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Preface

Thank you for purchasing WISE310 series escalator AC drive!

WISE310 series escalator AC drive, developed and manufactured by Inovance, is an AC drive dedicated for escalator applications. Monarch™ is a brand name for elevator- and escalator-related products exclusively owned by Inovance and provides a series of elevator solutions and comprehensive solutions conforming to new national standards. The complete product range enable us to meet various requirements of our customers.

The product adopts V/F control with a power range covering 3.7–90 kW. It also provides CAN communication terminals and supports a maximum of 8 speeds for running.

This manual provides guidance on correct use of the WISE310 series escalator AC drive, including information on product features, safety precautions, construction and wiring, commissioning procedures, and care and maintenance. Read and understand the manual before using the product, and keep it carefully for future operation and maintenance.


Precautions	
◆	The drawings in manual are sometimes shown without covers or protective guards. During use, remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
◆	The figures in this user manual are for reference only, and may not be the same as the product you have purchased.
◆	The instructions are subject to change due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.
◆	If the manual is damaged or lost, order a replacement from your agent or the customer service center of Inovance.
◆	Contact the customer service center of Inovance if you have problems during the use.
◆	Customer service hotline: 400-777-1260

First-time Use

For users who use this product for the first time, read the manual carefully. If you have any problem concerning the functions or performance, contact the technical support personnel of Inovance to ensure correct use.

Standards

The WISE310 series AC drive complies with the international standards listed in the following table.

Certification	Mark	Directives		Standard
CE		EMC directives	2014/30/EU	EN 12015: 2014 EN 12016: 2013
		LVD directives	2014/35/EU	EN 61800-5-1
		RoHS directives	2011/65/EU	EN 50581

About the Manual

This manual is shipped with the product, please contact your sales representative for any additional order.

The manuals are subject to change without notice. The up-to-date version of the manual is available by:


- Contacting our distributors;
- Scanning the QR code on the cover page of the manual to download an APP for technologies and service support.
- Downloading from our official website: www.inovance.cn.


Safety Instructions


Safety Disclaimer

1. Read and comply with the safety instructions before you performing any installation, operation, and maintenance on the equipment.
2. To ensure the safety of humans and the device, follow the marks on the device and all the safety instructions in this document.
3. The "CAUTION", "WARNING", and "DANGER" are only supplements to the safety instructions.
4. Use this equipment based on the designated environment requirements. Damages caused by improper usage are not covered by warranty.
5. The company shall take no responsibility of any personal injuries or property damages caused by improper usage.



Safety Levels and Definitions

 **Danger** The "Danger" sign indicates that failure to comply with the notice will result in server personal injuries or even death.

 **Warning** The "Warning" sign indicates that failure to comply with the notice may result in server personal injuries or even death.

 **Caution** The "Caution" sign indicates that failure to comply with the notice may result in minor or moderate personal injuries or damage to the equipment.


Safety Instructions

Unpacking
<p> Caution</p> <ul style="list-style-type: none"> ◆ Check whether the packing is intact and whether there is damage, water seepage, damp, and deformation. ◆ Unpack the package following the package sequence. Do not hit the package with force. ◆ Check whether there are damages, rust, or injuries on the surface of the product or product accessories. ◆ Check whether the number of packing materials is consistent with the packing list.
<p> Warning</p> <ul style="list-style-type: none"> ◆ Do not install the equipment if you find damages, corrosions, or indications of use on the product or accessories. ◆ Do not install the equipment if you find water seepage, component missing or damage upon unpacking. ◆ Do not install the equipment if you find the packing list does not conform to the equipment you received.

Storage and Transportation


 Caution

- ◆ Store this equipment based on the storage and transportation requirements on humidity and temperature.
- ◆ Avoid transporting the equipment in environment such as water splashing, rain, direct sunlight, high voltage, strong magnetic field, and strong vibration.
- ◆ Avoid storing the product for more than 3 months, long-term storage shall require stricter protection and necessary inspections..
- ◆ Pack the product strictly before you transport. Use a sealed box for long-distance transportation.
- ◆ Never transport this product with products or materials that harm or have negative impacts on this product.

 Warning

- ◆ Use professional loading and unloading equipment to carry large-scale or heavy products.
- ◆ When carry this equipment with bear hand, hold the product casing firmly with care preventing from parts falling, otherwise, it may result in personal jury or equipment damages.
- ◆ Handle the products with care, mind your steps, otherwise, it may result in personal juries or equipment damages.
- ◆ Never stand or stay below the equipment when the equipment is lifted by hoisting equipment.

Installation

 Warning

- ◆ Read and comply with the safety instructions before performing installation.
- ◆ Do not modify this product.
- ◆ Do not rotate the product components or the fixed bolts and red marked bolts on product components.
- ◆ Do not install this product in places where there is strong electric field or strong magnetic field.
- ◆ When this product is installed in a cabinet or terminal device, the cabinet or terminal device must be equipped with protective shell. The proof class must comply with relevant IEC standards and local regulations.


 Danger

- ◆ Do not allow non-professionals to perform product installation, wiring, maintenance, inspection or parts replacement.
- ◆ The installation, wiring, maintenance, inspection and parts replacement are intended to be performed by professional personnel only.
- ◆ Installation personnel must be familiar with product installation requirements and relevant technical materials.
- ◆ If you need to install transformer or other strong electromagnetic interference equipment, install shielding device at the same time to avoid product malfunction.

Wiring

 **Danger**

- ◆ Do not allow non-professionals to perform product installation, wiring, maintenance, inspection or parts replacement.
- ◆ Never perform wiring at power-on. Failure to comply may result in electric shock.
- ◆ Cut off all power supplies before wiring. Wait at least 10 minutes after power-off so that residual voltage can discharge safely.
- ◆ Make sure that the equipment is reliably grounded. Failure to comply may result in electric shock.
- ◆ Following the proper electrostatic discharge (ESD) procedures, and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or the internal circuit the product.

 **Warning**

- ◆ Never connect the power cable with the product output terminals (U, V, W). Failure to comply may result in equipment damage or even fire.
- ◆ When connecting driving equipment with the motor, make sure the phase sequence of the drive and motor are consistent to prevent motor reverse rotation.
- ◆ The cable used in wiring must conform to the wire diameter and shielding requirements, the shielding layer of the shielded cable must be reliably grounded at one end.
- ◆ After wiring, make sure there are no fallen screws or exposed wire inside the cabinet or product.

Power-on

 **Danger**

- ◆ Before power-on, make sure that the equipment or products are intact, all wiring are safely connected, and the motor device allows a restart.
- ◆ Before power-on, check if the power supply meets the equipment requirements, avoid equipment damage or fire.
- ◆ At power-on, equipment or product may start running abruptly, keep away from mechanical device.
- ◆ After power-on, never open the cabinet door or the protective shell to avoid electric shock.
- ◆ Never touch any terminals at power-on to avoid electric shock.
- ◆ Never dismantle the equipment or remove any parts from the equipment at power-on to avoid electric shock.






Operation

 **Danger**

- ◆ Never touch any terminals during operation. Failure to comply may result in electric shock.
- ◆ Never dismantle the equipment or remove any parts from the equipment during operation. Failure to comply may result in electric shock.
- ◆ Never touch the equipment shell, fan or resistor for temperature detection. Failure to comply may result in burn!
- ◆ Do not allow non-professional technicians to detect signals during operation. Failure to comply may result in equipment damage even personal injuries.


 **Warning**

- ◆ Prevent metal or other objects from falling into the device during operation, failure to comply may result in equipment damage.
- ◆ Never use contactors to start or stop the equipment. Failure to comply may result in damage to the equipment!

Maintenance
<p> Danger</p> <ul style="list-style-type: none">◆ Do not allow non-professionals to perform product installation, wiring, maintenance, inspection or parts replacement.◆ Never perform maintenance at power-on. Failure to comply may result in electric shock.◆ Before maintenance, wait at least 10 minutes after power-off so that residual voltage can discharge safely.
<p> Warning</p> <ul style="list-style-type: none">◆ Following the equipment repair and maintenance requirements to perform routine and periodical inspection and maintenance, and keep a maintenance record.
Repair
<p> Danger</p> <ul style="list-style-type: none">◆ Do not allow non-professionals to perform product installation, wiring, maintenance, inspection or parts replacement.◆ Never perform any inspection or maintenance operations at power-on. Failure to comply may result in electric shock.◆ Before inspection or maintenance, wait at least 10 minutes so that residual voltage can discharge safely.
<p> Warning</p> <ul style="list-style-type: none">◆ Following the terms defined in the warranty agreement to repair the product.◆ When the equipment has a fault or is damaged, follow the instructions of the professionals to perform troubleshooting or maintenance, and keep a maintenance record.◆ Following the instructions of the quick-wear parts instructions to replace the damaged parts.◆ Do not continue to use the damaged equipment. Failure to comply may result in worse damages.◆ After replacement, perform a re-check of the wiring and specifications.
Disposal
<p> Warning</p> <ul style="list-style-type: none">◆ Following the local regulations or standards to dispose the retired equipment or products. Failure to comply may result in property damage or even death.◆ Following the industry waste disposal standards to recycle the scrapped equipment to avoid environmental pollution.

Safety Signs

To guarantee safety operations and maintenance of the equipment, follow the safety stickers on the equipment and products. Do not stain or remove the safety signs. Instructions of safety signs are as follows:

Safety signs	Instructions
	<ul style="list-style-type: none">◆ Read this notice before installation and operation. Failure to comply may result in electric shock.◆ Do not remove the cover within 10 minutes of power-off.◆ During maintenance, inspection or wiring, you may start operation at least 10 minutes after power-off at the input/output terminal when the power indicators are completely off.



1 Product Information

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Chapter 1 Product Information

1.1 Model and Nameplate of the WISE310

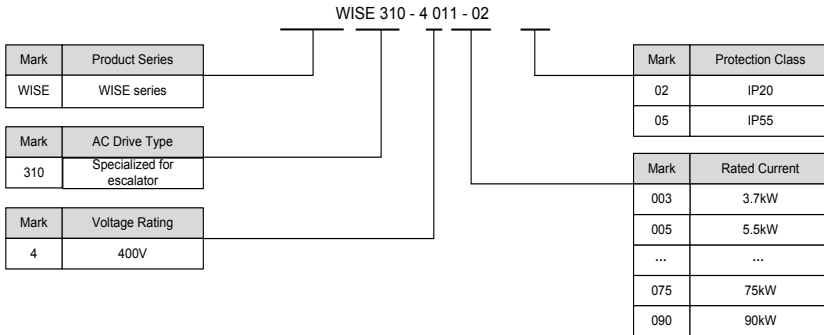


Figure 1-1 Designation rule of the WISE310

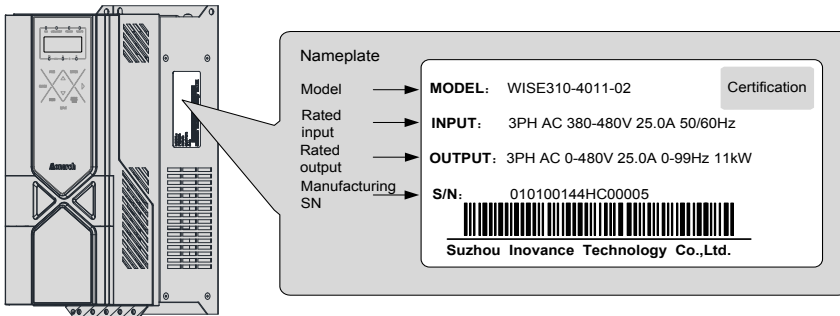


Figure 1-2 Nameplate of the WISE310

1.2 Components of the WISE310

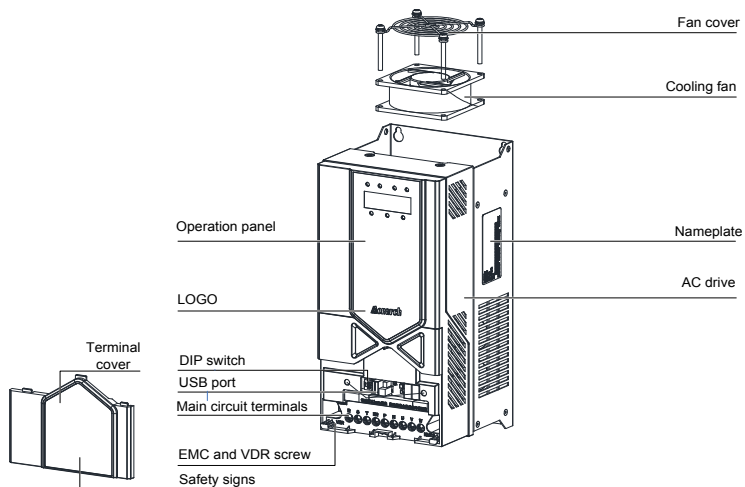


Figure 1-3 Components of the WISE310 (WISE310-4003-02 to WISE310-4030-02)

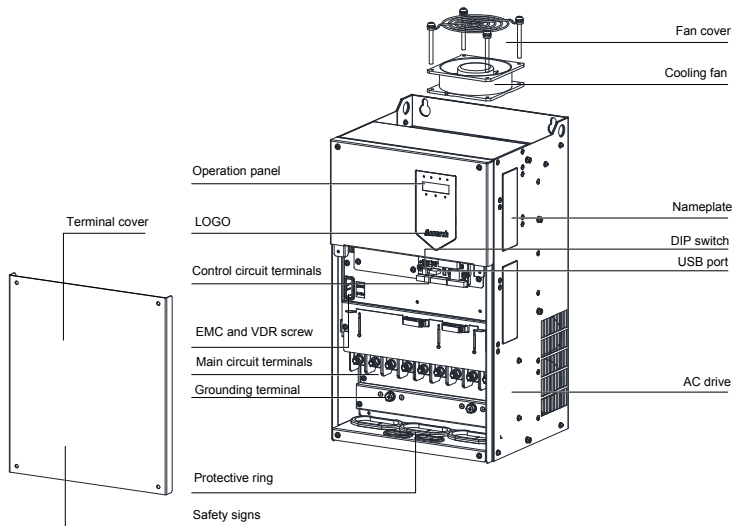


Figure 1-4 Components of the WISE310 (WISE310-4037-02 to WISE310-4090-02)

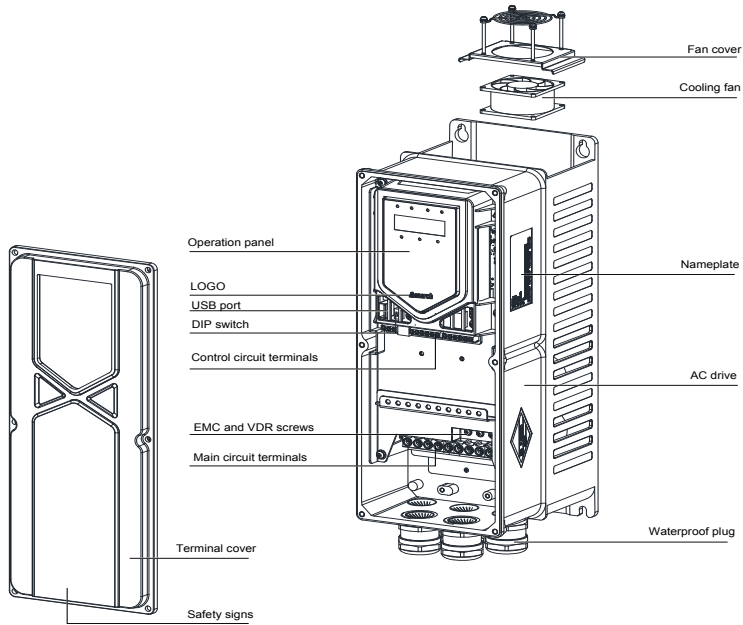


Figure 1-5 Components of the WISE310 (WISE310-4003-05 to WISE310-4030-05)

1.3 Dimensions of the WISE310

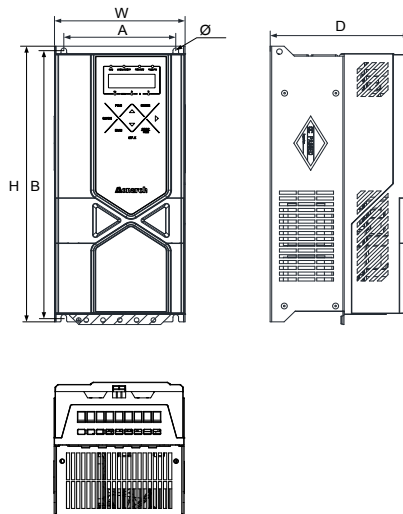


Figure 1-6 Physical appearance and mounting dimensions of the WISE310 (WISE310-4003-02 to WISE310-4030-02)

Table 1-1 Physical dimensions and mounting hole diameters of different WISE310 models (WISE310-4003-02 to WISE310-4030-02)

AC Drive Model	Protection Class	Mounting Hole (mm)		External Dimensions (mm)			Mounting Hole Diameter (mm)	Gross Weight (kg)
		A	B	H	W	D		
Three-phase 380 V								
WISE310-4003-02	IP20	98	240	250	110	125	Ø 5.0	2.6
WISE310-4005-02								
WISE310-4007-02								
WISE310-4011-02								
WISE310-4015-02								
WISE310-4018-02								
WISE310-4022-02								
WISE310-4030-02		150	384	395	192	183	Ø 7.0	15.5

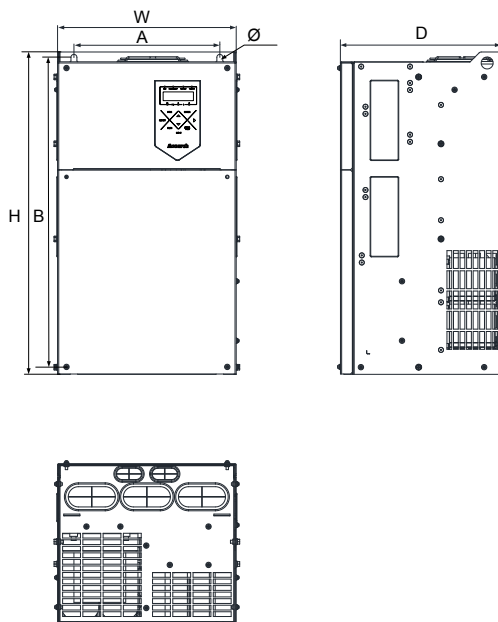


Figure 1-7 Physical appearance and mounting dimensions of the WISE310 (WISE310-4037-02 to WISE310-4090-02)

Table 1-2 Physical dimensions and mounting hole diameters of different WISE310 models (WISE310-4037-02 to WISE310-4090-02)

AC drive model	Protection Class	Mounting Hole (mm)		External Dimensions (mm)			Mounting Hole Diameter (mm)	Gross Weight (kg)
		A	B	H	W	D		
Three-phase 380 V								
WISE310-4037-02	IP20	245	523	542	300	275	Ø 10.0	35
WISE310-4045-02								
WISE310-4055-02								
WISE310-4075-02	IP20	270	560	580	338	315	Ø 10.0	51.5
WISE310-4090-02								

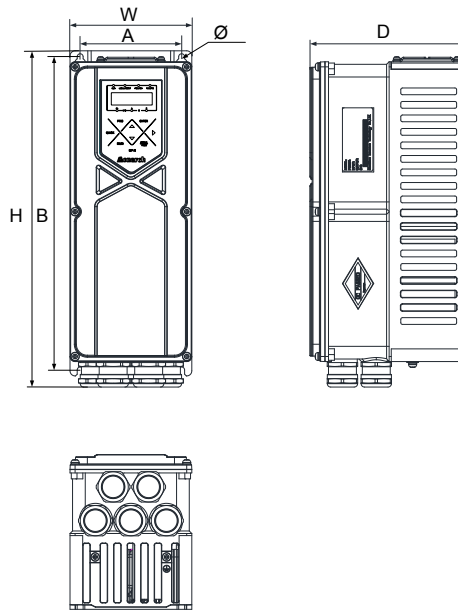


Figure 1-8 Physical appearance and mounting dimensions of the WISE310 (WISE310-4003-05 to WISE310-4030-05)

Table 1-3 Physical dimensions and mounting hole diameters of different WISE310 models (WISE310-4003-05 to WISE310-4030-05)

AC drive model	Protection Class	Mounting Hole (mm)		External Dimensions (mm)			Mounting Hole Diameter (mm)	Gross Weight (kg)
		A	B	H	W	D		
Three-phase 380 V								
WISE310-4003-05	IP55	120	371	399	144	184	Ø 7.0	8.5
WISE310-4005-05								
WISE310-4007-05								
WISE310-4011-05								
WISE310-4015-05		150	446	476	195	218	Ø 7.0	19.5
WISE310-4018-05								
WISE310-4022-05								
WISE310-4030-05								

1.4 Technical Specifications

Table 1-4 Technical specifications of the WISE310

Item		Description
Input power	Number of phases, voltage and frequency	Three-phase AC380 V to 480 V, 50/60 Hz
	Allowable voltage change	-15% to +15%
	Allowable frequency change	-5% to +5%
Basic specifications	Maximum frequency	V/F control: 0.00-99.00 Hz
	Carrier frequency	2-10 kHz, default setting: 6 kHz The carrier frequency is automatically adjusted based on the load features.
	Input frequency resolution	0.01 Hz
	Control mode	V/F control
	Startup torque	150%
	Speed range	50 (V/F)
	Speed stability accuracy	1% (V/F)
	Acceleration/Deceleration curve	Straight-line acceleration/deceleration mode; Two groups of acceleration/deceleration time, range 0.0-6500.0s
	Multi-speed operation	A maximum of 8 speeds are supported based on the control terminals.
	Automatic voltage regulation (AVR)	The system maintains a constant output voltage automatically when the grid voltage changes.
	Overvoltage stall control	The voltage are limited automatically during running to avoid frequent tripping due to overvoltage.
	Fast current limit	This function reduces the overcurrent faults to the minimum and guarantees normal running of the AC drive.
Torque limit and control	The torque are limited automatically during running to avoid frequent tripping due to overcurrent.	

Item		Description
Individualized functions	Power dip ride-through	Load feedback energy compensates for any voltage reduction, allowing the drive to continue to operate for a short time during power dips.
	Speed tracking	The motor is free of tuning. The speed tracking time is less than 600 ms.
	Grid synchronization	The frequency and phase of the output voltage is consistent with the grid.
	Advanced background software	Software in the drive allows users to configure some operating parameters, and provides a virtual oscilloscope display that shows system status.
RUN	Command source	Operation panel control, terminal control, CAN communication terminals control.
	Input terminal	Five digital input (DI) terminals
	Output terminal	Two relay output terminals (NO/NC)
Protections	Overload protection	60s for 150% of the rated current, 1s for 200% of the rated current.
	Short circuit protection	Output phase-to-phase short-circuit protection
	Phase loss protection	The AC drive provides phase-loss detection function. If the input phase sequence is wrong, the control system will report the fault to prevent accidents.
	Overvoltage protection	Bus voltage 910 V (400 V series)
	Undervoltage protection	Bus voltage 350 V (400 V series)
	Heatsink overheated	Protected by thermistor devices
	Braking protection	Automatic detection of abnormality of brake unit
	Module protection	Overcurrent, short circuit, overheat protection
	Output ground protection	The outputs will be switched off if any phases are short-to-ground during the running process.
	Braking resistor short-circuit protection	Detected when braking
Display	LED display	Display parameters
	Operation panel	5-digit LED display, querying/modifying most parameters and monitoring the system state

1.5 Selection of Braking Components

1.5.1 Sslection of Braking Resistance

During braking, almost all regenerative energy of the motor is consumed by the braking resistor. The resistance value of the brake can be calculated according to the formula:

$$U \times U/R = P_b$$

■ U refers to the braking voltage at system stable braking. (The value of U varies with different systems. The default braking voltage for the WISE310 series AC drive is $U * 1.414 + 100$ V, whose upper limit is 810 V and lower limit is 480 V).

■ P_b refers to the braking power

1.5.2 Selection of Braking Components

Table 1-5 Braking components selection for the WISE310 AC drive

AC Drive Model	Power of Adaptable Motor (kW)	Braking Unit	Max. Current	Min. Resistance (Ω)
WISE310-4003-02/05	3.7	Built-in	6.5	98.4
WISE310-4005-02/05	5.5		9.4	68.1
WISE310-4007-02/05	7.5		12.2	52.1
WISE310-4011-02/05	11		18.0	35.4
WISE310-4015-02/05	15		23.0	27.7
WISE310-4018-02/05	18		26.6	23.9
WISE310-4022-02/05	22		32.4	19.7
WISE310-4030-02/05	30		43.2	14.8
WISE310-4037-02	37		48.0	13.3
WISE310-4045-02	45		48.0	13.3
WISE310-4055-02	55		64.0	10.0
WISE310-4075-02	75		96.0	6.6
WISE310-4090-02	90	External	105.6	6.0

Note

- ◆ The min. resistance is recommended to use when the rated input voltage is AC 380 V. Re-check the resistance for other input voltages.



2 Installation and Wiring

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Chapter 2 Installation and Wiring

2.1 Installation

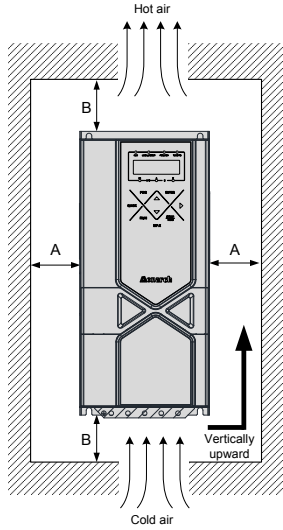
2.1.1 Installation Environment

Item	Requirements
Altitude	Below 1000 m: 100% full-load (no derating) Each increment of 100 m in altitudes makes the current de-rate 1%. The maximum altitude is 3000 m.
Ambient temperature	-10°C (no frost) to +50°C De-rate if the ambient temperature is above 50°C. Every increase of 1°C makes the current de-rate 2%. The maximum working temperature is 55°C.
Storage temperature	-40°C to +70°C
Relative humidity	0-95% RH, no condensation, no corrosive, no water drop.
Vibration and impact	5.9 m/s ² (0.6 g) at 2-200 Hz sine vibration
IP grade	IP20/IP55
Cooling and ventilation	Install the AC drive on a backplate, and ensure there is sufficient space around the enclosure to allow for efficient heat dissipation.
Mounting location	Ensure the mounting location is: Away from direct sunlight Without serious shock or vibration. (The vibration must be less than 0.6 g.) Free from oil, dirt, dust or metallic powders. (IP55 is applicable in places with dust or metallic powders.) In an area where humidity is 95% RH or less with no condensation. (IP55 is applicable in outdoor places with water showering.) Protected against corrosive, combustible or explosive gases (IP55 is applicable in places with some corrosive gases.)

2.1.2 Mounting Clearance Requirements

The clearance that needs to be reserved varies with the power rating of the WISE310, as shown in the following figure.

Single drive installation



Power Rating	Clearance (mm)	
3.7–11 kW	A ≥ 30	B ≥ 100
15–30 kW	A ≥ 30	B ≥ 200
37–45 kW	A ≥ 50	B ≥ 200
55–90 kW	A ≥ 50	B ≥ 300

Figure 2-1 Mounting clearance requirements for different power ratings

Parallel installation of multiple drives

The WISE310 series AC drive dissipates heat from bottom to top. If multiple drives are connected together, install them side by side.

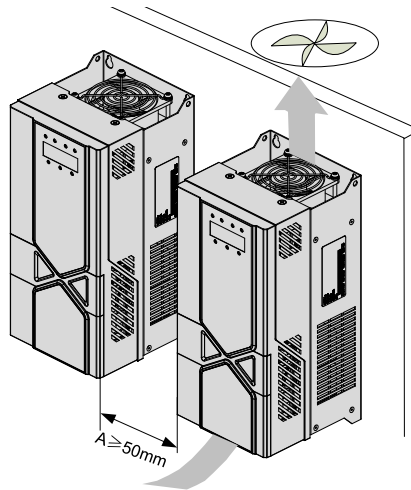


Figure 2-2 Parallel installation of multiple drives

2.1.3 Installation Instructions

The WISE310 series AC drive is installed using backplate mounting shown in the following diagram:

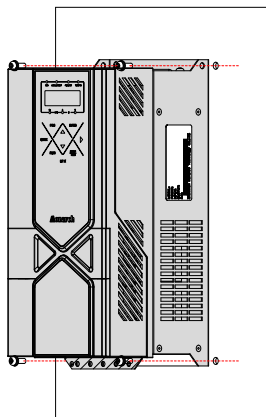


Figure 2-3 Backplate mounting diagram

The installation precautions are as follows:

1. Reserve the installation clearances as specified in Figure 2-1 to ensure sufficient space for heat dissipation. Take heat dissipation of other components in the cabinet into consideration.
2. Install the AC drive upright to facilitate heat dissipation. If multiple AC drives are installed in the cabinet, install them side by side.
3. Use incombustible hanging bracket.

2.1.4 Removal and Refitting of the Cover Plate

For the WISE310 series AC drives, you need to remove the cover plate before wiring the main circuit and control circuit.

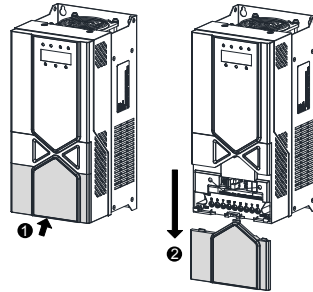


- ◆ Ensure the drive power-off time exceeds 10 minutes before removing the cover.
- ◆ Be careful when removing the cover plate. A falling cover may cause equipment damage or personal injury.

1. Remove and refit the cover plates of WISE310-4003-02 to WISE310-4030-02

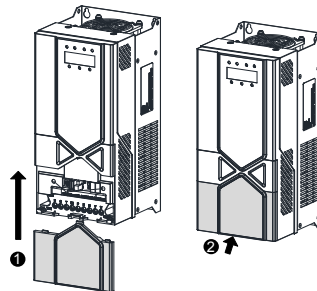
Removal

- (1) Pop up the buckle on the bottom of the cover by hand to disconnect it from the fixing hole on the cabinet .
- (2) Push out the cover along the bottom direction of the cabinet to complete the removal.



Refitting

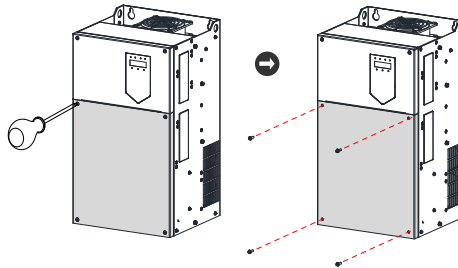
- (1) Align the cover at both sides of the slot and push it along the top direction (arrow direction) of the cabinet.
- (2) Press the buckle on the bottom of the cover to buckle it into the fixing hole on the cabinet and complete the refit.



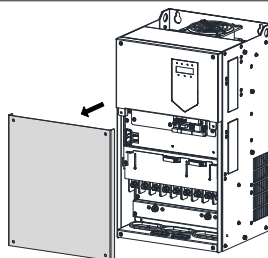
2. Remove and refit the cover plates of WISE310-4037-02 to WISE310-4090-02

Removal

- (1) Screw out the four screws of the cover plate by the screw driver.

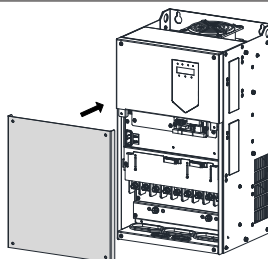


- (2) Hold the cover with both hands and lift it up in arrow direction to complete the removal.

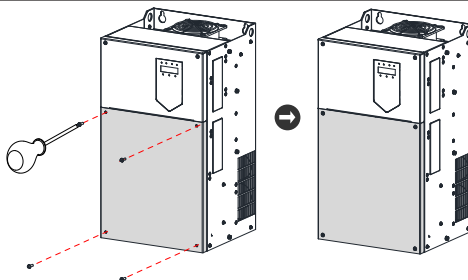


Refitting

- (1) Hold the cover with both hands and attach it (in arrow direction) to the cabinet.



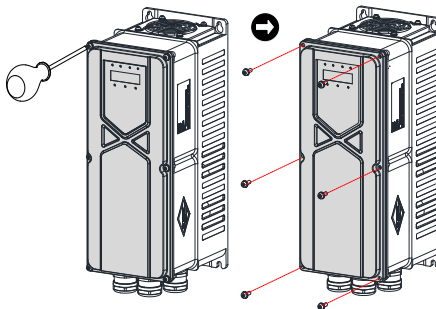
- (2) Secure the four screws by the screw driver to complete the refitting.



3. Remove and refit the cover plates of WISE310-4003-05 to WISE310-4030-05

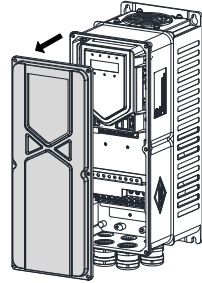
Removal

- (1) Screw out six screws of the cover plate by the screw driver.



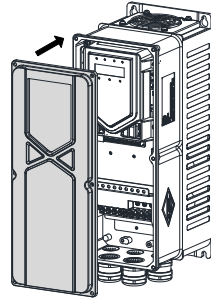
Removal

- (2) Hold the cover with both hands and lift it up in arrow direction to complete the removal.

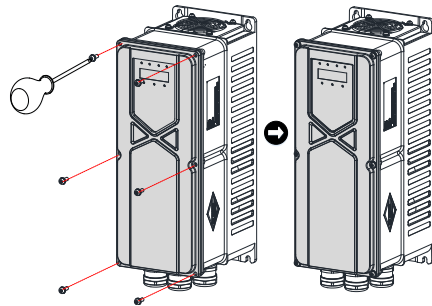


Refitting

- (1) Hold the cover with both hands and attach it (in arrow direction) to the cabinet.



- (2) Secure the six screws by screw driver to complete the refitting.



2.2 Wiring

2.2.1 Wiring of Main Circuit

The following diagram shows how to connect the main circuit of the WISE310 AC drive.

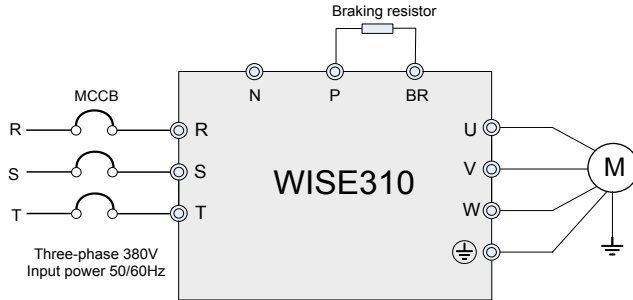


Figure 2-4 Three-phase 380 V main circuit wiring diagram of WISE310

2.2.2 Description of Main Circuit Terminals

1. Main circuit terminals

Table 2-1 Description of main circuit terminals of three-phase AC drive

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connected to the three-phase AC power supply.
P, N	Positive and negative terminals of DC bus	Connected to the common DC bus.
P, BR	Terminals for connecting braking resistor	External regenerative resistor
U, V, W	AC drive output terminals	Connected to three-phase motor

2. Main circuit cable selection

Symmetrical shielded cables are recommended to be used as the input and output main circuit cables since less electromagnetic radiation is produced in the whole conduction system compared with the four-conductor shielded cable.

■ Recommended power cable — symmetrical shielded cable

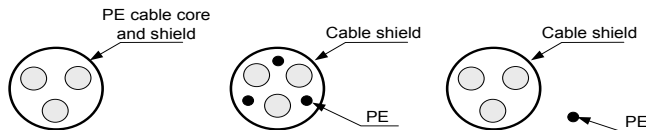


Figure 2-5 Recommended power cable

■ Non-recommended power cable

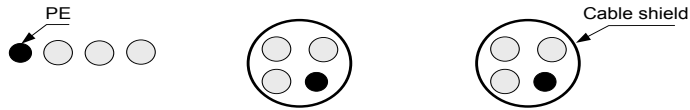


Figure 2-6 Non-recommended power cable

3. Input power R, S, T

The cable connection on the input side of the AC drive has no phase sequence requirement.

For external main circuit cables, the specifications and installation method should meet the requirement of local regulations and relevant IEC standards.

The filter must be installed close to the input terminal of the AC drive. The connection cable between them must not exceed 30 cm. The ground terminals of the filter and the AC drive must be connected together. Ensure the filter and the AC drive are installed on the same conductive installation plane which is connected to the main grounding of the cabinet.

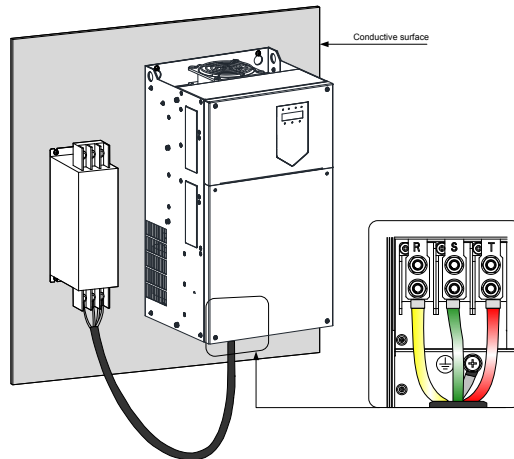


Figure 2-7 Installation of the filter

4. DC bus P, N

Ensure that wiring operations are carried out 10 minutes after power-off, as the residual voltage remains in the P, N terminals of the DC bus just after power-off. Otherwise, there will be the risk of electric shock.

The cable length of the braking unit must not be longer than 10 m. Use the twisted pair wire or tight pair wires for parallel connection.

Do not connect the braking resistor directly to the DC bus. Otherwise, it may damage the AC drive and even cause fire.

5. Terminals (P, BR) for connecting braking resistor

Select a braking resistor model that fulfills the specifications as recommended, and ensure that the cable

length of the braking resistor is shorter than 5 m. Otherwise, it may damage the AC drive.

Ensure that there is no combustibles around the braking resistor as the overheated braking resistor may ignite surrounding devices.

6. AC drive output side U, V, W

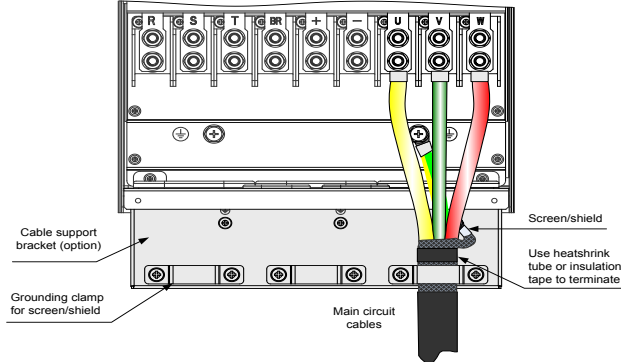


Figure 2-8 Wiring of the cable shield

For external main circuit cables, the specifications and installation methods must meet the requirements of local regulations and relevant IEC standards.

Do not connect a capacitor or surge absorber to the output side of the AC drive. Otherwise, it may cause frequent AC drive faults or even damage the AC drive.

If the motor cable is too long, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in overcurrent protection. If the motor cable length is greater than 100 m, an AC output reactor must be installed close to the AC drive.

The shielded cable is recommended to be used as the cable of the output motor. A grounding bracket for cable shields is needed to achieve a 360° contact and connect the lead-out wire to the PE terminal. The lead-out wire of the motor cable shield must be as short as possible and its width must not be less than 1/5 of its length.

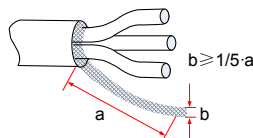


Figure 2-9 The lead-out wire of the motor cable shield

7. Grounding sheet metal PE

The ground sheet metal must be reliably grounded, with the resistance of grounding cable smaller than 0.1 Ω. Otherwise, it may cause abnormality or damage to the AC drive.

The grounding terminal

must not be used as the N terminal of neutral wire, or vice versa. For the protective earthing conductor, the impedance must be able to bear the large short-circuit current that possibly occurs upon faults.

The yellow/green cable must be used for the protective earthing conductor. Select size of the protective earthing conductor according to the following table:

Section Area of Phase Line (S)	Minimum Section Area of Protective Conductor (Sp)
$S \leq 16 \text{ mm}^2$	S
$16 \text{ mm}^2 < S \leq 35 \text{ mm}^2$	16 mm^2
$35 \text{ mm}^2 < S$	S/2

8. Protection requirements of the main circuit cable

Use a heat-shrinkable sleeve to wrap the copper tube of a cable lug and the core wire part of the main circuit cable, then perform thermal shrinkage. Ensure that the conductor part of the cable is completely covered by the sleeve as shown in the following figure:

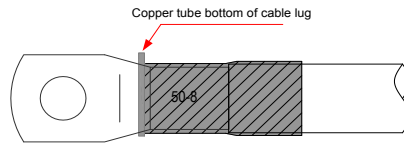


Figure 2-10 The diagram of a cable conductor with heat-shrinkable sleeve

Requirements for the Mains System

The product applies to the mains system with neutral point earthing. To use the product in the IT system (mains system without neutral point earthing), remove the grounding screws of the voltage dependent resistor (VDR) and the safety capacitor (EMC), that is screw 1 and screw 2 as shown in the figure. And the filter installation is not allowed. Otherwise, personal injuries or damage to the AC drive may occur.

For configuration of the residual current circuit-breaker, if tripping occurs during the startup, remove the grounding screw (screw 2) of the safety capacitor (EMC2).

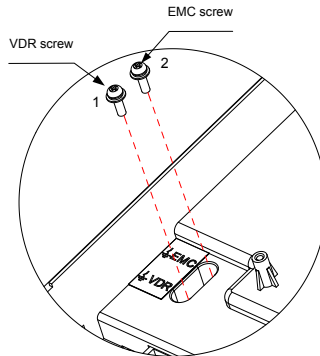


Figure 2-11 VDR and EMC grounding jumper position diagram

2.2.3 Recommended Installation Dimensions and Clearance of the Power Terminal

1. The recommended data and models are for reference only. The cable diameter you select cannot be larger than the size in the following figures.

The Selection of Cable IEC is based on:

- Standards of EN 60204–1 and IEC 60364–5–52;
- PVC insulation;
- Ambient temperature: 40°C, surface temperature: 70°C
- Symmetrical cable shielded by copper mesh
- The number of cables laid in parallel within a cable tray must not exceed 9.

In the following tables, 4 * 10 refers to a four-conductor cable, and 2 * (3 * 95) refers to two three-conductor cables.

The recommended data and models in the tables are for reference only. The cable diameter you select cannot be larger than the size in the following figures.

The prerequisite of cable selection: under ambient temperature of 50°C in steady state, for the recommended diameters of the PVC insulation copper conductor or cable, see section 12.4 of the IEC 60204–1–2005.

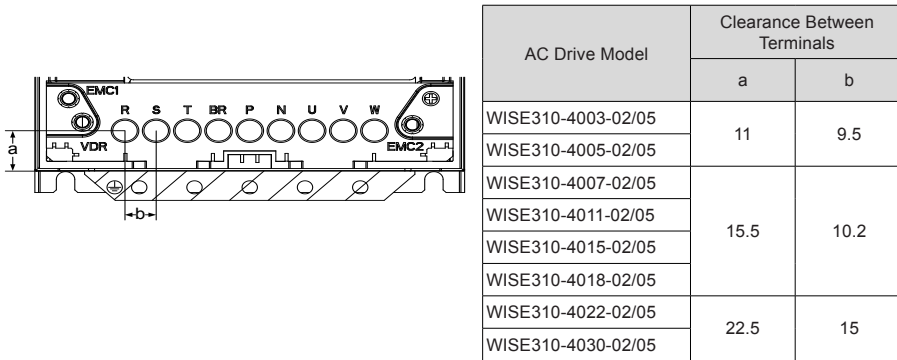


Figure 2-12 Dimensions of the wiring terminals 3.7–30 kW (IP20/IP55)

Table 2-2 Recommended cable sizes and lug models 3.7–30 kW (IP20)

AC Drive Model	Rated Input Current (A)	Power Input/ Output Cable (mm ²)	Lug Model	Grounding Cable (mm ²)	Lug Model for Grounding Cable	Torque of Torque Driver (N·m)
WISE310-4003-02	9.0	4 * 1.5	TAR-3	1.5	GTNR2.5-4	1.2
WISE310-4005-02	13.0	4 * 2.5	TAR-3	2.5	GTNR2.5-4	1.2
WISE310-4007-02	17.0	4 * 6	TAR-6	6.0	GTNR6-5	2.8
WISE310-4011-02	25.0	4 * 6	TAR-6	6.0	GTNR6-5	2.8
WISE310-4015-02	32.0	4 * 8	TAR-8	8.0	GTNR10-6	2.8
WISE310-4018-02	37.0	4 * 10	TAR-10	10.0	GTNR10-6	2.8
WISE310-4022-02	45.0	4 * 10	TAR-10	10.0	GTNR10-6	4.0

AC Drive Model	Rated Input Current (A)	Power Input/ Output Cable (mm ²)	Lug Model	Grounding Cable (mm ²)	Lug Model for Grounding Cable	Torque of Torque Driver (N·m)
WISE310-4030-02	60.0	4 * 16	TAR-16	16.0	GTNR16-6	4.0

Table 2-3 Recommended cable sizes and lug models 3.7–30 kW (IP55)

AC Drive Model	Rated Input Current (A)	Power Input/ Output Cable (mm ²)	Lug Model	Grounding Cable (mm ²)	Lug Model for Grounding Cable	Torque of Torque Driver (N·m)
WISE310-4003-05	9.0	4 * 1.5	TAR-3	1.5	GTNR2.5-4	1.2
WISE310-4005-05	13.0	4 * 2.5	TAR-3	2.5	GTNR2.5-4	1.2
WISE310-4007-05	17.0	4 * 6	TAR-6	6.0	GTNR6-5	2.8
WISE310-4011-05	25.0	4 * 6	TAR-6	6.0	GTNR6-5	2.8
WISE310-4015-05	32.0	4 * 8	TAR-8	8.0	GTNR10-6	2.8
WISE310-4018-05	37.0	4 * 10	TAR-10	10.0	GTNR10-6	2.8
WISE310-4022-05	45.0	4 * 10	TAR-10	10.0	GTNR10-6	4.0
WISE310-4030-05	60.0	4 * 16	TAR-16	16.0	GTNR16-6	4.0

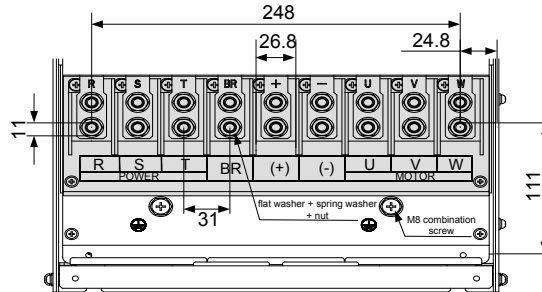


Figure 2-13 Main circuit terminals dimensions of WISE310-4037-02 to WISE310-4055-02

Table 2-4 Recommended cable sizes and lug models 37–55 kW (IP20)

AC Drive Model	Rated input current (A)	Power Input/ Output Cable (mm ²)	Lug Model	Grounding Cable (mm ²)	Lug Model for Grounding Cable	Torque of Torque Driver (N·m)
WISE310-4037-02	69.0	4 * 16	GTNR16-8	16	GTNR16-8	4
WISE310-4045-02	89.0	4 * 25	GTNR25-8	16	GTNR16-8	10.5
WISE310-4055-02	106.0	4 * 50	GTNR50-8	25	GTNR25-8	10.5

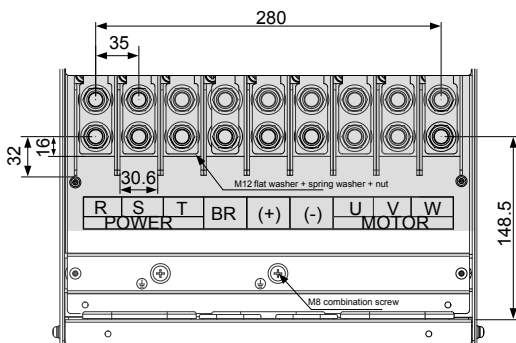


Figure 2-14 Main Circuit terminals dimensions of WISE310-4075-02 to WISE310-4090-02

Table 2-5 Recommended cable sizes and lug models 75-90 kW (IP20)

AC Drive Model	Rated input current A	Power Input/ Output Cable (mm ²)	Lug Model Model	Grounding Cable (mm ²)	Lug Model for Grounding Cable	Torque of Torque Driver (N·m)
WISE310-4075-02	139.0	4 * 70	GTNR70-12	35	GTNR35-12	35
WISE310-4090-02	164.0	4 * 95	GTNR95-12	50	GTNR50-12	35

The recommended lugs are manufactured by Suzhou Yuanli Metal Enterprise Co., Ltd.



GTNR series



TNR series

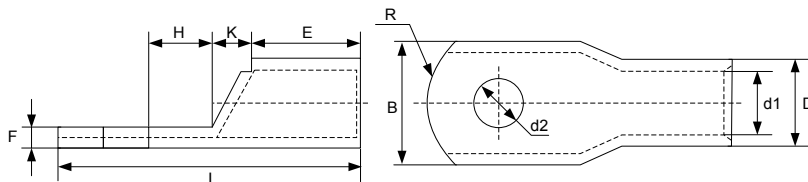


Figure 2-15 Round lug dimensions of the GTNR series (recommend)

Table 2-6 Round lug models and dimensions of the GTNR series

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
GTNR2.5-4	4.5	2.9	7.0	5.0	2.0	8.0	4.3	1.0	18.0	5.0	RYO-8 YYT-8 RYO-14
GTNR4-5	5.2	3.6	7.0	6.0	2.0	10.0	5.3	10.0	20.0	7.0	
GTNR6-5	6.0	4.2	9.0	6.0	3.0	10.0	5.3	1.0	23.0	7.0	
GTNR10-6	7.0	5.0	9.0	8.0	3.5	12.4	6.4	1.0	27.0	7.0	

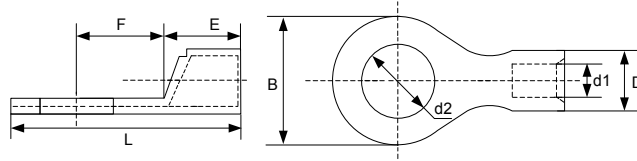


Figure 2-16 Round lug dimensions of the TNR series (recommend)

Table 2-7 Round lug models and dimensions of the TNR series

Model	Cable Range		D	d1	E	F	B	d2	L	Crimping Tool
	AWG	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	RYO-8 AK-1M
TNR1.25-4	22-16	0.25-1.65	3.4	1.7	4.5	7.3	8.0	5.3	15.8	

2.2.4 Description and Wiring of Control Circuit Terminals

1. Control circuit terminals

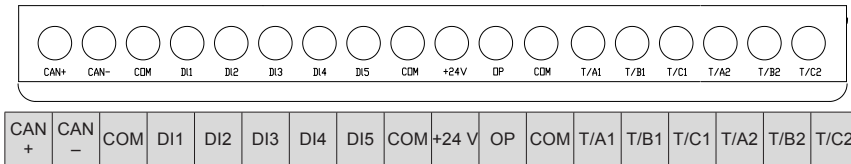


Figure 2-17 Layout of control circuit terminals

Table 2-8 Function descriptions of the control circuit terminals

Type	Mark	Name	Function Description
Power supply	+24 V-COM	+24 V power supply	Provides +24 V power supply to an external unit. It is generally used to supply power to the DI/DO terminals and external sensors. Max. output current: 100 mA (see Note 1)
	OP	Input terminal for external power supply	With +24 V by default When DI1-DI5 are driven by external signal, OP needs to be connected to external power supply and be disconnected from +24 V.

Type	Mark	Name	Function Description
Digit input	DI1	Digital input 1	Photocoupler isolation, compatible with dual-polarity input Input impedance: 4.4 kΩ Voltage range upon level input: 9–30 V
	DI2	Digital input 2	
	DI3	Digital input 3	
	DI4	Digital input 4	
	DI5	Digital input 5	
Relay output	T/A1-T/B1-T/C1	Relay output 1	TA-TB Normally closed contact TA-TC Normally open contact Contact driving capacity: 2 A/30 V DC; 0.5 A/125 AC
	T/A2-T/B2-T/C2	Relay output 2	
Communication	CAN	CAN communication	Rate: 100 kHz

Note Wiring of signal input terminals:
 Note 1: When the ambient temperature is above 23°C, the output current must be derated 1.8 mA by every 1°C. The maximum output current is 100 mA when the ambient temperature is 40°C. The DI terminals must be given consideration if you need to short OP and 24 V.

2. DI Terminal

Usually, a shielded cable is required, which must be as short as possible, not longer than 20 m. If an active driving mode is adopted, necessary filtering measures must be taken to prevent the interference to the power supply. The contact control is recommended.

(1) SINK wiring

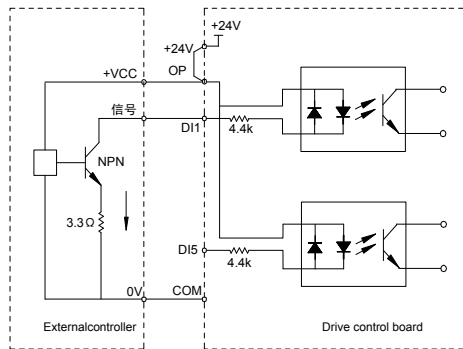


Figure 2-18 SINK wiring

For internal power supply, short the OP and +24 V (default), then connect the COM to the corresponding DI terminals through the controller contact.

For external power supply, remove the jumper bar between 24 V and OP, and connect the positive + 24 V of the external power supply to OP, then connect the 0 V external power supply to the corresponding DI terminals through the controller contact.

Note ♦ In such wiring mode, the DI terminals of different AC drives cannot be connected in parallel. Otherwise, DI malfunction may result.

(2) SOURCE wiring

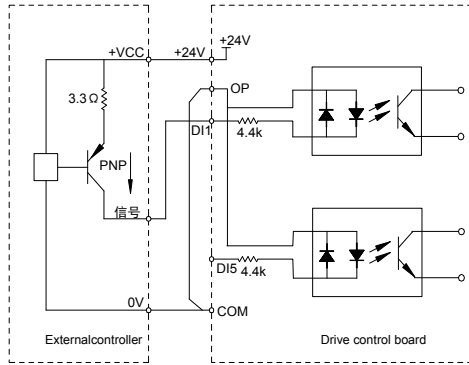


Figure 2-19 SOURCE wiring

For internal power supply, remove the jumper bar between +24 V and OP, and connect the OP to COM, and meanwhile connect +24 V to corresponding DI terminals through the controller contact.

For internal power supply, remove the jumper bar between +24 V and OP, and connect the OP to 0 V of the external power supply, and meanwhile connect +24 V of the external power supply to corresponding DI terminals through the controller contact.

2.2.5 Cable Dimensions and Tightening Torque of the Control Circuit Terminals

Use the tubular terminals with insulation sleeve.

For single or twisted cables, the length of the exposure cable core is 5 mm.

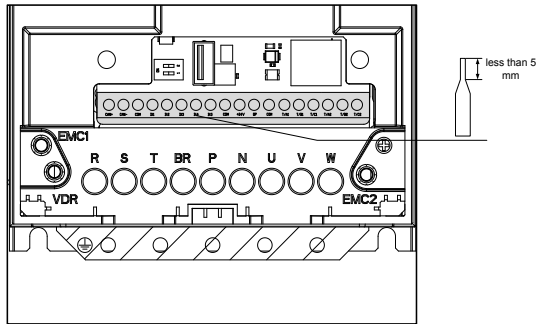


Figure 2-20 Requirements of tubular terminals for control cables

Table 2-9 Specifications of the control cable

Terminal Name	Single Cable (mm ²) (AWG)	Twisted Cable (mm ²) (AWG)	Tightening Torque (N·m)
Control circuit terminals block	0.2–0.75 (AWG 24–18)		0.51



3 LED Operation Panel

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Chapter 3 LED Operation Panel

3.1 Introduction

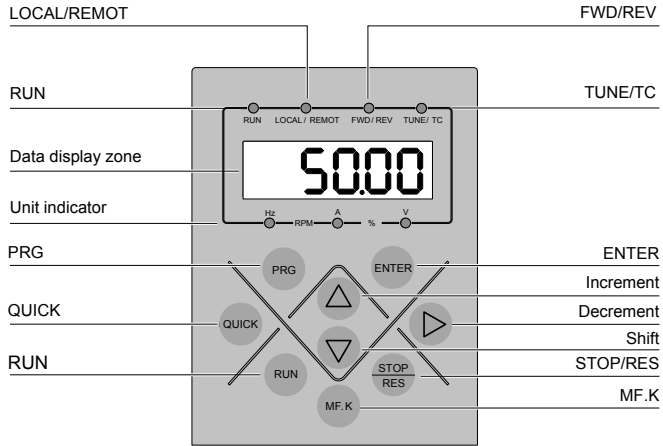


Figure 3-1 Components of the operation panel

3.1.1 Keys on LED Operation Panel

Key	Name	Function
	Programming	Enter or exit Level I menu.
	Confirm	Enter each level of menu interfaces, and confirm displayed parameter setting.
	Increment	Increase the displayed data or parameter.
	Decrement	Decrease the displayed data or parameter.
	Shift	Select the displayed parameters in turn in the stop or running state. It is used to move the focus when modifying a parameter.
	RUN	Start the AC drive in the start/stop control mode of the operation panel
	Stop/Reset	Stop the AC drive when it is in the running state; It sets whether to enable fault reset.
	Forward rotation/Reverse rotation	Switchover between forward rotation and reverse rotation in the start/stop control mode of the operation panel.

3.1.2 Status Indicators





























In the following table,  means that the indicator is ON, and  means that the indicator is OFF, and  indicates that the indicator is flashing.

Table 3-1 Description of panel indicators

Indicator	Indication
RUN Running status indicator	 RUN Off indicates the STOP status.
	 RUN On indicates the RUNNING status.
LOCAL/REMOT Command source indicator	 LOCAL/REMOT OFF indicates operating panel control mode.
	 LOCAL/REMOT ON indicates operating terminal control mode.
	 LOCAL/REMOT Blinking indicates communication control mode
FWD/REV	 FWD/REV OFF indicates forward motor rotation.
	 FWD/REV ON indicates reverse motor rotation.
TUNE/TC	 TUNE/TC Off indicates normal running mode
	 TUNE/TC FLASHING SLOWLY (once a second) indicates auto-tuning status.
	 TUNE/TC FLASHING QUICKLY (four times a second) indicates a fault condition.
 Hz — RPM —  A — % —  V	Hz: unit of frequency
Hz —  RPM —  A — % —  V	A: unit of current
Hz —  RPM —  A — % —  V	V: unit of voltage
 Hz — RPM —  A — % —  V	RPM: unit of rotational speed
Hz —  RPM —  A — % —  V	%: percentage

3.1. 3 Data display

The five-digit LED display can display the monitoring data such as frequency reference, output frequency, all kinds of monitoring data, and fault codes.

Table 3-2 Indication of LED display



LED Display	Indication	LED Display	Indication	LED Display	Indication	LED Display	Indication
0	0	6	6	C	C	N	N
1	1	7	7	c	c	P	P
2	2	8	8	d	D	r	R
3	3	9	9	E	E	T	T
4	4	A	A	F	F	U	U
5	5, S	b	B	L	L	u	u



3.2 Basic Operations

The drive operating panel has three levels of menu:

- Level I - function parameter group
- Level II - function parameter
- Level III - function parameter value

After entering any level of the parameter menu, press , , or  to modify the parameters when the LED indicator is flashing.

You can return to Level II menu from Level III menu by pressing  or . The difference between the two is as follows:

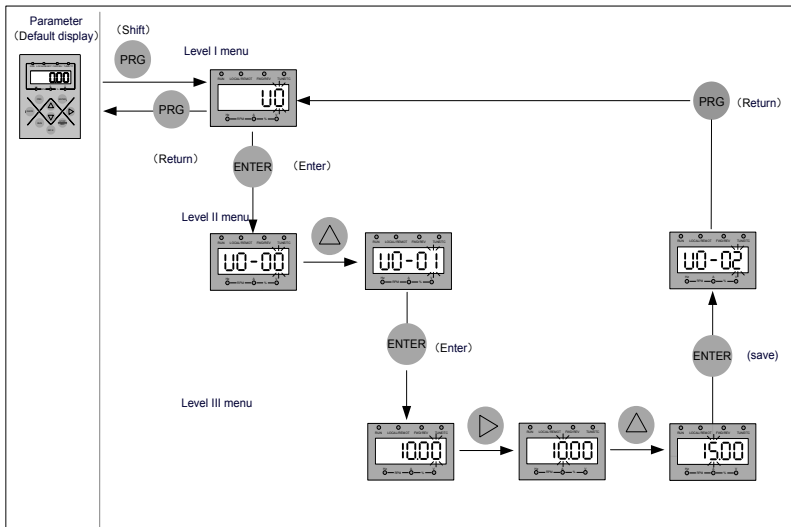
1. After you press , the system saves the parameter setting first, and then goes back to Level II menu and shifts to the next function code.
2. After you press , the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

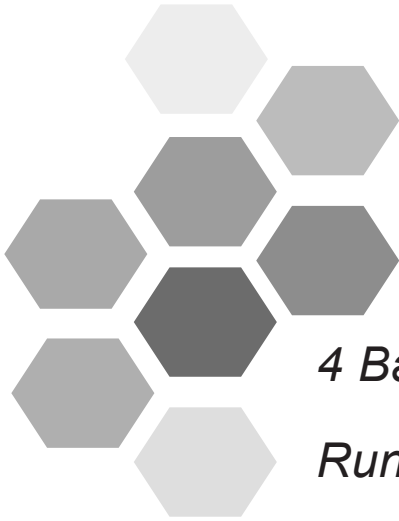
In Level III menu, if the parameter has no flashing digit, it means that the parameter cannot be modified.

This may be because:

1. Such a function code is only readable, such as, drive models, actually detected parameters and running record parameters.
2. Such a parameter cannot be modified in the running state and can only be changed at stop.

Figure 3-2 Operations for the change of parameter setting





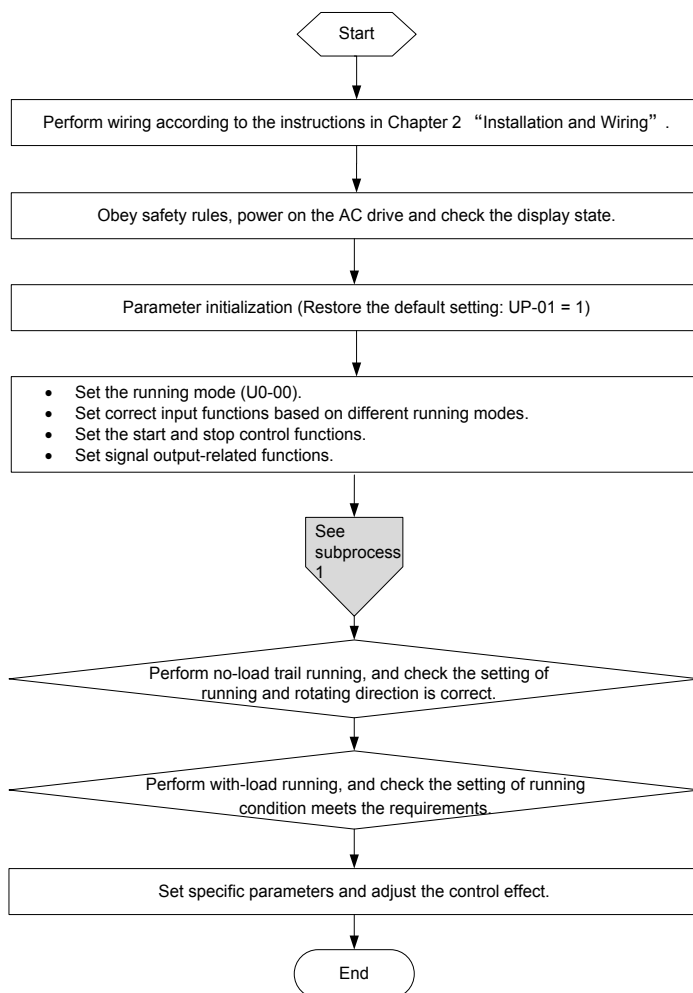
4 Basic Operation and Trial Running

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Chapter 4 Basic Operation and Trial Running

This chapter describes the basic commissioning procedure of WISE 310 series escalator AC drive, including the frequency reference setting, startup control, and stop control. By following the instructions, you can perform the trial running of motor under the control of the AC drive.

4.1 AC drive commissioning flowchart



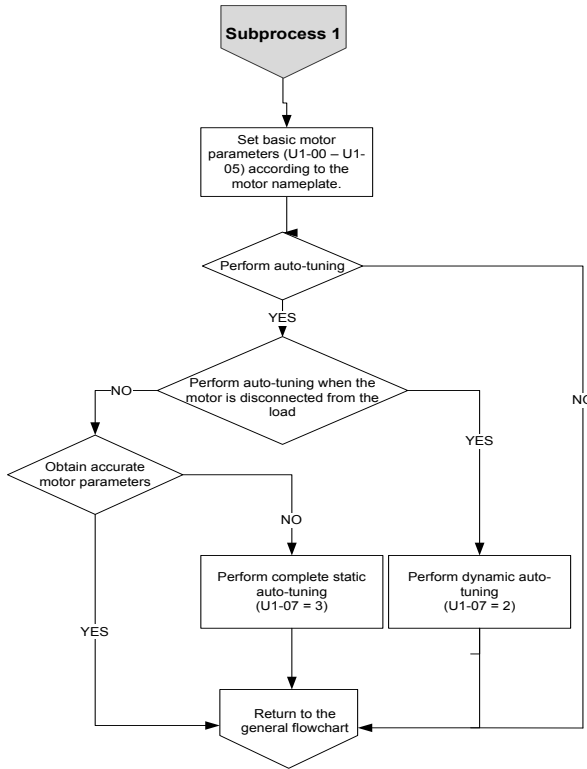


Figure 4-1 Subprocess flowchart of AC drive commissioning

4.2 Checking Before Power-on

Before power on, ensure that the following items are checked.

Item	Description
Check the power voltage	AC 380 V – 480 V, 50/60 Hz
	Wire power input terminals (R, S, T) reliably.
	Ensure the AC drive and the motor are properly grounded.
Check the connection between AC drive output terminals and motor terminals	Check whether AC drive output terminals (U, V, W) and motor terminals are connected securely.
Check the connection between AC drive control circuit terminals and other control devices	Check whether AC drive output terminals (U, V, W) and motor terminals are connected securely and reliably.

Check the state of AC drive control circuit terminals	Check whether all AC drive control circuit terminals are OFF (the AC drive is not in running state).
Check the connection of the braking resistor	Check whether the braking resistor is connected to two ends of input terminals (P, BR).

4.3 Display State Checking After Power-on

After power on, the normal display on the operator is as follows:

State	Display	Description
In normal state		The default is terminal control mode, and the frequency displayed is 0.00 Hz.
At fault occurrence		After the fault occurs, the AC drive is in the stoppage state, and the fault type is displayed.

4.4 Parameter Initialization

You can restore default settings of the AC drive. After initialization, UP-01 automatically restores to zero.

Parameter No.	Parameter Name	Setting Range	Default
UP-01	Parameter initialization	0: No auto-tuning 01: Restore default settings except motor parameters 02: Clear records 04: Back up current user parameters 501: Restore user backup parameters	0

1: Restore default settings except motor parameters

If UP-01 is set to 1, most function parameters of the AC drive are restored to the default settings. But the motor parameters, fault records, accumulative running time (U5-12), and accumulative power-on time (U5-13) will not be restored.

2: Clear records

The fault records, accumulative running time (U5-12), and accumulative power-on time (U5-13) are cleared.

4: Back up current user parameters

Back up the values of current function parameters so that customers can restore the settings if incorrect parameter setting is performed.

501: Restore user backup parameters

Restore the user parameters that are backed up previously, that is, restore the backup parameters by setting UP-01 to 4.

4.5 Start/Stop Command

Parameter No.	Parameter Name	Setting Range	Default
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U0-00	Running mode selection	0: Operation panel control 1: Terminal multi-speed 2: Multi-speed loop 3: Communication setting	1
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It is used to determine the input channel of the AC drive control commands, such as start, stop, forward rotation and reverse rotation.

0: Operation panel control (LOCAL/REMOT indicator OFF);

Commands are given by pressing keys RUN and STOP/RES on the operating panel.

1: Terminal multi-speed (LOCAL/REMOT indicator ON);

Commands are given by means of multifunctional input terminals with functions such as FWD and REV.

2: Multi-speed loop (LOCAL/REMOT indicator ON);

Commands are given by means of multifunctional input terminals with functions such as FWD and REV.

3: Communication control (LOCAL/REMOT indicator blinking)

4.5.1 Operation Panel Start/Stop

Commands are given by pressing keys RUN and STOP/RES on the operating panel. The LOCAL/REMOT indicator is OFF. For key description, see Chapter 3 "Panel Operation".

4.5.2 Terminal Start/Stop (DI)

Parameter No.	Parameter Name	Setting Range	Default
U2-06	Terminal control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0

This parameter is used to set the mode in which the AC drive is controlled by external terminals.

The following part uses DI1, DI2 and DI3 terminals among DI1 to DI10 as an example to describe these modes. That is, the functions of DI1, DI2, and DI3 terminals are selected by setting U2-01 to U2-03. For details, see the setting of U2-01 to U2-03.

0: Two-wire control mode 1

It is the most commonly used two-wire mode, in which the forward/reverse rotation of the motor is decided by DI1 and DI2 terminals. Parameter setting is as follows:

Parameter No.	Parameter Name	Parameter value	Function description
U2-06	Terminal control mode	0	Two-wire control mode 1
U2-01	DI1 terminal function selection	1	Forward rotation (FWD)
U2-02	DI2 terminal function selection	2	Reverse rotation (REV)

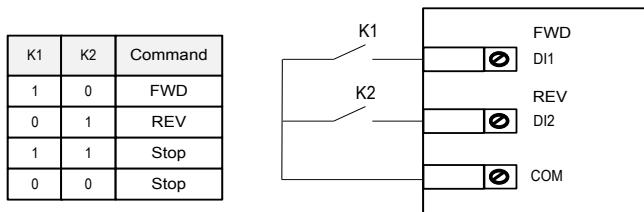


Figure 4-2 Two-wire mode 1

As shown in the preceding figure, when only K1 is ON, the AC drive instructs forward rotation. When only K2 is ON, the AC drive instructs reverse rotation. When K1 and K2 are ON or OFF simultaneously, the AC drive stops.

1: Two-wire mode 2

In this mode, DI1 is the RUN enable terminal, and DI2 decides the running direction. Parameter setting is as follows:

Parameter No.	Parameter Name	Parameter value	Function description
U2-06	Terminal control mode	1	Two-wire control mode 2
U2-01	DI1 terminal function selection	1	Run enable
U2-02	DI2 terminal function selection	2	Running direction (FWD or REV)

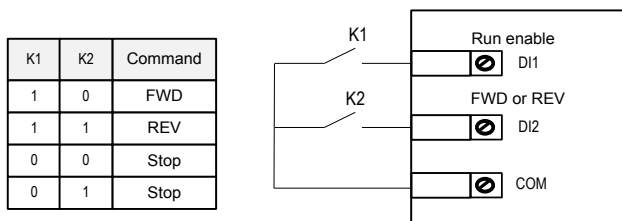


Figure 4-3 Two-wire control mode 2

As shown in the preceding figure, when K1 is ON and K2 is OFF, the AC drive instructs forward rotation. When only K2 is ON, the AC drive instructs reverse rotation. When only K1 is OFF, the AC drive stops.

2: Three-wire control mode 1

In this mode, DI3 is the RUN enable terminal, and DI1 and DI2 decide the running direction. Parameter setting is as follows:

Parameter No.	Parameter Name	Parameter value	Function description
U2-06	Terminal control mode	2	Three-wire control mode 1
U2-01	DI1 terminal function selection	1	FWD
U2-02	DI2 terminal function selection	2	REV

Parameter No.	Parameter Name	Parameter value	Function description
U2-03	DI3 terminal function selection	3	Three-wire control mode

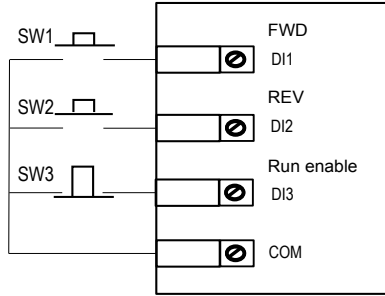


Figure 4-4 Three-wire control mode 1

As shown in the preceding figure, if SW3 is ON, the AC drive instructs forward rotation when SW1 is pressed to be ON and instructs reverse rotation when SW2 is pressed to be ON. The AC drive stops immediately after SW3 becomes OFF. During normal startup and running, SW3 must remain ON. The commands by SW1 and SW2 become active at the moment when these buttons become ON. The running state of the AC drive is determined by the final actions on SW1, SW2 and SW3.

3: Three-wire control mode 2

In this mode, DI3 is the RUN enable terminal. The RUN command is given by DI1 and the running direction is decided by DI2. Parameter setting is as follows:

Parameter No.	Parameter Name	Parameter value	Function description
U2-06	Terminal control mode	3	Three-wire control mode 2
U2-01	DI1 terminal function selection	1	Run enable
U2-02	DI2 terminal function selection	2	Running direction (FWD or REV)
U2-03	DI3 terminal function selection	3	Three-wire control mode

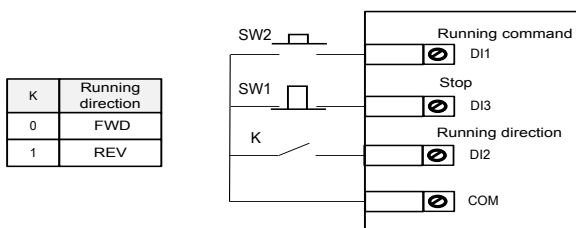


Figure 4-5 Three-wire control mode 2

As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON. The AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SW1 must remain ON. The command by SW2 becomes active at the moment when this button becomes ON.

4.6 Auto-tuning

The methods for the AC drive to obtain the internal electrical parameters of the controlled motor are: dynamic auto-tuning, static auto-tuning 1, static auto-tuning 2, and manual input.

Auto-tuning Mode	Applicable Condition	Auto-tuning effect
No-load dynamic auto-tuning U1-07 = 2	It is applied to applications where the motor can be conveniently disconnected from the application system.	Best
With-load dynamic auto-tuning U1-07 = 2	It is applied to applications where the motor cannot be conveniently disconnected from the application system, but it can run with load. If the load friction is very small, the auto-tuning is close to no-load dynamic auto-tuning when the motor runs at constant speed.	The smaller the friction is, the better effect will be obtained.
Static auto-tuning 1 U1-07 = 1	It is applied to applications where the motor can be hardly disconnected from load and dynamic auto-tuning is not allowed.	Ordinary
Static auto-tuning 2 U1-07 = 3	It is applied to applications where the motor can be hardly disconnected from load and dynamic auto-tuning is not allowed. This mode is recommended when selecting static auto-tuning. The auto-tuning time is longer than that of static auto-tuning 1.	Good
Manually input parameters	It is applied to applications where the motor can be hardly disconnected from the application system. Input the motor parameters of the same model with successful auto-tuning previously into corresponding parameters (U1-01 to U1-05).	Good

The motor auto-tuning procedure is as follows:

The following part takes motor 1 as an example to describe motor auto-tuning. The auto-tuning of motors 2 is the same, but the parameter No. should be adjusted accordingly.

Step 1: If the motor can be completely disconnected from the load, disconnect the motor from the load mechanically after power-off so that the motor can rotate freely without load.

Step 2: After power-on, select the operation panel control as the AC drive command (U0-00).

Step 3: Input the motor nameplate parameters (such as U1-01 to U1-05) correctly and input the following parameters based on the actually selected motor.

Motor selection	Parameter No.
Motor	U1-01: Rated motor power U1-02: Rated motor voltage U1-03: Rated motor current U1-04: Rated motor frequency U1-05: Rated motor speed

Step 4: For asynchronous motor, set U1-07 (Auto-tuning selection) to 2 (Asynchronous motor complete auto-tuning), and press ENTER. Then, "TUNE" is displayed on the operation panel, as shown in the following figure.



After pressing RUN on the operation panel, the AC drive drives the motor to accelerate/decelerate and run in the forward/reverse direction, and the RUN indicator is ON. The auto-tuning lasts for approximately 2 minutes. When the preceding display disappears and the operation panel returns to the normal parameter display state, it indicates that the auto-tuning is completed.

If the motor cannot be completely disconnected from the load, set U1-07 to 3 (Asynchronous motor static auto-tuning 2) and then press RUN on the operation panel to start the motor auto-tuning.



5 Parameter Description

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Chapter 5 Parameter Description

Group U0: Basic Parameters

Parameter No.	Parameter Name	Setting Range	Default
U0-00	Running mode selection	0: Operation panel control 1: Terminal multi-speed 2: Multi-speed loop 3: Communication setting	1

Select the setting channel of the main frequency. The main frequency can be set in the following 8 channels:

0: Operation panel control

The initial value of the frequency reference is the value of U0-01 (Running frequency in operation panel). You can change the frequency reference by pressing keys on the operation panel (or using the UP/DOWN function of multifunctional input terminals).

When the AC drive is powered on again after power failure, the frequency reference is restored to the value of U0-01.

1: Terminal multi-speed

In multi-reference mode, combinations of different DI terminal correspond to different frequency references. The WISE310 supports a maximum of 8 references implemented by 8 state combinations of three DI terminals in group U4. The multiple references are a percentage relative to the value of U0-02 (Max. frequency).

If a DI terminal is used for the multi-reference function, you need to perform related setting in group U2. For details, refer to description of related parameters in group U2.

2: Multi-speed loop (Simple PLC)

When the multi-speed loop is used as the frequency source, the running frequency of the AC drive can be switched over among the 4 frequency references. You can set the holding time of the 4 frequency references. For details, refer to related descriptions in group U4.

3: Communication setting

The main frequency source is set from the host computer by means of communication.

Communication mode supported by the WISE310: CAN communication

Parameter No.	Parameter Name	Setting Range	Default
U0-01	Running frequency in operation panel	0.00 Hz to Max. frequency (Retentive at power failure)	10.00 Hz

If the frequency source is digital setting or terminal UP/DOWN, the value of this parameter is the initial frequency of the AC drive (digital setting).

Parameter No.	Parameter Name	Setting Range	Default
U0-02	Max. frequency	0.00–99.00 Hz	50.00 Hz

The maximum output frequency of the WISE310 can reach up to 99 Hz. The frequency reference resolution can be fixed to 2 decimal places.

Parameter No.	Parameter Name	Setting Range	Default
U0-03	Carrier frequency	2.0–10.0 kHz	6 kHz

This function is used to adjust the carrier frequency of the AC drive, helping to reduce the motor noise, avoid the resonance point of the mechanical system, and reduce the leakage current to the earth and interference generated by the AC drive.

When the carrier frequency becomes lower, the high-order harmonic components of the output current, and the power loss and temperature rise of the motor increase.

When the carrier frequency becomes higher, the power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference. Note: When the carrier frequency is set to the lowest value, the overcurrent suppression point must be reduced correctly. Otherwise, the pulse-by-pulse current limit fault will be triggered.

Adjusting the carrier frequency will exert influences on the following parameters:

Carrier frequency	Low → High
Motor noise	Large → Small
Output current waveform	Bad → Good
Motor temperature rise	High → Low
AC drive temperature rise	Low → High
Leakage current	Small → Large
External radiation interference	Small → Large

The default carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than the default value, it will lead to an increase in temperature rise of the AC drive heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may over-heat and alarm.

Group U1: Motor Parameters

Parameter No.	Parameter Name	Setting Range	Default
U1-01	Rated motor power	0.1–150.0 kW	Model dependent
U1-02	Rated motor voltage	1–600 V	Model dependent
U1-03	Rated motor current	0.01–655.00 A	Model dependent
U1-04	Rated motor frequency	0.01 Hz to Max. frequency	Model dependent
U1-05	Rated motor speed	1–3000 rpm	Model dependent

The parameters listed in this table are motor nameplate parameters. You need to set them correctly according to the motor nameplate. To achieve better V/F performance, you need to perform motor auto-tuning. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

Parameter No.	Parameter Name	Setting Range	Default
U1-06	Asynchronous motor stator resistance	0.001–65.535 Ω (AC drive power ≤ 55 kW) 0.0001–6.5535 Ω (AC drive power > 55 kW)	Auto-tuning parameter

U1-06 is the asynchronous motor parameter. It is unavailable on the motor nameplate and is obtained by means of motor auto-tuning.

If asynchronous motor auto-tuning cannot be performed on site, manually input the values of these parameters according to data provided by the motor manufacturer.

Parameter No.	Parameter Name	Setting Range	Default
U1-07	Running mode selection	0: No auto-tuning 1: Asynchronous motor static partial auto-tuning 2: Asynchronous motor dynamic complete auto-tuning 3: Asynchronous motor static complete auto-tuning	0

0: No auto-tuning

That is, auto-tuning is prohibited.

1: Asynchronous motor static partial auto-tuning

It is applicable to the applications where rotary auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from large-inertia load.

2: Asynchronous motor dynamic complete auto-tuning

During the process of dynamic complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in U4-04. The AC drive keeps running for a certain period and then decelerates to stop within the deceleration time set in U4-05.

3: Asynchronous motor static complete auto-tuning

In motor static state, auto-tuning is for motor related parameters (In this case, the motor may still jitter slightly. You must be careful).

Setting description: Set this parameter to 3, and press RUN key. Then, the AC drive starts no-load auto-tuning.

Group U2: Input Function Parameters

The WISE310 provides five multi-function digital input terminals.

Parameter No.	Parameter Name	Setting Range	Default
U2-01	DI1 terminal function selection	0: No function 1: FWD or RUN command	1
U2-02	DI2 terminal function selection	2: REV or Running direction (FWD or REV) 3: Three-wire control mode 9: Fault reset (RESET)	2
U2-03	DI3 terminal function selection	11: External fault normally open (NO) input 12: Multi-speed terminal 1 13: Multi-speed terminal 2 14: Multi-speed terminal 3	12
U2-04	DI4 terminal function selection	16: Terminal for acceleration/deceleration time selection 23: Multi-speed loop reset 33: External fault normally closed (NC) input	0
U2-05	DI5 terminal function selection	47: Emergency stop	0

These parameters are used to set the functions of DIs, which are described in the following table.

Table 5-3 Function description of multi-function digital input terminals

Value	Function	Description
0	No Function	Set 0 for reserved terminals to avoid malfunction
1	FWD or RUN command	The forward or reverse rotation of the AC drive can be controlled by external terminals. (Note: When these parameters are set to 1 and 2, refer to the parameter description of U2-06).
2	REV or Running direction (FWD or REV)	
3	Three-wire control mode	The terminal determines three-wire control mode of the AC drive. For details, see the parameter description of U2-06 (Terminal control mode).
9	RESET	The terminal is used for fault reset function. It is the same as the function of RESET key on the operation panel. Remote fault reset is implemented by this function.
11	External fault NO input	If this terminal becomes ON, the AC drive reports Err15 and performs corresponding fault protection actions.
12	Multi-speed terminal 1	The setting of 8 speeds can be implemented through 8 state combinations of these three terminals.
13	Multi-speed terminal 2	
14	Multi-speed terminal 3	
16	Terminal for acceleration/deceleration time selection	Two groups of acceleration/deceleration time can be selected through the two state combinations of these two terminals.
23	Multi-speed loop reset	When PLC control is started again after a pause, the terminal is used to restore the original state of PLC control for the AC drive.
33	External fault NC input	If this terminal becomes ON, the AC drive reports Err15 and stops.
47	Emergency stop	When this terminal becomes ON, the AC drive stops within the emergency stop time.

Three multi-reference terminals have 8 state combinations, corresponding to 8 reference values, as listed in the following table.

Table 5-4 Function description of multi-references

K3	K2	K1	Reference Setting	Corresponding Parameter
OFF	OFF	OFF	Reference 0	U4-00
OFF	OFF	ON	Reference 1	U4-01
OFF	ON	OFF	Reference 2	U4-02
OFF	ON	ON	Reference 3	U4-03
ON	OFF	OFF	Reference 4	U4-04
ON	OFF	ON	Reference 5	U4-05
ON	ON	OFF	Reference 6	U4-06
ON	ON	ON	Reference 7	U4-07

If the frequency source is multi-reference, 100% of the value of U4-00 to U4-07 corresponds to the value of U0-02 (Max. frequency).

Parameter No.	Parameter Name	Setting Range	Default
U2-06	Terminal control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0

For parameter description, see section 4.6.2 in Chapter 4 "Basic Operation and Trial Running".

Parameter No.	Parameter Name	Setting Range	Default
U2-07	DI active mode selection	0: High level valid 1: Low level valid Unit's position: DI1 active mode Ten's position: DI2 active mode Hundred's position: DI3 active mode Thousand's position: DI4 active mode Ten thousand's position: DI5 active mode	00000

It is used to set the active mode of DI terminals.

When high level is valid, the DI terminal is active when being connected with COM and inactive when being disconnected from COM.

When low level is valid, the DI terminal is inactive when being connected with COM and active when being disconnected from COM.

Group U3: Output Function Parameters

Parameter No.	Parameter Name	Setting Range	Default
U3-01	Control board relay 1 function selection (T/A1-T/B1-T/C1)	0: No output 1: AC drive running	0
U3-02	Control board relay 2 function selection (T/A2-T/B2-T/C2)	2: Fault output (coast-to-stop fault) 38: Alarm output (all faults) 42: Grid synchronous output	2

The functions of output terminals are described in the following table.

Value	Function	Description
0	No output	No function set for the output terminal
1	AC drive running	When the AC drive is running and has output frequency (can be zero), the terminal becomes ON.
2	Fault output (coast-to-stop fault)	When the AC drive stops due to a fault, this terminal becomes ON.
38	Alarm output	When a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal.
42	Grid synchronous output	It is applicable to scenarios where the AC drive is connected to the power grid after it is started by means of acceleration.

Group U4: Running Control Parameters

Parameter No.	Parameter Name	Setting Range	Default
U4-00	Reference 0	-100.0% to +100.0%	0.0%
U4-01	Reference 1	-100.0% to +100.0%	0.0%
U4-02	Reference 2	-100.0% to +100.0%	0.0%
U4-03	Reference 3	-100.0% to +100.0%	0.0%
U4-04	Reference 4	-100.0% to +100.0%	0.0%
U4-05	Reference 5	-100.0% to +100.0%	0.0%

U4-06	Reference 6	-100.0% to +100.0%	0.0%
U4-07	Reference 7	-100.0% to +100.0%	0.0%

Multi-reference can be used as frequency source. It is a relative value and ranges from -100.0% to 100.0%. As frequency source, it is a percentage relative to the maximum frequency.

Multi-reference can be switched over based on different states of DI terminals. For details, see the related descriptions of group U2.

Parameter No.	Parameter Name	Setting Range	Default
U4-08	Acceleration time 1	0.0-60.0s	4.0s
U4-09	Deceleration time 1	0.0-60.0s	10.0s

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to "Acceleration/Deceleration base frequency", that is, t_1 in the following figure.

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" to 0 Hz, that is, t_2 in the following figure.

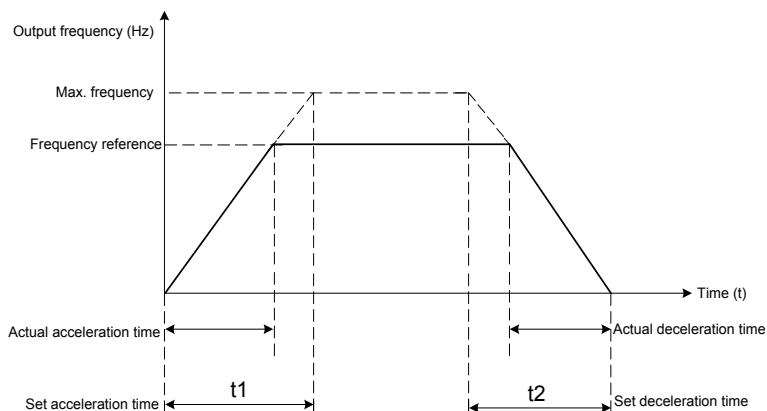


Figure 5-1 Acceleration/Deceleration time

The WISE310 provides two groups of acceleration/deceleration time for selection. You can perform switchover by using a DI terminal. The four groups of acceleration/deceleration time are set by means of the following

Group 1: U4-08, U4-09;

Group 2: U4-10, U4-11;

Parameter No.	Parameter Name	Setting Range	Default
U4-10	Acceleration time 2	0.0-60.0s	10.0s
U4-11	Deceleration time 2	0.0-60.0s	10.0s

Parameter No.	Parameter Name	Setting Range	Default
U4-12	Running time of multi-speed loop reference 0	0.0–6500.0s	60s
U4-13	Running time of multi-speed loop reference 1	0.0–6500.0s	6500s
U4-14	Running time of multi-speed loop reference 2	0.0–6500.0s	6500s
U4-15	Running time of multi-speed loop reference 3	0.0–6500.0s	6500s

Parameter No.	Parameter Name	Setting Range	Default
U4-16	Start mode	0: Direct start 1: Catching a spinning motor	0

0: Direct start

The AC drive starts to run from the start frequency.

1: Catching a spinning motor

In this start mode, the AC drive detects the speed and direction of the spinning motor first, and then starts to run at the tracked motor frequency, implementing smooth startup without impacting the rotating motor. It is applicable to restart upon instantaneous power failure of large-inertia load. To catch a spinning motor, the motor parameters in group U1 must be set correctly.

Parameter No.	Parameter Name	Setting Range	Default
U4-17	Mode of catching a spinning motor	3: Catching a spinning motor based on the magnetic field position	3

3: Catching a spinning motor based on the obtained magnetic field position

Parameter No.	Parameter Name	Setting Range	Default
U4-18	Stop mode	0: Decelerate to stop 1: Coast to stop	0

0: Decelerate to stop

After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

1: Coast to stop

After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

Parameter No.	Parameter Name	Setting Range	Default
U4-19	Power dip ride-through function selection	0: Invalid 1: Decelerate 2: Decelerate to stop	0

Upon instantaneous power failure, the load feedback energy compensates the voltage reduction, enabling the AC drive to continue running within a short time.

Group U5: Monitoring and Display

Parameters in group U5 are used to monitor the running state of the AC drive. You can view the parameter values by using the operation panel, convenient for on-site commissioning, or view by means of communication to monitor the host computer.

Parameter No.	Parameter Name	Range
U5-00	Running frequency	0.00–99.00 Hz
U5-01	Frequency reference	0.00–99.00 Hz

These two parameters display the absolute value of the theoretical running frequency and frequency reference.

Parameter No.	Parameter Name	Range
U5-02	Bus voltage	0.0–3000.0 V

This parameter displays the AC drive bus voltage.

Parameter No.	Parameter Name	Range
U5-03	Output voltage	0–1140 V

This parameter displays the output current of the AC drive in the running state.

Parameter No.	Parameter Name	Range
U5-04	Output current	0.00–655.35 A

This parameter displays the output current of the AC drive in the running state.

Parameter No.	Parameter Name	Range
U5-05	Output power	0–32767

This parameter displays the output power of the AC drive in the running state.

Parameter No.	Parameter Name	Range
U5-06	DI input monitoring	0: Input invalid 1: Input valid Unit's position: DI1 Ten's position: DI2 Hundred's position: DI3 Thousand's position: DI4 Ten thousand's position: DI5

This parameter displays the current input state of DI terminals.

Parameter No.	Parameter Name	Range
U5-07	DO output state	0: Input invalid 1: Input valid Unit's position: Relay 1 Ten's position: Relay 2

This parameter displays the current output state of DO terminals.

Parameter No.	Parameter Name	Range
U5-08	Product SN	-
U5-09	Performance version	-
U5-10	Function version	-
U5-11	Heatsink temperature of inverter module	-20°C to +120°C
U5-12	Accumulative running time	0-65535 h
U5-13	Accumulative power-on time	0-65535 h

Parameter No.	Parameter Name	Range
U5-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Control power supply fault 9: Undervoltage 10: AC drive overload 11: Motor overload 12: Input phase loss 13: Output phase loss 14: Module overheat 15: External device fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 21: EEPROM read-write fault 22: AC drive hardware fault 23: Short circuit fault 24: Reserved 25: Reserved 26: Accumulative running time reached 29: Accumulative power-on time reached 30: Load becoming 0 40: Pulse-by-pulse current limit fault 41: Motor switchover fault during running 45: Motor overheat 61: Braking unit overload 62: Short-circuit of braking circuit
U5-15	2nd fault type	
U5-16	3rd (latest) fault type	

These parameters are used to record the types of the most recent three faults of the AC drive. 0 indicates no fault.

Chapter 5 Parameter Description

Parameter No.	Parameter Name	Range
U5-17	Frequency upon 3rd fault	It displays the frequency when the latest fault occurs.
U5-18	Current upon 3rd fault	It displays the current when the latest fault occurs.
U5-19	Bus voltage upon 3rd fault	It displays the bus voltage when the latest fault occurs.
U5-20	DI terminal state upon 3rd fault	It displays the state of all DI terminals when the latest fault occurs. The sequence is as follows: If a DI terminal is ON, the setting is 1. If the DI terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the DI states.
U5-21	DO terminal state upon 3rd fault	It displays the state of all DO terminals when the latest fault occurs. The sequence is as follows: If a DI terminal is ON, the setting is 1. If the DI terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the DI states.
U5-22	AC drive state upon 3rd fault	Reserved
U5-23	Power-on time upon 3rd fault	It displays the present power-on time when the latest fault occurs.
U5-24	Running time upon 3rd fault	It displays the present running time when the latest fault occurs.
U5-25	Frequency upon 2nd fault	Same as U5-17 to U5-24
U5-26	Current upon 2nd fault	
U5-27	Bus voltage upon 2nd fault	
U5-28	DI terminal state upon 2nd fault	
U5-29	DO terminal state upon 2nd fault	
U5-30	AC drive state upon 2nd fault	
U5-31	Power-on time upon 2nd fault	
U5-32	Running time upon 2nd fault	
U5-33	Frequency upon 1st fault	Same as U5-17 to U5-24
U5-34	Current upon 1st fault	
U5-35	Bus voltage upon 1st fault	
U5-36	DI terminal state upon 1st fault	
U5-37	DO terminal state upon 1st fault	
U5-38	AC drive state upon 1st fault	
U5-39	Power-on time upon 1st fault	
U5-40	Running time upon 1st fault	

Group UP: Parameter Management

UP-00	User password	Default	0
	Setting range	0-65535	

Parameter No.	Parameter Name	Setting Range	Default
UP-00	User password	0-65535	0

If UP-00 is set to a non-zero number, the password protection function is enabled. You must input the password correctly to enter the menu. Otherwise, you cannot view or modify the function parameters. Remember the user password you set clearly.

If UP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

Parameter No.	Parameter Name	Setting Range	Default
UP-01	Parameter initialization	0: No auto-tuning 01: Restore default settings except motor parameters 02: Clear records 04: Back up current user parameters 501: Restore user backup parameters	0

1: Restore default settings except motor parameters

If UP-01 is set to 1, most function parameters of the AC drive are restored to the default settings. But the motor parameters, fault records, accumulative running time (U5-12), and accumulative power-on time (U5-13) will not be restored.

2: Clear records

The fault records, accumulative running time (U5-12), and accumulative power-on time (U5-13) are cleared.

4: Back up current user parameters

Back up the values of current function parameters so that customers can restore the settings if incorrect parameter setting is performed.

501: Restore user backup parameters

Restore the user parameters that are backed up previously, that is, restore the backup parameters by setting UP-01 to 4.




6 Troubleshooting

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Chapter 6 Troubleshooting

6.1 Fault Display

When the AC drive detects a fault, it stops output immediately, the fault indicator  flashes, and the contact of the fault relay acts.

The operation panel displays fault codes, such as "Err02". The corresponding fault types and common solutions are shown in the following table. The faults and solutions listed in the following table can only be used for reference. Do not repair or modify the AC drive yourself. If the fault cannot be rectified, contact us or our agent for technical support.

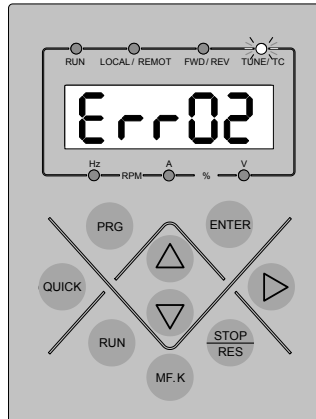


Figure 6-1 Operation panel interface

6.2 Faults and Diagnostics






Troubleshoot the faults occurring during operating the AC drive as follows:

Fault code	Fault	Possible Causes	Solutions
Err02	Overcurrent during acceleration	The output circuit is grounded or short circuited.	Eliminate external faults. Check whether short-circuit occurs on the motor or contactor.
		The acceleration time is too short.	Increase the acceleration time.
		The spinning motor is started.	Enable the catching a spinning motor function or start the motor after it stops.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.
Err03	Overcurrent during deceleration	The output circuit is grounded or short circuited.	Eliminate external faults. Check whether short-circuit occurs on the motor or contactor.
		The deceleration time is too short.	Increase the deceleration time.
		The braking unit and braking resistor are not installed.	Install the braking unit and braking resistor.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.
Err04	Overcurrent at constant speed	The output circuit is grounded or short circuited.	Eliminate external faults. Check whether short-circuit occurs on the motor or contactor.
		The AC drive power class is too small.	If the running current exceeds rated motor current or rated output current of the AC drive during stable running, select an AC drive of higher power rating.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.
Err05	Overvoltage during acceleration	The input voltage is too high.	Adjust the voltage to normal range.
		An external force drives the motor during acceleration.	Cancel the external force or install a braking resistor.
		The braking unit and braking resistor are not installed.	Install the braking unit and braking resistor.
		The acceleration time is too short.	Increase the acceleration time.
Err06	Overvoltage during deceleration	An external force drives the motor during deceleration.	Cancel the external force or install a braking resistor.
		The deceleration time is too short.	Increase the deceleration time.
		The braking unit and braking resistor are not installed.	Install the braking unit and braking resistor.


Fault code	Fault	Possible Causes	Solutions
Err07	Overvoltage at constant speed	An external force drives the motor during running.	Cancel the external force or install a braking resistor.
Err08	Control power supply fault	The input voltage is not within the allowable range.	Adjust the input voltage to the allowable range.
Err09	Undervoltage	Instantaneous power failure occurs.	Enable the power dip ride through function (U1-08 ≠ 0).
		The input voltage of the AC drive is not within the allowable range.	Adjust the voltage to normal range.
		The bus voltage is abnormal.	Contact the agent or Inovance.
		The rectifier bridge, buffer resistor, drive board or control board is abnormal.	Contact the agent or Inovance for technical support.
Err10	AC drive overload	The load is too heavy or locked-rotor occurs on the motor.	Reduce the load, and check the motor and mechanical conditions.
		The AC drive power class is too small.	Select an AC drive of higher power rating.
Err11	Motor overload	The load is too heavy or locked-rotor occurs on the motor.	Reduce the load, and check the motor and mechanical conditions.
Err12	Input phase loss	The three-phase power input is abnormal.	Eliminate faults in external circuitry.
		The drive board, lightning protection board, control board, or rectifier bridge is abnormal.	Contact the agent or Inovance.
Err13	Output phase loss	Motor fault	Check whether short-circuit occurs on the motor.
		The cable connecting the AC drive and the motor is abnormal.	Eliminate external faults.
		The three-phase outputs of the AC drive are unbalanced when the motor is running.	Check whether the motor three-phase winding is normal and eliminate the fault.
		The drive board or IGBT module is abnormal.	Contact the agent or Inovance for technical support.
Err14	Module overheat	The ambient temperature is too high	Lower the ambient temperature.
		The air filter is blocked.	Clean the air filter.
		The fan is damaged.	Replace the damaged fan.
		The thermistor of the module is damaged.	Replace the damaged thermistor.
		The inverter module is faulty.	Replace the inverter module.
Err15	External device fault	Input the external fault signal via DI.	Eliminate external faults.

Fault code	Fault	Possible Causes	Solutions
Err16	Communication fault	Host computer is in abnormal state.	Check the wiring of the host computer.
		The communication cable is abnormal.	Check the communication cable.
		If the fault still exists after all the preceding checking has been done, restore the default settings.	
Err17	Contactor fault	The drive board and power supply are faulty.	Replace the drive board or power supply board.
		The contactor is faulty.	Replace the contactor.
		The lightning protection board is abnormal.	Replace the lightning protection board.
Err18	Current detection fault	Check whether the hall device is abnormal.	Replace the hall device.
		The drive board is faulty.	Replace the drive board.
Err19	Motor auto-tuning fault	The motor parameters are not set according to the nameplate.	Set the motor parameters correctly according to the nameplate.
		The motor auto-tuning times out.	Check the cable connecting the AC drive and the motor.
Err21	EEPROM read-write fault	The EEPROM chip is damaged.	Replace the main control board.
Err23	Short circuit fault	The motor is short circuited to the ground.	Replace the cable or motor.
		AC drive inter-phase short-circuit	Replace the cable or motor.
Err26	Accumulative running time reached	The accumulative running time reaches the setting value.	Clear the record through parameter initialization.
Err29	Accumulative power-on time reached	The accumulative power-on time reaches the setting value.	Clear the record through parameter initialization.
Err30	Load becoming 0	The running current of the AC drive is too low.	Check whether the motor is disconnected from the load.
Err40	Pulse-by-pulse current limit error	The load is too heavy or locked-rotor occurs on the motor.	Reduce the load, and check the motor and mechanical conditions.
		The AC drive power rating is too small.	Replace an AC drive of higher power class.
Err41	Motor switchover fault during running	Change the motor selection via DI during AC drive running.	Perform motor switchover only after the AC drive stops.
Err45	Motor overheat	The cabling of the temperature sensor becomes loose.	Check the temperature sensor cabling and eliminate the cabling fault.
		The motor temperature is too high.	Lower the carrier frequency or adopt other heat radiation measures to cool the motor.
Err61	Braking unit overload	The resistance of the braking resistor is too small.	Replace a braking resistor of larger resistance.
Err62	Short-circuit of braking circuit	Braking module is abnormal.	Contact the agent or Inovance.

6.3 Common Faults and Solutions

Fault Description	Possible Causes	Solutions
There is no display at power-on. 	There is no mains voltage or the mains voltage is too low.	Check the power supply.
	The switching-mode power supply (SMPS) on the drive board of the AC drive is faulty.	Check the bus voltage.
	Wires between the control board and the drive board and between the control board and the operating panel break.	Re-connect the 10-pin wire and 50-pin wire.
	The pre-charge resistor of the AC drive is damaged.	Contact the agent or Inovance for technical support.
	The control board or the operation panel is faulty.	
	The rectifier bridge is damaged.	
"HC" is displayed at power-on. 	The wire between the drive board and the control board is in poor contact.	Re-connect the 50-pin wire.
	Related components on the control board are damaged.	Contact the agent or Inovance for technical support.
	The motor or the motor cable is short circuited to the ground.	
	The hall is damaged.	
	The mains voltage is too low.	
"Err23" is displayed at power-on. 	There is motor short-circuit or AC drive inter-phase short-circuit.	Check the insulation status of the motor and the output cable with a megger.
	The AC drive is damaged.	Contact the agent or Inovance for technical support.
The AC drive display is normal while power-on. But after running, "HC" is displayed and the drive stops immediately. 	The fan is damaged or locked-rotor occurs.	Replace the damaged fan.
	The cable of the external control terminal is short circuited.	Eliminate the external short-circuit fault.
Err14 (module overheat) is reported frequently. 	The setting of carrier frequency is too high.	Reduce the carrier frequency (U0-03).
	The fan is damaged, or the air filter is blocked.	Replace the fan and clean the air filter.
	Components inside the AC drive (thermal coupler or others) are damaged.	Contact the agent or Inovance for technical support.
The motor does not rotate after the AC drive runs.	Check the motor and motor cables.	Check whether the wiring between the AC drive and the motor is normal.
	The AC drive parameters are set incorrectly (motor parameters).	Restore the default settings and re-set parameters correctly. Check whether U0-00 (running mode) is set correctly.
	The wire between the drive board and the control board is in poor contact.	Re-connect wirings and ensure secure connection.
	The drive board is faulty.	Contact the agent or Inovance for technical support.

Chapter 6 Troubleshooting

Fault Description	Possible Causes	Solutions
DI terminals are disabled.	The parameters are set incorrectly.	Check and set the parameters in group U2 again.
	The external signal is incorrect.	Re-connect external signal cables.
	The jumper across OP and +24 V becomes loose.	Re-confirm the jumper across OP and +24 V and ensure secure connection.
	The control board is faulty.	Contact the agent or Inovance for technical support.
The AC drive reports overcurrent and over-voltage frequently.	The motor parameters are set improperly.	Re-set motor parameters or re-perform the motor auto-tuning.
	The acceleration/deceleration time is improper.	Set proper acceleration/deceleration time.
	The load fluctuates.	Contact the agent or Inovance for technical support.
Err17 is detected upon power-on or running. 	The soft startup contactor is not closed.	Check whether the contactor cable is loose. Check whether the contactor is faulty. Check whether 24 V power supply of the contactor is faulty. Contact the agent or Inovance for technical support.



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Chapter 7 Inspection and Maintenance

7.1 Daily Inspection

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the components in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

7.1.1 Daily Inspection Items

<input type="checkbox"/> √	No.	Daily Inspection Item
<input type="checkbox"/>	1	Check whether abnormal noise exists during motor running.
<input type="checkbox"/>	2	Check whether a strong vibration exists during motor running.
<input type="checkbox"/>	3	Check whether the installation environment of the AC drive changes.
<input type="checkbox"/>	4	Check whether the cooling fan of the AC drive works properly.
<input type="checkbox"/>	5	Check whether the AC drive overheats.

7.1.2 Daily Cleaning Items

<input type="checkbox"/> √	No.	Daily Cleaning Item
<input type="checkbox"/>	1	Keep the AC drive clean all the time
<input type="checkbox"/>	2	Remove the dust, especially metal powder, from the surface of the AC drive to prevent it from entering the AC drive.
<input type="checkbox"/>	3	Clear the oil stain on the cooling fan of the AC drive.

7.2 Periodic Inspection

Perform periodic inspection on the items that are difficult to check in daily inspection and running.

7.2.1 Periodic Inspection Items

<input type="checkbox"/> √	No.	Periodic Inspection Item
<input type="checkbox"/>	1	Check and clean the air filter periodically.
<input type="checkbox"/>	2	Check whether the screws become loose.
<input type="checkbox"/>	3	Check whether the AC drive is corroded.
<input type="checkbox"/>	4	Check whether the wiring terminals have arc signs.

7.2.2 Insulation Test on Main Circuit

Before measuring insulation resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Do not use the insulation resistance meter to test the insulation of the control circuit. The high voltage test needs not be performed again because it has been completed before delivery.

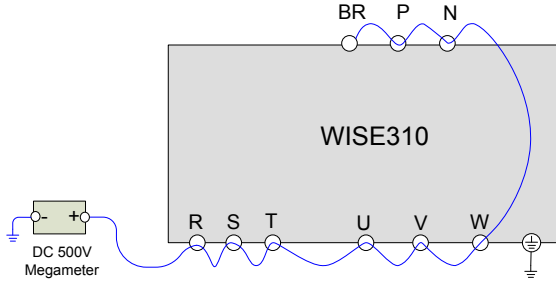


Figure 7-1 Main Circuit Insulation Test

The measured insulation resistance must be greater than 5 MΩ.

Before test, remove the voltage dependent resistor (VDR) screw and disconnect the VDR. For the position of jumper screw connecting the VDR and the ground, see Figure 2-11.

7.3 Replacement of Vulnerable Components

Vulnerable components of the AC drive include the cooling fan and filter electrolytic capacitor. Their service life is closely related to the operating environment and maintenance. Usually, the service life is as follows:

Component	Standard Service Life
Cooling fan	5 years

Note: The standard service life is obtained based on the following conditions. You can determine when to replace these parts according to the actual operating time.

- Ambient temperature: average 30°C per year
- Load rate: below 80%
- Running time: less than 20 hours per day

Component	Possible Damage Cause	Judging Criteria
Cooling fan	Bearing worn or blade aging	Check whether there is crack on the blade. Check whether there is abnormal vibration noise upon startup.

7.4 Storage

After purchasing the AC drive, pay attention to following aspects for temporary and long-term storage:

- Pack the AC drive with the original packing box provided by Inovance.
- Do not expose the AC drive to moisture, high temperature or outdoor direct sunlight for a long time
- Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

Appendix Parameter Table

Parameter No.	Parameter Name	Setting Range	Default
Group U0: Basic Parameters			
U0-00	Running mode	0: Operation panel control 1: Terminal multi-speed 2: Multi-speed loop 3: Communication setting	1
U0-01	Running frequency in operation panel	0.00 Hz to Max. frequency (Retentive at power failure or stop)	10.00 Hz
U0-02	Max. frequency	0.00–99.00 Hz	50.00 Hz
U0-03	Carrier frequency	2–10.0 kHz	6 kHz
Group U1: Motor Parameters			
U1-01	Rated motor power	0.1–150.0 kW	Model dependent
U1-02	Rated motor voltage	1–600 V	Model dependent
U1-03	Rated motor current	0.01–655.00 A	Model dependent
U1-04	Rated motor frequency	0.01 Hz to Max. frequency	Model dependent
U1-05	Rated motor speed	1–3000 rpm	Model dependent
U1-06	Asynchronous motor stator resistance	0.001–65.535 Ω (AC drive power ≤ 55 kW) 0.001–6.535 Ω (AC drive power > 55 kW)	Auto-tuning parameter
U1-07	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static partial auto-tuning 2: Asynchronous motor dynamic complete auto-tuning 3: Asynchronous motor static complete auto-tuning	0
Group U2: Input Function Parameters			
U2-01	DI1 terminal function selection	0: No function 1: Forward rotation (FWD) or RUN command	1
U2-02	DI2 terminal function selection	2: Reverse rotation (REV) or Running direction (FWD or REV) 3: Three-wire control mode 9: Fault reset (RESET)	2
U2-03	DI3 terminal function selection	11: NO input 12: Multi-speed terminal 1 13: Multi-speed terminal 2	12
U2-04	DI4 terminal function selection	14: Multi-speed terminal 3 16: Terminal for acceleration/deceleration time	0
U2-05	DI5 terminal function selection	23: Multi-speed loop reset 33: NC input 47: Emergency stop	0

Appendix Parameter Table

Parameter No.	Parameter Name	Setting Range	Default
U2-06	Terminal control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0
U2-07	DI active mode selection	0: High level valid 1: Low level valid Unit's position: DI1 Ten's position: DI2 Hundred's position: DI3 Thousand's position: DI4 Ten thousand's position: DI5	00000
Group U3: Output Function Parameters			
U3-01	Relay 1 function selection (T/A1-T/B1-T/C1)	0: No output 1: AC drive running 2: Fault output (coast-to-stop fault)	0
U3-02	Relay 2 function selection (T/A2-T/B2-T/C2)	38: Alarm output (all faults) 42: Grid synchronous output	2
Group U4: Running Control Parameters			
U4-00	Multi-speed frequency 0	-100.0% to +100.0%	0.00%
U4-01	Multi-speed frequency 1	-100.0% to +100.0%	0.00%
U4-02	Multi-speed frequency 2	-100.0% to +100.0%	0.00%
U4-03	Multi-speed frequency 3	-100.0% to +100.0%	0.00%
U4-04	Multi-speed frequency 4	-100.0% to +100.0%	0.00%
U4-05	Multi-speed frequency 5	-100.0% to +100.0%	0.00%
U4-06	Multi-speed frequency 6	-100.0% to +100.0%	0.00%
U4-07	Multi-speed frequency 7	-100.0% to +100.0%	0.00%
U4-08	Acceleration time 1	0.0-60.0s	4.0 s
U4-09	Deceleration time 1	0.0-60.0s	10.0 s
U4-10	Acceleration time 2	0.0-60.0s	10.0 s
U4-11	Deceleration time 2	0.0-60.0s	10.0 s
U4-12	Running time of multi-speed loop reference 0	0-6500s	60 s
U4-13	Running time of multi-speed loop reference 1	0-6500s	6500 s
U4-14	Running time of multi-speed loop reference 2	0-6500s	6500 s
U4-15	Running time of multi-speed loop reference 3	0-6500s	6500 s
U4-16	Start mode	0: Direct start 1: Catching a spinning motor	0
U4-17	Mode of catching a spinning motor	3: Catching a spinning motor based on the magnetic field position	3

Parameter No.	Parameter Name	Setting Range	Default
U4-18	Stop mode	0: Decelerate to stop 1: Coast to stop	0
U4-19	Power dip ride-through function selection	0: Invalid 1: Decelerate 2: Decelerate to stop	0
Group U5: Monitoring and Display			
U5-00	Running frequency (Hz)	-	-
U5-01	Frequency reference (Hz)	-	-
U5-02	Bus voltage (V)	-	-
U5-03	Output voltage (V)	-	-
U5-04	Output current (A)	-	-
U5-05	Output power (kW)	-	-
U5-06	DI input monitoring	0: Input invalid 1: Input valid Unit's position: DI1 Ten's position: DI2 Hundred's position: DI3 Thousand's position: DI4 Ten thousands position: DI5	00000
U5-07	Relay output monitoring	0: Input invalid 1: Input valid Unit's position: Relay 1 Ten's position: Relay 2	00
U5-08	Product SN	-	-
U5-09	Performance version	-	-
U5-10	Function version	-	-
U5-11	Heatsink temperature of inverter module	-20°C to +120°C	-
U5-12	Accumulative running time	0-65535 h	-
U5-13	Accumulative power-on time	0-65535 h	-

Appendix Parameter Table

Parameter No.	Parameter Name	Setting Range	Default
U5-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Control power supply fault 9: Undervoltage 10: AC drive overload 11: Motor overload 12: Input phase loss 13: Output phase loss 14: Heatsink overheat 15: External device fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 21: EEPROM read-write fault 22: AC drive hardware fault 23: Short circuit fault 24: Reserved 25: Reserved 26: Accumulative running time reached 29: Accumulative power-on time reached 30: Load becoming 0 40: Pulse-by-pulse current limit fault 41: Motor switchover error during running 45: Motor overheat 61: Braking unit overload 62: Short-circuit of braking circuit	-
U5-15	2nd fault type		-
U5-16	3rd (latest) fault type		-
U5-17	Frequency upon 3rd (latest) fault	-	-
U5-18	Current upon 3rd (latest) fault	-	-
U5-19	Bus voltage upon 3rd (latest) fault	-	-
U5-20	Input terminal state upon 3rd (latest) fault	-	-
U5-21	Output terminal state upon 3rd (latest) fault	-	-
U5-22	AC drive state upon 3rd (latest) fault	-	-
U5-23	Power-on time upon 3rd (latest) fault	-	-

Parameter No.	Parameter Name	Setting Range	Default
U5-24	Running time upon 3rd (latest) fault	-	-
U5-25	Frequency upon 2nd fault	-	-
U5-26	Current upon 2nd fault	-	-
U5-27	Bus voltage upon 2nd fault	-	-
U5-28	Input terminal state upon 2nd fault	-	-
U5-29	Output terminal state at occurrence of the 2nd fault	-	-
U5-30	AC drive state upon 2nd fault	-	-
U5-31	Power-on time upon 2nd fault	-	-
U5-32	Running time upon 2nd fault	-	-
U5-33	Frequency upon 1st fault	-	-
U5-34	Current upon 1st fault	-	-
U5-35	Bus voltage upon 1st fault	-	-
U5-36	Input terminal state upon 1st fault	-	-
U5-37	Output terminal state upon 1st fault	-	-
U5-38	AC drive state upon 1st fault	-	-
U5-39	Power-on time upon 1st fault	-	-
U5-40	Running time upon 1st fault	-	-
Group UP: Parameter Management			
UP-00	User password	0-65535	0
UP-01	Parameter initialization	0: No operation 01: Restore default settings except motor parameters 02: Clear records 04: Back up current user parameters 501: Restore user backup parameters	0

Revision History

Date	Revised Version	Change description
December 2017	A00	First release