
280 A	240	235	220	190	133	11 x 15	Ø12
330 A	240	240	220	190	135	11 x 15	Ø12
400 A and 500 A	240	220	325	190	119	11 x 15	Ø11
600 A and 680 A	240	230	325	190	128	11 x 15	Ø11
790 A	300	218	355	240	136	11 x 15	Ø11
910 A	300	228	355	240	148	11 x 15	Ø11
1100 A	360	250	380	310	144	11 x 15	Ø11

5.4.8 Magnetic Ring and Ferrite Clamp

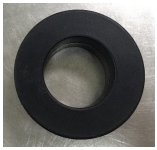
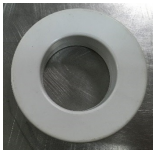
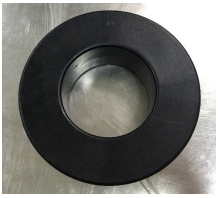
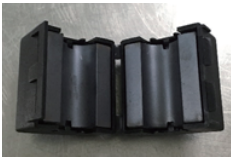
Model

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

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

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

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

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

Dimensions

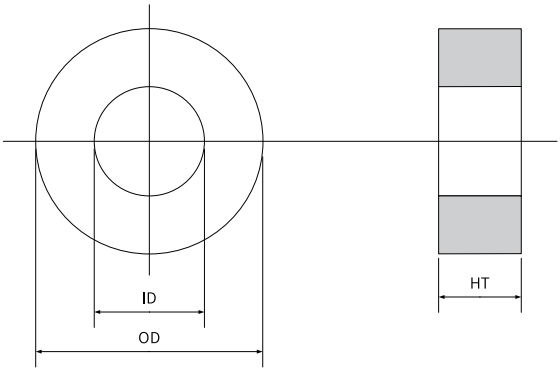


Figure 5-49 Dimensions of the magnetic ring

Table 5–63 Dimensions of the magnetic ring

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

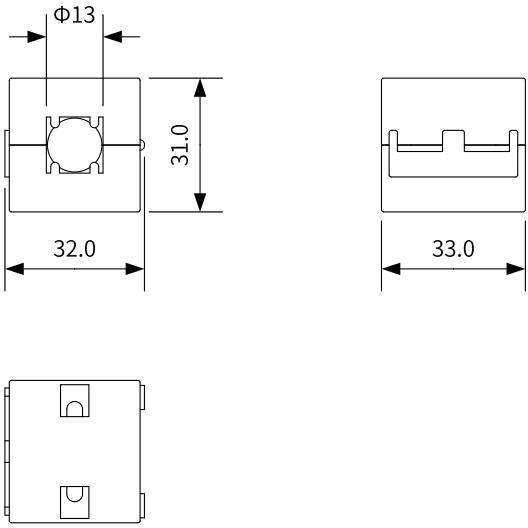


Figure 5-50 Dimensions of the ferrite clamp

5.5 External Operating Panel

Model	Description	Appearance
MDKE-10	It is an optional LED operating panel that supports parameter display and modification. The dimensions are shown below.	
SOP-20-810	It is an optional LCD operating panel that supports parameter copy, download, and modification and supports English and Chinese. The dimensions are shown below.	

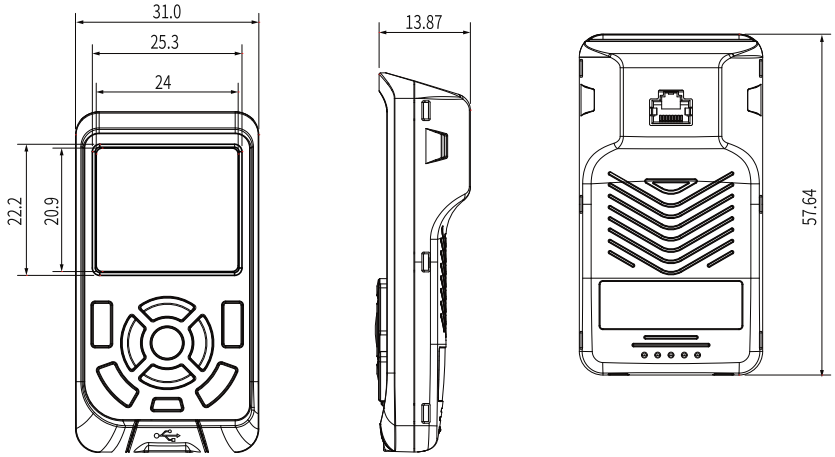
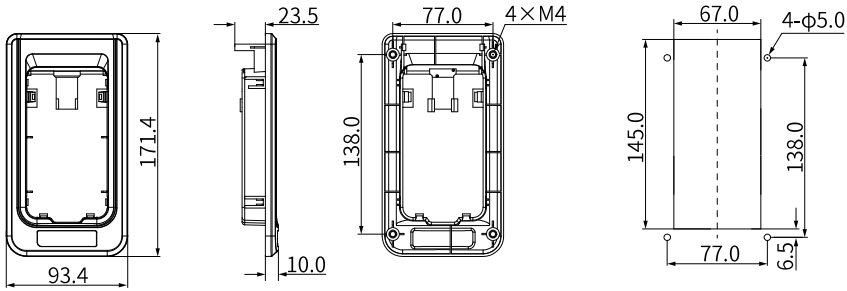


Figure 5-51 Dimensions of the MDKE-10 (unit: mm)



Dimensions for the mounting bracket

Hole dimensions

Figure 5-52 Base mounting bracket dimensions and hole sizes (mm) of the MDKE-10

Note

If the thickness of the door is 1.5 mm, no bolts are required.

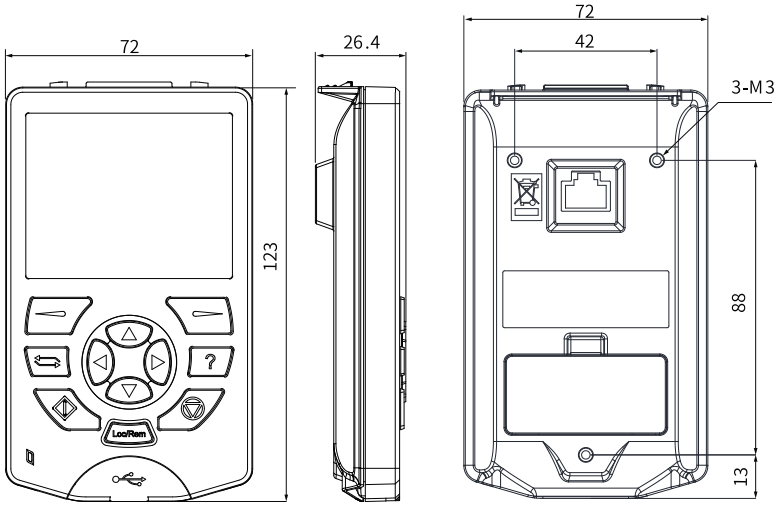


Figure 5-53 Dimensions of the SOP-20-810 (unit: mm)

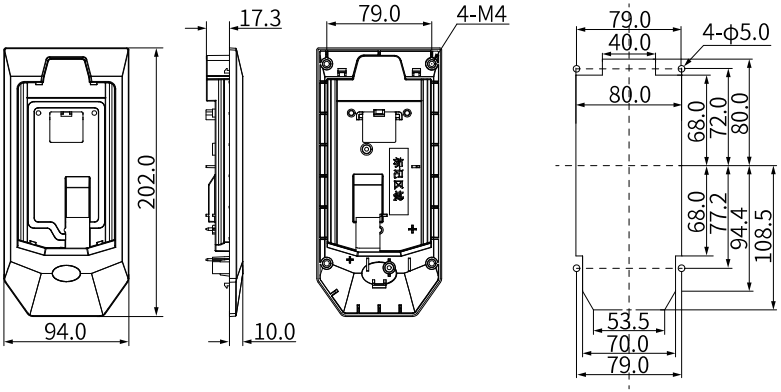


Figure 5-54 Base mounting bracket dimensions and hole sizes (mm) of the SOP-20-810

5.6 Expansion Card

For details on the expansion cards of the AC drive, see *"5.1 Option List " on page 52*. The following table shows the installation position of the expansion cards. Before installing these cards, remove the front cover of the AC drive.

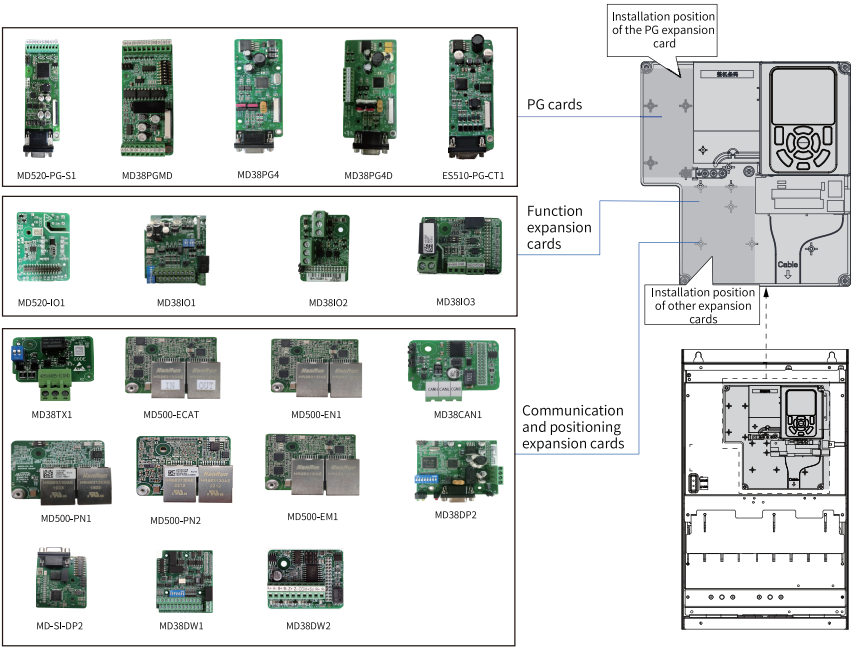


Figure 5-55 Installation positions of expansion cards

6 Technical Data

6.1 Electrical Specifications

Note

In the following tables, the rated power of the AC drive is measured under the following conditions:

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

Three-phase 380 V to 480 V

Table 6–1 Electrical parameters of T1 models (three-phase 380 V to 480 V)

Item		Specification					
Module: MD520-4Txxxxx		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					
	Maximum output frequency	599 Hz (edited through parameters)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of the rated current					

Item		Specification					
Module: MD520-4Txxxxx		0.4B(S)	0.7B(S)	1.1B(S)	1.5B(S)	2.2B(S)	3.0B(S)
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 V to 480 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA) (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
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
	Exhaust air volume (CFM)	-	-	-	9	9	9
Overvoltage class	OVCIII						
Pollution degree	PD2						
IP rating	IP20 (open type, for IEC products) Type 1 (enclosed type, for UL-certified products)						

Table 6–2 Electrical parameters of T2 to T4 models (three-phase 380 V to 480 V)

Item		Specification				
Module: MD520-4Txxxxx		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				
	Maximum output frequency	599 Hz (edited through parameters)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of the rated current				

Item		Specification				
Module: MD520-4Txxxxx		3.7B(S)	5.5B(S)	7.5B(S)	11B(S)	15B(S)
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 V to 480 V, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA) (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
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
	Exhaust air volume (CFM)	20	24	30	40	42
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20 (open type, for IEC products) Type 1 (enclosed type, for UL-certified products)					

Table 6–3 Electrical parameters of T5 to T6 models (three-phase 380 V to 480 V)

Item		Specification					
Module: MD520-4Txxxxx		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					
	Maximum output frequency	599 Hz (edited through parameters)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of the rated current					

Item		Specification					
Module: MD520-4Txxxxx		18.5(B)(S)	22(B)(S)	18.5(B)(S)-T	22(B)(S)-T	30(B)(S)	37(B)(S)
Input	Rated input current (A) (heavy load)	49.5	59	37.2	43.4	57	69
	Rated input current (A) (light load)	59	79	43.4	55.3	71	86
	Rated voltage/frequency	Three-phase 380 V to 480 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA) (heavy load)	36	44	33	39	52	63
	Power supply capacity (kVA) (light load)	44	59	39	52	65	79
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
	Exhaust air volume (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 products) Type 1 (enclosed type, for UL-certified products)						

Table 6–4 Electrical parameters of T7 to T9 models (three-phase 380 V to 480 V)

Item		Specification						
Module: MD520-4Txxxxx		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						
	Maximum output frequency	599 Hz (edited through parameters)						
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)			0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 V to 480 V, 50/60 Hz						
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC						
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz						
	Power supply capacity (kVA) (heavy load)	81	97	127	150	179	220	263
	Power supply capacity (kVA) (light load)	97	127	150	179	220	263	334
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
	Exhaust air volume (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 products)							

Table 6–5 Electrical parameters of T10 to T11 models (three-phase 380 V to 480 V)

Item		Specification			
Module: MD520-4Txxxxx		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			
	Maximum output frequency	599 Hz (edited through parameters)			
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 V to 480 V, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC			
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz			
	Power supply capacity (kVA) (heavy load)	334	375	404	453
	Power supply capacity (kVA) (light load)	404	453	517	565
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
	Exhaust air volume (CFM)	638.4	722.5	789.4	882
Overvoltage class	OVCIII				
Pollution degree	PD2				
IP rating	IP00 (open type, for IEC products)				

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

Item		Specification		
Module: MD520-4Txxxxx		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		
	Maximum output frequency	599 Hz (edited through parameters)		
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)		
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 V to 480 V, 50/60 Hz		
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC		
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz		
	Power supply capacity (kVA) (heavy load)	517	565	629
	Power supply capacity (kVA) (light load)	629	716	952
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
	Exhaust air volume (CFM)	645	860	860
Overvoltage class	OVCIII			
Pollution degree	PD2			
IP rating	IP00 (open type, for IEC products)			

Table 6–7 Electrical parameters of T13 models (three-phase 380 V to 480 V)

Item		Specification		
Module: MD520-4Txxxxx		500(S)(-A)	560(S)(-A)	630(S)(-L)
Structure		T13		
Output	Power (kW) (heavy load)	500	560	630
	Power (kW) (light load)	630	710	800
	Rated output current (A) (heavy load)	900	1020	1120
	Rated output current (A) (light load)	1120	1260	1460
	Output voltage	Three-phase 0 V to input voltage		
	Maximum output frequency	599 Hz (edited through parameters)		
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)		
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of the rated current		
Input	Rated input current (A) (heavy load)	838.1	949.6	1043.5
	Rated input current (A) (light load)	1041	1170.9	1301.5
	Rated voltage/frequency	Three-phase 380 V to 480 V, 50/60 Hz		
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC		
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz		
	Power supply capacity (kVA) (heavy load)	766	868	957
	Power supply capacity (kVA) (light load)	952	1070	1194
Heat dissipation design	Thermal design power (kW) (heavy load)	9.94	10.4	11.5
	Thermal design power (kW) (light load)	13.2	13.6	16.5
	Exhaust air volume (CFM)	2200	2200	2200
Overvoltage class	OVCIII			
Pollution degree	PD2			
IP rating	IP20			

Three-phase 200 V to 240 V

Table 6–8 Electrical parameters of T1 to T2 models (three-phase 200 V to 240 V)

Item		Specification					
Module: 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					
	Maximum output frequency	599 Hz (edited through parameters)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 and frequency	Three-phase 200 V to 240 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA) (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
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
	Exhaust air volume (CFM)	-	9	9	9	20	24
Overvoltage class	OVCIII						
Pollution degree	PD2						
IP rating	IP20						

Table 6–9 Electrical parameters of T3 to T6 models (three-phase 200 V to 240 V)

Item		Specification				
Module: MD520-2Txxxxx		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				
	Maximum output frequency	599 Hz (edited through parameters)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 and frequency	Three-phase 200 V to 240 V, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA) (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
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
	Exhaust air volume (CFM)	40	42	57.4	118.5	118.5
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20					

Table 6–10 Electrical parameters of T7 to T8 models (three-phase 200 V to 240 V)

Item		Specification				
Module: MD520-2Txxxxx		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				
	Maximum output frequency	599 Hz (edited through parameters)				
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 and frequency	Three-phase 200 V to 240 V, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Power supply capacity (kVA) (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
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
	Exhaust air volume (CFM)	122.2	122.2	218.6	287.2	354.2
Overvoltage class	OVCIII					
Pollution degree	PD2					
IP rating	IP20					

Table 6–11 Electrical parameters of T9 to T12 models (three-phase 200 V to 240 V)

Item		Specification					
Module: MD520-2Txxxxx		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					
	Maximum output frequency	599 Hz (edited through parameters)					
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)					
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of 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 and frequency	Three-phase 200 V to 240 V, 50/60 Hz					
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC					
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz					
	Power supply capacity (kVA) (heavy load)	131	167	187	202	258	314
	Power supply capacity (kVA) (light load)	164	209	232	256	324	384
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
	Exhaust air volume (CFM)	627	638.4	722.5	882	645	860
Overvoltage class	OVCIII						
Pollution degree	PD2						
IP rating	IP20						

Single-phase 200 V to 240 V

Table 6–12 Electrical parameters of T2 models (single-phase 200 V to 240 V)

Item		Specification			
Module: MD520-2Sxxxxx		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
	Rated output current (A) (heavy load)	2.3	4	7	9.6
	Output voltage	Three-phase 0 V to 240 V (subject to input voltage)			
	Maximum output frequency	599 Hz (edited through parameters)			
	Carrier frequency	0.5 kHz to 16.0 kHz (automatically adjusted according to the load characteristics)			
	Overload capacity	Heavy load: 60s at 150% of the rated current Light load: 60s at 110% of the rated current			
Input	Rated input current (A) (heavy load)	5.4	8.2	14	20
	Rated voltage and frequency	Single-phase 200 V to 240 V, 50/60 Hz			
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC			
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz			
	Power supply capacity (kVA) (heavy load)	1.4	2.2	3.7	6
Heat dissipation design	Thermal design power (kW) (heavy load)	0.043	0.065	0.097	0.121
	Exhaust air volume (CFM)	20	20	20	20
Overvoltage class	OVCIII				
Pollution degree	PD2				
IP rating	IP20 (open type, for IEC products) Type 1 (enclosed type, for UL-certified products)				

6.2 Technical Specifications

Item			Technical specifications
Control performance	Motor type		Asynchronous induction motors (IM), permanent magnet synchronous motors (PMSM), and synchronous reluctance motors (SynRM)
	Control mode		Sensorless vector control (SVC), feedback vector control (FVC), and voltage/frequency (V/f) control
	Asynchronous motor (V/f control)	Supported function	Energy saving control, overvoltage suppression, overcurrent suppression, voltage dip suppression, oscillation suppression, torque boost, slip compensation, different V/f curve selection, V/f separation, DC braking, random PWM, overexcitation fast deceleration, and droop control
Control performance	Asynchronous motor (FVC)	Supported function	Energy saving control, inertia auto-tuning, acceleration feedforward, droop control, master-slave control, free programming and self-adaption of speed loop parameters, load observer, overvoltage suppression, voltage dip suppression, overexcitation fast deceleration, automatic voltage adjustment (AVR generator bus voltage control), DC braking, continuous operation after smooth switchover to SVC upon encoder abnormality, and FVC-to-SVC switchover at designated frequency (This can avoid abnormal operation caused by high-speed jitter of the encoder.)
		Supported encoder	23-bit communication encoder, ABZ encoder (differential, collector, push-pull), resolver, and sin-cos encoder
		Starting torque	200%
		Speed step response	Within 2 ms
		Speed stability accuracy	0.02% when the motor and encoder are free from faults
		Speed fluctuation	0.05% when the motor and encoder are free from faults
		Torque control accuracy	±2%
		Flux weakening magnification	5

Item			Technical specifications
Control performance	Asynchronous motor (SVC)	Supported function	Energy saving control, inertia auto-tuning, acceleration feedforward, droop control, master-slave control, free programming and self-adaption of speed loop parameters, load observer, overvoltage suppression, voltage dip suppression, overexcitation fast deceleration, automatic voltage adjustment (AVR generator bus voltage control), flying start, DC braking, continuous operation after smooth switchover to SVC upon encoder abnormality, and FVC-to-SVC switchover at designated frequency (This can avoid abnormal operation caused by high-speed jitter of the encoder.)
		Speed regulation range	1: 500
		Starting torque	200%
		Speed step response	Within 2 ms
		Torque control accuracy	±3% when the torque is above 5 Hz
		Speed stability accuracy	Within 10% of the rated slip value
		Flux weakening magnification	5

Item			Technical specifications
Control performance	Synchronous motor (FVC)	Supported function	Electronic motor stator shorting, overexcitation fast deceleration, master-slave control, maximum torque per ampere (MTPA) control, inertia auto-tuning, acceleration feedforward, droop control, free programming and self-adaption of speed loop parameters, overvoltage suppression, voltage dip suppression, automatic voltage adjustment (AVR generator bus voltage control), DC braking, continuous operation after smooth switchover to SVC upon encoder abnormality, and FVC-to-SVC switchover at designated frequency (This can avoid abnormal operation caused by high-speed jitter of the encoder.)
		Supported encoder	23-bit communication encoder, ABZ encoder (differential, collector, push-pull), resolver, and sin-cos encoder
		Starting torque	200%
		Speed step response	Within 2 ms
		Speed stability accuracy	0.02% when the motor and encoder are free from faults
		Speed fluctuation	0.05% when the motor and encoder are free from faults
		Torque control accuracy	±2%

Item			Technical specifications
Control performance	Synchronous motor (SVC)	Supported function	Flying start, electronic motor stator shorting, overexcitation fast deceleration, master-slave control, maximum torque per ampere (MTPA) control, inertia auto-tuning, acceleration feedforward, droop control, free programming and self-adaption of speed loop parameters, overvoltage suppression, voltage dip suppression, automatic voltage adjustment (AVR generator bus voltage control), DC braking, continuous operation after smooth switchover to SVC upon encoder abnormality, and FVC-to-SVC switchover at designated frequency (This can avoid abnormal operation caused by high-speed jitter of the encoder.)
		Speed regulation range	1: 200
		Starting torque	200%
		Speed step response	Within 2 ms
		Speed stability accuracy	0.05% when the motor is free from faults
		Torque control accuracy	±3% when the torque is above 5 Hz

Item			Technical specifications
Basic functions	Command source		The commands are used to start or stop the motor. The command sources include the DI, DO, virtual DI, virtual DO, and DI/DO on the external expansion card. Switchover among four different sets of motor parameters and control parameters is supported. Start and stop commands can be set through programming.
	Reference channel	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.1%
		Speed/ Torque reference	Acceleration and deceleration curve, dynamic switchover among multiple acceleration and deceleration time sets, acceleration and deceleration S curve, external PID reference, AI (2 channels, supporting ±10 V or 0-20 mA), speed and torque set through communication, pulse reference (DI5), multi-reference, speed/torque set through programming
	Communication mode		Modbus (Modbus RTU, Modbus ASCII, Modbus TCP/IP), PROFIBUS DP, CANlink, CANopen, PROFINET, EtherCAT, and Ethernet/IP
	Output limit		Supports torque limit, power limit, current limit, maximum/minimum torque limit, speed limit, and jump frequency
	Process control	PID	Hibernation, configurable reference and feedback sources, 2-segment PID parameter switchover, feedback loss detection, configuration of output limit, configuration initialization
		Brake	Brake with or without feedback supported, starting speed, starting torque, brake release judgment condition settings
	Protection		AC drive and motor protection, including protection against overvoltage, overcurrent, overload, motor overheating (PT100, PT1000, KTY-84-130, PTC-130, PTC-150), and load loss, as well as automatic fault reset, automatic restart, and limp mode upon fault

Item		Technical specifications
Customized function	Free programming	Free programming can be implemented. Word-to-bit conversion, word and double word conversion, logic (AND, OR, NOT, XOR, XNOT), arithmetic operations (fixed-point and floating point addition/subtraction/multiplication/division, absolute value, numerical comparison), selector switch, free filtering, switch-on and switch-off delay through logic, multi-point curve, constant value
	Self-test	The AC drive, motor, and encoder support self-test. IGBT shoot through, short circuit to ground, phase loss, and inter-phase short circuit tests are supported.
	Long-distance drive	The drive supports long-distance drive and various types of output filters.
	Reluctance motor	The drive can control reluctance motors in FVC/SVC mode, ferrite booster magnetos, pure reluctance motors, and permanent magnet and ferrite hybrid reluctance motors.
	Electromagnetic coil	The current frequency is set separately. The three-phase AC power supply with variable frequency is provided, which applies main to electromagnetic mixers and welding equipment.
	Powerful software	The software InoDriveShop allows you to upload and download AC drive parameters and supports the oscilloscope function. In addition, the InoDriveShop supports remote commissioning and fault diagnosis. With the oscilloscope function, you can monitor the internal state of the AC drive.

Item		Technical specifications
Operation	Command source	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 source	The drive supports 10 frequency reference sources, including digital settings, analog voltage settings, analog current settings, pulse, and serial port communication, which can be switched over in various ways.
	Auxiliary frequency reference source	The drive supports 10 auxiliary frequency reference sources. 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: Five DIs
	Output terminal	Standard: One DO One relay output terminal One FM terminal (can be set with the 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: One DO One relay output terminal
Display and operating panel	LED operating panel	It can display parameters and AC drive status (forward running, reverse running, stop, operating panel/ terminal/communication control, speed/torque control, STO state) and can be used to modify parameters.
	LCD operating panel	It is optional and displays content in Chinese, English, or Russian. You can use it to modify parameters.
	Parameter copy	You can use the LCD operating panel to implement quick parameter upload and download.
	Key locking and function selection	Keys on the operating panel can be locked partially or all keys can be locked. In addition, functions with limited availability range can be assigned to some keys. This can prevent accidental operation.

Item		Technical specifications
Environment	Operating location	Indoors and free from direct sunlight, dusts, corrosive gases, combustible gases, oil mists, vapors, water drips, and salty elements
	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. If the altitude is above 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	Less than 95% RH, non-condensing
	Vibration	Below 5.9 m/S^2 (0.6 g)
	Storage temperature	-20°C to +60°C

7 Maintenance and Inspection

7.1 Routine Inspection Items

7.1.1 Daily Inspection Items

The influence of the ambient temperature, humidity, dust, and vibration will cause aging of components inside the AC drive, which will result in potential faults or shorter service life of the AC drive. Therefore, routine maintenance on the device is required. The maintenance interval must be shortened when the drive is used in environments suffering from high ambient temperature, frequent startup and stop, violent fluctuation in the AC power supply and the load, strong vibration or shock, and intrusive and corrosive substances such as dust, metal dust, and hydrochloric acid.

Check the following items daily to ensure a proper operation of the device. It is recommended to make a copy of this checklist and sign the "Checked" column after each inspection.

Item	Content	Solution	Checked
Motor	Check for unusual vibration or noise.	• Check whether the mechanical connection is normal. • Check whether motor phase loss occurs. • Check whether fixing screws of the motor are tightened.	
Fan	Check whether the fan operates normally.	• Check whether the fan on the device side is operating. • Check whether the fan on the motor side operates properly. • Check whether the ventilation duct is blocked. • Check whether ambient temperature is within the specified range.	
Installation environment	Check the cabinet and cable trays.	• Check for insulation damage of input and output cables. • Check whether the mounting bracket is shaking. • Check whether the copper bar and cable terminals are loose or corroded.	

Item	Content	Solution	Checked
Load	Check whether the operating current of the drive exceeds the rated current of the drive and motor.	• Check for settings of motor parameters. • Check whether the motor is overloaded. • Check whether the mechanical vibration is too strong (< 0.6 g under normal conditions).	
Input voltage	Check whether the power supply voltage between the main circuit and control circuit is normal.	• Check whether the input voltage is within the permissible range. • Check whether a heavy load is being started around the drive.	

7.1.2 Regular Checklist

Check the items listed in the following table every one or two years. Determine the actual inspection cycle based on actual application and operating environment. Regular maintenance helps detect product function deterioration and damage.

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

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

Item	Content	Solution	Checked
AC drive	Check for wastes, dirt and dust on the surface of the AC drive.	• Check whether the controller cabinet has been powered off. • Use a vacuum cleaner to suck up waste and dust to prevent direct contact with the components. • For stubborn surface dirt, wipe up the dirt with a piece of soft cloth immersed in alcohol.	
Cables	• Check whether power cables and the connectors are discolored. • Check whether the insulation is aged or cracked.	• Replace the cracked cable. • Replace the aged or cracked terminal.	

Item	Content	Solution	Checked
Peripherals of the electromagnetic contactor	• Check whether the contactor closes tightly or generates unusual noise during closing. • Check whether short circuit, water seepage, swelling, or cracking occurs on any peripheral device.	Replace the abnormal components.	
Air duct	• Check whether the air duct and heatsink are clogged. • Check whether the fan is damaged.	• Clean the air duct. • Replace the fan.	
Control circuit	• Check whether control components are in poor contact. • Check whether terminal screws are loose. • Check whether the insulation of the control cable is cracked.	• Clean up the surface of control circuit cables and terminals. • Replace the damaged or corroded control cables.	

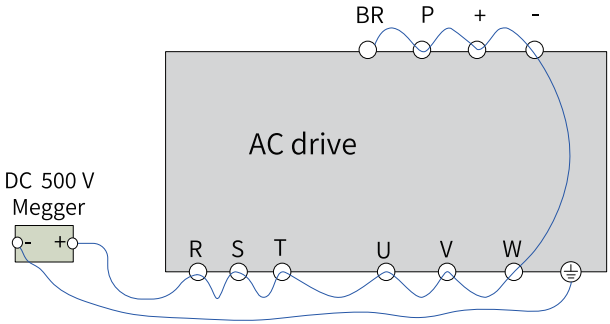
7.2 Main Circuit Insulation Test

Danger

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

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

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



The insulation resistance measured must be greater than 5 MΩ.

Caution

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

7.3 Replacing Quick-Wear Parts

7.3.1 Service Life of Quick-Wear Parts

The quick-wear parts of the AC drive include the cooling fan and filter electrolytic capacitor. Their service life is closely related to the ambient environment and maintenance condition. Generally, the service life is as follows.

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

7.3.2 Replacing the Fan

Cooling fans

- The fan may be damaged due to worn-out bearing or aging blades.
- Criteria for determining fan damage: cracks on the blade, unusual vibration noise upon start, and improper operation of fan blades
- Replacement of the fan: Press the snap-fit joint on the fan plastic cover and pull the fan outward. After replacing the fan, ensure the fan blows the air upwards.

Table 7–1 Number of cooling fans

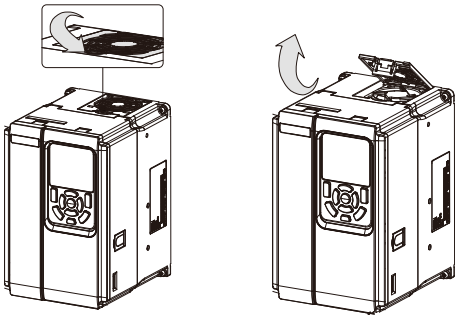
Structure	Fan Quantity
T1 (0.4 kW to 1.1 kW)	/
T1 (1.5 kW to 3.0 kW) T2 T3 (7.5 kW) T5 and T7	1

Structure	Fan Quantity
T3 (11 kW) T4 T8 and T10	2
T11 and T12	3
T13	2

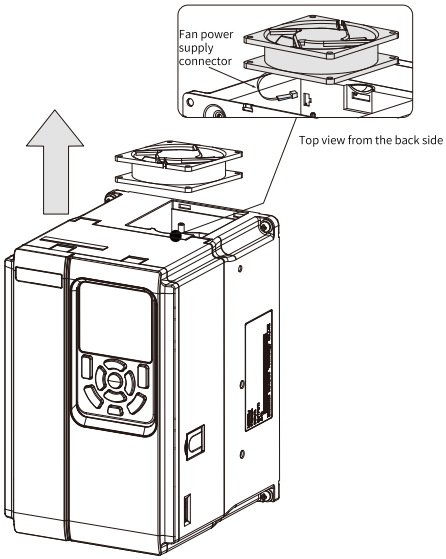
Removing and installing fans of T1 to T6 models

Removing the fan

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



2. Pull the fan upwards and unplug the power cable connector from the socket.

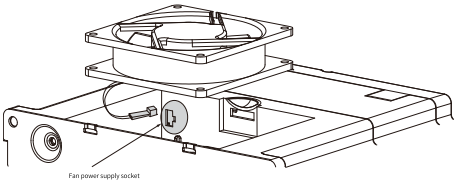


Installing the fan

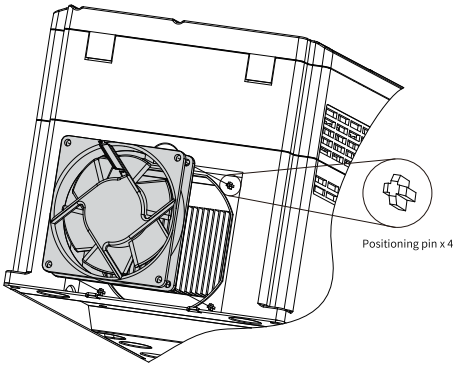
Note

- Install the fan in the reverse order of removal and ensure the correct direction of the fan.
- The fan should rotate clockwise to blow air into the motor air duct when viewed from the rear cover of the fan.

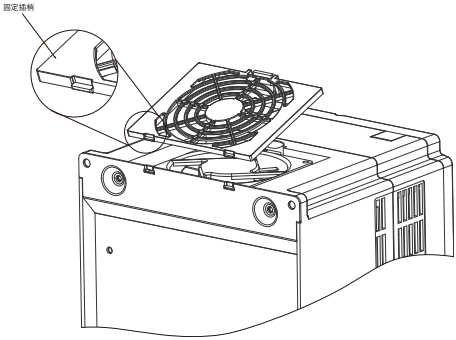
1. Plug the fan power cable connector to the socket.



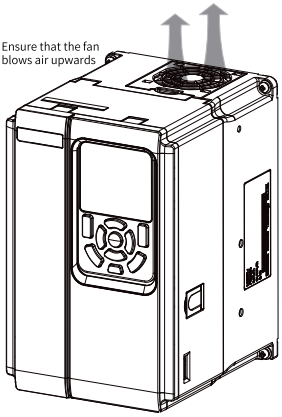
2. Install the fan into the drive, with the four fixing holes at the bottom of the fan aligned with the positioning pins.



3. Insert the two small snap-fit joints on the fan cover into the slot and then press down to fix the snap-fit joints.



4. After replacing the fan, ensure the fan blows the air upwards.



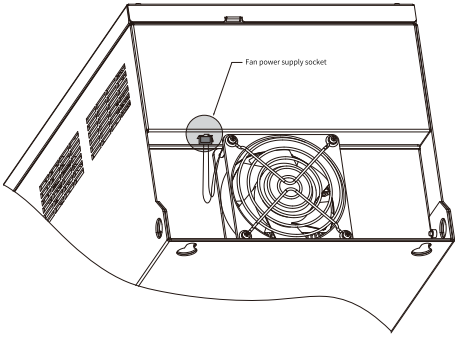
Removing and installing cooling fans of T7 to T9 Models

Note

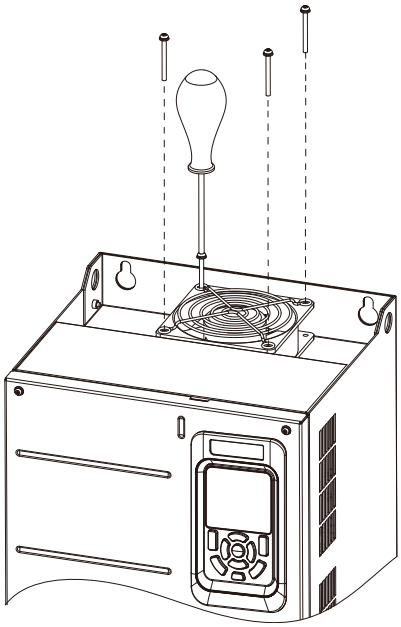
The number and location of cooling fans vary with product models, but the fans are removed and installed in the same way.

Removing the fan

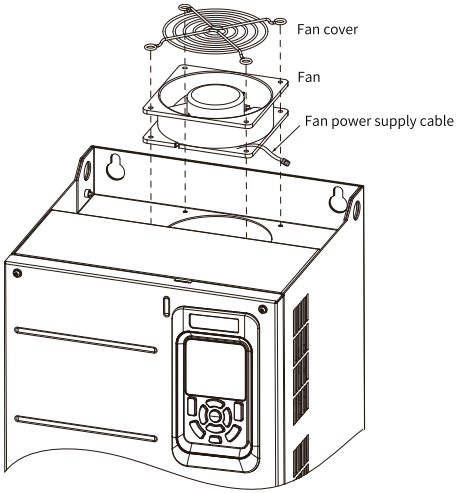
1. Disconnect the power cable connector of the fan (top view).



2. Remove the four fixing screws on the fan cover with a screwdriver.



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

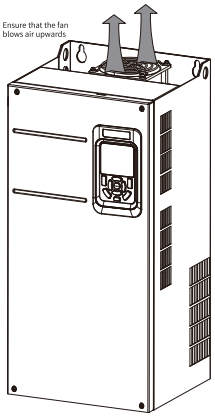


Installing the fan

1. Install the fan in the 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 drive during installation.

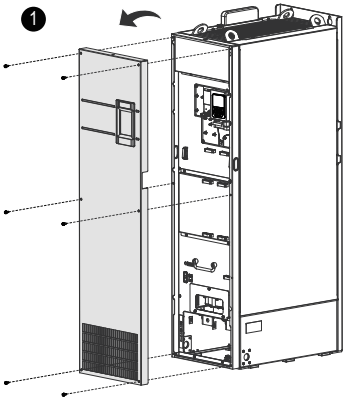
3. After replacing the fan, ensure the fan blows the air upwards.



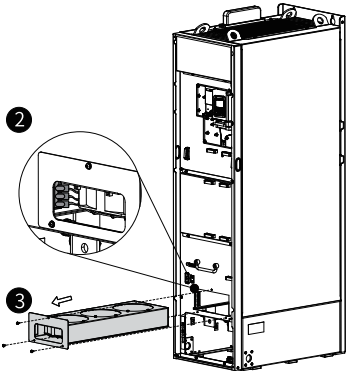
Removing and installing cooling fans of T10 to T12 models

Removing the fan

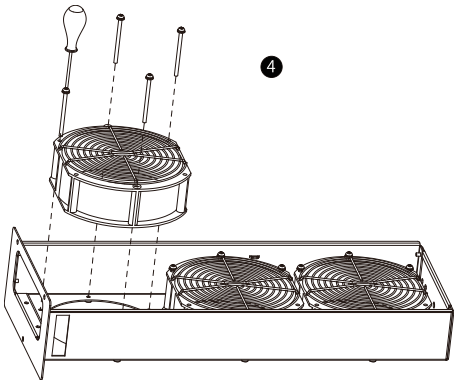
1. Remove the six fixing screws on the cover. Then, hold the cover with both hands and lift it up in the direction indicated by the arrow to remove the cover.



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



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

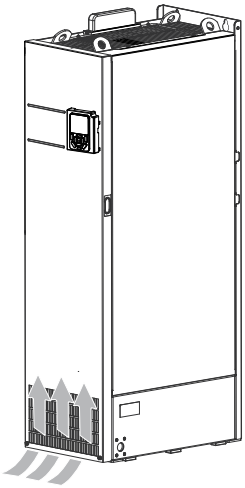


Installing the fan

1. Install the fan in the 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 drive.

3. Connect the power cable connector of the fan and fasten the fan box. After replacing the fan, ensure the fan blows the air upwards.



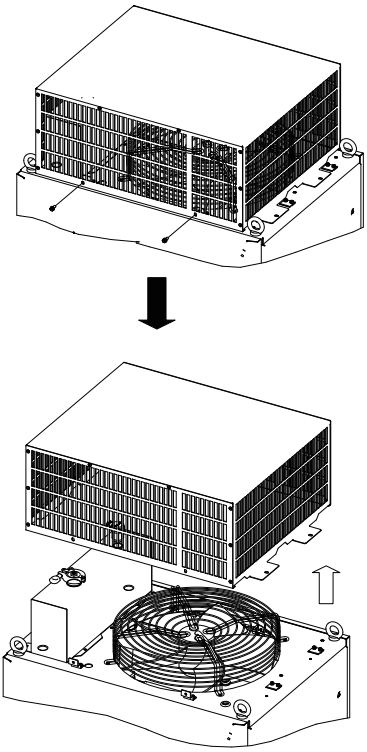
Removing and installing the fan of T3 models

Note

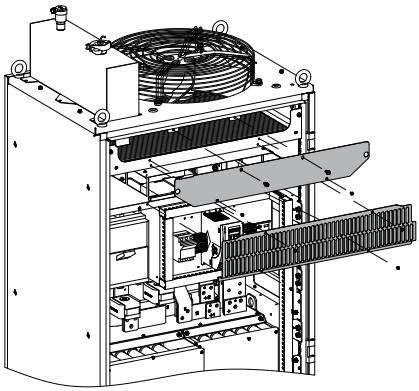
T13 models have a top-mounted fan and a cabinet-mounted AC drive fan. Their removal and installation are described below.

Removing the fan on the top

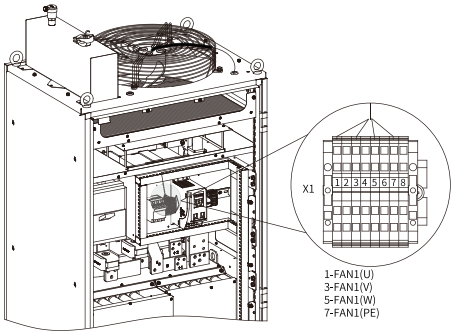
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



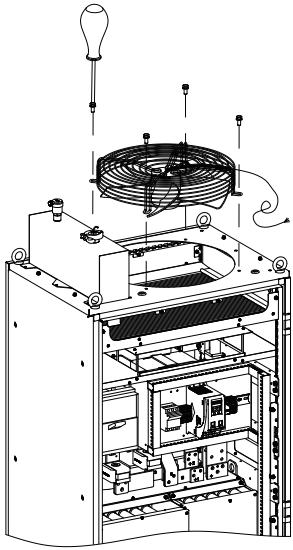
2. Remove the baffle plate as shown in the figure.



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



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



Installing the fan on the top

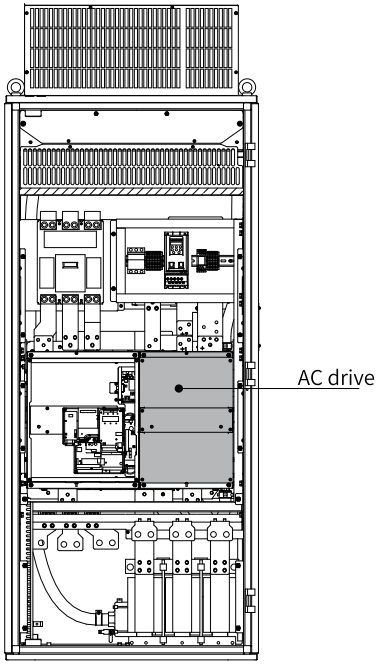
1. Install the fan in the reverse order of removal.

2. Wire fan cables according to the wiring diagram.

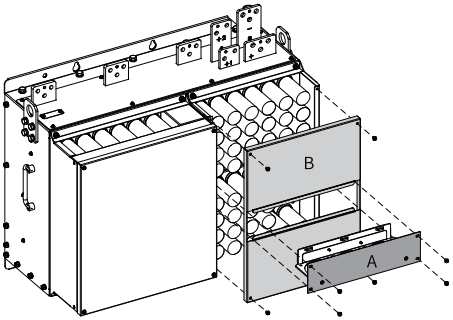
3. Connect the cables to terminals 1, 3, 5, and 7 of the X1 terminal block.

Removing the AC drive fan in the cabinet

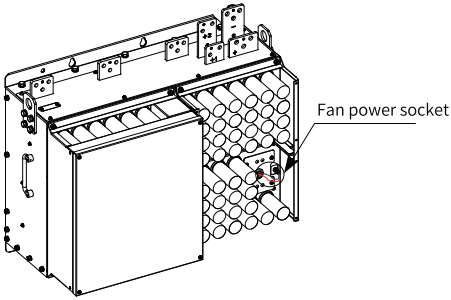
1. Open the cabinet door to find the AC drive position, which is shown in the following figure.



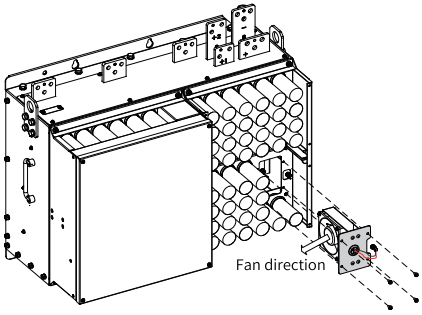
2. Remove baffle plates A and B in sequence from the AC drive.



3. Unplug the fan power cable connector from the socket.



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



Installing the AC drive fan in the cabinet

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

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

3. After replacement, check the air flow direction.

7.3.3 Replacing the Filter Electrolytic Capacitor

- Possible damage causes: input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolytic aging

- How to determine whether the capacitor needs to be replaced: 1) Check whether there is liquid leakage. 2) Check whether the safety valve has protruded. 3) Measure the static capacitance and the insulation resistance.
- Replacement: As the capacitor involves the internal parts, never replace the capacitor by yourself. Contact Inovance for replacement.

7.4 Storage and Warranty

Storage

To store the AC drive properly, observe the following:

- To store the drive, pack the drive with the original packing box provided by Inovance.
- Do not expose the product to moisture, high temperature, or direct sunlight for a long time.
- The electrolytic capacitor will deteriorate after long-term storage. Therefore, the AC drive must be switched on once for at least 5 hours every 6 months. The input voltage must be increased slowly to the rated value by using a voltage regulator. Contact Inovance for technical support if necessary.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period,maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

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

For details, see the Product Warranty Card.

8 Certification and Standard Compliance

8.1 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	Directive		Standard
CE Certification	EMC Directive	2014/30/EU	EN IEC 61800-3
	LVD	2014/35/EU	EN 61800-5-1
	RoHS Directive	2011/65/EU	EN 50581
UL/cUL Certification	-		UL61800-5-1
			C22.2 No.274-17
KCC Certification	Korea radio law		KN 11
Function safety certification (STO)	Machinery directive	2006/42/EC	EN ISO 13849-1:2015 EN 61508: 2010 EN 61800-5-2:2017 EN IEC 62061:2021

Note

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

8.2 CE Certification

8.2.1 Precautions for Compliance with European Standards

Figure 8-1 CE mark

- The CE mark is required for commercial trades (production, import, and sales) in Europe to indicate compliance with the Low Voltage Directive (LVD), Electromagnetic Compatibility (EMC), and Restriction of Hazardous Substances (RoHS) directives.
- The CE mark is required for engaging in commercial business (production, importation, and distribution) in Europe.

- The drive complies with LVD, EMC, and RoHS directives and carries the CE mark.
- The machinery and devices equipped with this product must also meet CE requirements when sold in Europe.
- The integrator who integrates this product with other devices has the responsibility of ensuring compliance with CE standards when the CE mark is labeled on the final device.

8.2.2 Requirements for Compliance with EMC Directive

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

If the product is used in the first environment, it may generate radio interference. In addition to CE compliance requirements, measures should be taken to prevent interference when necessary.

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

The manufacturer of the system with the product installed must ensure that the system meets the requirements of the European EMC Directive, and ensure that the system meets the requirements of the standard EN IEC 61800-3 according to the application environment of the system.

EMC specifications

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

Table 8–1 Maximum motor cable length allowed by conducted and radiated emission

Grid	Structure	Maximum Motor Cable Length Allowed by Conducted Emission				Maximum Motor Cable Length Allowed by Radiated Emission			
		C2 class		C3 class		C2 class		C3 class	
		Built-in Filter	External EMC Filter	Built-in Filter	External EMC Filter	Built-in Filter	External EMC Filter	Built-in Filter	External EMC Filter
Single-phase 200 V to 240 V	T2	-	25 m	25 m[1*]	-	-	25 m	25 m[1*]	-
Three-phase 200 V to 240 V	T1	-	25 m	25 m[1*]	-	-	25 m	25 m[1*]	-
	T2	-	25 m[1*]	25 m[2*]	-	-	25 m[1*]	25 m[2*]	-
	T3	-	25 m	25 m[1*]	-	-	25 m	25 m[1*]	-
	T4		25 m	25 m[3*]			25 m	25 m[3*]	-
	T5	-	25 m	-	-	-	3 m	-	-
	T6	-	25 m	5 m[4*]	-	-	3 m	-	-
	T7 and T8	-	25 m[5*]	5 m	-	-	25 m[5*]	5 m	-
	T9 and T11	-	25 m	5 m	-	-	25 m	5 m	-
	T12	-	25 m[6*]	5 m	-	-	25 m[6*]	5 m	-
Three-phase 380 V to 480 V	T1	-	25 m	25 m[1*]	-	-	25 m	25 m[1*]	-
	T2	-	25 m[1*]	25 m[2*]	-	-	25 m[1*]	25 m[2*]	-
	T3	-	25 m	25 m[1*]	-	-	25 m	25 m[1*]	-
	T4	-	25 m	25 m[3*]	-	-	25 m	25 m[3*]	-
	T5	-	25 m	-	-	-	3 m	-	-
	T6	-	25 m	5 m[4*]	-	-	3 m	-	-
	T7 and T8	-	25 m[5*]	5 m	-	-	25 m[5*]	5 m	-
	T9 and T11	-	25 m	5 m	-	-	25 m	5 m	-
	T12	-	25 m[6*]	5 m	-	-	25 m[6*]	5 m	-

Note

- 1*: Add the magnetic ring DY644020H to the input side of the AC drive.
- 2*: Add the magnetic ring DY644020H to the input and outside sides of the AC drive.
- 3*: Add the magnetic ring DY644020H and simple filter Cxy-1-1 to the input side of the AC drive.
- 4*: Add the magnetic ring DY805020H to the input and outside sides of the AC drive.
- 5*: Add the magnetic ring DY1207030H to the outside side of the AC drive.
- 6*: Add the magnetic ring NC-0567-L-b to the outside side of the AC drive.

Introduction to EMC standards

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

- The electromagnetic interference generated by 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.

Devices are divided into the following four categories based on the intended application environment.

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

- C4 equipment: PDS with the rated voltage equal to or higher than 1000 V or rated current equal to or higher than 400 A, or intended for use in complex systems in the second environment

8.2.3 Requirements for Compliance with the LVD

The drive has been tested in accordance with EN61800-5-1 and has complied with the LVD. Observe the following requirements to enable machines and devices integrated with this drive to comply with the LVD.

Installation location

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

Installation environment

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

Installation protection 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 IEC standards.
- Drives (IP20) intended to be installed inside the cabinet must be installed in a structure that prevents intrusion of unwanted objects from the top and the front.

Wiring of main circuit terminals

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

Requirements for 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 86*.

8.3 UL or cUL Certification

Figure 8-2 UL/cUL mark

- The UL/cUL mark commonly applies to products sold in the United States and Canada. Products with UL/cUL mark have been inspected and assessed by the UL organization. To pass UL/cUL certification, main built-in components of electrical products must also be UL certified.
- The drive has been tested in accordance with UL 61800-5-1 and CSA C22.2 No. 274-17 standards and has complied with UL/cUL standards. Observe the following requirements to enable machines and devices integrated with this drive to comply with UL/cUL standards.

Mounting 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 protection level, 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 in a cabinet according to the following requirements:
  The drive must be installed in a fireproof cabinet with the housing that provides effective electrical and mechanical protection. The installation must conform to local and regional laws and regulations and relevant NEC standards.

Main circuit wiring requirements

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

- Terminals BR, (-), and (+) are used to connect optional parts. Do not connect these terminals to an AC power supply.
- To protect the main circuit, separate and cover the surface that may come into contact with the main circuit.
- The control circuit is the internal safety extra-low voltage (SELV) circuit, which must be insulated and isolated from other circuits. Make sure that the control circuit is connected to the external SELV circuit.
- Prevent foreign matters from entering the wiring part of the terminal block.
- Do not solder the twisted conductors.
- The tightening torque may vary with terminals. Tighten terminal screws with the specified tightening torque. You can use the torque screwdriver, ratchet, or wrench.
- When using an electric screwdriver to tighten terminal screws, set a low speed to prevent 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 requirements

Observe the requirements in UL508 during wiring.

Main circuit cable selection

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:

  1. Ambient temperature: < 40°C
  2. Normal operating ratings

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

Terminal dimensions and cable selection

For selection of terminals and cables for main circuits, see *"5.3.1 Main Circuit Cables" on page 73*.

Requirements for protective devices

- To comply with UL standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.
- Install sufficient protective devices against short circuit in branch circuits according to applicable regulations and this guide. The drive is applicable to circuits with a rated breaking capacity lower than 100000 A and a maximum voltage of 480 VAC (class 400 V). For selection of circuit breakers, see *"5.4.1 Fuse, Contactor, and Circuit Breaker" on page 86*.

8.4 KCC Certification

Appllicant Suzhou Inovance Technology Co., Ltd.

AC Drive

Model MD520 series

Made In China

Manufacturer

Suzhou Inovance Technology Co.,Ltd.

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8.5 Function Safety Certification

EU directives and standards

Low Voltage Directive 2014/35/EU, EN 61800-5-1

Electromagnetic Compatibility Directive 2014/30/EU, EN 61800-3:2018

Machinery Directive 2006/42/EC (Function Safety), IEC 61800-5-2

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