SLANVERT

Hope530 Series VFD

USER'S MANUAL

Hope SenLan Science & Technology Holding Corp., Ltd

Content

Preface

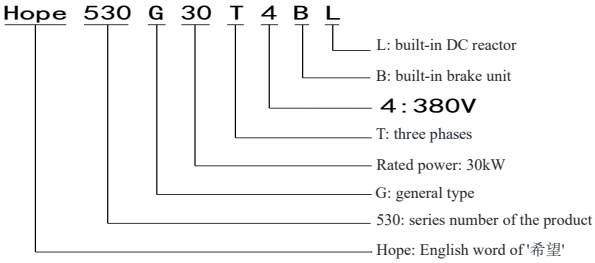
Thank you for purchasing SLANVERT Hope530 high-performance vector control VFD(variable-frequency drive).
The Hope530 series VFD is a new generation of low-noise, high-performance and multi-function VFD independently developed by SLANVERT. It adopts the rotor-magnetic-field-oriented vector control mode to achieve high torque of motor, high precision, wide range speed regulation, high reliability and powerful functions.
It is widely used in metallurgy, petroleum, chemical industry, power industry, building materials, coal, medicine, food, papermaking, plastic, textile industry, printing & dyeing, lifting, washing, cable, packing, machinery, ceramics, water supply, centrifuge, conveyor, dehydrator, wastewater treatment, heating & ventilating industry, as well as drawbench, agitator, extruder, winding machine, compressor, fan pumps, grinding miller, conveyor, hoister, centrifuge and so on.
This Manual provides users with installation wiring, parameter setting, daily maintenance, fault diagnosis and troubleshooting, etc. Before installing, setting up, running and maintaining the VFD, please be sure to read all the contents of the User Manual of this product in detail, memorize the relevant knowledge and safety precautions of the VFD, and ensure the correct use and give full play to its superior performance. Technical specification of this product may change without prior notice. The Manual of this product shall be properly kept until the VFD is scrapped.

Notes for Unpacking Inspection

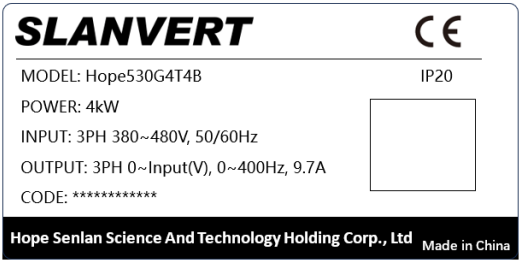
When unpacking, please confirm the following items carefully. If there is any problem, please contact our company or the Supplier directly.

Confirmation Item	Validation Methods
Is it in line with your order?	Confirm whether the nameplate on the side of VFD is consistent with your order.
Is there any damage to the product?	Check the overall appearance of the product to confirm whether it is damaged during transportation.

Model description of the VFD



Description on VFD nameplate (taking Hope530G55T4 as an example)



Definition of Safety Signs

For safety-related contents in this manual, please use the following signs, and the contents with safety signs must be followed.

DANGER: **Wrong use or operation not according to the requirements may cause damage to the VFD or casualties.**

ATTENTION: Operation not according to the requirements may result in abnormal operation of the system. In serious cases, it may cause VFD or mechanical damage.

The comparison table of some terms and abbreviations is as follows:

Name	Meaning and Description
AI	Analog Input
AO	Analog Output
ASR	Automatic Speed Regulator
AVR	Automatic Voltage Regulation
EMC	Electric Magnetic Compatibility
EMI	Electric Magnetic Interference
LED	Light Emitting Diode
PFI	Pulse Frequency Input
PFO	Pulse Frequency Output
PID	Proportional-Integral-Derivative
PG	Pulse Generator
PWM	Pulse Width Modulate
UP/DOWN regulating value	The percentage that can be adjusted by the terminal, panel △/▽keys and can be taken as frequency setting (with the maximum frequency of 100%), PID setting, etc.
Programmable unit	Programmable software module for arithmetic operation, logic operation, comparison and other functions in the VFD.
Digital input n	It refers to internal switching signal of the nth item in the digital input function definition table It is available for DI terminal selection and logical unit, timer, comparator output selection connection.
Digital output n	It refers to internal switching signal of the nth item in the digital output function definition table It is for DO terminal and relay selection output and the input selection for logic unit, timer, analog multi-circuit switch control signal, counter and length counter.
Analog output quantity n	The internal analog quantity of nth item in the analog output definition table It is for the selection output of analog output terminals AO1, AO2 and PFO and the input selection of comparator, arithmetic unit, analog multi-circuit switch and low-pass filter.

1. Safety and Precautions

1.1 Safety Precautions

I. Installation

- Do not install the VFD at the place with or near combustible materials, or there will be a fire risk.
- The VFD shall be installed on a smooth and solid surface, away from Humid, hot and condensed environment.II. Wiring

- Make sure that the high-voltage indicator light is completely off and the voltage of both positive and negative buses is below 36V, otherwise there may be danger of electric shock.

- Make sure that the input power supply is completely cut off when wiring, otherwise it may cause electric shock.

- Do not connect brake resistors directly between DC terminals DC+ and DC-. Otherwise, fire may occur.

- The voltage of the input power terminal shall not exceed the rated voltage range, otherwise the VFD will be damaged.

- The grounding terminal (PE) of the VFD must be reliably and correctly grounded (ground resistance: ≤10Ω), otherwise it may cause electric shock.

III. Inspection before Power On

- The frequency converter door must be closed before power on, otherwise it may cause electric shock and explosion.

- The VFD can control the motor to run at high speed. To run above the rated frequency of the motor, it must first confirm whether the motor and mechanical device can withstand high speed operation.

IV. Power on and Operation Precautions

- Check whether the parameter setting is correct before test run.

- The front door cannot be opened when the input power is connected, there is high voltage inside and it may cause electric shock.

- Do not use wet hands to operate the VFD, otherwise it may cause electric shock.

- When the VFD is delivered from the factory, the automatic power-on start is enabled. If the terminal control and the running signal is valid, the power-on will start automatically.

- Do not turn on or off the input power to control the VFD operation and stop.

- When parameter initialization is performed, the parameters shall be reset.

- When selecting the restart function (such as fault self-reset or instantaneous power failure restart), do not get close to the motor and mechanical load while the VFD is waiting for starting.

V. Transportation and Packing Precautions

- Quantity of the stacked VFD shall not exceed the value specified for packing case.

- Do not place heavy objects on the VFD.

- Do not open the door when transporting the VFD.

- Operation panel and door shall not be stressed during transport, otherwise personal injury or property loss may be caused.

VI. Scrapping

- It shall be scrapped as industrial wastes.

- The electrolytic capacitor inside the VFD may explode when burned.

- The plastic parts of the VFD will produce toxic gas when burned.

1.2 Precautions

I. About Motor and Mechanical Load

- Compare with power frequency operation

The Hope530 series VFD is a kind of PWM voltage VFD with its output voltage containing harmonic wave. Compared with power frequency power supply, the loss generated when driving the motor and the temperature rise and noise of the motor are increased.

When the input voltage is high or the motor connection distance is long, the insulation and voltage resistance of cable and motor must be considered.

- Constant-torque and low-speed operation

When the VFD drives the common motor to run at low speed for a long time, the temperature of the motor will rise due to the poor heat dissipation effect of the motor. If running at low speed constant torque for a long time is needed, it must use frequency conversion motor or forced air cooling.

- Motor overload protection

When the adaptive motor is selected, the VFD can protect the motor from overload. If the motor does not match the rated capacity of the VFD, the protection value must be adjusted or other protective measures must be taken to ensure the safe operation of the motor.

- Operation above the frequency of 50Hz

In case of operation exceeding 50Hz, in addition to considering the increase of vibration and noise of the motor, it must also confirm whether the use speed range of the motor bearing and mechanical device is allowed.

- Lubrication for mechanical device

When the gearbox, gear and other mechanical devices needing to be lubricated are operated at low speed for a long time, they may be damaged due to poor lubrication effect, so they must be confirmed in advance.

- Regenerative torque load

For the occasion of lifting load, there is often a regenerative torque, the VFD often stops due to overvoltage protection, at this time the appropriate specification of the brake components shall be considered.

- Mechanical resonance point of load device

The VFD may encounter the mechanical resonance point of the load device within a certain output frequency range, which can be avoided by setting anti-vibration rubber under the base plate of the motor or by setting the frequency avoidance of the VFD.

- Insulation inspection of motor before being connected with the VFD

When the motor is used for the first time and re-used after long time placement, insulation inspection for motor shall be carried out prevent the VFD from damage due to insulation failure of the motor winding. Please use 500V voltage megohmmeter for test, and it shall guarantee that the measured insulation resistance is not less than 5MΩ.

II. About the VFD

- Capacitance or pressure sensitive devices improving the power factor

As the VFD outputs PWM voltage, if the output side is installed with capacitance or lightning protection voltage-sensitive resistor for improving power factor, it will cause the VFD fault trip or device damage, please be sure to remove it.

- Contactors and other switching devices installed at the output end of the frequency converter

If switches such as contactors need to be installed between the VFD output and the motor, please be sure to switch on and off when the VFD has no output, otherwise the VFD may be damaged.

- Occasion for frequent start and stop

Start and stop control shall be achieved for VFD via terminals. It is strictly prohibited to use contactors and other switching devices on the input side of the VFD for direct and frequent start and stop, or it will cause equipment damage.

- Use beyond rated voltage

Hope530 series VFDs are not recommended to be used beyond the allowable input voltage range. If necessary, boost or step-down device can be used for voltage transformation.

- Lightning impulse protection

The VFD is equipped with lightning overvoltage protection device, which has a certain self-protection ability for inductive lightning.

- Earth-leakage protective device

When the VFD runs, there is a high-speed switching action, which will inevitably produce high-frequency leakage current, and sometimes lead to the misoperation of leakage protection circuit. When encountering the above problems, in addition to appropriately reducing the carrier frequency and shortening the lead, the leakage protector shall be correctly installed.

When installing the leakage protector, following items shall be paid with attention:
1) The leakage protector shall be set at the input side of the VFD, which is more suitable to set it behind the air switch (no fuse circuit breaker).

2) Leakage protector that is insensitive to ultraharmonics or special leakage protector shall be selected for the VFD (sensitivity above 30mA). If adopting ordinary leakage protector, the sensitivity shall be above 200mA and the action time shall be above 0.1s.

- Derating of VFD

1) If the ambient temperature exceeds 40°C, the converter shall be derated by 1.5% per 1°C of environment temperature and the maximum service temperature shall not exceed 55°C; When the ambient temperature exceeds 50°C, please consult the Company before ordering, and the ambient temperature shall be indicated when ordering.

2) In areas with an altitude of more than 1000m, the thin air will cause the heat dissipation effect of the VFD to deteriorate, and it is necessary to derate the use. For every 100m, the derating is 1%.

3) When the set carrier frequency is above the factory default, the VFD needs to be derated by 5% for every increase of 1kHz.

2. Product Specification

2.1 General Technical Specification of Hope530 Series VFD

Item		Description
Input	Rated voltage, frequency	3-phase: 380V(-15%) ~ 440V(+10%), 50Hz/60Hz
	Allowable range	Voltage unbalance: ＜3％; frequency: 47Hz~63Hz
Output	Output Voltage	3-phase, 0V~input voltage, deviation<5%
	Output frequency range	V/F control: 0.00Hz~400.00Hz; vector control: 0.00Hz~200.00Hz
Basic specifications	Motor control mode	Without PGV/F control, with PGV/F control, without PG vector control, with PG vector control, V/F separation control
	Steady-state speed precision	Without PG vector control: ±0.5%; with PG vector control: ±0.05%
	Starting torque	When frequency is 0.50Hz, the starting torque is ≥150％ of rated torque.
	Overload capacity	150％ rated current for 1min, 180% rated current for 15s, 200% rated current for 2s
	Frequency resolution	Digital setting: 0.01Hz; simulation setting: 0.1% of the maximum frequency
	Output frequency accuracy	Analog setting: ±0.2% maximum frequency (25±10°C) Digital setting: 0.01Hz (-10°C~+40°C)
	Run command channel	Operation panel setting, control terminal setting, communication setting, switchable via terminal
	Frequency setting channel	Operation panel, communication, UP/DOWN regulated value Al1~Al4, PFI arithmetic unit
	Auxiliary frequency setting	For flexible auxiliary frequency trim and setting frequency synthesis
	Torque boost	Automatic torque improving; manual torque improving
	V/F curve	Users can define V/F curve, linear V/F curve and 5 reduction torque characteristic curves.
	Acceleration & deceleration methods	Linear acceleration & deceleration, S curve acceleration & deceleration
	Jogging	Jog frequency range: 0.10Hz~50.00Hz; jog acceleration & deceleration time: 0.1s~60.0s
	Automatic energy-saving operation	Automatically optimize V/F curve according to load condition for automatic energy-saving operation.
	Automatic voltage regulation (AVR)	When grid voltage changes within a certain range, automatically maintain the constant output voltage.
	Automatic carrier regulation	Automatically regulate carrier frequency according to load characteristic and environment temperature.
	Random PWM	Regulate motor timbre when operating.
	Droop control	Applicable to the condition when several VFDs drive the same one load.
	Instantaneous shutdown operation	When powering down instantaneously, the equipment can continue operating via busbar voltage control.
	Dynamic braking capacity	Built-in brake unit
	DC braking capacity	Braking time: 0.0s~60.0s, braking current: 0.0%~100.0% rated current
	PFI	Maximum input frequency: 50kHz
	PFO	Output of 0Hz~50kHz collector open ended pulse square signal is programmable.
	Analog inputs	Input of 2 analog signals can select voltage mode or current mode frequency VFD via positive or negative input, supporting 2-circuit analog input expansion
	Analog output	Output of 2 analog signals can respectively select 0/4mA~20mA or 0/2V~10V, programmable.
	Digital input	5 source-drain type selectable multifunctional digital input, supporting digital input extension

Item		Description
	Digital output	2-circuit multifunctional digital output; output of 2 multifunctional relays, supporting digital output extension
	Communication	Built-in RS485 communication interface, supporting Modbus protocol (RTU, TCP), USS instruction, PROFIbus-DP protocol, PROFINET protocol, etc.
Unique features	Process PID	Two groups of PID parameters; various modification modes; of free PID function; of hibernation function.
	Multi-mode PLC	User can set as many as 8 groups of PLC operation mode parameters, and the single mode PLC can reach 48 segments; it can select mode via terminal; PLC state is storable when powering down.
	Multistage speed method	Encoding selection, direct selection, overlap selection and number selection method.
	User defined menus	Thirty user parameters can be defined.
	Parameter display modification	Support the parameter display that is different from ex-factory value.
	Torque control function	The equipment can switch torque/speed control via terminal, having plenty torque setting methods.
Unique features	Zero servo and position control function	For performing zero-speed position locking, accurate positioning and position control.
	High-speed regulation counter	For synchronous control of position, production counting, counting shutdown and clear positioning control.
	High-speed length counter	For fixed-length shutdown, length indication.
	Spinning pendulum frequency function	For uniform winding displacement of spinning winding.
	Programmable unit	Comparator, logical unit, trigger, arithmetic unit, filter, multiway switch, timer
	Timing watt hour meter function	Facilitating to regulation of the best energy conservation scheme.
Protection function		Over-current, over-voltage, under-voltage, input/output phase loss, output short circuit, overheat, motor overload, external failure, lost connection of analog input, stall prevention, etc.
Options		Digital I/O expansion board, encoder interface board, analog input expansion board, I/O reactor, electric magnetic interference filter, Profibus-DP module, PROFINET module, Chinese/English LCD panel, operation panel mounting box, operation panel extension cable, RS485 communication module, etc.
Environment	Application site	With elevation below 1,000m, indoor, without direction sunshine, dust, corrosive gas, combustible gas, oil mist, water vapor, water drop, and salt mist, etc.
	Operation ambient temperature/humidity	-10℃~＋40℃/20％~90％RH, without condensation water drop
	Storage temperature	－20℃~＋60℃
	Vibration	<5.9m/s^2 (0.6g)
Structure	IP grade	IP20 (up to IP40 for 11kW~37kW models with shield)
	Method of cooling	Forced cooling, control via fan

2.2 Product Series Specification

See following table for rated value of Hope530G series VFD:

VFD model	Rated Capacity (kVA)	Rated output Current (A)	Motor (kW)	VFD model	Rated Capacity (kVA)	Rated output Current (A)	Motor (kW)
Hope530G0.75T4B*	1.6	2.5	0.75	Hope530G55T4**	74	112	55
Hope530G1.5T4B*	2.4	3.7	1.5	Hope530G75T4**	99	150	75
Hope530G2.2T4B*	3.6	5.5	2.2	Hope530G90T4*L	116	176	90

VFD model	Rated Capacity (kVA)	Rated output Current (A)	Motor (kW)	VFD model	Rated Capacity (kVA)	Rated output Current (A)	Motor (kW)
Hope530G4T4B*	6.4	9.7	4	Hope530G110T4*L	138	210	110
Hope530G5.5T4B*	8.5	13	5.5	Hope530G132T4*L	167	253	132
Hope530G7.5T4B*	12	18	7.5	Hope530G160T4*L	200	304	160
Hope530G11T4B*	16	24	11	Hope530G200T4L	248	377	200
Hope530G15T4B*	20	30	15	Hope530G220T4L	273	415	220
Hope530G18.5T4B*	25	38	18.5	Hope530G250T4L	310	475	250
Hope530G22T4B*	30	45	22	Hope530G280T4L	342	520	280
Hope530G30T4**	40	60	30	Hope530G315T4L	389	590	315
Hope530G37T4**	49	75	37	Hope530G375T4L	460	705	375
Hope530G45T4**	60	91	45	—	—	—	—

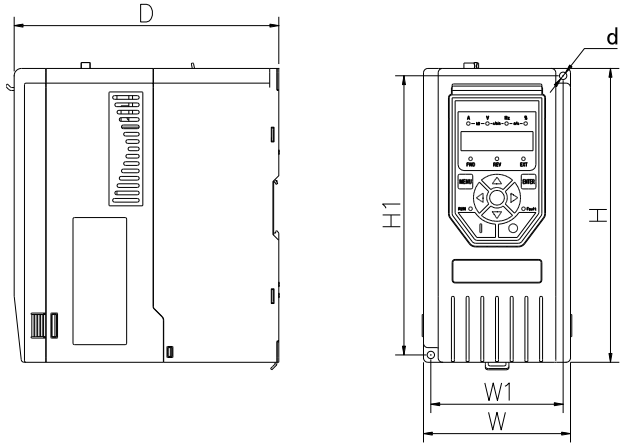
Note 1: The last two characters of the VFD model are default and indicated by '**'. If the first '*' changes to letter B, it refers to built-in brake unit, and if the second '*' changes to letter L, it refers to built-in DC reactor.

Note 2: 22kW and below models are provided with built-in brake unit, which is not optional, and 90kW and above models are provided with built-in DC reactor which is not also optional.

200kW and above models are not provided with built-in brake unit.

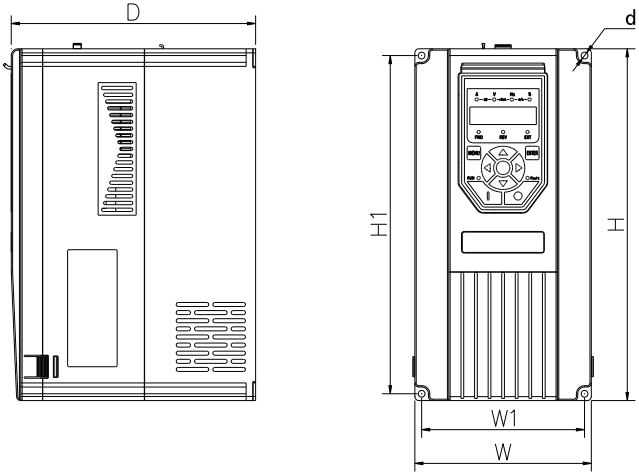
1) Installation dimensions, weight and outline drawing of Hope530G0.75T4~ Hope530G4T4 models:

VFD model	W (mm)	W1 (mm)	H (mm)	H1 (mm)	D (mm)	d (mm)	Weight with reactor (kg)	Weight without reactor (kg)
Hope530G0.75T4B*	100	90	200	190	180	5	2.1	1.8
Hope530G1.5T4B*	100	90	200	190	180	5	2.1	1.8
Hope530G2.2T4B*	100	90	200	190	180	5	2.1	1.8
Hope530G4T4B*	100	90	200	190	180	5	2.1	1.8



2) Installation dimensions, weight and outline drawing of Hope530G55T4~Hope530G75T4 models:

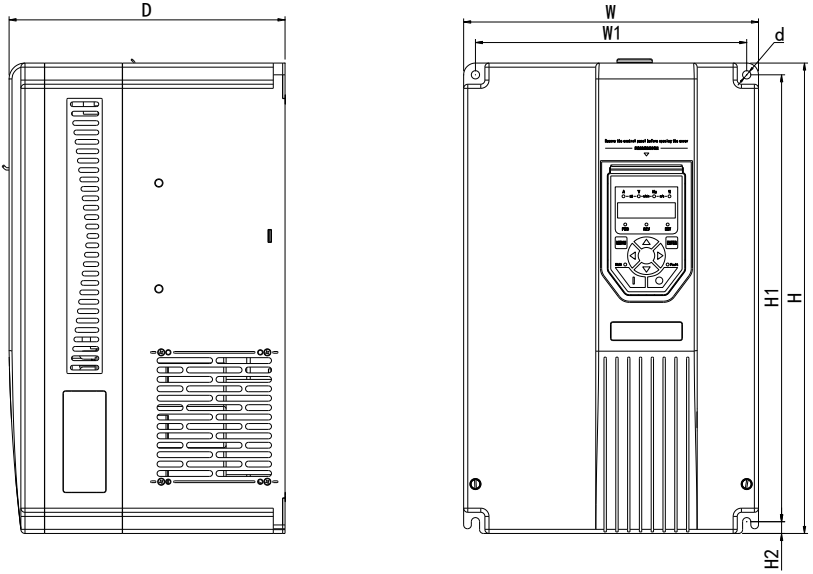
VFD model	W (mm)	W1 (mm)	H (mm)	H1 (mm)	D (mm)	d (mm)	Weight with reactor (kg)	Weight without reactor (kg)
Hope530G5.5T4B*	130	120	260	250	180	5	3.7	3.4
Hope530G7.5T4B*	130	120	260	250	180	5	3.7	3.4



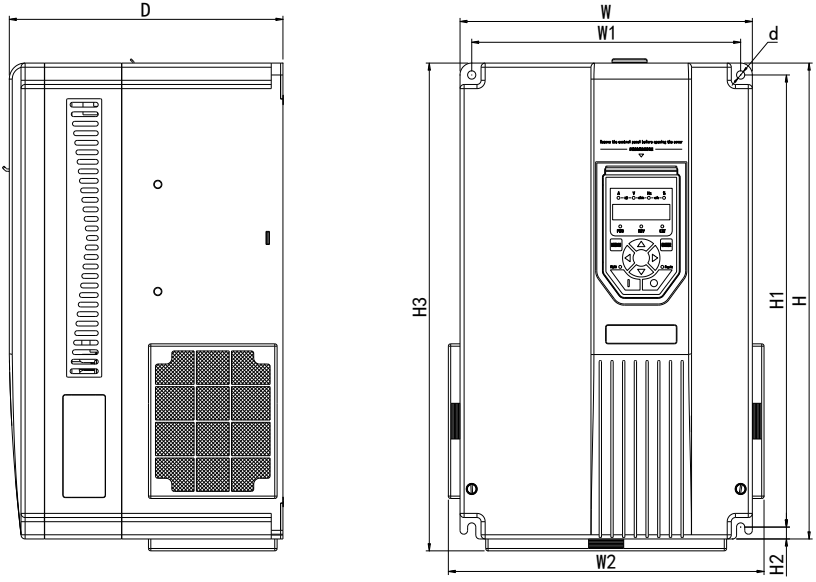
3) Installation dimensions, weight and outline drawing of Hope530G11T4～Hope530G37T4 plastic case models:

VFD model	W (mm)	W1 (mm)	W2 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	D (mm)	d (mm)	Weight with reactor (kg)	Weight without reactor (kg)
Hope530G11T4B*	170	160	190	300	290	5	310	192	5	5.7	5.2
Hope530G15T4B*	170	160	190	300	290	5	310	192	5	5.7	5.2
Hope530G18.5T4B*	208	195	230	352	337	5	360	203	6	10.5	7.6
Hope530G22T4B*	208	195	230	352	337	5	360	203	6	11	7.7
Hope530G30T4**	248	230	270	400	382	10	410	234	7	18.5	12.5
Hope530G37T4**	248	230	270	400	382	10	410	234	7	19.5	12.5

Without shield



With shield

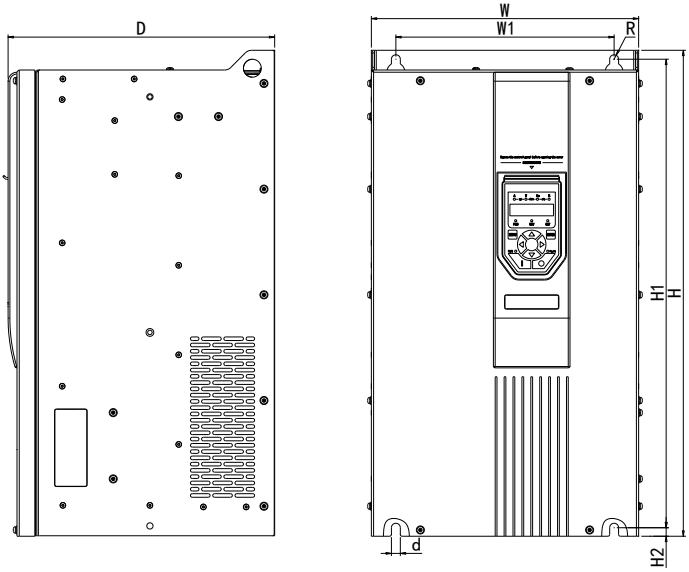


Note: The shield is an optional component. See section of shield in chapter 9 for details.

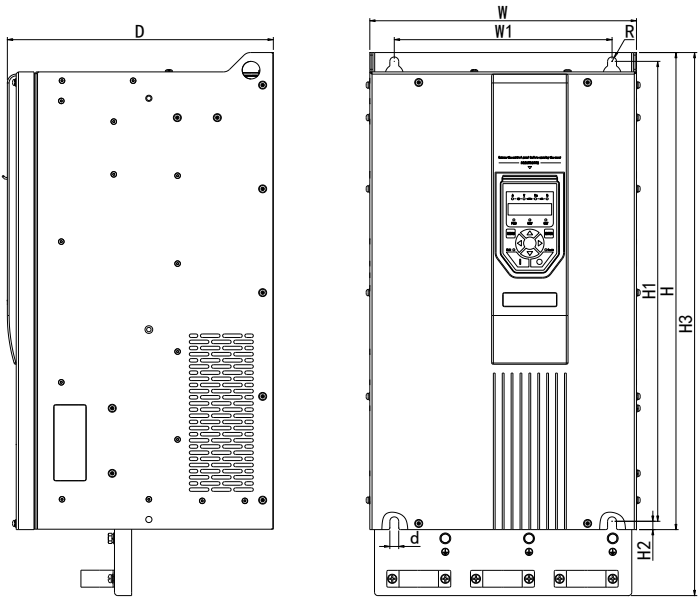
4) Installation dimensions, weight and outline drawing of Hope530G45T4~Hope530G375T4 ironclad models:

VFD model	W (mm)	W1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	D (mm)	d (mm)	R (mm)	Weight with reactor (kg)	Weight without reactor (kg)
Hope530G45T4**	300	245	545	525	10	620	300	10	5	33.5	29.1
Hope530G55T4**	300	245	545	525	10	620	300	10	5	34.3	29.1
Hope530G75T4**	340	270	580	562	10	676	326	10	5	63.2	50.9
Hope530G90T4*L	340	270	580	562	10	676	326	10	5	63.2	—
Hope530G110T4*L	340	270	580	562	10	676	326	10	5	63.2	—
Hope530G132T4*L	400	320	915	895	10	1013	355	10	5	92.5	—
Hope530G160T4*L	400	320	915	895	10	1013	355	10	5	92.5	—
Hope530G200T4L	440	300	1000	975	10	1170	395	11	5.5	118	—
Hope530G220T4L	440	300	1000	975	10	1170	395	11	5.5	118	—
Hope530G250T4L	485	300	1130	1100	12	1300	400	12	6	145	—
Hope530G280T4L	485	300	1130	1100	12	1300	400	12	6	145	—
Hope530G315T4L	400	490	1150	1125	10	1320	400	11	5.5	190	—
Hope530G375T4L	400	490	1150	1125	10	1320	400	11	5.5	192.5	—

Without cable bracket



With cable bracket



Note: The cable bracket is an optional component. See section of wiring auxiliary kit in chapter 9 for details.

3. Installation and Wiring

3.1 VFD Installation

DANGER	**1. All inspection work of the VFD can only be carried out by trained professionals.** **2. Do not install or use the VFD if it is damaged or its components are incomplete; otherwise it may result in fire and personal injury.** **3. The VFD shall be installed where it can withstand the weight of the VFD, otherwise there is a risk of injury or damage to property when falling.** **4. Do not put operation panel and door under heavy load during transportation, or it may fall to cause personal injury or property loss.**

3.1.1 Installation Environment

1) Ambient temperature: The life of the VFD is greatly affected by the ambient temperature, so it is necessary to ensure that the operating environment temperature does not exceed the allowable temperature range (-10~40℃) . When the ambient temperature exceeds 40°C, the converter shall be derated by 1.5% per 1°C temperature rise, and external forced heat dissipation must be added;

2) In areas with an altitude of more than 1000m, the thin air will cause the heat dissipation effect of the converter to deteriorate, and it is necessary to derate the use. For every 100m, the derating is 1%;

3) Do not install it in places with direct sunlight, humidity, and water droplets. The humidity shall be lower than 90% RH, and there shall be no condensation of water droplets;

4) Do not install it in places with oil pollution, heavy dust and metal powder;

5) Do not install it in places with corrosive, inflammable and explosive gases in the air;

6) Install in the place where the vibration is less than 5.9m/S^2 (0.6g), especially away from the punch press and other equipment;

7) The VFD shall be installed on the surface of flame retardant objects. The VFD will generate a lot of heat when working, so there shall be enough space around for heat dissipation.

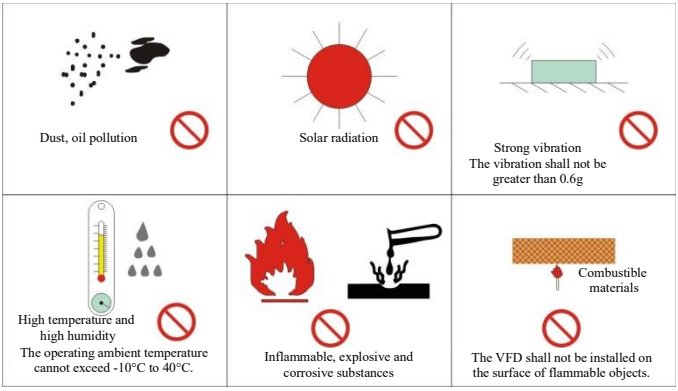


Fig. 3-1 Installation Environment Requirements

8) The VFD shall be installed vertically and upward and it is not allowed to be installed inversely, obliquely or horizontally. The VFD shall be fixed on a firm structure using suitable bolts.

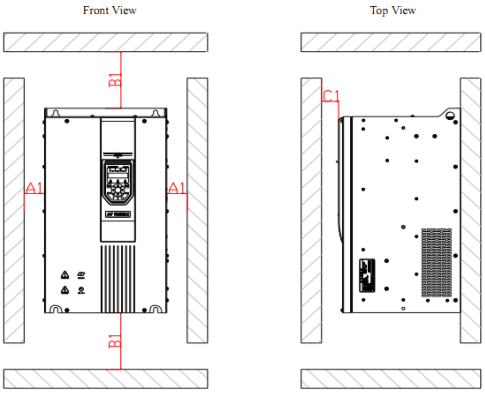
9) The Hope530G series products are designed to be installed in cabinets and shall be used in final system that shall provide corresponding fire protection enclosure, electrical protection enclosure and mechanical protection enclosure meeting local laws, regulations and relevant IEC standard requirements.

3.1.2 Installation Spacing and Direction

1) Installation spacing

The surrounding space shall be reserved for the VFD according to the different power levels.

◆ Installation of single set

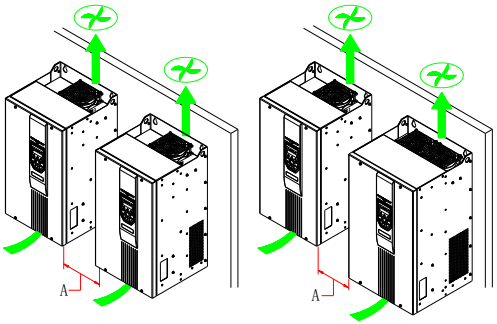


Power level	Size requirements (mm)		
0.75~37kW	A1≥50	B1≥200	C1≥40
45~375kW	A1≥50	B1≥300	C1≥40

Fig. 3-2 Installation Spacing of Single Set (Hope530G0.75T4～Hope530G375T4)

◆ Installation of multiple sets

Heat dissipates from the bottom to top when the VFD is cooling. When multiple VFDs work, they are usually installed side by side, as shown in the figure below.



Power level	Size requirements (mm)
0.75~375kW	A≥50

Fig. 3-3 Side-by-side Installation of Multiple Sets (Hope530G0.75T4~Hope530G375T4)

◆ Installation of upper and lower rows

In the place requiring installing VFDs in upper and lower rows, the heat of lower row of VFD will raise the temperature of the VFD in the upper row, resulting in overheating/overload fault of upper row of VFD, so there shall be a heat insulation guide plate installed between upper row and lower row as shown in figure.

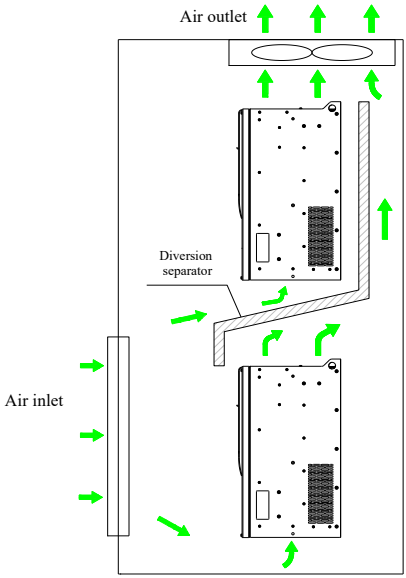


Fig. 3-4 Installation Requirements for Upper and Lower Rows

Note: The area of the air inlet must be larger than the area of air outlet, and the air volume of the air outlet fan must be greater than the sum of the air volume of all the heat dissipation fans of the VFD installed at the upper and lower rows. The exhaust air rate of the heat dissipation fan of a single VFD with various power levels is shown in the following table:

Rating(kW)	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45
Exhaust air rate (CFM)	25	25	35	35	50	50	80	80	120	120	180	180	200
Rating(kW)	55	75	90	110	132	160	200	220	250	280	315	375	—
Exhaust air rate (CFM)	200	400	400	550	550	600	750	800	1000	1150	1250	1400	—

2) Mounting direction

The VFD shall be installed vertically and upward and it is not allowed to be installed inversely or horizontally or in other ways.

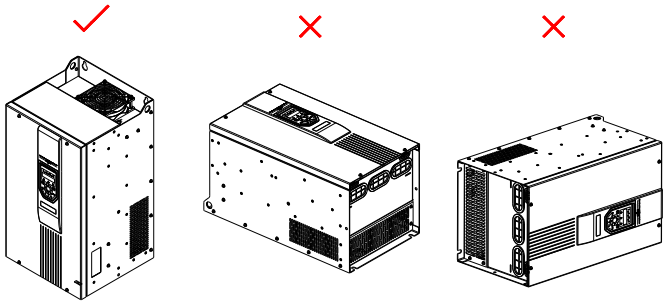


Fig. 3-5 Installation Directions

3.1.3 Complete Installation of Each Model

Hope530G0.75T4~Hope530G7.5T4 models can only be installed on wall, Hope530G11T4~Hope530G375T4 models support wall-mounted way and optional embedded installation. Products shall be installed based on installation guide according to specific model and installation and application places.

ATTENTION:

■ Figure 3-2 shows the installation space requirements. It is required to ensure that the VFD has sufficient space for heat dissipation. When reserving space, it is required to consider the heat dissipation conditions of other components in the cabinet;

■ Vertical and upward installation of the VFD is conducive to upward heat dissipation. VFDs, if there are many of them in cabinet, shall be installed side by side. Figure 3-4 shows the way to install vertically with heat insulation guide pl ate;

■ Lanyards, when required, must be made of flame retardant materials;

■ For applications with metal dust, it is recommended to use the installation cabinet that can completely seal the VFD, so that the VFD can be isolated from metal dust. At this time, the space in the fully sealed cabinet shall be as large as possible.

1) Wall-mounted type

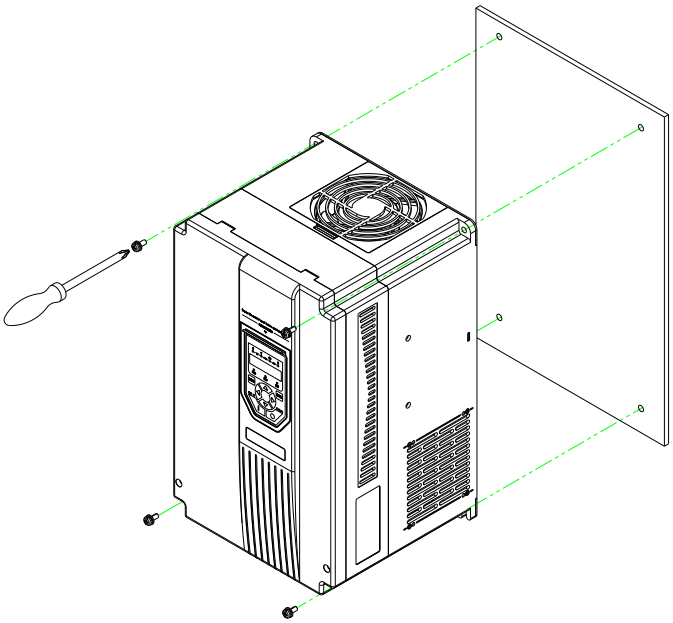


Fig. 3-6 Wall-mounted Type Hope530G0.75T4~Hope530G37T4 Models

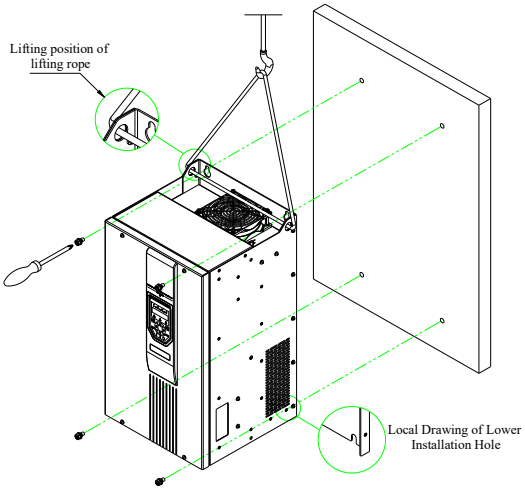


Fig. 3-7 Wall-mounted Type Hope530G45T4~Hope530G375T4 Models

Note: As for this installation mode, it is forbidden to fix only the two fixing nuts on the upper end of the VFD, otherwise the VFD may fall off and be damaged after a long time running.

2) Embedded installation

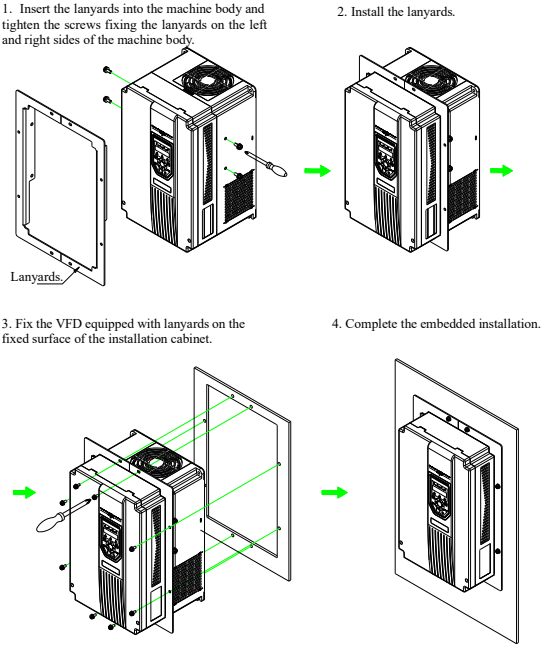


Fig. 3-8 Embedded Installation of Hope530G11T4~Hope530G37T4 Models

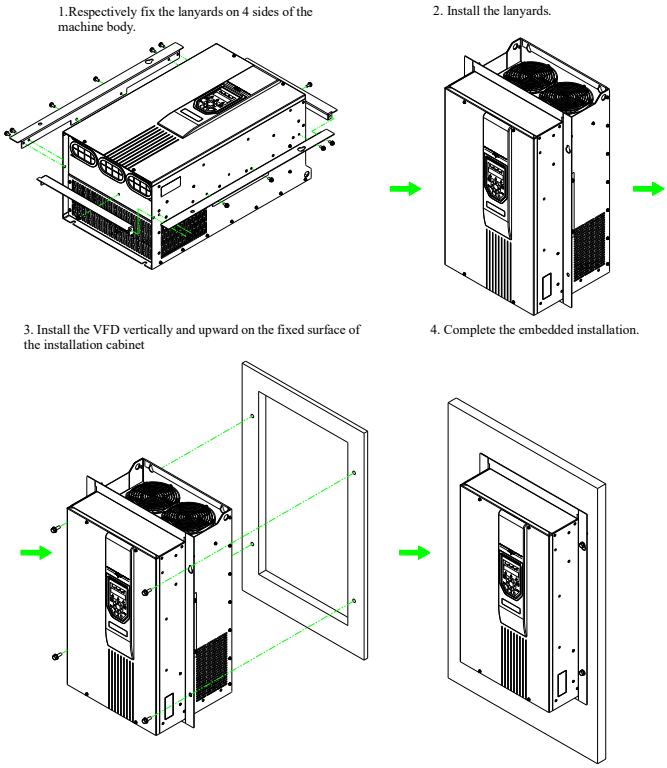


Fig. 3-9 Embedded Installation of Hope530G45T4~Hope530G375T4 Models

Note: Lanyard is required for embedded installation. See the section of embedded mounting lanyard in chapter IX for the selection of lanyard.

3.1.4 Disassembly and Installation of Cover Plate

Wiring for main circuit and control circuit of Hope530G series shall be carried out after removing the cover plate.

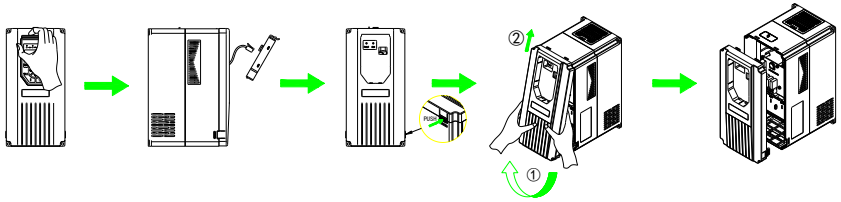
⚠ ATTENTION: Please be sure to remove the operation panel of the VFD before opening the VFD cover, otherwise the VFD may be damaged!

⚠ ATTENTION: One end of the operation panel connecting line is provided with a buckle, and the other end has no buckle. The end with no buckle is connected with the mainboard of VFD!

1) Disassembly and installation of cover plate of Hope530G0.75T4~Hope530G7.5T4 models

Disassembly Steps

1. Press the spring on the upper end of the operation panel and pull out the operation panel outward.
2. Unplug the connecting cable on the back of the operation panel and remove the operation panel.
3. Press the buckle on the cover plate inside the cabinet.
4. Hold the cover plate with both hands, ① Lift the lower end of the cover plate; ② Push slightly and upward and take out the connecting cable of the operation panel from the cover plate, then lift the upper end of the cover plate.
5. The cover plate is disassembled.



Installation Steps

1. Hold the cover plate with both hands and snap the buckle on the upper edge of the cover plate into the fixing hole.
2. Pull the connecting cables of operation panel out of the reserved hole on the cover plate from the cabinet.
3. Install the buckle at lower end of the cover plate into the buckle hole of the middle frame.
4. Connect the connecting cables of operation panel to the operation panel.
5. ① Insert into the operation panel diagonally, ② Press and push the upper end of the operation panel to assemble the cover plate.

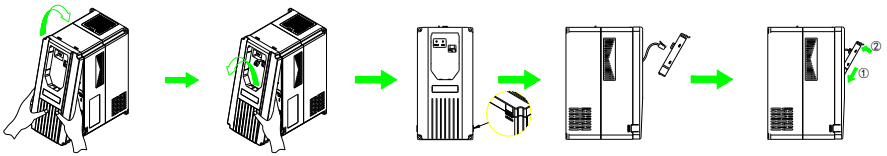


Fig. 3-10 Steps for Disassembly and Installation of Cover Plate of Hope530G0.75T4~Hope530G7.5T4 Models

⚠ ATTENTION: Please be sure to remove the operation panel of the VFD before opening the VFD cover, otherwise the VFD may be damaged!

ATTENTION: One end of the operation panel connecting line is provided with a buckle, and the other end has no buckle. The end with no buckle is connected with the mainboard of VFD!

2) Disassembly and installation of cover plate of Hope530G11T4~Hope530G37T4 models

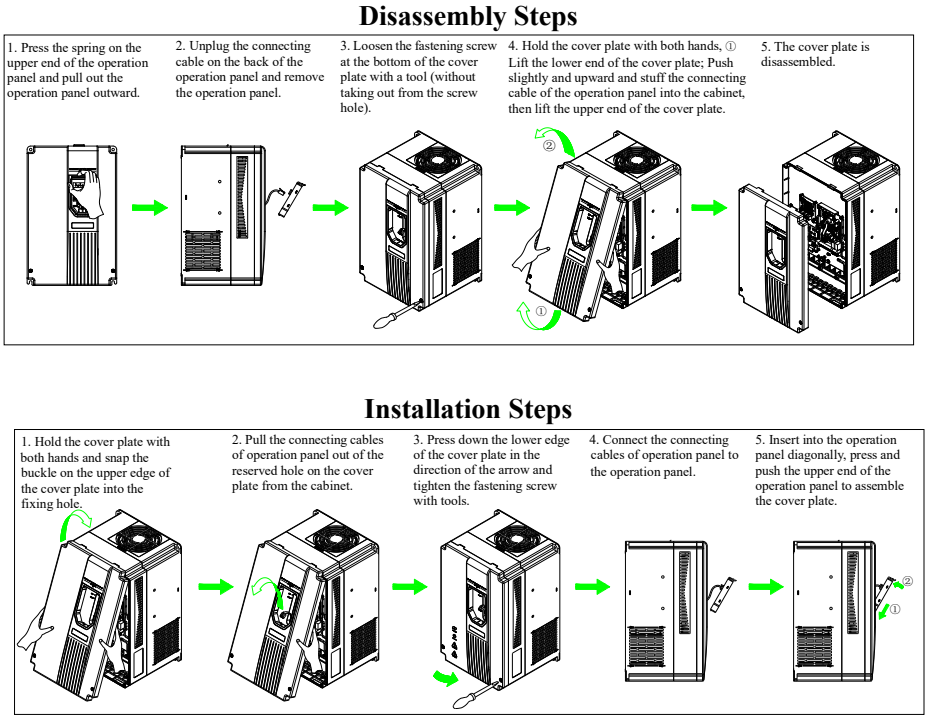


Fig. 3-11 Steps for Disassembly and Installation of Cover Plate of Hope530G11T4~Hope530G37T4 Models

ATTENTION: Please be sure to remove the operation panel of the VFD before opening the VFD cover, otherwise the VFD may be damaged!

ATTENTION: One end of the operation panel connecting line is provided with a buckle, and the other end has no buckle. The end with no buckle is connected with the mainboard of VFD!

3) Disassembly and installation of cover plate of Hope530G45T4~Hope530G375T4 models

Disassembly steps

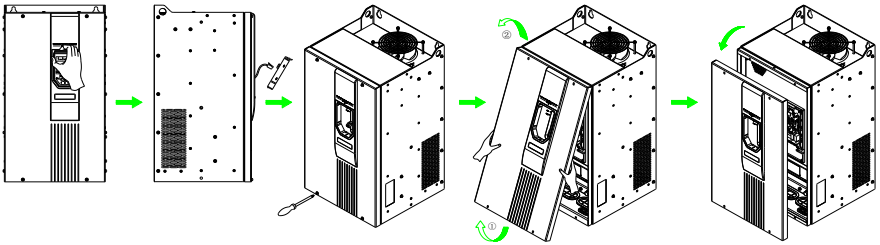
1. Press the spring on the upper end of the operation panel and pull out the operation panel outward.

2. Unplug the connecting cable on the back of the operation panel and remove the operation panel.

3. Unscrew the fastening screw from the upper and lower ends of cover plate with tools.

4. Hold the cover plate with both hands, ①Lift the lower end of the cover plate; ② Push slightly and upward and stuff the connecting cable of the operation panel into the cabinet, then lift the upper end of the cover plate.

5. The cover plate is disassembled.



Installation Steps

1. Hold the cover plate with both hands, align the cover plate bolt with the fastening hole on the upper part of the cabinet, and snap it into the fastening hole as shown in the figure from top to bottom.

2. Pull the connecting cables of operation panel out of the reserved hole on the cover plate from the cabinet.

3. Press down the lower edge of the cover plate in the direction of the arrow and tighten the fastening screw with tools.

4. Connect the connecting cables of operation panel to the operation panel.

5. Insert into the operation panel diagonally, press and push the upper end of the operation panel to assemble the cover plate.

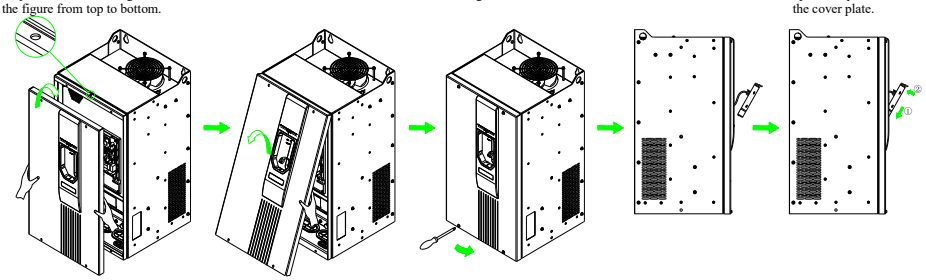


Fig. 3-12 Steps for Disassembly and Installation of Cover Plate of Hope530G45T4~Hope530G375T4 Models

3.2 Wiring of the VFD

DANGER

1. VFD wiring can only be carried out by trained personnel.
2. The door of the VFD can be opened only more than 10 minutes later after the power supply of the converter is reliably cut off and all the indicator lights of the operation panel are off.
3. Internal wiring can only be started when the voltage between the main circuit terminal DC+ and DC- inside the VFD is below 36V.
4. The VFD must be grounded reliably, otherwise an electric shock or fire may occur.
5. It is forbidden to short connect DC+ and DC- in case of fire and property damages.
6. It is forbidden to connect the power cable to U, V and W.
7. Before powering on, it shall be carefully verified that the rated input voltage of the VFD is consistent with the voltage level of the AC power supply. Otherwise, it may cause personal injury and equipment damage.
8. The main circuit terminal and the wire cold press terminal must be firmly connected.
9. U, V and W output terminals must be wired in strict accordance with the phase order.
10. It is forbidden to connect a surge-absorbing capacitor and voltage dependent resistor to the leading-out terminal of the VFD.

3.2.1 Main Circuit Terminal Wiring and Configuration

For the connection between VFD and peripheral equipment, see the figure below:

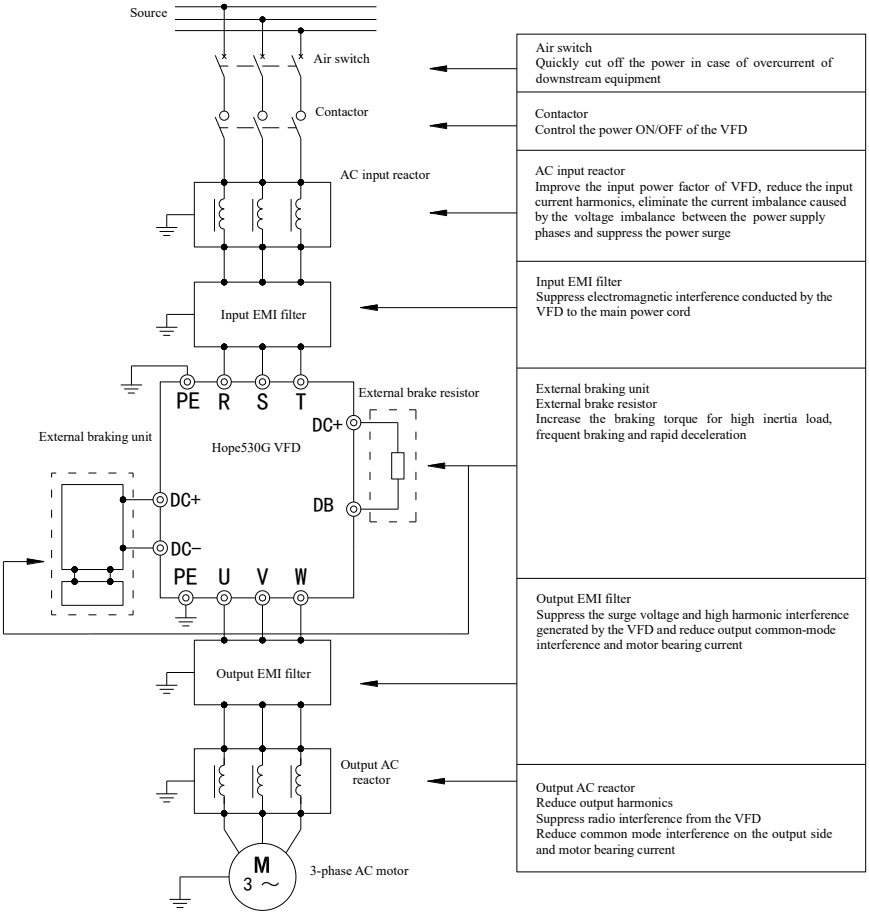


Fig. 3-13 Connection Schematic Diagram of Hope530 VFD System

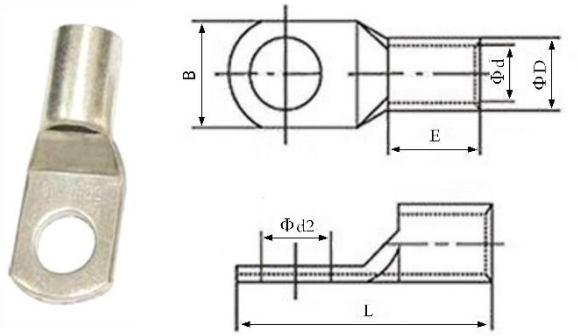
Recommended Model of Air Switch Capacity and Input/Output Copper-core Insulated Conductor

VFD model	Air switch (A)	Input/output copper wire range (mm^2)	Recommended input/output copper wire models (mm^2)	Recommended wiring terminal model	Screws Spec.	Tightening torque (N•m)
Hope530G0.75T4B*	10	2.5	2.5	—	—	2~3
Hope530G1.5T4B*	16	2.5	2.5	—	—	2~3
Hope530G2.2T4B*	25	2.5	2.5	—	—	2~3
Hope530G4T4B*	32	2.5	2.5	—	—	2~3
Hope530G5.5T4B*	40	4	4	—	—	2~3
Hope530G7.5T4B*	40	6	6	—	—	2~3
Hope530G11T4B*	63	6	6	SC6-5	M5	2~3
Hope530G15T4B*	63	6	6	SC6-5	M5	2~3
Hope530G18.5T4B*	100	10~16	16	SC16-6	M6	3~6
Hope530G22T4B*	100	16~25	25	SC25-6	M6	3~6
Hope530G30T4**	125	16~25	25	SC25-6	M6	3~6
Hope530G37T4**	160	25~35	35	SC35-6	M6	3~6
Hope530G45T4**	200	35~50	50	SC50-8	M8	8~11
Hope530G55T4**	200	35~50	50	SC50-8	M8	8~11
Hope530G75T4**	315	70~95	95	SC95-10	M10	17~22
Hope530G90T4*L	315	70~95	95	SC95-10	M10	17~22
Hope530G110T4*L	400	95	95	SC95-10	M10	17~22
Hope530G132T4*L	400	95~185	120	SC120-12	M12	30~39
Hope530G160T4*L	500	120~185	150	SC150-12	M12	30~39
Hope530G200T4L	630	2×(75~95)	2×95	SC95-12	M12	30~39
Hope530G220T4L	630	2×(95~120)	2×120	SC120-12	M12	30~39
Hope530G250T4L	850	2×(95~120)	2×120	SC120-12	M12	30~39
Hope530G280T4L	850	2×(95~120)	2×120	SC120-12	M12	30~39
Hope530G315T4L	1000	2×(120~185)	2×150	SC150-12	M12	30~39
Hope530G375T4L	1200	2×(150~185)	2×150	SC150-12	M12	30~39

Re commanded Model of Grounding Cables

VFD model	Grounding copper wire range (mm^2)	Recommended grounding copper wire models (mm^2)	Recommended wiring terminal model	Screws Spec.	Tightening torque (N•m)
Hope530G0.75T4B*	2.5	2.5	—	—	2~3
Hope530G1.5T4B*	2.5	2.5	—	—	2~3
Hope530G2.2T4B*	2.5	2.5	—	—	2~3
Hope530G4T4B*	2.5	2.5	—	—	2~3
Hope530G5.5T4B*	4	4	—	—	2~3
Hope530G7.5T4B*	6	6	—	—	2~3
Hope530G11T4B*	6	6	SC6-5	M5	2~3
Hope530G15T4B*	6	6	SC6-5	M5	2~3
Hope530G18.5T4B*	10~16	16	SC16-6	M6	3~6
Hope530G22T4B*	10~16	16	SC16-6	M6	3~6
Hope530G30T4**	10~16	16	SC16-6	M6	3~6
Hope530G37T4**	10~16	16	SC16-6	M6	3~6
Hope530G45T4**	16~25	25	SC25-8	M8	8~11
Hope530G55T4**	16~25	25	SC25-8	M8	8~11
Hope530G75T4**	35~50	50	SC50-8	M8	8~11
Hope530G90T4*L	35~50	50	SC50-8	M8	8~11
Hope530G110T4*L	35~50	50	SC50-8	M8	8~11
Hope530G132T4*L	50~70	70	SC70-8	M8	8~11
Hope530G160T4*L	70~95	95	SC95-8	M8	8~11
Hope530G200T4L	2×50	2×50	SC50-8	M8	8~11
Hope530G220T4L	2×(50~70)	2×70	SC70-8	M8	8~11
Hope530G250T4L	2×70	2×70	SC70-8	M8	8~11
Hope530G280T4L	2×70	2×70	SC70-8	M8	8~11
Hope530G315T4L	2×(70~95)	2×95	SC95-10	M10	17~22
Hope530G375T4L	2×(70~95)	2×95	SC95-10	M10	17~22

SC crimping terminal appearance is shown below:



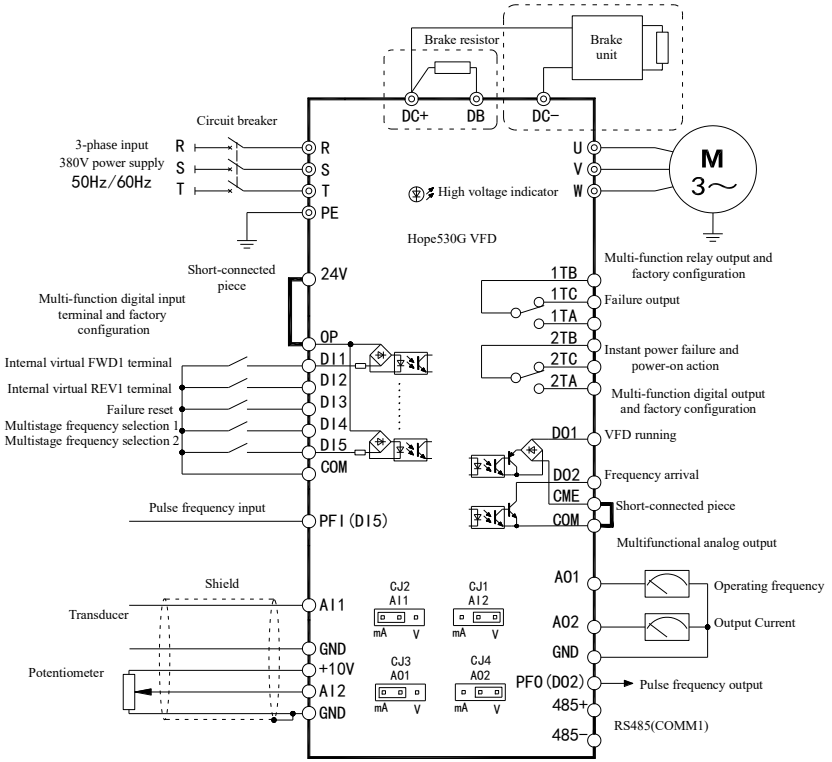
List of model and dimension of SC terminal:

Type model	Dimension(mm)						Type model	Dimension(mm)					
ITEM NO.	Φd2	B	L	ΦD	Φd	E	ITEM NO.	Φd2	B	L	ΦD	Φd	E
SC1.5-4	4.2	8	16	3.7	1.8	5	SC50-6	6.5	17.8	45	12.4	9.5	16
SC1.5-5	5.2	10	17				SC50-8	8.4	17.8	45			
SC1.5-6	6.5	10	18				SC50-10	10.5	17.8	45			
SC2.5-4	4.2	8	18	4	2.4	7	SC50-12	13	20	45			
SC2.5-5	5.2	10	20				SC50-14	15	22	46			
SC2.5-6	6.5	10	20				SC50-16	17	24	47			
SC2.5-8	8.4	12.5	23				SC70-8	8.4	21	52	14.7	11.2	20
SC4-4	4.2	10	20	4.8	3.1	7	SC70-10	10.5	21	52			
SC4-5	5.2	10	20				SC70-12	13	21	52			
SC4-6	6.5	10	20				SC70-14	15	21	52			
SC4-8	8.4	12.5	23				SC70-16	17	25	53			
SC6-4	4.2	10	24	5.5	3.8	9	SC95-8	8.4	25	58	17.4	13.5	23
SC6-5	5.2	10	24				SC95-10	10.5	25	58			
SC6-6	6.5	12	24				SC95-12	13	25	58			
SC6-8	8.4	12.5	26				SC95-14	15	25	58			
SC6-10	10.5	15	28	6.2	4		SC95-16	17	25	58			
SC10-5	5.2	12	25	6.2	4.5	9	SC120-8	8.4	28	63	19.4	15	22
SC10-6	6.5	12	25				SC120-10	10.5	28	63			
SC10-8	8.4	12.5	27				SC120-12	13	28	63			
SC10-10	10.5	15	29				SC120-14	15	28	63			
SC10-12	13	17	31				SC120-16	17	28	63			
-	-	-	-	-	-	-	SC120-20	21	28	63			

List of model and dimension of SC terminal (continued):

Type model	Dimension(mm)						Type model	Dimension(mm)					
ITEM NO.	Φd2	B	L	ΦD	Φd	E	ITEM NO.	Φd2	B	L	ΦD	Φd	E
SC16-5	5.2	12	30	7.1	5.4	12	SC150-8	8.4	30.6	70	21.2	16.5	26
SC16-6	6.5	12	30				SC150-10	10.5	30.6	70			
SC16-8	8.4	12.5	30				SC150-12	13	30.6	70			
SC16-10	10.5	16	33				SC150-14	15	30.6	70			
SC16-12	13	17	35				SC150-16	17	30.6	70			
SC25-5	5.2	13	33	8.8	6.8	12	SC150-20	21	30.6	70			
SC25-6	6.5	13	33				SC185-10	10.5	34	75	23.5	18.5	32
SC25-8	8.4	15	33				SC185-12	13	34	75			
SC25-10	10.5	18	34				SC185-14	15	34	75			
SC25-12	13	18	35				SC185-16	17	34	75			
SC25-14	15	20	38				SC185-20	21	34	75			
SC35-5	5.2	16	38	10.6	8.2	14	SC240-10	10.5	38.6	90	26.5	21	38
SC35-6	6.5	16	38				SC240-12	13	38.6	90			
SC35-8	8.4	16	38				SC240-14	15	38.6	90			
SC35-10	10.5	18	39				SC240-16	17	38.6	90			
SC35-12	13	19	40.5				SC240-18	19	38.6	90			
SC35-14	15	20	42				SC240-20	21	38.6	90			

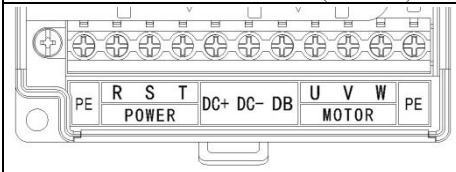
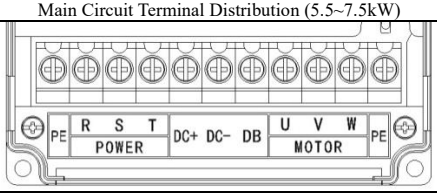
The basic operation wiring connection is as follows:



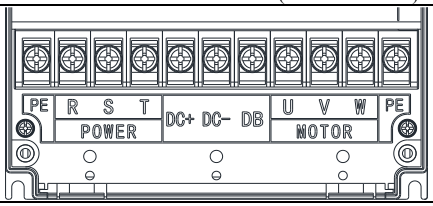
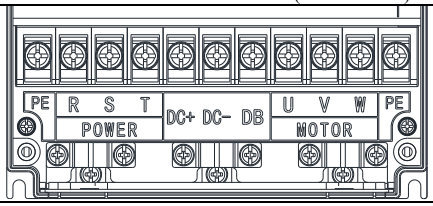
Description on major loop terminal function

Terminal Symbol	Terminal Name	Description
R, S, T	Input power terminal	Connect with three-phase 380V power supply
U, V, W	VFD output terminal	Connection with three-phase motor
DC＋, DC－	DC bus terminal	Connect braking unit between DC+ and DC-
DB	Brake output terminal	Connect brake resistor between DC+ and DB
PE	Earthing terminal	Grounding terminal on VFD case shall be connected with ground.

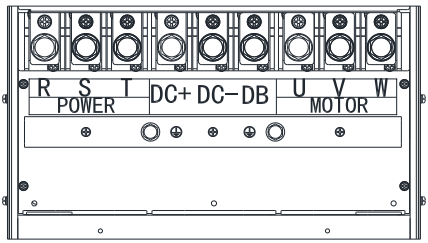
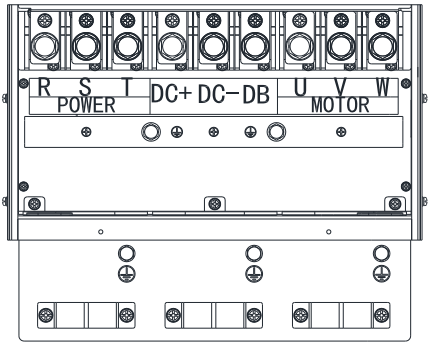
Arrangement of main circuit terminal of Hope530G0.75T4~Hope530G7.5T4 VFDs is as follows:

Main Circuit Terminal Distribution (0.75~4kW)	Main Circuit Terminal Distribution (5.5~7.5kW)
	

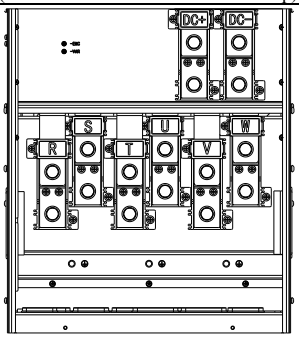
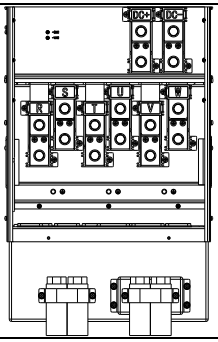
Arrangement of main circuit terminal of Hope530G11T4~Hope530G37T4 VFDs is as follows:

Main Circuit Terminal Distribution (without wire nail)	Main Circuit Terminal Distribution (with wire nail)
	

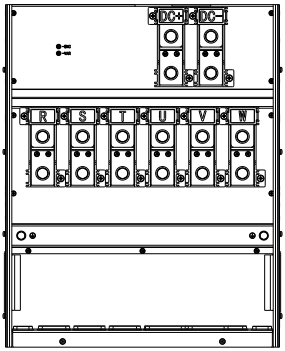
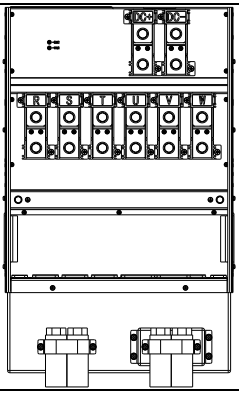
Arrangement of main circuit terminal of Hope530G45T4~Hope530G160T4 VFDs is as follows:

Main Circuit Terminal Distribution (without cable bracket and cable clamp)	Main Circuit Terminal Distribution (with cable bracket and cable clamp)
	

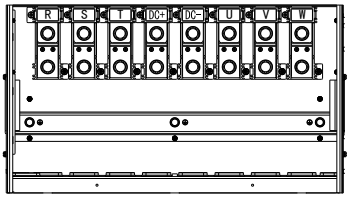
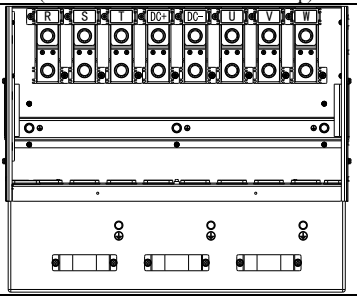
Arrangement of main circuit terminal of Hope530G200T4L and Hope530G220T4L VFDs is as follows:

Main Circuit Terminal Distribution (without cable bracket and cable clamp)	Main Circuit Terminal Distribution (with cable bracket and cable clamp)
	

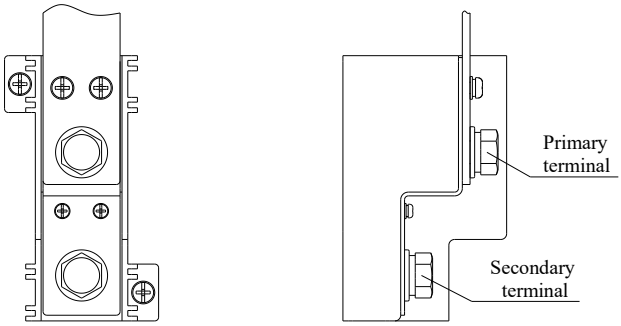
Arrangement of main circuit terminal of Hope530G250T4L and Hope530G280T4L VFDs is as follows:

Main Circuit Terminal Distribution (without cable bracket and cable clamp)	Main Circuit Terminal Distribution (with cable bracket and cable clamp)
	

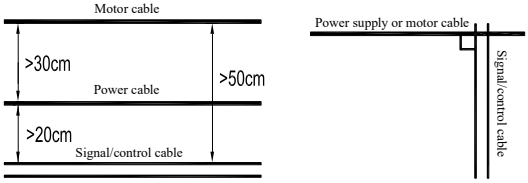
Arrangement of main circuit terminal of Hope530G315T4L and Hope530G375T4L VFDs is as follows:

Main Circuit Terminal Distribution (without cable bracket and cable clamp)	Main Circuit Terminal Distribution (with cable bracket and cable clamp)
	

ATTENTION : Each terminal of the Hope530G200~375 models contains a primary terminal in the upper part and a secondary terminal in the lower part. When connecting cables, it is required ensure that the primary terminal is used first, as shown in the figure below.

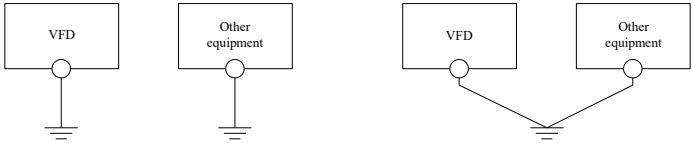


Control cable, power cable and motor cable shall be applied separately to avoid interference due to intercoupling, and enough far distance shall be maintained between them, especially, when cables are installed in a parallel manner and with long extension distance. If signal cable has to cross power cable, the vertical crossing method shall be applied, shown as follows:

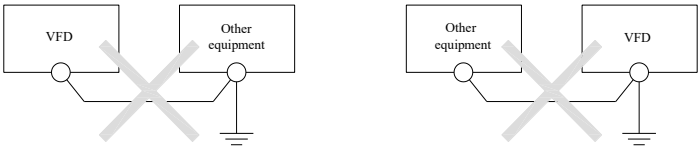


Direct earth capacitance becomes larger and intercoupling interference becomes stronger if motor cable is longer or cross sectional area of motor cable is bigger, therefore, cable with specified cross sectional area shall be applied, and its length shall be as short as possible.

See following figure for recommended earthing method when wiring:



The following earthing methods are not allowed:



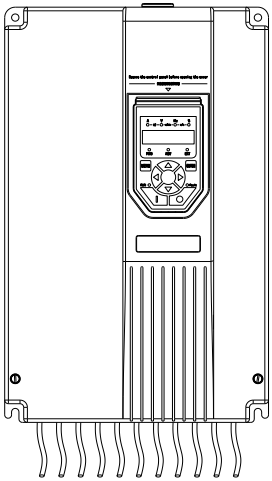
3.2.2 Incoming and Outgoing Form of Lines of the VFD

Hope530G0.75T4～Hope530G375T4 models adopts the down-in down-out wiring mode.

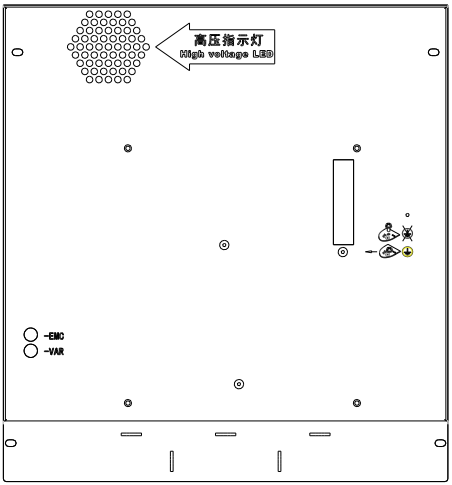
The complete wiring effect of Hope530G11T4～Hope530G37T4 models without cable bracket is shown in the left figure below.

The VFD of 45kW and above power grade is provided with an internal high-voltage indicator light inside at the top left corner of pallet on mainboard, which is below the hexagonal transparent hole composed of multiple circular holes. The transparent hole is shown in the right figure below, which is for reference before wiring. The isohigh voltage indicator light must be off and the voltage between main circuit terminal DC+ and DC- (measured by a voltmeter) shall be below 36V before starting internal wiring.

Wiring Effect of the Complete Machine

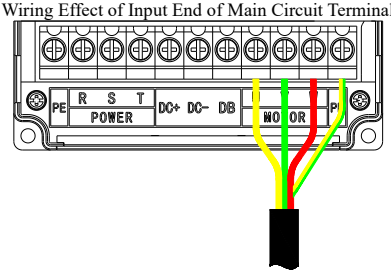


Relative Position of Transparent Hole

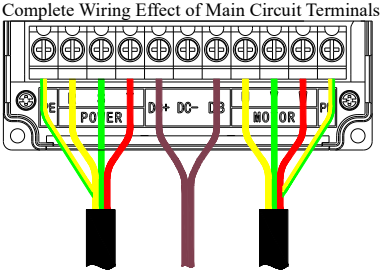


Airing of main circuit terminal of Hope530G0.75T4~Hope530G7.5T4 VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals

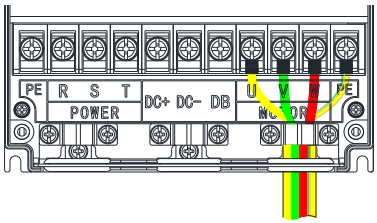


Complete Wiring Effect of Main Circuit Terminals

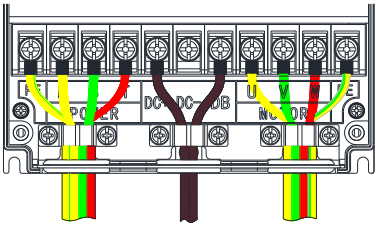


Wiring of main circuit terminal of Hope530G11T4~Hope530G37T4 VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals

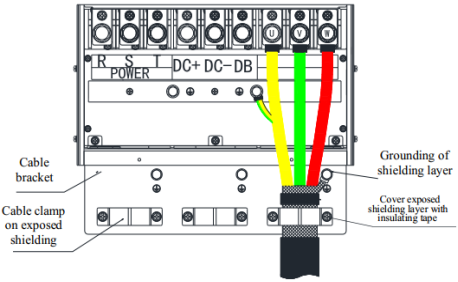


Overall Wiring Effect of Main Circuit Terminals

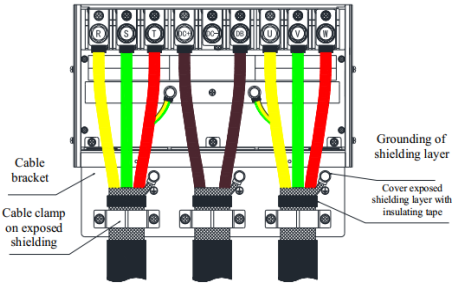


Wiring of main circuit terminal of Hope530G45T4~Hope530G160T4 VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals

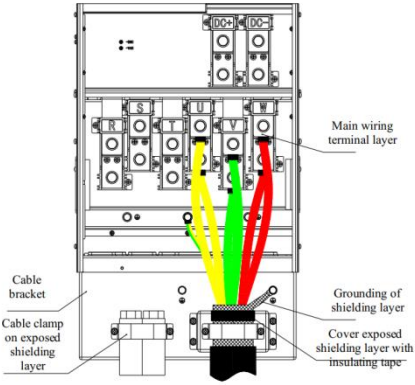


Overall Wiring Effect of Main Circuit Terminals

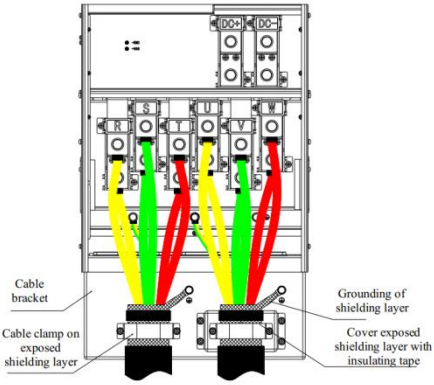


Wiring of main circuit terminal of Hope530G200T4L and Hope530G220T4L VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals

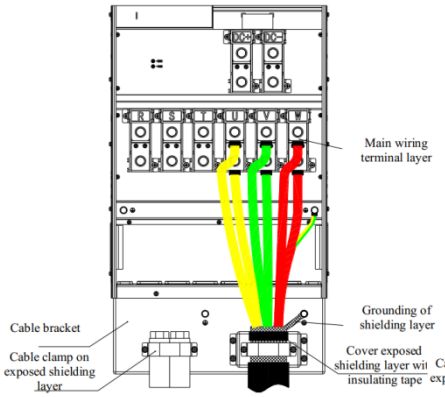


Overall Wiring Effect of Main Circuit Terminals

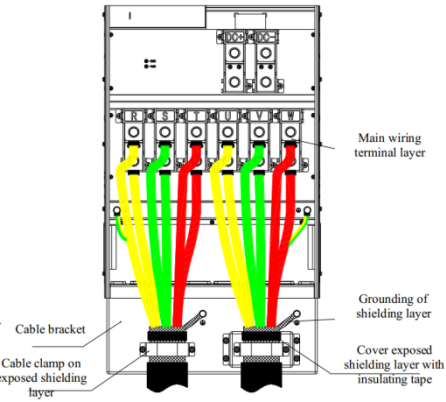


Wiring of main circuit terminal of Hope530G250T4L and Hope530G280T4L VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals

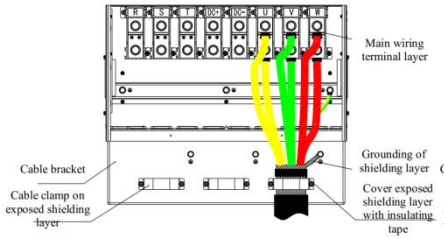


Overall Wiring Effect of Main Circuit Terminals

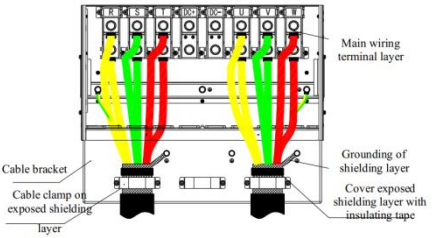


Wiring of main circuit terminal of Hope530G315T4L and Hope530G375T4L VFDs is as follows:

Wiring Effect of Input End of Main Circuit Terminals



Overall Wiring Effect of Main Circuit Terminals



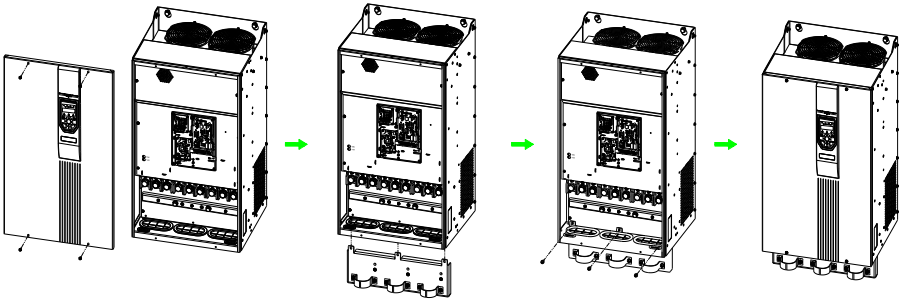
Cable brackets in the wiring figure of main circuit terminal of Hope530G45T4~Hope530G375T4 are optional components, which shall be separately purchased. Installation steps are as follows:

1. Remove the cover plate with tools.

2. Clamp into the cable bracket from the position shown on the lower end plate figure.

3. Screw 3 M5x12 triple screws at the position shown in figure and assemble the bracket.

4. Assemble the cover plate to complete the assembly.



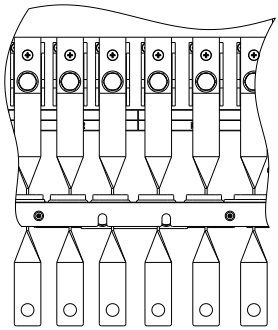
If the copper bar is used to connect the wiring terminals of the iron chassis VFD to peripheral devices, in order to ensure the electrical safety distance between the copper bar and the chassis protective earthing (PE), attention shall be paid to the following items:

① The copper bar must be covered with heat-shrink tubing;

② The copper bar must be twisted for 90° to thread out of the chassis. After the copper bar is threaded out of the chassis, the user can decide whether to further twist it for 90° and connect it with peripheral devices according to the site conditions.

First twist the copper bar for 90° and thread it out of the chassis, and then further twist it for 90° and connect it with peripheral devices as shown below:

Copper Bar Twisting Diagram



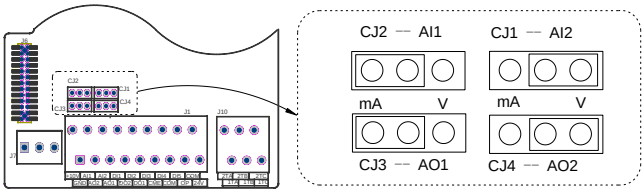
Wiring Effect Diagram of Twisted Copper Bar on Machine

3.2.3 Control board Terminal, Jumper and Wiring

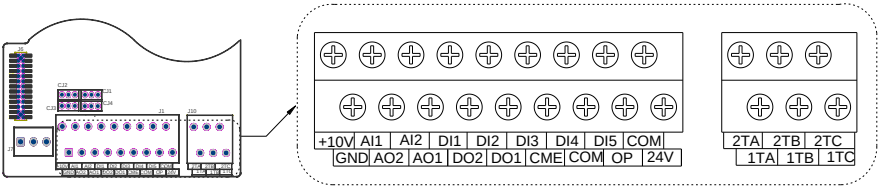
See the following table for functions of control panel jumper:

Grade	Name	Functions & Settings	Factory Settings
CJ1	AI2	AI2 input type selection V: voltage type mA: current type	V
CJ2	AI1	AI1 input type selection V: voltage type mA: current type	mA
CJ3	AO1	AO1 output type selection V: 0~10V voltage signal mA: 0/4~20mA current signal	mA
CJ4	AO2	AO2 output type selection V: 0~10V voltage signal mA: 0/4~20mA current signal	V

Control board jumper connection schematic diagram:



Arrangement of control board terminal of Hope530 series (1mm² copper conductor is recommended):



Functions of control board terminal of Hope530 series are shown below:

Terminal Symbol	Terminal Name	Terminal Function & Description	Technical Specification
+10V	+10V reference power supply	+10V power supply to the user	+10V maximum output current 15mA, voltage accuracy above 2%
GND	Underground water transmission and drainage layer	Grounding terminal of analog input/output, communication and +10V power supply	GND is internally isolated from COM, OP and CME
AI1	Analog input 1	Function selection: see description for parameters F6-00~F6-19 Select voltage or current output form via jumper CJ2, CJ1.	Input voltage range: -10 ~ +10V Input current range: -20 ~ +20mA Input impedance: voltage input: 110kΩ Current input: 250Ω
AI2	Analog input 2		
AO1	Multifunctional analog output 1	Function selection: see description for parameters F6-20 and F6-24 Select voltage or current output form via jumper CJ4, CJ3.	Current type: 0 ~ 20mA, load ≤ 500Ω Voltage type: 0~10V, output ≤10mA
AO2	Multifunctional analog output 2		
DI1	DI1 digital input terminal	See F4 menus for function selection and settings.	Photo coupler isolation Support bi-directional input Input impedance: >3k Ω Input voltage range: <30V Sampling period: 1ms High level: voltage difference with OP>10V Low level: voltage difference with OP<3V
DI2	DI2 digital input terminal		
DI3	DI3 digital input terminal		
DI4	DI4 digital input terminal		
DI5	DI5 digital input terminal		
	Pulse frequency input (PFI)	DI5 can be reused for PFI. See description for parameters F6-28~F6-30	0~50 kHz, input impedance: 1.5kΩ High level: >6V; Low level: <3V Maximum input voltage: 30V
OP	Digital input common terminal	Common terminal of DI1~DI5 terminal	Internally isolated from COM and 24V and OP is in short connection with adjacent 24V when delivering
CME	DO1 and DO2 common terminal	DO2 (when COM is short-circuited with CME) and DO1 digital output common terminal	DO1: Photo coupler isolation bi-directional open circuit collector output DO2: Photo coupler isolation one-way open circuit collector output Specification: 24VDC/50mA Output operation frequency: <500Hz
DO1	DO1 digital output terminal	See F5 menus for function selection and configurations.	
DO2	DO2 digital output terminal		

Terminal Symbol	Terminal Name	Terminal Function & Description	Technical Specification
			Break-over voltage: ＜2.5V (relative to CME) CME short connected to the adjacent COM at the time of delivery
	Pulse frequency output (PFO)	DO2 can be reused for PFO. See description for parameters F6-31~F6-36	0 to 50 kHz, open collector output Specification: 24V/50mA
24V	24V power terminal	Provide users with 24V voltage	24V maximum output current 80mA
COM		24V power field	
1TA	Output terminal of relay 1	See F5 menus for function selection and configurations.	TA-TB: normally open TB-TC: normally closed Contact specifications: 250V AC/3A 24V DC/5A
1TB			
1TC			
2TA	Output terminal of relay 2		
2TB			
2TC			

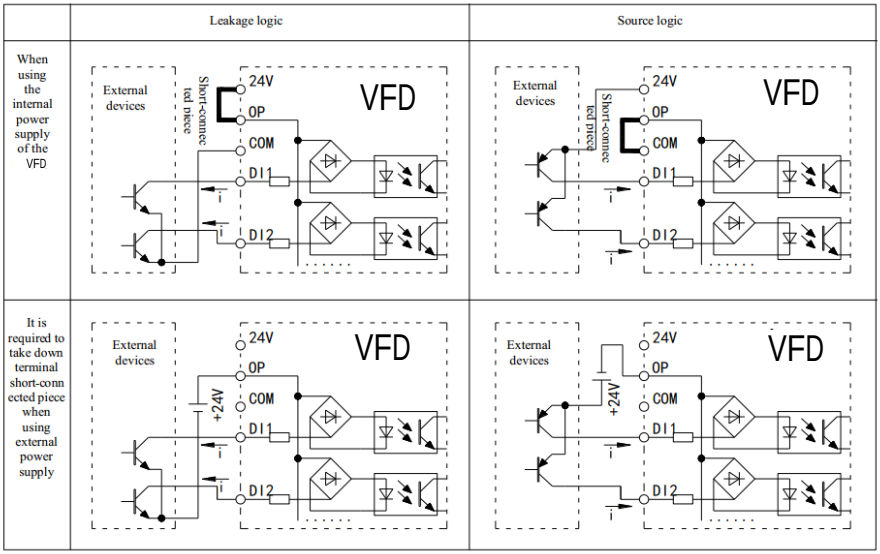
1) Analog input terminal wiring

Using analog signal for remote operation requires the length of the control line between the operator and the VFD to be less than 30m. Since the analog signal is easily interfered, the analog control line shall be separated from the strong current circuit, relay, contactor, etc. The wiring shall be as short as possible and the connecting wire shall be shield twisted pair. One end of the shield wire shall be connected to the GND terminal of the VFD.

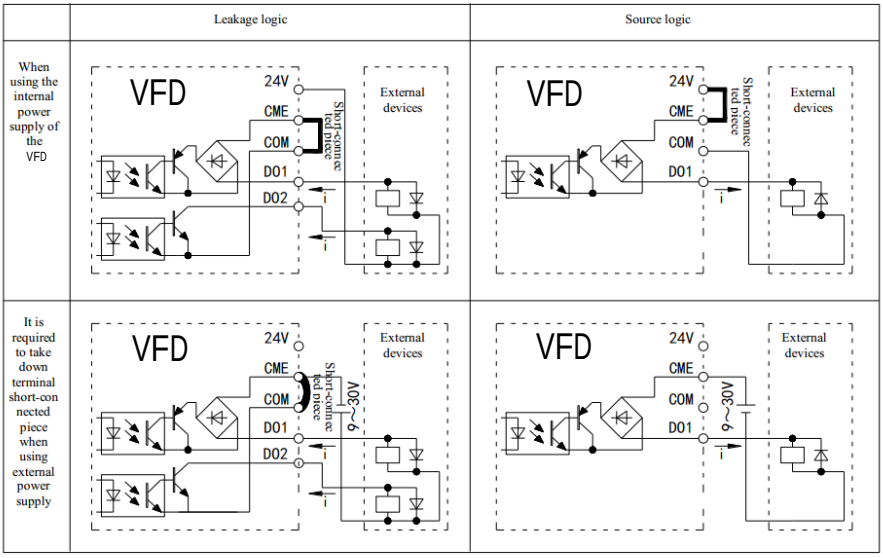
2) Wiring for multi-function input terminals DI1~DI5, and multi-function output terminals DO1 and DO2

Hope530 series VFD multi-function input terminals and output terminals are available in two types: leakage logic and source logic. The interface mode is flexible and convenient. Typical wiring methods are as follows:

Connection of multifunction input terminal and external device:

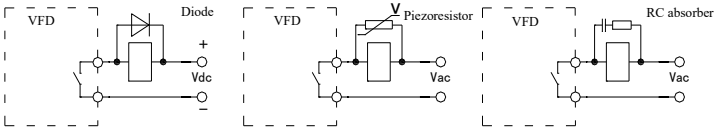


Connection of multifunction output terminal and external device:



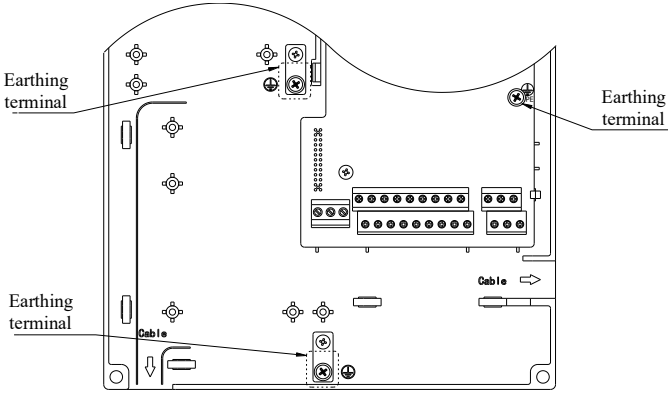
3) Wiring of relay output terminals TA, TB, TC

For driving inductive loads (such as electromagnetic relays, contactors, electromagnetic brakes), surge voltage absorbing circuits, varistor or freewheeling diodes (for DC electromagnetic circuits, must pay attention to polarity when installing) shall be installed. The components of the snubber circuit shall be installed close to the coils of the relay or contactor as shown below:

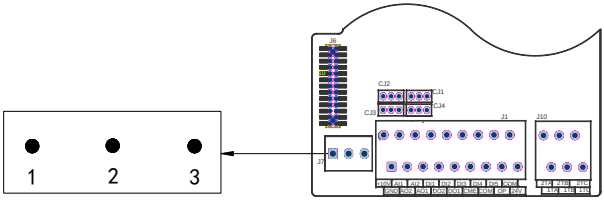


4) Ground terminal of control board

The control board and corresponding expansion board shall be grounded reliably. The grounding between the board and the shell is shown in the figure below:



Hope530 control board COMM1 communication port:



Pins of COMM1 communication port are defined as below:

Pin No.	Terminal Name
1	485+
2	485-
3	Not connected

Note: The terminal of COMM1 communication port can also be replaced by a crystal port. Please contact the manufacturer if needed. Only the physical interface corresponds to the COMM1 communication port, and the other ports on the expansion board correspond to the COMM2 communication port.

Note: The LCD panel uses the COMM1 communication port. Therefore, COMM1 is not available for external communication. A communication expansion card is required when communication is needed.

3.3 Suppression Method for VFD Electromagnetic Interference

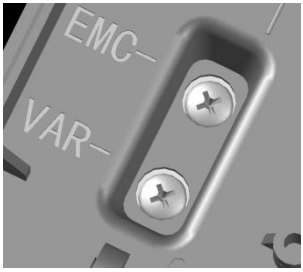
Working principle of the VFD determines that it will produce certain interference, which may bring EMC (electromagnetic compatibility) problems to the equipment or system. As electronic equipment, the VFD will also be affected by external electromagnetic interference. The followings are some installation design methods meeting EMC specifications for reference in field installation and wiring of VFDs.

I. Measures for suppression of electromagnetic interference are shown below:

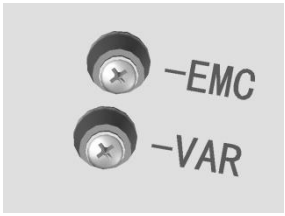
Interference propagation path	Measures minimizing influence
Leakage Current Earth loops	When peripheral devices form a closed loop through the wiring of the VFD, the leakage current of the VFD ground wire will cause misoperation of equipment. If the equipment is not grounded, misoperation will be reduced.
Power line propagation	When peripheral device and the VFD share the same power supply, the interference generated by the VFD will result in inverse power line propagation, which will make other devices in the same system misoperate. Following measures can be adopted: (1) Provide an EMI filter or ferrite common-mode filter (magnet ring) for the input end of the VFD; (2) Control the noise of other equipment with isolation transformer or power filter.
Motor line radiationPower line radiation VFD radiation	When measuring instruments, radio devices, sensors and other weak signal equipment or signal lines are installed in the same cabinet as the VFD and the line is very close to each other, they are prone to space interference and misoperation. The following measures shall be taken: (1) Easily affected equipment and signal lines shall be installed as far away from the VFD as possible. Shielded wires shall be used as signal lines with shielding layer grounded. Signal cables shall be encased in metal tubes, and shall be far away from the VFD and VFD input and output lines. If it is inevitable for signal cables to pass through the power cable, they shall be vertical; (2) Install EMI filter or ferrite common-mode filter (magnetic ring) on input and output side of the VFD respectively; (3) The motor cable shall be placed in a barrier of greater thickness, such as in a pipe of greater thickness (more than 2mm) or buried in a cement tank. The power line shall be encased in metal tubes, and shielded and grounded (the motor cables shall be 4-core cables, one of which shall be grounded on the VFD side, and the other side shall be connected to the motor shell).
Electrostatic induction Electromagnetic induction.	(1) Signal line and power line shall not be arranged in parallel or the power line shall not be bundled up; (2) Susceptible equipment or signal lines shall be as far as possible away from the VFD and VFD input and output lines; (3) Shielded cables are used for both signal cables and power cables, and are respectively wrapped into metal tubes, with a distance of at least 20cm between them.

Note: When using this product in the power grid system with ungrounded neutral points, loosen the two cross screws corresponding to VAR and EMC shown in the figure below shall be loosened (this screw is provided with a position-limit mechanism. The screw can be loosened but do not try to screw it out) to cut off the electric connection.

Besides, filter shall not be installed otherwise personal injury or VFD damage may be caused.



Schematic Diagram of Stop Screws of Plastic Case Cabinet

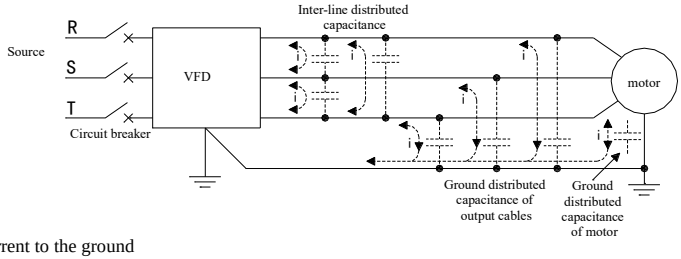


Schematic Diagram of Stop Screws of Ironclad Cabinet

II. Leakage Current and Solution

Leakage current will occur due to the existence of the ground capacitance of the input and output cables of the VFD, the inter-line capacitance and the ground capacitance of the motor. Leakage current includes ground leakage current and inter-line leakage current, which depends on the size of distributed capacitance and carrier frequency.

Leakage current path is shown below:



Leakage current to the ground

The leakage current not only flows into the VFD system, but also may flow into other equipment through the ground wires. These leakage currents may cause misoperation of leakage circuit breakers, relays or other equipment.
The higher the carrier frequency of the VFD is , the greater the leakage current will be and the longer the motor cable is, the greater the leakage current will be.

Suppressing measures:

Reduce carrier frequency, but the motor noise will increase;Motor cables shall be as short as possible;VFD systems and other systems shall be provided with the leakage circuit breakers designed for high harmonics and surge leakage currents.

Inter-line leakage current

AS for the leakage current that flows through the distributed capacitance between the cables at the output side of the VFD, its high harmonics may result in misoperation of the external thermal relay, especially small-capacity VFD. When the wiring is very long (above 50m), the leakage current will increase a lot, which will easily make the external thermal relay misoperate. It is recommended to directly monitor the motor temperature with a temperature sensor or replace the external thermal relay with the motor overload protection function of the VFD itself.

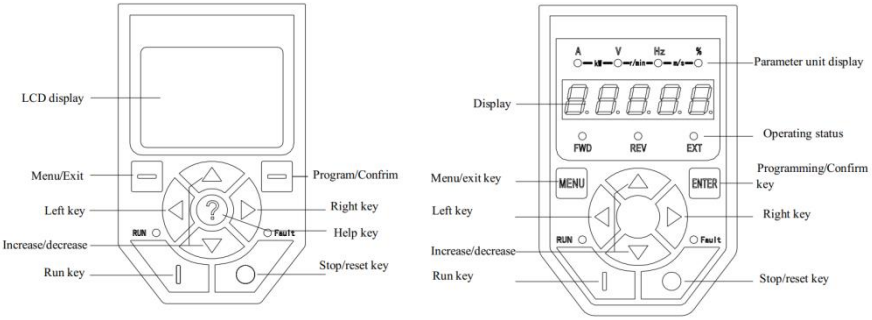
Suppressing measures: reduce carrier frequency, install electric reactor at output side.

4. VFD Operation and Test Run

4.1 VFD Operation and Display4.1

.1 Functions of Operation Panel

The operation panel can be used to set and check parameters, operation control and display fault information, its standard configuration is HOPE-PU07, or HOPE-PU04 and HOPE-PU10 can be configured as required by customers. Besides, HOPE-PU07 (LEED panel), HOPE-PU04 (LCD panel) or HOPE-PU10 (with potentiometer LED panel) can be installed on cabinet panel by purchasing optional components. Outside view of HOPE-PU04 and HOPE-PU07 operation panel is shown below:

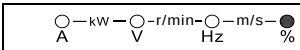
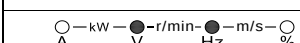
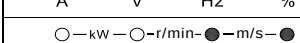
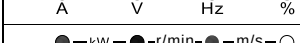
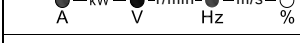


Functions of keys on HOPE-PU07 operation panel are shown below:

Key Logo	Key Name	Functions
MENU	Menu/exit key	Return to the previous menu; Enter/exit the monitoring state
ENTER	Programming/confirming key	Enter the next-level menu; storage parameters; clear alarm information
△	Increase key	The number increases progressively, and increases faster when long pressing it down
▽	Decrease key	The number decreases progressively, and decreases faster when long pressing it down
◁	Left key	Select the position to be modified. The monitoring parameters can be displayed circularly in the monitoring state
▷	Right key	
▯	Run button	Run Command
○	Stop/reset key	Shutdown, fault reset

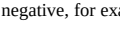
Combinations of unit indicator lights indicate the units as follows:

Display	Unit	Description
●—kW—○—r/min—○—m/s—○ A V Hz %	A	A
○—kW—●—r/min—○—m/s—○ A V Hz %	V	V
○—kW—○—r/min—●—m/s—○ A V Hz %	Hz	Hz

	%	Percentage
	kW	KW (lights A and V are on at the same time)
	r/min	r/min (lights V and Hz are on at the same time)
	m/s	m/s (lights Hz and % are on at the same time)
	Length	m or mm (lights A, V and Hz are on at the same time)
	Time	H, min, s, ms (lights V, Hz and % are on at the same time)

The corresponding relationship between the symbols displayed on the LED operation panel and the actual symbols is as follows:

LED display symbols	Actual symbol	LED display symbols	Actual symbol	LED display symbols	Actual symbol
	0		9		H
	1		A		I
	2		b		L
	3		c		n
	4		C		o
	5		d		P
	6		E		r
	7		F		u
	8		G		U

Note: When the highest bit of the LED operation panel displays  , it indicates that the number is negative, for example,  presents -100.00. If the lowest bit is displayed with a decimal point, it also indicates that the number is negative, for example,  presents -20000.

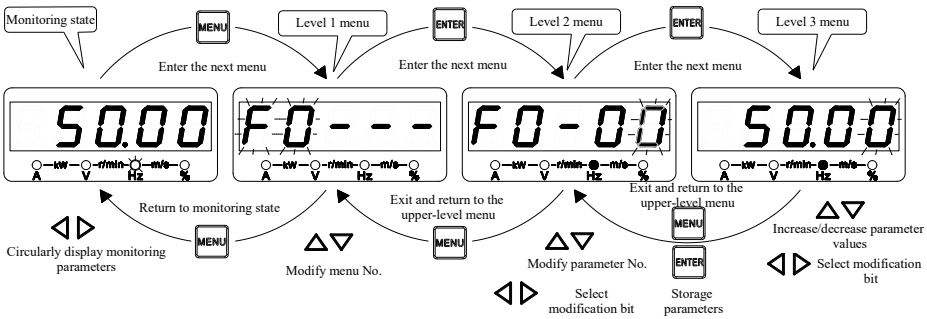
The following table shows the five status indicator lights on the operation panel, i.e., FWD, REV, EXT, RUN and Fault:

Indicator light	Display	Indicated current status of the VFD
RUN indicator	Off	Standby state
	On	Stable operation state
	Flashing	Accelerating or decelerating
FWD indicator light	Off	Set direction and current running direction are reversed
	On	Set direction and current running direction are forward
	Flashing	Set direction and current running direction are inconsistent

Indicator light	Display	Indicated current status of the VFD
REV indicator light	Off	Set direction and current running direction are forward
	On	Set direction and current running direction are reversed
	Flashing	Set direction and current running direction are inconsistent
EXT indicator light	Off	Operation panel control status
	On	Terminal control state
	Flashing	Communication control state
Fault indicator light	Off	Fault-free state
	On	Failed status

4.1.2 Display Status and Operations on the Operations Panel

The display status of Hope530 series VFD operation panel includes monitoring status (including standby monitoring status, running monitoring status), parameter editing status, fault status, alarm status, etc. The conversion relationship of each state is shown below:



Standby monitoring state

Press ◁ and ▷ under the state to enable the operation panel to circularly display different standby state parameters (defined in FC-02~FC-08).

Operation monitoring state

Press ◁ and ▷ under the state to circularly display different operation state parameters (defined in FC-02~FC-12).

Parameter editing state

Press MENU under monitoring state to enter editing state that is displayed as a level 3 menu in sequence of parameter group number→parameter group serial number→parameter value. Press ENTER to enter next level and press MENU to return to previous menu (return to monitoring state if at level 1 menu). Change parameter group number, parameter group serial number or parameter value by pressing △ and ▽. Under level 3 menu, the bit that can be modified will flash, and the bit can be changed by pressing ◁ and ▷, and the modification results can be saved by pressing ENTER, and it will return to level 2 menu and point to next parameters.

When FC-00 is set to 1 (only user parameters are displayed) or 2 (only parameters different from the factory defaults are displayed), the level 1 menu is not displayed to facilitate user operations.

Password verification status

If there is a user password (F0-16 is not zero), enter the password verification status before entering parameter editing. The device shows '————' at this time, and users can enter password by △, ▽, ◁ and ▷, during which the '————' will be displayed all the time. Then password protection can be released by pressing ENTER. If the password is not correct, the keyboard will flash and display 'Err'. At the time, press 'MENU' to return to the verification status and press MENU again to exit password verification status.

After the password protection is removed, the password protection automatically takes effect if pressing the ENTER + ◁ in the monitoring state or pressing no keys within 2min.

When the value of FC-00 is 1 (only user parameters are displayed), user parameters are not protected by passwords. However, user password is required when changing the value of FC-00.

Fault display status

Once detecting fault signal, the VFD will enter fault display status with fault code flashing. Faults can be reset by entering reset commands (◯, control terminal or communication command on operation panel). If the fault still exists, the fault code will be still displayed, during which improper parameters can be modified and set to eliminate the fault.

Alarm display status

If the VFD detects the alarm information, the Nixie tube will display flashing alarm code. In case of multiple alarm signals, they will be displayed alternately, and the alarm display can be temporarily shielded by pressing MENU or ◁. The VFD automatically detects the alarm value, and automatically clears the alarm signal if it returns to normal state. The VFD will not stop when alarming.

4.2 First Energization

Please connect cables according to the technical requirements provided in section 3.2 "VFD Wiring" of this Manual.

After checking the wiring and power supply, close the AC power supply air switch at the input side of the VFD to supply power for the VFD. The VFD operation panel will display "8.8.8.8.8" first. Once the contactor inside the VFD is normally closed, the words displayed by LED Nixie tube at the given frequency, it indicates that the VFD has been initialized. In case of abnormalities during the power-on process, turn off the air switch on the input side to check the cause and eliminate such abnormalities.

4.3 Quick Commissioning Guidelines

This section gives the common and necessary commissioning steps for the speed regulation in the general mode of Hope530 series VFD based on the default values.

4.3.1 Settings for Public Parameters of Each Control Mode

1. Select the control mode: Select control mode according to the application conditions and requirements. For details, see the description of 'Motor Control Mode';

2. Select the frequency set channel and set the frequency: see F0-01 'main given channel for ordinary operation';

3. Select run command channel: see F0-02 'run command channel selection';

4. Correctly set F0-06 'maximum frequency', F0-07 'upper limiting frequency', F0-08 'lower limiting frequency';

5. Motor running direction: confirm the motor wiring phase sequence and set F0-09 'direction locking' according to mechanical load requirements;

6. Acceleration and deceleration time: set as long as possible under the premise of meeting needs. If it is too short, it will produce too much torque, which may damage load or cause overcurrent;

7. Start and stop mode: see F1-19 'start mode' and F1-25 'stop mode';

8. Parameters of motor on nameplate: rated power, number of motor poles, rated current, rated frequency, rated speed, rated voltage.

9. Motor overload protection: see Fb-00 'heat dissipation condition of motor', Fb-01 'motor overload protection value' and Fb-02 'motor overload protection action selection'.

4.3.2 V/F Control Quick Commissioning

V/F control quick commissioning methods based on the condition without PG V/F control are introduced below. If 'with PG V/F control' is adopted, set encoder parameters according to the encoder parameter description.

1. See V/F curve settings;

2. See torque lifting options;

3. Motor parameters self-tuning: see the description of FA-00 on age 125. 'Static self-tuning' is only required to be executed for V/F control.

V/F control optimization adjustment:

1. F2-09 'vibration damping': it is used to eliminate motor oscillation under light load. If the motor oscillates, adjust the parameter from small to large until the oscillation is eliminated, but it shall not be too large;

2. F2-02 'manual torque lifting amplitude': If the starting current is too large, the value of this parameter can be reduced;

3. Automatic torque lift: in order to increase the starting torque of the converter and the output torque during low speed operation, automatic torque lift is recommended (F2-01 "torque lift option" = 2). Automatic torque lift requires correct setting of motor nameplate parameters and motor static self-tuning is also required;

4. Slip compensation: speed drop caused by load can be reduced. Slip compensation is effective only when automatic torque lift is effective. Settings required: F2-05 'slip compensation gain', F2-06 'slip compensation filtering time', and slip compensation amplitude limiting.

4.3.3 Vector Control Quick Commissioning

Vector control quick commissioning methods based on the condition without PG vector control are introduced below. If 'with PG vector control' is adopted, set encoder parameters according to the encoder parameter description.

1. F3-22 'magnetic flux intensity': Adjust the magnetic flux intensity to make the current of motor under no-load operation at low speed (non-flux weakening field) under vector control is close to the no-load current of the motor;

2. Motor parameter self-tuning: no-load and complete motor self-tuning is required for vector control. If no-load complete self-tuning is not possible, correct motor parameters must be manually input, including FA-08 "motor stator resistance", FA-09 "motor leakage inductive reactance", FA-10 "motor rotor resistance", and FA-11 "motor mutual inductive reactance";

3. See settings of speed regulator.

4. For vector control, F2-12 "basic frequency" must be set as the same as FA-04 "motor rated frequency".

5. List of Functional Parameters

Note:

Change: "○" means that both standby and operation state can be changed, "×" means that only the operation state cannot be changed, and "△" means read-only.

F0 Basic Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
F0-00	Digital settings frequency	0.00Hz~F0-06 'maximum frequency'	50.00Hz	○	79
F0-01	Main preset channel for normal operation	**Tens and units: Given channel 1** **Thousands and hundreds: Given channel 2** 0: F0-00 number given 1: COMM1 communication setting 2: COMM2 communication setting 3: AI1 4: AI2 5: AI3 6: AI4 7: UP/DOWN regulating value 8: PFI 9: Arithmetic unit 1 10: Arithmetic unit 2 11: Arithmetic unit 3 12: Arithmetic unit 4 13: Panel potentiometer	0300	○	79
F0-02	Selection for operation command channel	**Units: Command channel 1 selection** **Tens: Command channel 2 selection** 0: Operation panel 1: Virtual terminal 1 (FWD1/REV1) 2: Virtual terminal 2 (FWD2/REV2) 3: COMM1 control 4: COMM2 control	10	×	80
F0-03	Given frequency holding mode	**Units: Power-down storage selection** 0: The main given frequency at which △, ▽ or communication is modified is stored to F0-00 in case of power failure. 1: The main given frequency at which △, ▽ or communication is modified is not stored in case of power failure. **Tens: Stop hold common option** 0: The main given frequency at which △, ▽ is modified is held in case of power failure. 1: The main given frequency at which △, ▽ is modified is recovered to F0-00. **Hundreds: Stop hold compulsory option** 0: Stop hold compulsory option invalid 1: Stop hold compulsory option valid	000	○	80
F0-04	Selection for auxiliary preset channel	0: None 1: F0-00 2: UP/DOWN adjustment value 3: AI1 4: AI2 5: AI3 6: AI4 7: PFI 8: Arithmetic unit 1 9: Arithmetic unit 2 10: Arithmetic unit 3 11: Arithmetic unit 4 12: Panel potentiometer	0	○	80
F0-05	Auxiliary preset gain	-1.000~1.000	1.000	○	80
F0-06	Maximum frequency	F0-07~400.00Hz(V/F)/200.00Hz (vector control)	50.00Hz	×	81
F0-07	Upper limiting frequency	F0-08 "lower limit frequency" ~ F0-06 "maximum frequency"	50.00Hz	×	81
F0-08	Lower limit frequency	0.00Hz~F0-07 "upper limit frequency"	0.00 Hz	×	81

Parameters	Name	Setting Range and Description	Default	Change	Page
F0-09	Direction locking	0: Forward and reverse directions are both ok 1: Lock forward direction 2: Lock reverse direction	0	○	81
F0-10	Parameter write protection	0: No protection 1: Except for F0-00 and F7-04 2: Full protection	0	○	81
F0-11	Parameter initialization	11: Initialization 22: Initialization, except for communication parameters	00	×	81
F0-12	Motor control mode	0: No PG V/F control 1: With PG V/F control 2: No PG vector control 3: With PG vector control 4: V/F separation control 5: With PG vector control 2	0	×	81
F0-13	Rated power of VFD	Min. unit: 0.01kW	Model determination	△	82
F0-14	Software Version No.	0.00~99.99	Version determination	△	82
F0-15	Selection of IO accessories	**Units: IO module** 0: No accessories 1: Digital I/O expansion board 1 2: Digital I/O expansion board 2 3: Digital I/O expansion board 3 4: Analog I/O expansion board 1 **Tens: Communication module** 0: No accessories 1: Isolated RS485 communication expansion board 1 2: Isolated RS485 communication expansion board 2 (support TCP) 3: Profibus-DP or PROFINET communication expansion board **Hundreds: PG card** 0: No accessories 1: Encoder expansion board	000	×	83
F0-16	User's password setting	0000~9999, 0000 indicates that no password is set.	0000	○	83
F0-17	Administrator password settings	0000~9999, 0000 indicates that no password is set.	0000	○	83

F1 Acceleration & Deceleration, Starting, Stopping and Jogging Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
F1-00	Acceleration time 1	0.01~3600.0s Acceleration time: the time required to increase the frequency by 50Hz Deceleration time: the time required to reduce the frequency by 50Hz Note: 22 kW and below models are set to be 6.0s when delivering 30kW and above models are set to be 20.0s when delivering	Model determination	○	83
F1-01	Deceleration time 1				
F1-02	Acceleration time 2				
F1-03	Deceleration time 2				
F1-04	Acceleration time 3				
F1-05	Deceleration time 3				
F1-06	Acceleration time 4				84
F1-07	Deceleration time 4				
F1-08	Acceleration time 5				

Parameters	Name	Setting Range and Description	Default	Change	Page
F1-09	Deceleration time 5	Note: The minimum unit is determined by F1-16			
F1-10	Acceleration time 6				
F1-11	Deceleration time 6				
F1-12	Acceleration time 7				84
F1-13	Deceleration time 7				
F1-14	Acceleration time 8				
F1-15	Deceleration time 8				
F1-16	Minimum unit of acceleration and deceleration time	0: 0.01s 1: 0.1s	1	○	84
F1-17	Acceleration and deceleration time automatic switching point	0.00~400.00Hz, below this point is the acceleration / deceleration time 8	0.00Hz	×	84
F1-18	Emergency stop deceleration time	0.01~3600.0s, the minimum unit is determined by F1-16	10.0s	○	84
F1-19	Method of starting	0: Start from the starting frequency 1: First DC braking and then starting from the starting frequency 2: Speed tracking start	0	×	85
F1-20	Frequency of starting	0.00~60.00Hz	0.50Hz	○	85
F1-21	Starting frequency retention time	0.0~60.0s	0.0s	○	85
F1-22	Voltage soft start	0: Invalid, 1: Valid	1	×	85
F1-23	Starting DC braking time	0.0~60.0s	0.0s	○	85
F1-24	Starting DC braking current	0.0~100.0%, the rated current of the VFD is 100%	0.0%	○	85
F1-25	Stop mode	0: Deceleration stop 1: Free stop 2: deceleration + DC braking 3: deceleration + brake locking delay	0	○	86
F1-26	Stop/DC braking frequency	0.00~60.00Hz	0.50Hz	○	86
F1-27	DC brake waiting time at stop	0.00~10.00s	0.00s	○	86
F1-28	DC braking time at stop	0.0~60.0s, as brake locking delay time at stop	0.0s	○	86
F1-29	DC brake current at stop	0.0~100.0%, the rated current of the VFD is 100%	0.0%	○	86
F1-30	Zero speed delay time	0.0~60.0s	0.0s	○	87
F1-31	Selection of acceleration and deceleration modes	0: Linear acceleration & deceleration 1: S curve acceleration & deceleration	0	×	87
F1-32	S curve acceleration start time	0.01~10.00s	0.20s	×	87
F1-33	S curve acceleration end time				87
F1-34	S curve deceleration start time	0.01~10.00s	0.20s	×	87
F1-35	S curve deceleration end time				87

Parameters	Name	Setting Range and Description	Default	Change	Page
F1-36	Time of positive and reverse rotating dead zone	0.0~3600.0s	0.0s	×	88
F1-37	Jog operation frequency	0.10~50.00Hz	5.00Hz	○	88
F1-38	Jog acceleration time	0.1~60.0s	Model determination	○	88
F1-39	Jog deceleration time	0.1~60.0s	Model determination	○	88

F2 V/F Control Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
F2-00	V/F curve settings	0: Custom 1: Linear 2: Reduced torque V/F curve 1 3: Reduced torque V/F curve 2 4: Reduced torque V/F curve 3 5: Reduced torque V/F curve 4 6: Reduced torque V/F curve 5	1	×	89
F2-01	Torque boost selection	0: None 1: Manual boost 2: Automatic boost 3: manual boost + automatic boost	1	×	89
F2-02	Manual torque boost amplitude	0.0%~ maximum value determined by model, the minimum unit is 0.1%	Model determination	○	89
F2-03	Manual torque boost end point	0.0~100.0%, take F2-12 as 100%	50.0%	○	89
F2-04	Automatic torque boost degree	0.0~100.0%	80.0%	×	89
F2-05	Slip compensation gain	0.0~300.0%	0.0%	○	90
F2-06	Slip compensation filtering time	0.1~25.0s	1.0s	×	90
F2-07	Electric slip compensation amplitude limiting	0 to 250%, with motor rated slip frequency of 100%	200%	×	90
F2-08	Regenerative slip compensation amplitude limiting	0 to 250%, with motor rated slip frequency of 100%	200%	×	90
F2-09	Anti-vibration damping	0~200	Model determination	○	90
F2-10	AVR function settings	0: Invalid 1: Always valid 2: Invalid only when decelerating	1	×	90
F2-11	Automatic energy saving operation selection	0: Invalid 1: Valid	0	○	91
F2-12	Basic frequency	1.00~400.00Hz	50.00Hz	×	91
F2-13	Maximum output voltage	150~500V	380V	×	91
F2-14	V/F frequency value F4	F2-16~F2-12	0.00Hz	×	91
F2-15	V/F voltage value V4	F2-17~100.0%, take F2-13 as 100%	0.0%	×	91
F2-16	V/F frequency value F3	F2-18~F2-14	0.00Hz	×	91
F2-17	V/F voltage value V3	F2-19~F2-15, take F2-13 as 100%	0.0%	×	91

Parameters	Name	Setting Range and Description	Default	Change	Page
F2-18	V/F frequency value F2	F2-20~F2-16	0.00Hz	×	91
F2-19	V/F voltage value V2	F2-21~F2-17, take F2-13 as 100%	0.0%	×	91
F2-20	V/F frequency value F1	0.00Hz~F2-18	0.00Hz	×	91
F2-21	V/F voltage value V1	0.0%~F2-19, take F2-13 as 100%	0.0%	×	91
F2-22	V/F separation voltage input selection	0: F2-23 1: |AI1| 2: |AI2 | 3: |AI3| 4: |AI4| 5: |UP/DOWN regulation value | 6: |PFI| 7: |Arithmetic unit 1| 8: |Arithmetic unit 2| 9: |Arithmetic unit 3| 10: |Arithmetic unit 4|	0	×	92
F2-23	V/F separation voltage digital setting	0.0~100.0%	100.0%	○	92
F2-24	V/F voltage coefficient	0: 100.0% 1: |AI1| 2: |AI2| 3: |AI3| 4: |AI4| 5: |UP/DOWN regulation value | 6: |PFI| 7: |Arithmetic unit 1| 8: |Arithmetic unit 2| 9: |Arithmetic unit 3| 10: |Arithmetic unit 4|	0	×	92

F3 Speed, Torque and Flux Control Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
F3-00	High-speed ASR proportional gain	0.00~200.00	5.00	×	92
F3-01	High-speed ASR integration time	0.010~30.000s	1.000s	×	92
F3-02	Low-speed ASR proportional gain	0.00~200.00	10.00	×	92
F3-03	Low-speed ASR integration time	0.010~30.000s	0.500s	×	92
F3-04	ASR parameter switching point	0.00~400.00Hz	5.00Hz	×	92
F3-05	ASR filtering time	0.000~2.000s	0.010s	×	92
F3-06	Acceleration compensation differential time	0.000~20.000s	0.000s	×	93
F3-07	Torque limitation selection	0: Determined by F3-08 and F3-09 1: |AI1|×2.5 2: |AI2|×2.5 3: |AI3|×2.5 4: |AI4|×2.5 5: |Arithmetic unit 1|×2.5 6: |Arithmetic unit 2|×2.5 7: |Arithmetic unit 3|×2.5 8: |Arithmetic unit 4|×2.5	0	×	93
F3-08	Electric torque limitation	0.0~290.0%, take rated torque of motor as 100% Note: for vector control only.	180.0%	×	93
F3-09	Regenerative torque limitation		180.0%	×	93
F3-10	ASR output frequency limitation	0.0~20.0%, only for these with PG V/F control	10.0%	×	93
F3-11	Sag	0.00~50.00Hz	0.00Hz	○	94
F3-12	Sag starting torque	0.0~100.0%, take rated torque of motor as 100%	0.0%	○	94
F3-13	Torque control selection	0: Digital input 48 selection 1: Valid all the time	0	×	94

Parameters	Name	Setting Range and Description	Default	Change	Page
F3-14	Torque given selection	0: F3-15 setting 1:AI1×2.5 2: AI2×2.5 3: AI3×2.5 4: AI4×2.5 5: PFI×2.5 6: UP/DOWN regulating value×2.5 7: Arithmetic unit 1×2.5 8: Arithmetic unit 2×2.5 9: Arithmetic unit 3×2.5 10: Arithmetic unit 4×2.5	0	×	94
F3-15	Digital torque setting	-290.0~290.0%, take rated torque of motor as 100%	0.0%	○	95
F3-16	Torque control speed limit selection	0: Determination of given frequency 1: Determination of F3-17 and F3-18	0	○	95
F3-17	Forward limit of torque control speed	0.00Hz~F0-07 "upper limit frequency"	5.00Hz	○	95
F3-18	Reversed limit of torque control speed	0.00Hz~F0-07 "upper limit frequency"	5.00 Hz	○	95
F3-19	Torque given increase or decrease time	0.000~10.000s	0.020s	×	95
F3-20	Speed/torque control Switching delay time	0.001~1.000s	0.050s	×	95
F3-21	Pre-excitation time	0.10~5.00s	Model determination	×	95
F3-22	Magnetic flux intensity	50.0~150.0%	94.0%	×	95
F3-23	Low-speed flux lifting	0~50%	0%	×	95
F3-24	Weak magnetic regulator integration time	0.100~3.000s	0.150s	×	95
F3-25	Electric power limit	0.0~250.0%, take rated power of VFD as 100%	120.0%	×	96
F3-26	Regenerative power limit	0.0~250.0%, take rated power of VFD as 100%	120.0%	×	96

F4 Digital Input Terminal and Multi-Speed

Parameters	Name	Setting Range and Description	Default	Change	Page
F4-00	DI1 digital input terminal function	0: Not connected to the following signals 1: Multi-segment frequency selection 1 2: Multi-segment frequency selection 2 3: Multi-segment frequency selection 3 4: Multi-segment frequency selection 4 5: Multi-segment frequency selection 5 6: Multi-segment frequency selection 6 7: Multi-segment frequency selection 7 8: Multi-segment frequency selection 8 9: Acceleration / deceleration time selection 1 10: Acceleration / deceleration time selection 2 11: Acceleration and 36: PID parameter 2 selection 37: Three line stop command 38: Internal virtual FWD1 terminal 39: Internal virtual REV1 terminal 40: Internal virtual FWD2 terminal 41: Internal virtual REV2 terminal 42: Run command channel 1/2 switch 43: FWD1/REV1 terminal command switching to three-wire type 1 (only valid for FWD1/REV1) 44: Main given frequency channel switching 45: Simultaneous switching of main given frequency channel and run command channel	38	×	96
F4-01	DI2 digital input terminal function		39		
F4-02	DI3 digital input terminal function		13		
F4-03	DI4 digital input terminal function		1		
F4-04	DI5 digital input terminal function		2		

Parameters	Name	Setting Range and Description	Default	Change	Page
		deceleration time selection 3 12: External fault input 13: Fault reset 14: Forward jog operation 15: Reverse jog operation 16: Emergency shutdown 17: VFD operation prohibited 18: Free shutdown 19: Terminal UP/DOWN increase 20: Terminal UP/DOWN decrease 21: Terminal UP/DOWN clear 22: PLC control prohibited 23: PLC suspended 24: PLC standby reset 25: PLC mode selection 1 26: PLC mode selection 2 27: PLC mode selection 3 28: PLC mode selection 4 29: PLC mode selection 5 30: PLC mode selection 6 31: PLC mode selection 7 32: Auxiliary given channel forbidden 33: Operation interruption 34: Stop DC braking 35: Process PID forbidden 46: Acceleration & deceleration prohibited 47: Analog quantity given frequency retention 48: Speed/torque control selection 49: Multistage PID selection 1 50: Multistage PID selection 2 51: Multistage PID selection 3 52: Zero servo command 53: Counter presetting 54: Counter reset 55: length counter and counter 2 reset 56: Wobble frequency input 57: Wobble frequency state reset 58: Total fan running time reset 59: PFI is reversed for position setting 60: Motor rated current selection 2 61: Motor rated current selection 3 62: Process PID paused			
F4-05	Positive and negative logic 1 of input terminal	**Ten thousands: DI5 Thousands: DI4** **Hundreds: DI3 Tens: DI2 Units: DI1** 0: Positive logic, valid if circuit is powered and invalid if circuit is not powered 1: Negative logic, invalid if circuit is powered and valid if circuit is not powered	00000	×	99
F4-06	Shake elimination time of digital input terminal	0~2000ms	10ms	○	99
F4-07	DI1 input delay	0.00~400.00s	0.00s	○	99
F4-08	DI1 disconnection delay		0.00s	○	99
F4-09	DI2 input delay		0.00s	○	99
F4-10	DI2 disconnection delay		0.00s	○	99
F4-11	DI3 input delay	0.00~400.00s	0.00s	○	99
F4-12	DI3 disconnection delay		0.00s	○	99
F4-13	FWD1/REV1 and FWD2/REV2 operation mode	**Tens: FWD2/REV2 operation mode (0~4)** **Units: FWD1/REV1 operation mode (0~6)** 0: Single-line type (start/stop) 1: Two-line type 1 (forward, reversal) 2: Two line type 2 (start / stop, direction) 3: Two line type 3 (start, stop) 4: Two-line type 4 (monopulse start and stop) 5: Three-line type 1 (forward, reversal, stop) 6: Three-line type 2 (operation, direction, stop)	01	×	100
F4-14	UP/DOWN adjustment method	0: Terminal level type 1: Terminal pulse type 2: Operation panel level type 3: Operation panel pulse type	0	○	102
F4-15	UP/DOWN rate/step size	0.01~100.00, the unit is %/s or %	1.00	○	102
F4-16	UP/DOWN memory selection	0: Power failure storage 1: Power failure clear 2: Cleared at stop and power failure	0	○	102

Parameters	Name	Setting Range and Description	Default	Change	Page
F4-17	UP/DOWN upper limit	0.0~100.0%	100.0%	○	102
F4-18	UP/DOWN lower limit	－100.0~0.0%	0.0%	○	102
F4-19	Multi-speed selection	0: Code selection 1: Direct selection 2: Superposition mode 3: Quantity selection	0	×	103
F4-20 ~ F4-67	Multistage frequency 1~48	0.00~400.00Hz Multistage frequency 1 ~ multistage frequency 48 are the default multistage frequency numbers, for example: the multistage frequency 3 factory default value is 3.00 Hz	n.00Hz (n=1~48)	○	103
F4-68	PG pulse number per revolution	1~8192	1024	×	104
F4-69	PG type	0: Quadrature encoder, 1: Single channel encoder	0	×	104
F4-70	PG direction selection	0: Positive 1: Negative	0	×	104
F4-71	PG disconnection action	0: No action, 1: Alarm, 2: Fault and free stop	2	×	105
F4-72	PG disconnection detection time	0.1~10.0s	1.0s	×	105
F4-73	PG gear ratio denominator setting	1~1000	1	×	105
F4-74	PG gear ratio molecular setting	1~1000	1	×	105
F4-75	PG speed measurement filtering time	0.000~2.000s	0.005s	○	105
F4-76	DI6 digital input terminal function	The same as DI1~DI5	0	×	105
F4-77	DI7 digital input terminal function		0	×	
F4-78	DI8 digital input terminal function		0	×	
F4-79	DI9 digital input terminal function		0	×	
F4-80	DI10 digital input terminal function		0	×	
F4-81	Positive and negative logic 2 of input terminal	**Ten thousands: DI10 Thousands: DI9** **Hundreds: DI8** **Tens: DI7 Units: DI6** 0: Positive logic, valid if circuit is powered and invalid if circuit is not powered 1: Negative logic, invalid if circuit is powered and valid if circuit is not powered	00000	×	106

Multi-segment Frequency Corresponding Parameter Table:

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Multi-segment frequency n	F4-20	F4-21	F4-22	F4-23	F4-24	F4-25	F4-26	F4-27	F4-28	F4-29	F4-30	F4-31	F4-32	F4-33	F4-34	F4-35
n	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Multi-segment frequency n	F4-36	F4-37	F4-38	F4-39	F4-40	F4-41	F4-42	F4-43	F4-44	F4-45	F4-46	F4-47	F4-48	F4-49	F4-50	F4-51
n	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
Multi-segment frequency n	F4-52	F4-53	F4-54	F4-55	F4-56	F4-57	F4-58	F4-59	F4-60	F4-61	F4-62	F4-63	F4-64	F4-65	F4-66	F4-67

F5 Digital Output and Relay Output Settings

Parameters	Name	Setting Range and Description	Default	Change	Page
F5-00	Digital output terminal signal type selection	**Units: DO2 output selection** 0: digital output 1: PFO pulse frequency output **Tens: DO1 digital output signal type** **Hundreds: DO2 digital output signal type** **Kilobit: T1 relay output signal type** **Myriabit: T2 relay output signal type** 0: Level output 1: Pulse output	00000	×	106
F5-01	DO1 digital output terminal function	0: VFD ready for operation 1: VFD in operation 2: Frequency reached 3: Frequency level detection signal 1 4: Frequency level detection signal 2 5: Fault output 6: Brake locking signal 7: Heavy motor load 8: Motor overload 9: Motor underload 10: Undervoltage lockout 11: External failure shutdown 12: Fault self-resetting 13: Instant power failure and power-on action 14: Alarm output 15: In reverse operation 16: During shutdown process 17: Operation interruption state 18: In operation panel control 19: Torque limiting 20: Limited by frequency upper limit 21: Limited by frequency lower limit 22: In power generation operation 23: Zero-speed operation 24: Zero servo complete signal 25: Host computer digital quantity 1 26: Host computer digital quantity 2 27: Wobble frequency in upper and lower limits 28: Set count value reached 29: Specified count value reached 30: Specified count value reached 2 31: Set length of length counter reached 32: DI1 (after positive and negative logics) 33: DI2 (after positive and negative logics) 34: DI3 (after positive and negative logics) 35: DI4 (after positive and negative logics) 36: DI5 (after positive and negative logics) 37: DI6 (expansion terminal) 38: DI7 (expansion terminal) 39: DI8 (expansion terminal) 40: DI9 (expansion terminal) 41: DI10 (expansion terminal) 42: Comparator 1 output 43: Comparator 2 output 44: Comparator 3 output 45: Comparator 4 output 46: Logic unit 1 output 47: Logic unit 2 output 48: Logic unit 3 output 49: Logic unit 4 output 50: Logic unit 5 output 51: Logic unit 6 output 52: Timer 1 output 53: Timer 2 output 54: Timer 3 output 55: Timer 4 output 56: A (encoder A channel) 57: B (encoder B channel) 58: PFI terminal state 59: Motor virtual loop count pulse 60: PLC running 61: PLC operation paused 62: PLC phase operation completion indication 63: PLC cycle completion indication 64: PLC mode 0 indication 65: PLC mode 1 indication 66: PLC mode 2 indication 67: PLC mode 3 indication 68: PLC mode 4 indication 69: PLC mode 5 indication 70: PLC mode 6 indication 71: PLC mode 7 indication 72: Process PID in sleep 73: Fan life expectancy reached	1		
F5-02	Functions of DO2 digital output terminal		2		
F5-03	T1 relay output function		5		
F5-04	T2 relay output function		13	×	106

Parameters	Name	Setting Range and Description	Default	Change	Page
F5-05	DO1 and DO2 terminal output Positive and negative logics	**Tens: DO2 Units: DO1** 0: Positive logic, valid connection, invalid disconnection 1: Negative logic, valid disconnection, invalid connection	00	×	108
F5-06	DO1 terminal closing delay	0.00~400.00s	0.00s	○	108
F5-07	DO1 terminal opening delay		0.00s		
F5-08	DO2 terminal closing delay		0.00s		
F5-09	DO2 terminal opening delay		0.00s		108
F5-10	T1 terminal closing delay	0.00~400.00s	0.00s	○	108
F5-11	T1 terminal opening delay		0.00s		
F5-12	T2 terminal closing delay		0.00s		
F5-13	T2 terminal opening delay		0.00s		109
F5-14	Frequency reaches detection width	0.00~400.00Hz	2.50Hz	○	109
F5-15	Frequency level detection value 1	0.00~400.00Hz	50.00Hz	○	109
F5-16	Frequency level detection hysteresis value 1	0.00~400.00Hz	1.00Hz	○	109
F5-17	Frequency level detection value 2	0.00~400.00Hz	25.00Hz	○	109
F5-18	Frequency level detection hysteresis value 2	0.00~400.00Hz	1.00Hz	○	109
F5-19	T3 relay output function	The same as the function of T1 and T2	5	×	109
F5-20	T4 relay output function		5		
F5-21	T5 relay output function		5		
F5-22	T6 relay output function		5		
F5-23	T3 terminal closing delay	0.00~400.00s	0.00s	○	110
F5-24	T3 terminal opening delay		0.00s		
F5-25	T4 terminal closing delay		0.00s		
F5-26	T4 terminal opening delay		0.00s		
F5-27	T5 terminal closing delay		0.00s		
F5-28	T5 terminal opening delay		0.00s		
F5-29	T6 terminal closing delay		0.00s		
F5-30	T6 terminal opening delay		0.00s		

F6 Analog and Pulse Frequency Terminal Settings

Parameters	Name	Setting Range and Description	Default	Change	Page
F6-00	AI1 minimum input analog	-100.00 ~ 100.00%, 100% at 10V or 20mA	20.00%	○	110
F6-01	AI1 maximum input analog		100.00%	○	110
F6-02	AI1 minimum input analog Corresponding given/feedback	－100.00~100.00％ Note: The highest frequency shall be used for reference for the given frequency PID reference scalar is for reference for PID feedback	0.00%	○	110
F6-03	AI1 maximum input analog Corresponding given/feedback		100.00%	○	110
F6-04	AI1 inflection point threshold value	AI1 minimum input analog~maximum input analog	20.00%	○	110
F6-05	AI1 inflection point return difference	0~10.00%	0.00%	○	110
F6-06	AI1 inflection point corresponded given value/feedback value	The same as F6-02 and F6-03	0.00%	○	110
F6-07	AI1 filtering time	0.000~10.000s	0.100s	○	110
F6-08	AI1 connection loss threshold	－20.00~20.00％	0.00%	○	110
F6-09	AI1 offline delay	0~360.00s	1.00s	○	110
F6-10	AI2 minimum input analog	-100.00 ~ 100.00%, 100% at 10V or 20mA	0.00%	○	110
F6-11	AI2 maximum input analog		100.00%	○	110
F6-12	Corresponding given value/feedback value of AI2 minimum input analog	－100.00~100.00％ Note: The highest frequency shall be used for reference for the given frequency PID reference scalar is for reference for PID feedback	0.00%	○	110
F6-13	Corresponding given value/feedback value of AI2 maximum input analog		100.00%	○	111
F6-14	AI2 inflection point threshold value	AI2 minimum input analog~maximum input analog	0.00%	○	111
F6-15	AI2 inflection point return difference	0~10.00%	0.00%	○	111
F6-16	Corresponding given value/feedback value of AI2 inflection point	The same as F6-02 and F6-03	0.00%	○	111
F6-17	AI2 filtering time	0.000~10.000s	0.100s	○	111
F6-18	AI2 connection loss threshold	－20.00~20.00％	0.00%	○	111
F6-19	AI2 offline delay	0~360.00s	1.00s	○	111
F6-20	AO1 function selection	0: Operating frequency 1: Given frequency 2: Output current 28: Low-pass filter 2 output 29: Analog multiway switch output	0	○	114

Parameters	Name	Setting Range and Description	Default	Change	Page
		3: Output voltage 4: Output power 5: Output torque 6: Given torque 7: PID feedback value 8: PID set value 9: PID output value 10: AI1 11: AI2 12: AI3 13: AI4 14: PFI 15: UP/DOWN regulating value 16: DC bus voltage 17: Given frequency of acceleration and deceleration ramp 18: PG detection frequency 19: Counter deviation 20: Counter percentage 21: Arithmetic unit 1 output 22: Arithmetic unit 2 output 23: Arithmetic unit 3 output 24: Arithmetic unit 4 output 25: Arithmetic unit 5 output 26: Arithmetic unit 6 output 27: Low-pass filter 1 output 30: Comparator 1 digital setting 31: Comparator 2 digital setting 32: Comparator 3 digital setting 33: Comparator 4 digital setting 34: Arithmetic unit 1 digital setting 35: Arithmetic unit 2 digital setting 36: Arithmetic unit 3 digital setting 37: Arithmetic unit 4 digital setting 38: Arithmetic unit 5 digital setting 39: Arithmetic unit 6 digital setting 40: COMM1 host computer analog 1 41: COMM1 host computer analog 2 42: Manufacturer output 1 43: Manufacturer output 2 44: COMM2 host computer analog 1 45: COMM2 host computer analog 2			
F6-21	AO1 type selection	0:0~10V OR 0~20mA 1:2~10V or 4~20mA 2: centered on 5V or 10mA	1	○	114
F6-22	AO1 gain	0.0~1000.0%	100.0%	○	114
F6-23	AO1 bias	-100.00 ~ 100.00%, 100% at 10V or 20mA	0.00%	○	114
F6-24	AO2 function selection	Same as AO1 function selection F6-20	2	○	114
F6-25	AO2 type selection	Same as AO1 type selection F6-21	0	○	114
F6-26	AO2 gain	0.0~1000.0%	100.0%	○	114
F6-27	AO2 bias	-100.00 ~ 100.00%, 100% at 10V or 20mA	0.00%	○	114
F6-28	100% corresponding PFI frequency	0~50000Hz	10000Hz	○	115
F6-29	0% corresponding PFI frequency	0~50000Hz	0Hz	○	115
F6-30	PFI filtering time	0.000~10.000s	0.100s	○	115
F6-31	PFO function selection	Same as AO1 function selection F6-20	0	○	115
F6-32	PFO output pulse modulation method	0: Frequency modulation 1: Duty ratio modulation	0	○	115
F6-33	100% corresponding PFO frequency	0 to 50000 Hz, also as the duty ratio modulation frequency	10000Hz	○	115
F6-34	0% corresponding PFO frequency	0~50000Hz	0Hz	○	115
F6-35	100% corresponding PFO duty ratio	0.0~100.0%	100.0%	○	115
F6-36	0% corresponding PFO duty ratio	0.0~100.0%	0.0%	○	115
F6-37	AI3 minimum input analog	0.00~100.00%, take 10V or 20mA as 100%	0.00%	○	116

Parameters	Name	Setting Range and Description	Default	Change	Page
F6-38	AI3 maximum input analog		100.00%	○	116
F6-39	Corresponding given value/feedback value of AI3 minimum input analog	－100.00~100.00％ Note: The highest frequency shall be used for reference for the given frequency PID reference scalar is for reference for PID feedback	0.00%	○	116
F6-40	Corresponding given value/feedback value of AI3 maximum input analog		100.00%	○	116
F6-41	AI3 inflection point threshold value	AI3 minimum input analog~maximum input analog	0.00%	○	116
F6-42	AI3 inflection point return difference	0~10.00%	0.00%	○	116
F6-43	Corresponding given value/feedback value of AI3 inflection point	The same as F6-02 and F6-03	0.00%	○	116
F6-44	AI3 filtering time	0.000~10.000s	0.100s	○	116
F6-45	AI3 connection loss threshold	0.00~20.00％	0.00%	○	116
F6-46	AI3 offline delay	0~360.00s	1.00s	○	116
F6-47	AI4 minimum input analog	0.00~100.00％, take 10V or 20mA as 100％	0.00%	○	116
F6-48	AI4 maximum input analog		100.00%	○	116
F6-49	Corresponding given value/feedback value of AI4 minimum input analog	－100.00~100.00％ Note: The highest frequency shall be used for reference for the given frequency PID reference scalar is for reference for PID feedback	0.00%	○	116
F6-50	Corresponding given value/feedback value of AI4 maximum input analog		100.00%	○	116
F6-51	AI4 inflection point threshold value	AI4 minimum input analog~maximum input analog	0.00%	○	116
F6-52	AI4 inflection point return difference	0~10.00%	0.00%	○	116
F6-53	Corresponding given value/feedback value of AI4 inflection point	The same as F6-02 and F6-03	0.00%	○	116
F6-54	AI4 filtering time	0.000~10.000s	0.100s	○	116
F6-55	AI4 offline threshold	0.00~20.00％	0.00%	○	116
F6-56	AI4 offline delay	0~360.00s	1.00s	○	116
F6-57	AO3 function selection	Same as AO1 function selection F6-20	2	○	116
F6-58	AO3 type selection	Same as AO1 type selection F6-21	0	○	116
F6-59	AO3 gain	0.0~1000.0％	100.0%	○	116
F6-60	AO3 bias	-100.00 ~ 100.00%, 100% at 10V or 20mA	0.00%	○	116

F7 Process PID Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
F7-00	PID control function selection	0: Non-selection process PID control 1: Selection process PID control 2: Select PID to correct the given frequency before the acceleration and deceleration ramp 3: Select PID to correct the given frequency after the acceleration and deceleration ramp 4: Select PID for torque correction 5: Free PID function	0	×	117
F7-01	Given channel selection	0: F7-04 1: AI1 2: AI2 3: AI3 4: AI4 5: PFI 6: UP/DOWN regulating value 7: Arithmetic unit 1 8: Arithmetic unit 2 9: Arithmetic unit 3 10: Arithmetic unit 4	0	×	118
F7-02	Feedback channel selection	0: AI1 1: AI2 2: AI3 3: AI4 4: PFI 5: AI1－AI2 6: AI1＋AI2 7: AI3－AI4 8: AI3＋AI4 9: $\sqrt{\lvert AI1\rvert}$ 10: $\sqrt{\lvert AI2\rvert}$ 11: $\sqrt{\lvert AI1-AI2\rvert}$ 12: $\sqrt{\lvert AI1\rvert}+\sqrt{\lvert AI2\rvert}$ 13: Arithmetic unit 1 14: Arithmetic unit 2 15: Arithmetic unit 3 16: Arithmetic unit 4	0	×	118
F7-03	PID display coefficient	0.010~10.000, only affects the monitoring menu	1.000	○	118
F7-04	PID digit given	－100.0~100.0%	0.0%	○	118
F7-05	Proportional gain 1	0.00~100.00	0.20	○	118
F7-06	Integration time 1	0.01~100.00s	20.00s	○	118
F7-07	Derivation time 1	0.00~10.00s	0.00s	○	118
F7-08	Proportional gain 2	0.00~100.00	0.20	○	118
F7-09	Integration time 2	0.01~100.00s	20.00s	○	118
F7-10	Derivation time 2	0.00~10.00s	0.00s	○	118
F7-11	PID parameter transition mode	0: Digital input 36 "PID parameter 2 selection" determined 1: Transition according to running frequency 2: |Arithmetic unit 1| 3: |Arithmetic unit 2| 4: |Arithmetic unit 3| 5: |Arithmetic unit 4|	0	×	119
F7-12	Sampling period	0.001~10.000s	0.010s	○	119
F7-13	Deviation limit	0.0~20.0%, take PID given value as 100%	0.0%	○	119
F7-14	Increase or decrease time of quantity given	0.00~20.00s	0.00s	○	119
F7-15	PID regulation characteristics	0: Active, 1: Counteractive	0	×	119
F7-16	Integral adjustment selection	0: Without integral action 1: With integral action	1	×	120
F7-17	PID upper limit amplitude	F7-18 "PID lower limit amplitude" ~ 100.0%	100.0%	○	120
F7-18	PID lower limit amplitude	-100.0%~F7-17 "PID upper limit amplitude"	0.0%	○	120
F7-19	PID derivation limit amplitude	0.0~100.0%, limit amplitude of the derivation upper and lower limits	5.0%	○	120
F7-20	PID preset	F7-18~F7-17	0.0%	○	120
F7-21	PID preset retention time	0.0~3600.0s	0.0s	×	120

Parameters	Name	Setting Range and Description	Default	Change	Page
F7-22	Multistage PID given 1	−100.0~100.0%	1.0%	○	120
F7-23	Multistage PID given 2		2.0%		
F7-24	Multistage PID given 3		3.0%		
F7-25	Multistage PID given 4		4.0%		
F7-26	Multistage PID given 5		5.0%		
F7-27	Multistage PID given 6		6.0%		
F7-28	Multi-segment PID given 7		7.0%		
F7-29	Sleep frequency	0.00~400.00Hz	40.00Hz	○	120
F7-30	Sleep waiting time	0.0~3600.0s	60.0s	○	121
F7-31	Sleep deviation	0.00~100.00%	0.00%	○	121
F7-32	Wake-up delay time	0.000~60.000s	0.500s	○	121
F7-33	Wake-up deviation	0.00~100.00%, note: 100.00% with no sleep function	100.00%	○	121
F7-34	PID modified maximum frequency	0.00～300.00Hz. Note: F7-00 “PID control function selection” =valid when it is 2 or 3	1.00Hz	○	121

F8 Simple PLC

Parameters	Name	Setting Range and Description	Default	Change	Page
F8-00	PLC running settings	**Units: PLC operation mode selection** 0: No PLC operation 1: Stop after cycling the number of times set in F8-02 2: Maintain the final value after cycling the number of times set in F8-02 3: Continuous cycle **Tens: PLC interrupt operation restart mode selection** 0: Run from the first section 1: Continue to run from the phase frequency of the interruption moment 2: Continue to run from the operation frequency of the interruption moment **Hundreds: PLC state parameter storage selection in case of power outage** 0: No storage 1: Storage **Thousands: Stage time unit selection** 0: Second, 1: Minute	0000	×	122
F8-01	PLC mode settings	**Units: PLC operation mode and segment number division** 0:1×48, a total of 1 mode, 48 segments of each mode 1:2×24, a total of 2 modes, 24 segments of each mode 2:3×16, a total of 3 modes, 16 segments of each mode 3:4×12, a total of 4 modes, 12 segments of each mode 4:6×8, a total of 6 modes, 8 segments of each mode 5:8×6, a total of 8 modes, 6 segments of each mode **Tens: PLC operation mode selection**	00	×	122

Parameters	Name	Setting Range and Description	Default	Change	Page
		0: Terminal code selection 1: Direct selection of terminal 2~9: mode 0~mode 7			
F8-02	PLC cycle times	1~65535	1	×	122
F8-03 ~ F8-97	Settings for stage 1~48	**Units: Running direction** 0: Forward running 1: Reversed running **Tens: Acceleration and deceleration time selection** 0: Acceleration / deceleration time 1 1: Acceleration / deceleration time 2 2: Acceleration / deceleration time 3 3: Acceleration / deceleration time 4 4: Acceleration and deceleration time 5 5: Acceleration and deceleration time 6 6: Acceleration and deceleration time 7 7: Acceleration and deceleration time 8	00	○	122
F8-04 ~ F8-98	Time of stages 1~48	0.0 to 4000.0 (seconds or minutes) The unit is determined by the thousands place of F8-00 "PLC operation mode"	0.0	○	122

PLC and multi-stage frequency corresponding parameters are shown below:

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stage n settings	F8-03	F8-05	F8-07	F8-09	F8-11	F8-13	F8-15	F8-17	F8-19	F8-21	F8-23	F8-25	F8-27	F8-29	F8-31	F8-33
Stage n time	F8-04	F8-06	F8-08	F8-10	F8-12	F8-14	F8-16	F8-18	F8-20	F8-22	F8-24	F8-26	F8-28	F8-30	F8-32	F8-34
Multi-segment frequency n	F4-20	F4-21	F4-22	F4-23	F4-24	F4-25	F4-26	F4-27	F4-28	F4-29	F4-30	F4-31	F4-32	F4-33	F4-34	F4-35
n	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Stage n settings	F8-35	F8-37	F8-39	F8-41	F8-43	F8-45	F8-47	F8-49	F8-51	F8-53	F8-55	F8-57	F8-59	F8-61	F8-63	F8-65
Stage n time	F8-36	F8-38	F8-40	F8-42	F8-44	F8-46	F8-48	F8-50	F8-52	F8-54	F8-56	F8-58	F8-60	F8-62	F8-64	F8-66
Multi-segment frequency n	F4-36	F4-37	F4-38	F4-39	F4-40	F4-41	F4-42	F4-43	F4-44	F4-45	F4-46	F4-47	F4-48	F4-49	F4-50	F4-51
n	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
Stage n settings	F8-67	F8-69	F8-71	F8-73	F8-75	F8-77	F8-79	F8-81	F8-83	F8-85	F8-87	F8-89	F8-91	F8-93	F8-95	F8-97
Stage n time	F8-68	F8-70	F8-72	F8-74	F8-76	F8-78	F8-80	F8-82	F8-84	F8-86	F8-88	F8-90	F8-92	F8-94	F8-96	F8-98
Multi-segment frequency n	F4-52	F4-53	F4-54	F4-55	F4-56	F4-57	F4-58	F4-59	F4-60	F4-61	F4-62	F4-63	F4-64	F4-65	F4-66	F4-67

F9 Wobble Frequency, Counter, Length Counter, Zero Servo

Parameters	Name	Setting Range and Description	Default	Change	Page
F9-00	Wobble frequency input mode	0: Wobble frequency invalid 1: Automatic input 2: Manual input	0	×	126
F9-01	Wobble frequency control mode	0: Center frequency of wobble frequency is 100% 1: Maximum frequency of wobble frequency is 100%	0	×	126
F9-02	Preset frequency of wobble frequency	F0-08 "lower limit frequency" ~ F0-07 "upper limit frequency"	0.00Hz	○	127
F9-03	Preset frequency waiting time of wobble frequency	0.0~3600.0s	0.0s	○	127

Parameters	Name	Setting Range and Description	Default	Change	Page
F9-04	Wobble frequency amplitude	0.0~50.0%, relative to the central frequency or maximum frequency	0.0%	○	127
F9-05	Kick frequency	0.0~50.0%, actual wobble frequency amplitude is 100%	0.0%	○	127
F9-06	Step time	0~50ms	0ms	○	127
F9-07	Wobble frequency cycle	0.1~1000.0s	10.0s	○	127
F9-08	Rise time	0.0~100.0%, take F9-07 as 100%	50.0%	○	127
F9-09	Oscillation randomness	0.0~50.0%, take F9-07 as 100%	0.0%	○	127
F9-10	Wobble frequency restart and power outage processing	**Units: Wobble frequency stop restart mode** 0: Start according to the memory before stop 1: Restart **Tens: Power-off storage selection under wobble frequency state** 0: Power-off storage wobble frequency state 1: Not store under power outage	00	×	127
F9-11	Selection of counting mode	0: General counting 1: Orthogonal counting	0	×	128
F9-12	Counter increment instruction selection	High-speed counting can be achieved together with DO1 digital output terminal function F5-01 'selection of digital output 56~58'	56	○	128
F9-13	Counter decrement instruction selection		57	○	129
F9-14	Counter preset value	0~65535	0	○	129
F9-15	Set counter	F9-16 'specified count value'~65535	10000	○	129
F9-16	Specified count value 1	0~F9-15 'set count value'	0	○	129
F9-17	Specified count value 2	0~F9-15 'set count value'	0	○	129
F9-18	Counter frequency dividing coefficient	1~65535	1	○	129
F9-19	Length counter input instruction selection	High-speed length counting can be achieved together with DO1 digital output terminal function F5-01 'selection of digital output 56~58'	0	○	130
F9-20	Length counter set length	0~65535m	1000 m	○	130
F9-21	Pulses per meter of length counter	0.1~6553.5	100.0	○	130
F9-22	Zero servo control selection	0: Invalid 1: Always valid 2: Digital input 52 selection	0	×	131
F9-23	Zero-speed level	0~120r/min	30r/min	×	131
F9-24	Zero servo end amplitude	1~10000 pulses	10	○	131
F9-25	Zero servo control gain	0.00~50.00	1.00	×	131
F9-26	Position control digital setting	-32768~32767	0	○	131
F9-27	Electronic gear numerator setting	1~65535	1	○	132
F9-28	Electronic gear denominator setting	1~65535	1	○	132
F9-29 ~ F9-38	Reserved	—	—	—	—

FA Motor Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
FA-00	Motor parameters self-tuning	11: Static self-tuning 22: No-load complete self-tuning	00	×	132
FA-01	Motor rating	0.40~500.00kW	Model determination	×	132
FA-02	Pole number of the gear reductor	2~48	4	×	132
FA-03	Motor rated current	0.5~1200.0A	Model determination	×	132
FA-04	Motor rated frequency	1.00~400.00Hz	50.00Hz	×	132
FA-05	Motor rated speed	125~40000r/min	Model determination	×	133
FA-06	Rated motor voltage	150~500V	380V	×	133
FA-07	Motor no-load current	0.1A~FA-03 "Motor rated current"	Model determination	×	133
FA-08	Motor stator resistance	0.00~50.00%	Model determination	○	133
FA-09	Leakage inductive reactance of motor	0.00~50.00%	Model determination	○	133
FA-10	Motor rotor resistance	0.00~50.00%	Model determination	○	134
FA-11	Mutual inductance resistance of motor	0.0~2000.0%	Model determination	○	134
FA-12	Motor core saturation coefficient 1	1.000~1.500	1.300	×	134
FA-13	Motor core saturation coefficient 2	1.000~FA-12 "motor core saturation coefficient 1"	1.100	×	134
FA-14	Motor core saturation coefficient 3	FA-15 "motor core saturation coefficient 4"~1.000	0.900	×	134
FA-15	Motor core saturation coefficient 4	0.300~1.000	0.700	×	134
FA-16	Motor rated current 2	0.5~1200.0A	Model determination	×	134
FA-17	Motor rated current 3	0.5~1200.0A	Model determination	×	134

Fb Protection Function and VFD Advanced Settings

Parameters	Name	Setting Range and Description	Default	Change	Page
Fb-00	Motor cooling condition	0: Ordinary motor 1: Conversion motor or motor with independent fan	0	○	135
Fb-01	Motor overload protection value	50.0~150.0%, rated current of the motor as 100%	100.0%	○	135
Fb-02	Motor overload protection action selection	0: No action 1: Alarm 2: Fault and free stop	2	×	135
Fb-03	Heavy load protection option of motor	**Units: Heavy load detection selection** 0: Keep detecting, 1: Only detect at constant speed **Tens: Heavy load action selection** 0: No action, 1: Alarm, 2: Fault and free stop	00	×	135

Parameters	Name	Setting Range and Description	Default	Change	Page
Fb-04	Motor overload detection level	20.0~200.0%, rated current of the motor as 100%	130.0%	×	135
Fb-05	Motor load overweight detection time	0.0~30.0s	5.0s	×	135
Fb-06	Motor under-load protection	0: No action, 1: Alarm, 2: Fault and free stop	0	×	136
Fb-07	Motor underload protection level	0.0~100.0%, the rated current of the motor is 100%	30.0%	×	136
Fb-08	Underload protection detection frequency	0.00~50.00Hz	0.00Hz	○	136
Fb-09	Underload protection detection time	0.0~100.0s	1.0s	×	136
Fb-10	Analog input connection loss action	0: No action 1: Alarm, run at the average operation frequency of 10s before connection loss 2: Alarm, run at an analog input offline force frequency 3: Fault, and free stop	0	×	136
Fb-11	Analog input offline force frequency	0.00Hz~F0-06 'maximum frequency'	0.00Hz	○	136
Fb-12	Other protection action selections	**Units: VFD input phase loss protection** 0: No action, 1: Alarm, 2: Fault and free stop **Tens: VFD output phase loss protection** 0: No action, 1: Alarm, 2: Fault and free stop **Hundreds: Grounding test** 0: No test 1: Test only when powering up 2: Test before operation 3: Test during operation **Thousands: Parameter storage failure action selection** 0: Alarm 1: Fault and free stop **Ten Thousands: treatment for AC input power offline** 0: NO actions 1: Alarm	10122	×	136
Fb-13	Overcurrent & stall prevention selection	Units: Accelerate overcurrent & stall prevention Tens: Constant-speed over-current stall prevention 0: Invalid 1: Valid, limited time: 1min 2: Valid, unlimited time Hundreds: Stall mode selection 0: Mode 1 1: Mode 2 2: Mode 3	011	×	136
Fb-14	Acceleration overcurrent & stall point	50.0~200.0%, the rated current of the VFD is 100%	150.0%	×	137
Fb-15	Constant speed overcurrent & stall point	50.0~200.0%, the rated current of the VFD is 100%	150.0%	×	137
Fb-16	Overvoltage & stall prevention selection	0: Invalid, 1: Valid	1	×	137
Fb-17	Overvoltage stalling point	400~750V	700V	×	137
Fb-18	DC bus undervoltage action	0: Free shutdown, reporting undervoltage fault (Er.dcL) 1: Free stop, limited time power recovery and restart 2: Free stop, power supply recovery and restart during CPU operation 3: Slow operation and maintain bus voltage	0	×	137

Parameters	Name	Setting Range and Description	Default	Change	Page
Fb-19	DC bus undervoltage point	280~480V	400V	×	138
Fb-20	Instantaneous power failure allowable time	0.0~30.0s	0.1s	×	138
Fb-21	Instantaneous stop deceleration time	0.0~200.0s, if set to 0.0, the current deceleration time will be used	5.0s	×	138
Fb-22	Automatic reset times for faults	0~10, module protection and external fault without self-reset function	0	×	138
Fb-23	Interval time for automatic reset	1.0~30.0s	5.0s	×	138
Fb-24	Fault output during automatic reset period	0: No output, 1: Output	0	×	138
Fb-25	Instantaneous stop, self-reset, restart mode after operation interruption	0: Start by start mode, 1: Track & start	1	×	138
Fb-26	Automatic start after power supply is allowed	0: Forbidden, 1: Allowed	1	○	139
Fb-27	Braking unit operating point	620~720V	680V	○	139
Fb-28	Modulation method	0: Auto 1: Continuous modulation	0	○	139
Fb-29	Carrier frequency	15kW and below: 1.1k~12.0 kHz, factory default: 4.0kHz 18.5~30 kW: 1.1k~10.0 kHz, factory default: 3.0kHz 37~160 kW: 1.1k~8.0 kHz, factory default: 2.5kHz 200kW and above: 1.1k~5.0 kHz, factory default: 2.0kHz	Model determination	○	139
Fb-30	Attached PWM settings	0~30%	0%	○	139
Fb-31	Automatic adjustment selection of carrier frequency	0: Forbidden, 1: Allowed	1	○	139
Fb-32	Dead zone compensation is allowed	0: Forbidden, 1: Allowed	1	×	139
Fb-33	Space vector angle stop memory	0: No memory 1: With memory	0	×	140
Fb-34	Overmodulation enabled	0: Forbidden, 1: Allowed	1	×	140
Fb-35	Control of cooling fan	0: Power off after 3min of standby 1: Keep running 2: Always running	0	○	140
Fb-36	Avoidance frequency 1	0.00~625.00Hz	0.00Hz	○	140
Fb-37	Avoidance frequency 1 width	0.00~20.00Hz	0.00Hz	○	140
Fb-38	Avoidance frequency 2	0.00~625.00Hz	0.00Hz	○	140
Fb-39	Avoidance frequency 2 width	0.00~20.00Hz	0.00Hz	○	140
Fb-40	Avoidance frequency 3	0.00~625.00Hz	0.00Hz	○	140
Fb-41	Avoidance frequency 3 width	0.00~20.00Hz	0.00Hz	○	140

Parameters	Name	Setting Range and Description	Default	Change	Page
Fb-42	Fan life expectancy settings	1~40000h	40000h	○	141

FC Keyboard Operation and Display Settings

Parameters	Name	Setting Range and Description	Default	Change	Page
FC-00	Display parameter selection	0: All 1: User parameters 2: Different from factory default	0	○	141
FC-01	Key function and automatic lock	**Units: Automatic locking function of keys** 0: Not locked 1: Fully locked 2: Fully locked except ○ 3: Fully locked except ◁ and ▷ 4: Fully locked except ○, ◁ and ▷ 5: Fully locked except ▯ and ○ **Tens: ○ function selection** 0: Valid only when in the operation panel running command channel 1: Valid when on operation panel, and in terminal and communication operation command channel and stop according to stop mode 2: The device stops according to stop mode in running command channel on the operation panel and stops freely in running command channel not on the operation panel, and it also reports Er.Abb **Hundreds: ▯ function selection (only for panel command channel)** 0: Select run function 1: Select jogging function **Kilobit: Direction key combination function selection** 0: long press ◁ and △ combination key or ▷ and ▽ combination key, the function of simultaneously switching the main given frequency channel and running command channel is invalid. 1: long press ◁ and △ combination key or ▷ and ▽ combination key, the function of simultaneously switching the main given frequency channel and running command channel is valid.	0000	×	141
FC-02	Monitoring parameter selection 1	−1~56 It aims to select the monitoring parameters displayed in both running and standby monitoring states Note: -1 refers to empty, 0~56 refers to FU-00~FU-56 Minimum value of FC-02 is 0.	1	○	142
FC-03	Monitoring parameter selection 2		−1	○	142
FC-04	Monitoring parameter selection 3		−1	○	142
FC-05	Monitoring parameter selection 4		−1	○	142
FC-06	Monitoring parameter selection 5		−1	○	142
FC-07	Monitoring parameter selection 6		−1	○	142
FC-08	Monitoring parameter selection 7		−1	○	143

Parameters	Name	Setting Range and Description	Default	Change	Page
FC-09	Operation monitoring parameter 1	－1~56 It aims to select monitoring parameters that are displayed only in the running monitoring state Note: -1 refers to empty, 0~56 refers to FU-00~FU-56	0	○	143
FC-10	Operation monitoring parameter 2		2	○	143
FC-11	Operation monitoring parameter 3		4	○	143
FC-12	Operational monitoring parameter 4		-1	○	143
FC-13	Speed display coefficient	0.001~10.000	1.000	○	143
FC-14	Linear velocity display coefficient	0.01~100.00	0.01	○	143
FC-15 ~ FC-44	User parameter 1 ~ User parameter 30	-00.01~FU.56, except manufacturer parameter Fn -00.01 is empty, the others are the parameter numbers, for example, F0.01 means F0-01	-00.01	○	143
FC-45	User parameter 31	Fixed to FC-00 'display parameter selection'	FC.00	△	143
FC-46	User parameter 32	Fixed to F0-10 'Parameter writing protection'	F0.10	△	143
FC-47	Administrator parameters	Fixed to F0-17 'administrator password'	F0.17	△	143

User parameter corresponding table:

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
User parameter n	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21	FC-22	FC-23	FC-24	FC-25	FC-26	FC-27	FC-28	FC-29	FC-30
n	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
User parameter n	FC-31	FC-32	FC-33	FC-34	FC-35	FC-36	FC-37	FC-38	FC-39	FC-40	FC-41	FC-42	FC-43	FC-44	FC-45	FC-46

Fd Retained by the manufacturer.

FE Programmable Unit

Parameters	Name	Setting Range and Description	Default	Change	Page
FE-00	Comparator 1 in-phase input selection	Options are the same as AO1 function selection F6-20	0	○	143
FE-01	Comparator 1 inverted input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-02	Configuration of comparator 1	**Units: function settings** 0: ＞ 1: ＜ 2: ＝ 3: ≠ 4: Output is always 1 5: Output is always 0 **Tens: whether absolute value is required** 0: Absolute value not required 1: Absolute value required **Hundreds: Comparator output connection protection function selection** 0: No action, 1: Alarm, 2: Fault and free stop	005	○	144
FE-03	Comparator 1 digital setting	－100.0~100.0%	50.0%	○	144
FE-04	Comparator 1 error band	0.0~100.0%	5.0%	○	144
FE-05	Comparator 1 output selection	Options are the same as DI1 digital input terminal function F4	0	○	144

Parameters	Name	Setting Range and Description	Default	Change	Page
FE-06	Comparator 2 in-phase input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-07	Comparator 2 inverted input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-08	Configuration of comparator 2	Options are the same as configuration FE-02 of comparator 1	005	○	144
FE-09	Comparator 2 digital setting	－100.0~100.0%	50.0%	○	144
FE-10	Comparator 2 error band	0.0~100.0%	5.0%	○	144
FE-11	Comparator 2 output selection	Options are the same as DI1 digital input terminal function F4	0	○	144
FE-12	Comparator 3 in-phase input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-13	Comparator 3 inverted input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-14	Configuration of comparator 3	Options are the same as configuration FE-02 of comparator 1	005	○	144
FE-15	Comparator 3 digital setting	－100.0~100.0%	50.0%	○	144
FE-16	Comparator 3 error band	0.0~100.0%	5.0%	○	144
FE-17	Comparator 3 output selection	Options are the same as DI1 digital input terminal function F4	0	○	144
FE-18	Comparator 4 in-phase input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-19	Comparator 4 inverted input selection	Options are the same as AO1 function selection F6-20	0	○	144
FE-20	Configuration of comparator 4	Options are the same as configuration FE-02 of comparator 1	005	○	144
FE-21	Comparator 4 digital setting	－100.0~100.0%	50.0%	○	144
FE-22	Comparator 4 error band	0.0~100.0%	5.0%	○	144
FE-23	Comparator 4 output selection	Options are the same as DI1 digital input terminal function F4	0	○	144
FE-24	Logical unit 1 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	145
FE-25	Logical unit 1 input 2 selection		0	○	145
FE-26	Configuration of logical unit 1	0: And 1: Or 2: NAND 3: NOR 4: XOR (≠) 5: XNOR (=) 6: Input 1 directly outputs 7: Input 1 outputs inversely 8: Output is always 1 9: Output is always 0 10: R-S trigger	9	○	145
FE-27	Logical unit 1 output selection	Options are the same as DI1 digital input terminal function F4	0	○	145
FE-28	Logical unit 2 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	145
FE-29	Logical unit 2 input 2 selection		0	○	145

Parameters	Name	Setting Range and Description	Default	Change	Page
FE-30	Configuration of logical unit 2	Options are the same as logical unit 1 configuration FE-26	9	○	145
FE-31	Logical unit 2 output selection	Options are the same as DI1 digital input terminal function F4	0	○	145
FE-32	Logical unit 3 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	145
FE-33	Logical unit 3 input 2 selection		0	○	145
FE-34	Configuration of logical unit 3	Options are the same as logical unit 1 configuration FE-26	9	○	146
FE-35	Logical unit 3 output selection	Options are the same as DI1 digital input terminal function F4	0	○	146
FE-36	Logical unit 4 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	146
FE-37	Logical unit 4 input 2 selection		0	○	146
FE-38	Configuration of logical unit 4	Options are the same as logical unit 1 configuration FE-26	9	○	146
FE-39	Logical unit 4 output selection	Options are the same as DI1 digital input terminal function F4	0	○	146
FE-40	Logical unit 5 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	146
FE-41	Logical unit 5 input 2 selection		0	○	146
FE-42	Configuration of logical unit 5	Options are the same as logical unit 1 configuration FE-26	9	○	146
FE-43	Logical unit 5 output selection	Options are the same as DI1 digital input terminal function F4	0	○	146
FE-44	Logical unit 6 input 1 selection	Options are the same as DO1 digital output terminal function F5-01	0	○	146
FE-45	Logical unit 6 input 2 selection		0	○	146
FE-46	Configuration of logical unit 6	Options are the same as logical unit 1 configuration FE-26	9	○	146
FE-47	Logical unit 6 input selection	Options are the same as DI1 digital input terminal function F4	0	○	146
FE-48	Timer 1 input selection	Options are the same as DO1 digital output terminal function F5-01	0	○	146
FE-49	Configuration of timer 1	**Units: type of timer** 0: Rising edge delay 1: Falling edge delay 2: Both rising and falling edges are delayed 3: Pulse function **Tens: set time multiplier** 0: 1 time 1: 10 times 2: 100 times 3: 1000 times 4: 10000 times 5: 100000 time **Hundreds: output signal settings** 0: No inversion 1: Inversion 2: Output always 1 3: Output always 0 4: And 5: And after inversion 6: Or 7: Or after inversion	300	○	146

Parameters	Name	Setting Range and Description	Default	Change	Page
FE-50	Set time of timer 1	0~40000ms, delay time = set time x multiplier	0ms	○	146
FE-51	Timer 1 output selection	Options are the same as DI1 digital input terminal function F4	0	○	146
FE-52	Timer 2 input selection	Options are the same as DO1 digital output terminal function F5-01	0	○	146
FE-53	Configuration of timer 2	Options are the same as configuration FE-49 of timer 1	300	○	146
FE-54	Set time of timer 2	0~40000ms, delay time = set time x multiplier	0ms	○	146
FE-55	Timer 2 output selection	Options are the same as DI1 digital input terminal function F4	0	○	147
FE-56	Timer 3 input selection	Options are the same as DO1 digital output terminal function F5-01	0	○	147
FE-57	Configuration of timer 3	Options are the same as configuration FE-49 of timer 1	300	○	147
FE-58	Set time of timer 2	0~40000ms, delay time = set time x multiplier	0ms	○	147
FE-59	Timer 3 output selection	Options are the same as DI1 digital input terminal function F4	0	○	147
FE-60	Timer 4 output selection	Options are the same as DO1 digital output terminal function F5-01	0	○	147
FE-61	Configuration of timer 4	Options are the same as configuration FE-49 of timer 1	300	○	147
FE-62	Set time of timer 4	0~40000ms, delay time = set time x multiplier	0ms	○	147
FE-63	Timer 4 output selection	Options are the same as DI1 digital input terminal function F4	0	○	147
FE-64	Arithmetic unit 1 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	147
FE-65	Arithmetic unit 1 input 2 selection		0	○	147
FE-66	Configuration of arithmetic unit 1	0: Input 1+input 2 1: Input 1-input 2 2: Input 1 × input 2 3: Input 1 ÷ input 2 4: Take the smaller value 5: Take the larger value 6: |Input 1|×input 2 7: |Input 1|÷input 2 8: Input 1 directly outputs (for connection) 9: Encoder position high word 10: Encoder position low word	0	○	148
FE-67	Digital settings of arithmetic unit 1	－100.0~100.0%	0.0%	○	148
FE-68	Arithmetic unit 2 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	148
FE-69	Arithmetic unit 2 input 2 selection		0	○	148
FE-70	Configuration of arithmetic unit 2	Options are the same as arithmetic unit 1 configuration FE-66	0	○	148
FE-71	Digital settings of arithmetic unit 2	－100.0~100.0%	0.0%	○	148
FE-72	Arithmetic unit 3 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	148
FE-73	Arithmetic unit 3 input 2 selection		0	○	148

Parameters	Name	Setting Range and Description	Default	Change	Page
FE-74	Configuration of arithmetic unit 3	Options are the same as arithmetic unit 1 configuration FE-66	0	○	148
FE-75	Digital settings of arithmetic unit 3	－100.0~100.0%	0.0%	○	148
FE-76	Arithmetic unit 4 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	148
FE-77	Arithmetic unit 4 input 2 selection		0	○	148
FE-78	Configuration of arithmetic unit 4	Options are the same as arithmetic unit 1 configuration FE-66	0	○	148
FE-79	Digital settings of arithmetic unit 4	－100.0~100.0%	0.0%	○	148
FE-80	Arithmetic unit 5 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	148
FE-81	Arithmetic unit 5 input 2 selection		0	○	148
FE-82	Configuration of arithmetic unit 5	Options are the same as arithmetic unit 1 configuration FE-66	0	○	148
FE-83	Digital settings of arithmetic unit 5	－100.0~100.0%	0.0%	○	148
FE-84	Arithmetic unit 6 input 1 selection	Options are the same as AO1 function selection F6-20	0	○	148
FE-85	Arithmetic unit 6 input 2 selection		0	○	148
FE-86	Configuration of arithmetic unit 6	Options are the same as arithmetic unit 1 configuration FE-66	0	○	148
FE-87	Digital settings of arithmetic unit 6	－100.0~100.0%	0.0%	○	148
FE-88	Low pass filter 1 input selection	Options are the same as AO1 function selection F6-20	0	○	149
FE-89	Low pass filter 1 filtering time	0.000~10.000s	0.010s	○	149
FE-90	Low pass filter 2 input selection	Options are the same as AO1 function selection F6-20	0	○	149
FE-91	Low pass filter 2 filtering time	0.000~10.000s	0.010s	○	149
FE-92	Analog multiway switch output 1	Options are the same as AO1 function selection F6-20	0	○	149
FE-93	Analog multiway switch output 2	Options are the same as AO1 function selection F6-20	0	○	149
FE-94	Analog multiway switch control signal	Options are the same as DO1 digital output terminal function F5-01	0	○	149

FF Communication Parameters

Parameters	Name	Setting Range and Description	Default	Change	Page
FF-00	COMM2 communication protocol selection	0: Modbus 1: USS command 2: CAN Note: COMM1 only supports Modbus communication	0	×	150
FF-01	Communication data format	**Units: COMM1 data format** **Tens: COMM2 data format** 0: 8,N,1 1: 8,E,1 2: 8,O,1 3: 8,N,2 4: 8,E,2 5:8,O,2	00	×	150
FF-02	Baud rate selection	**Units: COMM1 Baud rate** **Tens: COMM2 Baud rate** 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 115200bps 8: 250000bps 9: 500000bps	34	×	150
FF-03	COMM1 address of the machine	0~247	1	×	150
FF-04	COMM2 address of the machine	0~247	1	×	150
FF-05	Communication timeout detection time	0.1~600.0s	10.0s	○	150
FF-06	COMM1 response delay of the machine	0~1000ms	5ms	○	150
FF-07	COMM2 response delay of the machine	0~1000ms	5ms	○	150
FF-08	Communication timeout action	**Units: COMM1 communication timeout action** **Tens: COMM2 communication timeout action** 0: No action, 1: Alarm, 2: Fault and free stop 3: Alarm running based on F0-00 4: Alarm running based on F0-07 5: Alarm running based on F0-08	00	×	150
FF-09	COMM2 USS message PZD word count	0~4	2	×	150
FF-10	COMM1 communication set frequency ratio	0.001~30.000	1.000	○	150
FF-11	COMM2 communication set frequency ratio	0.001~30.000	1.000	○	150

Fn Manufacturer's Parameters

Parameters	Name	Setting Range and Description	Default	Change
—	—	—	—	—

FP Fault Records

Parameters	Name	Content and Description	Page
FP-00	Last fault type	0: No fault 1. ocb: Instantaneous start overcurrent 2. ocA: Overcurrent at accelerated operation 3. ocd: Overcurrent at decelerated operation 4. ocn: Overcurrent at constant speed operation 19: Co1: Output protection signal of comparator 1 20. Co2: Output protection signal of comparator 2 21. Co3: Output protection signal of comparator 3 22. Co4: Output protection signal of comparator 4 23. EEP: Parameter storage failure	156

Parameters	Name	Content and Description	Page
		5. ouA: Overvoltage at accelerated operation 6. oud: Overvoltage at decelerated operation 7. oun: Overvoltage at constant speed operation 8. ouE: Overvoltage in standby mode 9. dcL: Undervoltage during operation 10. PLI: Input phase loss 11. PLo: Output phase loss 12. FoP: Power device protection 13. oHI: VFD overheat 14. oLI: VFD overload 15. oLL: Motor overload 16. EEF: External fault 17. oLP: Heavy motor load 18. ULd: Motor underload 24. C1E: COMM1 communication abnormal 25. C2E: COMM2 communication abnormal 26. ccF: Current detection fault 27. ArF: Poor self-tuning 28. Aco: Analog input offline 29: PGo: PG disconnection 30: rHo: Thermistor open circuit 31: Abb: Abnormal shutdown fault 32: cno: Charging contactor is abnormal 33: GFF: Output grounding fault 34: Io1: Remained 35: Io2: Remained 36: PnL: Remained 37: dcE: DC bus voltage is abnormal	
FP-01	Total running time during last fault	The min. unit: 1h	156
FP-02	Operation frequency in the most recent failure	The min. unit: 0.01Hz	156
FP-03	Preset frequency in the most recent failure	The min. unit: 0.01Hz	156
FP-04	Output current in the most recent failure	The min. unit: 0.1A	156
FP-05	Output voltage in the most recent failure	Min. unit: 0.1V	156
FP-06	Output power in the most recent failure	Min. unit: 0.1kW	156
FP-07	Bus voltage in the most recent failure	Min. unit: 0.1V	156
FP-08	VFD temperature of the latest fault	Min. unit: 0.1℃	156
FP-09	Terminal input state 1 in the most recent failure	Ten thousands: DI5 Thousands: DI4 Hundreds: DI3 Tens: DI2 Units: DI1	156
FP-10	Terminal input state 2 in the most recent failure	Ten thousands: DI10 Thousands: DI9 Hundreds: DI8 Tens: DI7 Units: DI6	156
FP-11	Second last failure type	Content & meaning same as FP-00	156
FP-12	Total operation time in second last failure	The min. unit: 1h	156
FP-13	Third last failure type	Content & meaning same as FP-00	156
FP-14	Total operation time in third last failure	The min. unit: 1h	156
FP-15	Fourth last failure type	Content & meaning same as FP-00	156
FP-16	Total operation time in fourth last failure	The min. unit: 1h	156
FP-17	Fifth last failure type	Content & meaning same as FP-00	156
FP-18	Total operation time in fifth last failure	The min. unit: 1h	156
FP-19	Single operation time in case of fault	The min. unit: 0.1h	156
FP-20	Fault record clearing	11: Clear this menu parameter, it will automatically change to 00 after the operation is completed	156

FU Data Monitoring

Parameters	Name	Content and Description	Page
FU-00	Operating frequency	Reflecting the frequency of the motor speed, the min. unit: 0.01Hz	157
FU-01	Preset frequency	Unit indicator flickers, min. unit: 0.01Hz	157
FU-02	Output Current	The min. unit: 0.1A	157
FU-03	Load current percentage	The rated current of VFD is 100%, the min. unit: 0.1%	157
FU-04	Output Voltage	Min. unit: 0.1V	157
FU-05	Running speed or speeds	The min. unit: 1r/min	157
FU-06	Given rotating speed	Unit indicator flickers, min. unit: 1r/min	157
FU-07	DC bus voltage	Min. unit: 0.1V	157
FU-08	The output power	Min. unit: 0.1kW	157
FU-09	Output torque	The rated torque is 100%, the min. unit: 0.1%	157
FU-10	Given torque	The rated torque is 100% with unit indicator light flashing, the min. unit: 0.1%	157
FU-11	Operating line speed	The min. unit: 1m/s	157
FU-12	Given line speed	Unit indicator flickers, min. unit: 1m/s	158
FU-13	PID feedback value	Min. unit: 0.1%	158
FU-14	PID given value	Unit indicator flickers, min. unit: 0.1%	158
FU-15	PID output value	Min. unit: 0.1%	158
FU-16	Counter count value	The min. unit: 1	158
FU-17	Actual length of length counter	Min. unit: 1m	158
FU-18	AI1	Min. unit: 0.1%	158
FU-19	AI2	Min. unit: 0.1%	158
FU-20	AI3	Min. unit: 0.1%	158
FU-21	AI4	Min. unit: 0.1%	158
FU-22	PFI	Min. unit: 0.1%	158
FU-23	UP/DOWN regulating value	Unit indicator flickers, min. unit: 0.1%	158
FU-24	PLC current mode and stage	Example: 2.03 refers to the stage 3 of mode 2	158
FU-25	Cycled times of PLC	The min. unit: 1	158
FU-26	PLC time left in current stage	Min. unit: 0.1s or 0.1min, determined by thousands place of F8-00	158
FU-27	Arithmetic unit 1 output	Min. unit: 0.1%	158
FU-28	Arithmetic unit 2 output	Min. unit: 0.1%	158
FU-29	Arithmetic unit 3 output	Min. unit: 0.1%	158
FU-30	Arithmetic unit 4 output	Min. unit: 0.1%	158
FU-31	Arithmetic unit 5 output	Min. unit: 0.1%	158
FU-32	Arithmetic unit 6 output	Min. unit: 0.1%	158
FU-33	Low-pass filter 1 output	Min. unit: 0.1%	158
FU-34	Low-pass filter 2 output	Min. unit: 0.1%	158
FU-35	Analog multiway switch output	Min. unit: 0.1%	158

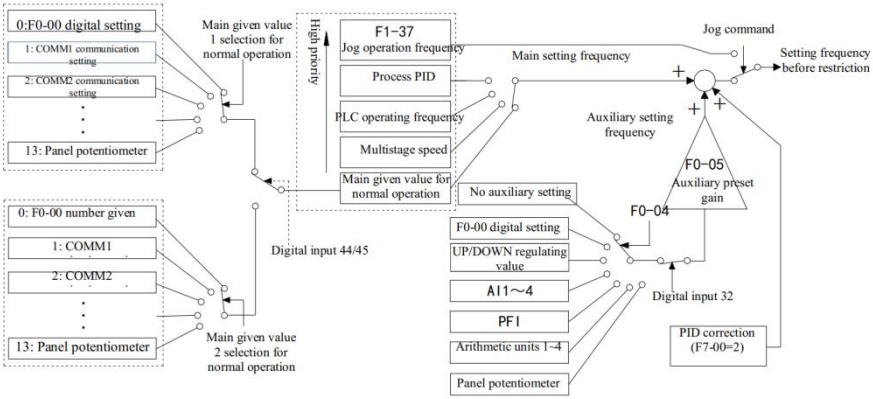
Parameters	Name	Content and Description	Page
FU-36	Radiator temperature	Min. unit: 0.1℃	158
FU-37	Counter deviation	The F9-15 'set count value' is 100%, Min. unit: 0.01%	158
FU-38	PG detection frequency	Min. unit: 0.1Hz	158
FU-39	Output power factor	The min. unit: 0.01	158
FU-40	Watt-hour meter (KWh)	0.0~6553.5kWh, press △ and ▽ at the same time, the parameter and watt-hour meter timer are reset at the same time.	159
FU-41	Watt-hour meter timer	0.00~655.35h, press △ and ▽ at the same time, the parameter and watt-hour meter (KWh) are reset at the same time.	159
FU-42	Digital input terminal state	Ten thousands: DI5 Thousands: DI4 Hundreds: DI3 Tens: DI2 Units: DI1 0: Invalid, 1: Valid	159
FU-43	Extended digital input terminal state	Ten thousands: DI10 Thousands: DI9 Hundreds: DI8 Tens: DI7 Units: DI6 0: Invalid, 1: Valid	159
FU-44	Digital output terminal state	Thousands: T2 Hundreds: T1 Tens: DO2 Units: DO1 0: Invalid, 1: Valid	159
FU-45	Extended digital output terminal state	Thousands: T6 Hundreds: T5 Tens: T4 Units: T3 0: Invalid, 1: Valid	159
FU-46	Comparator output state	Thousands: Comparator 4 Hundreds: Comparator 3 Tens: Comparator 2 Units: Comparator 1 0: Output 0 1: Output 1	159
FU-47	Number of COMM1 communication errors	0~40000	159
FU-48	Number of COMM2 communication errors	0~40000	159
FU-49	COMM1 communication polling time	Min. unit: 0.001s	159
FU-50	COMM2 communication polling time	Min. unit: 0.001s	159
FU-51	Given frequency of acceleration and deceleration ramp	The min. unit: 0.01Hz	159
FU-52	PG position high word	Encoder feedback position indicated by binary system is high 16 bits	159
FU-53	PG position high word	Encoder feedback position indicated by binary system is low 16 bits	159
FU-54	Counter 2 count value high word	Count value indicated by binary system is high 16 bits	159
FU-55	Counter 2 count value low word	Count value indicated by binary system is low 16 bits	159
FU-56	Accumulated running time of fan	The min. unit: 1h	159
FU-57	Manufacturing Date	Min. unit: 00.00	159
FU-58	VFD No.	Min. unit: 0001	159
Miscellaneous	Reserved	—	—

6. Detailed Explanation of Functional Parameters

6.1 F0 Basic Parameters

F0-00	Digital settings frequency	Default	50.00Hz	Change	○
Setting range	0.00Hz~F0-06 'maximum frequency'				
F0-01	**Main preset channel for normal operation**	Default	0300	Change	○
Setting range	Thousands, hundreds: Given channel 2 Tens, units: Given channel 1				
	0: F0-00 digital set, operating panel and for regulation 1: COMM1 communication setting, F0-00 is the initial value 2: COMM2 communication setting, F0-00 is the initial value 3: AI1 4: AI2 5: AI3 6: AI4 7: UP/DOWN regulating value 8: PFI 9: Arithmetic unit 1 10: Arithmetic unit 2 11: Arithmetic unit 3 12: Arithmetic unit 4 13: Panel potentiometer				

Given frequency channels are as follows:



🕮 The VFD has 5 operation modes, which are jogging, process PID, PLC, multistage speed, normal operation respectively from high priority to low priority. For example: The main given frequency is determined by the multistagefrequency if multistage speed is valid in normal operation.

🕮 Main given value for normal operation can be selected from F0-01 "normal operation main given channel", and can be forcibly switched by digital input 44 "main given frequency channel switch", digital input 45 "simultaneous switch of main given frequency channel and run command channel", and long press "◁, △" or long press "▷, ▽" combination key to simultaneously switch main given frequency channel and running command channel function. When normal run main given channel is forcibly switched from digital input 45 "simultaneous switch of main given frequency channel and run command channel" or by the combination key "◁, △" on panel to given channel 2, the frequency setting with a higher priority than the normal running master setting (such as inching, multi-speed) is invalid.

🕮 Auxiliary given channels are determined by F0-04 "auxiliary given channel selection" and can be disabled by digital input 32 "auxiliary given channel disabled".

🕮 F7-00 "PID control function selection"=2 the given frequency before the ramp can be corrected.

🕮 The digital input 14 "Forward jogging operation" or 15 "reverse jogging operation" is valid for terminal control.

🕮 The given frequency ultimately used shall be limited by F0-07 "upper frequency" and F0-08 "lower frequency".

F0-02	Selection for operation command channel	Default	10	Change	×
Setting range	Tens: Command channel 2 selection Units: Command channel 1 selection				
	0: Operation panel 1: Virtual terminal 1 (FWD1/REV1) 2: Virtual terminal 2 (FWD2/REV2) 3: COMM1 control 4: COMM2 control				

🕮 Digital input 42 'running command channel 1/2 switching': If the input is invalid, the command source selected by command channel 1 is valid. If the input is valid, the command source selected by command channel 2 is valid.

🕮 When selecting running command channel, it is also feasible to long press '◁, △' or long press '▷, ▽' combination key to forcibly and simultaneously switch main given frequency channel and running command channel function. Switching running command channel via combination keys is detailed in 134.

🕮 COMM2 is an optional communication port. See the section of communication component in Chapter IX.

F0-03	Given frequency holding mode	Default	000	Change	○
Setting range	Units: Power-down storage selection	0: The main given frequency at which △, ▽ or communication is modified is stored to F0-00 in case of power failure. 1: The main given frequency at which △, ▽ or communication is modified is not stored in case of power failure.			
	Tens: Stop hold common option	0: The main given frequency modified by △, ▽ is held in case of stop. 1: The main given frequency modified by △, ▽ is recovered to F0-00 in case of stop.			
	Hundreds: Stop hold forced option	0: Stop hold forced option invalid 1: Stop hold forced option valid			

🕮 This parameter is valid only when the given channel 1 (tens or unit) or the given channel 2 (thousands or hundreds) of F0-01 "main given channel for ordinary operation"=00, 01, 02.

🕮 The 'tens: stop hold common option' and 'hundreds: stop hold forced option' of the parameter are only valid when given channel 1 (tens and units) or given channel 2 (kilobit, hundreds) of F0-01' normal running main given channel' is =00

🕮 When 'tens: stop hold common option'of the parameter is 0 and main given frequency is modified by △, ▽, and there is no higher priority mode of operation before the VFD is shut down (such as multi-speed, inching), the hold function will be valid. This place is also under the influence of 'hundreds: stop hold forced option'.

🕮 When 'hundreds: stop hold forced option' of the parameter is 0, the stop hold is determined by the set value of 'tens: stop hold common option'. When 'stop hold forced option' =1, the stop hold at given frequency modified by △, ▽ is forcible and effective, regardless of whether a higher priority operation mode is in effect before shutdown or the stop hold of 'tens: stop hold common option' is invalid or not.

F0-04	Selection for auxiliary preset channel	Default	0	Change	○
Setting range	0: None 1: F0-00 "digital given frequency" 2: UP/DOWN regulating value 3: AI1 4: AI2 5: AI3 6: AI4 7: PFI 8: Arithmetic unit 1 9: Arithmetic unit 2 10: Arithmetic unit 3 11: Arithmetic unit 4 12: Panel potentiometer				
F0-05	Auxiliary preset gain	Default	1.000	Change	○
Setting range	−1.000~1.000				

🕮 See description of F0-00 and F0-01.

F0-06	Maximum frequency	Default	50.00Hz	Change	×
Setting range	V/F Control: F0-07 "upper limiting frequency"~400.00Hz Vector control: F0-07 "upper limiting frequency'~200.00Hz				
F0-07	**Upper limiting frequency**	Default	50.00Hz	Change	×
Setting range	F0-08 "lower limit frequency" ~ F0-06 "maximum frequency"				
F0-08	**Lower limit frequency**	Default	0.00Hz	Change	×
Setting range	0.00Hz~F0-07 "upper limit frequency"				

🕮 F0-06 'maximum frequency': The frequency when the frequency is set at 100% is used for analog input or PFI to set the frequency.

🕮 F0-07 'upper limiting frequency', F0-08 'lower limit frequency': limit the final given frequency.

F0-09	Direction locking	Default	0	Change	○
Setting range	0: Forward and reverse directions are both ok 1: Lock forward direction 2: Lock reverse direction				

🕮 It is recommended to lock the rotation direction when only one-way rotation is required.

F0-10	Parameter write protection	Default	0	Change	○
Setting range	0: No protection, all parameters can be overwritten (except read-only parameters) 1: Except for F0-00 "digital given frequency", F7-04 "PID digital given" and this parameter, other parameters are not allowed to be overwritten 2: All, except the parameters, are not allowed to be overwritten				

🕮 This function can prevent parameters from being modified by mistake.

F0-11	Parameter initialization	Default	00	Change	×
Setting range	11: Initialization 22: Initialization except communication parameters Note: it changes to 00 automatically after the initialization				

🕮 The parameter initialization can restore the parameters to factory default setting without restoring the failure logging (failure logging can be cleared via FP-20).

F0-12	Motor control mode		Default	0	Change	×
Setting range	0: No PG V/F control 3: With PG vector control	1: With PG V/F control 4: V/F separation control		2: No PG vector control 5: With PG vector control 2		

🕮 Motor control mode:

F0-12＝0 'no PG V/F control': The speed open-loop, voltage and frequency coordinated control mode can improve the torque output capacity by lifting torque and can improve the mechanical characteristics and speed control accuracy through slip compensation.

F0-12＝1 'with PG V/F control': V/F control mode with speed feedback achieved through encoder has a high steady speed accuracy. It is especially suitable for applications where the encoder is not directly mounted on the motor shaft and precise speed control is required.

F0-12＝2 'no PG vector control': i.e., speed sensorless vector control. It performs decoupling control for flux linkage and torque through rotor magnetic field orientation and achieves closed-loop speed control according to identified speed, so it has good mechanical characteristics. It can be used for the places that have high drive performance requirements and is inconvenient to install encoder. Torque can be controlled in this control mode.

F0-12＝2 'with PG vector control': i.e., with speed sensor vector control. It performs decoupling control for flux linkage and torque through rotor magnetic field orientation and achieves closed-loop speed control according to detected speed, so it has good dynamic performance and steady-state accuracy. It is mainly used for high-precision speed control, simple servo control and other high-performance control occasions. Torque can be controlled under this control mode and the torque control accuracy is high in low speed and power generation state.

F0-12＝4 'V/F separation control': Independent regulation of voltage and frequency can be realized.

F0-12＝5 'with PG vector control 2': It is similar to F0-12＝3 'with PG vector control', but the speed and torque control accuracy is higher. This control mode can be used in situations where high-precision torque control is needed.

🕮 For vector control, it shall be noted that:
1. It is generally used for the occasion of one VFD controlling one motor. Vector control can also be applied to multiple coaxial motors with the same model and parameters, but the parameter self-tuning shall be carried out when multiple motors are connected together, or the equivalent parameters after multiple motors are connected in parallel shall be manually input;

2. Motor parameters need to be self-tuned or accurately input for internal motor dynamic model and magnetic field orientation algorithm;

3. The power level of the motor and the VFD shall match. If the rated current of the motor is too small, the control performance will decline. The rated current of the motor shall not be less than 1/4 of the rated current of the VFD;

4. The parameters of ASR shall be set correctly to ensure steady and dynamic performance of speed control;

5. The number of poles of the motor shall not exceed 8 and vector control shall not be adopted for double-cage motor, deep-slot motor and torque motor;

6. Set F2-12 "basic frequency" to be the same as the rated frequency of the motor, which is convenient for high-speed field-weakening control.

🕮 V/F control is required in the following situations:
1. A single VFD drives multiple motors at the same time: the load of each motor is not output in a balanced way, or the motor parameter capacity is different;

2. The load current is less than 1/4 of the rated current of the VFD;

3. The VFD is not loaded (when testing);

4. The output of the VFD is connected to the transformer.

⚠ DANGER **For PG control mode, it is required to set PG parameters correctly. Improper setting may result in personal injury and property loss. After the motor cable is reconnected, the direction settings of the encoder must be checked again.**

F0-13	Rated power of VFD	Default	Model determination	Change	△

🕮 Rated power of VFD can be checked, minimum unit: 0.01kW.

F0-14	Software Version No.	Default	Version determination	Change	△

🕮 Software version can be checked, range: 0.00~99.99.

F0-15	Selection of IO accessories	Default	000	Change	×
Setting range	**Units: IO module** 0: No accessories 1: Digital I/O expansion board 1 2: Digital I/O expansion board 2 3: Digital I/O expansion board 3 4: Analog I/O expansion board 1				
	Tens: communication module 0: No accessories 1: Isolated RS485 communication expansion board 1 2: Isolated RS485 communication expansion board 2 3: Profibus-DP or PROFINET communication expansion board				
	Hundreds: PG card 0: No accessories 1: Encoder expansion board				

🕮 The digital I/O expansion board 1 model includes SL510-DIO1 and SL530-DIO1. Digital I/O expansion board 2 model includes SL510-DIO2 and SL530-DIO2. The model of digital I/O expansion board 3 is SL510-DIO3. Analog I/O expansion board 1 model includes SL510-AIO1 and SL530-AIO1.

🕮 Isolated RS485 communication expansion board 1 model includes SL510-COMM1 and SL530-COMM1; Isolated RS485 communication expansion board 2 (support TCP) model includes SL510-COMM2 and SL530-COMM2; Profibus-DP or PROFINET communication expansion module model includes SL510-DP, SL510-PN and SL530-PN.

🕮 Encoder expansion board model includes SL510-PG0, SL530-PG0 and SL530-PG1.

🕮 See chapter 9 for selection of IO accessories.

F0-16	User's password setting	Default	0000	Change	○
Setting range	0000~9999, 0000 indicates that no password is set.				

🕮 After setting password, the password will take effect if no keys pressed within 2min. Under monitoring state, the password will take effect immediately if pressing ENTER + ◁ at the same time.

F0-17	Administrator password settings	Default	0000	Change	○
Setting range	0000~9999, 0000 indicates that no password is set.				

🕮 After setting password, the password will take effect if no keys pressed within 2min. Under monitoring state, the password will take effect immediately if pressing ENTER + ◁ at the same time.

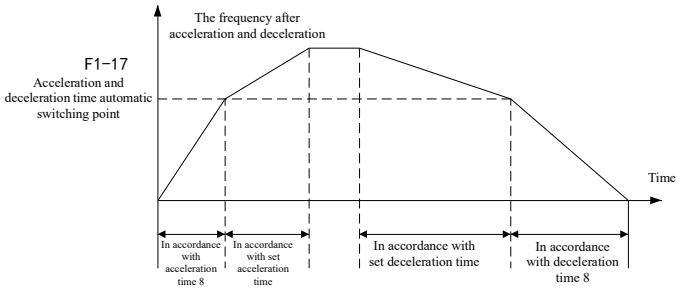
6.2 F1 Acceleration & Deceleration, Starting, Stopping and Jogging Parameters

F1-00	Acceleration time 1	Default	Model determination	Change	○
F1-01	Deceleration time 1	Default	Model determination	Change	○
F1-02	Acceleration time 2	Default	Model determination	Change	○
F1-03	Deceleration time 2	Default	Model determination	Change	○
F1-04	Acceleration time 3	Default	Model determination	Change	○
F1-05	Deceleration time 3	Default	Model determination	Change	○

F1-06	**Acceleration time 4**	Default	Model determination	Change	○
F1-07	**Deceleration time 4**	Default	Model determination	Change	○
F1-08	**Acceleration time 5**	Default	Model determination	Change	○
F1-09	**Deceleration time 5**	Default	Model determination	Change	○
F1-10	**Acceleration time 6**	Default	Model determination	Change	○
F1-11	**Deceleration time 6**	Default	Model determination	Change	○
F1-12	**Acceleration time 7**	Default	Model determination	Change	○
F1-13	**Deceleration time 7**	Default	Model determination	Change	○
F1-14	**Acceleration time 8**	Default	Model determination	Change	○
F1-15	**Deceleration time 8**	Default	Model determination	Change	○
Setting range	0.01~3600.0s, the minimum unit is determined by F1-16 'minimum unit of acceleration and deceleration time' Acceleration time: the time required to increase the frequency by 50Hz; Deceleration time: the time required to decrease the frequency by 50Hz. Note: 22 kW and below models are set to be 6.0s when delivering, and 30 kW and above models are set to be 20.0s when delivering.				
F1-16	**Minimum unit of acceleration and deceleration time**	Default	1	Change	○
Setting range	0: 0.01s 1: 0.1s				
F1-17	**Acceleration and deceleration time automatic switching point**	Default	0.00Hz	Change	×
Setting range	0.00~400.00Hz, acceleration and deceleration time 8 is mandatory below this point (F1-14, F1-15)				
F1-18	**Emergency stop deceleration time**	Default	10.0s	Change	○
Setting range	0.01~3600.0s, the minimum unit is determined by F1-16				

🕮 F1-00~F1-15 provides 8 acceleration & deceleration times. It can be selected according to digital input 9, 100 and 11.

🕮 Functions of F1-17 'automatic switch point of acceleration and deceleration time' are shown below. If automatic segmental acceleration and deceleration functions are not required, this parameter can be set to zero. Automatic switch function of acceleration and deceleration time is invalid in jogging operation, emergency stop and stall prevention.



🕮 F1-18 'Emergency shutdown deceleration time': When the digital input 16 'emergency stop" or the communication gives emergency stop command, the VFD will stop according to the 'emergency stop deceleration time'.

F1-19	Method of starting	Default	0	Change	×
Setting range	0: Start from the starting frequency 1: DC braking before starting from starting frequency 2: Speed tracking starting				
F1-20	**Frequency of starting**	Default	0.50Hz	Change	○
Setting range	0.00~60.00Hz				
F1-21	**Starting frequency retention time**	Default	0.0s	Change	○
Setting range	0.0~60.0s, only valid for the condition with no PG V/F control				
F1-22	**Voltage soft start**	Default	1	Change	×
Setting range	0: Invalid, start directly from the voltage corresponding to the starting frequency 1: Invalid, start with smooth rise of voltage within F1-21 "start frequency hold time".				
F1-23	**Starting DC braking time**	Default	0.0s	Change	○
Setting range	0.0~60.0s				
F1-24	**Starting DC braking current**	Default	0.0%	Change	○
Setting range	0.0~100.0%, the rated current of the VFD is 100%				

🕮 VFD starting mode:

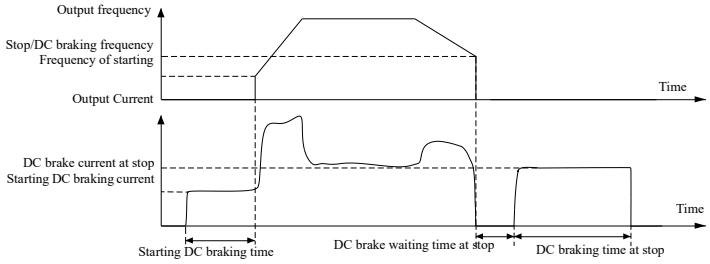
F1-19＝0 'start from starting frequency': when starting, the VFD runs at F1-20 'starting frequency', it will ac celerate after the time set in F1-21 'starting frequency holding time', which can reduce the current shock when starting.

F1-19＝1 'DC braking before starting from the starting frequency': Sometimes the motor is in a rotating state beforestarting (such as the fan may be reversed due to headwind before starting), so DC braking before starting can be adopted to stop the motor and start it again to prevent starting impact overcurrent. Relevant parameters can be set according to F1-23 'starting DC braking time' and F1-24 'start DC braking current'.

F1-19＝2 'speed tracking starting': Automatically identify the speed and direction of the motor before starting, and then start smoothly without impact from the corresponding frequency. For the rotating motor, it is unnecessary to stop it completely for restart, which can shorten the starting time and reduce the starting impact.

🕮 In case of transient stop, self-reset and restart after operation interruption, the Fb-25 "mode of transient stop, self-reset and restart after operation interruption" can be forcibly switched to tracking start. There is no need to select tracking start when PG V/F or PG vector is selected.

🕮 Starting and stopping DC braking are shown below:



⚠ATTENTION: Tracking starting mode is recommended for high-speed or large-inertia load starting, rather than long-time DC braking before starting.

⚠ATTENTION: Starting from the starting frequency immediately after the

free stop will lead to overcurrent due to the remanence counter electromotive force in the motor. Therefore, if the motor does not stop rotating after the free stop, it is recommended to adopt tracking starting mode to start it if it is required to be started immediately.

🕮 F1-22 'voltage soft starting': when selecting 'starting from the starting frequency' as the starting mode and F1-21 'starting frequency hold time' is not 0, the output voltage gradually transitions from 0 to the voltage corresponding to the starting frequency within the starting frequency holding time if F1-22＝1, so as to reduce the starting impact when starting and avoid the non-directional rotation of the motor caused by suddenly increased voltage. It is only valid for PG V/F control.

F1-25	Stop mode	Default	0	Change	○
Setting range	0: Deceleration stop 1: Free stop 2. Deceleration stop + DC braking 3: Deceleration stop + brake locking delay				
F1-26	Stop/DC braking frequency	Default	0.50Hz	Change	○
Setting range	0.00~60.00Hz				
F1-27	DC brake waiting time at stop	Default	0.00s	Change	○
Setting range	0.00~10.00s				
F1-28	DC braking time at stop	Default	0.0s	Change	○
Setting range	0.0~60.0s, as brake locking delay time at stop				
F1-29	DC brake current at stop	Default	0.0%	Change	○
Setting range	0.0~100.0%, the rated current of the VFD is 100%				

🕮 VFD stop mode:

F1-25＝0 'deceleration stop': The VFD reduces its operation frequency and enters the standby state at F1-26 " stop/DC braking frequency".

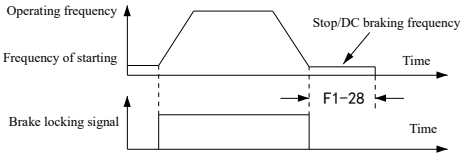
F1-25＝1 'free stop': VFD locks the output, and the motor slide freely; But during the jogging operation or emergency stop, the stop is still the deceleration stop. For the stop of water pump, free stop shall not be adopted generally, because the water pump stop time is short, sudden stop will occur water hammer effect.

F1-25＝2 'deceleration stop+DC braking': The VFD decelerates after receiving the stop instruction and locks the output when it reaches F1-26 "stop DC braking frequency". After the F1-27 "stop DC braking waiting time", there will be DC current as set in F1-29 "Stop DC brake current" in motor, then it will stop after reaching the F1-28 ' Stop DC braking time". See start and stop DC braking diagram. DC braking condition can be maintained forcibly via digital input 34 "Stop DC braking".

⚠ATTENTION: DC braking mode is recommended under low speed (below 10Hz generally) or for small motor.

⚠ATTENTION: DC braking will consume the load mechanical energy in the rotor of the motor, so long-time or frequent DC braking is easy to cause the motor overheating.

F1-25=3 'deceleration stop + lock delay': The VFD will decelerate after receiving the stop instruction, and maintain the operation at F1-26 "stop/DC brake frequency", and then enter the standby state after the set time of F1-28. The electromagnetic brake can be controlled by digital output 6 "braking signal", as shown in the Braking Delay Timing Sequence below.

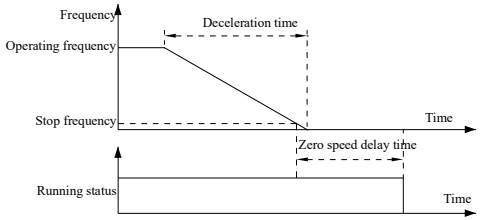


Braking Delay Timing Sequence

🕮 Under any running command channel (excluding communication control), press ENTER or double click ◯ to freely stop the VFD, but the operation panel must be unlocked.

F1-30	Zero-speed delay time	Default	0.0s	Change	○
Setting range	0.0~60.0s				

🕮 F1-30 'zero-speed delay time': when the stop mode is deceleration stop, and deceleration reaches F1-26 "stop/DC braking frequency", the motor continues to decelerate to zero within the set time of F1-30 and maintain the operation at zero frequency, and the motor keeps excited for quick start at any time without the need for pre-excitation before starting. The zero-speed delay is invalid when the parameter is changed to 0. The zero-speed delay stop process is shown below:

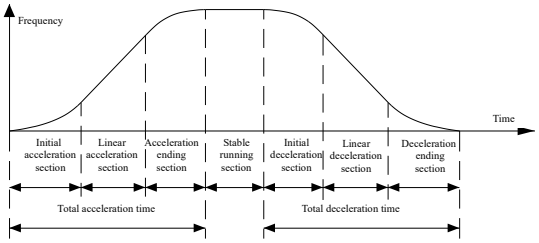


Zero-speed Delay Timing Sequence

F1-31	Selection of acceleration and deceleration modes	Default	0	Change	×
Setting range	0: Linear acceleration & deceleration, 1: S curve acceleration & deceleration				
F1-32	S curve acceleration start time	Default	0.20s	Change	×
F1-33	S curve acceleration end time	Default	0.20s	Change	×
F1-34	S curve deceleration start time	Default	0.20s	Change	×
F1-35	S curve deceleration end time	Default	0.20s	Change	×
Setting range	0.01~10.00s				

🕮 S curve acceleration and deceleration function: during acceleration and deceleration, the gradual acceleration is gradual and speed change is smooth, which can enhance the comfort degree of elevator when operating, prevent objects from tipping on the conveying equipment and reduce the impact on machinery when starting and stopping.

🕮 After setting S curve time, the total acceleration and deceleration time is extended as shown below:



The total acceleration and deceleration time is calculated according to formula below:

Total acceleration and deceleration time=acceleration and deceleration time without S curve+(time of initial section+time of ending section)÷2

However, if the total acceleration and deceleration time calculated in the above formula is less than the sum of the initial section and ending section, then:

Total acceleration and deceleration time=time of initial section+time of ending section

🕮 The S-curve function is automatically invalid when the automatic acceleration and deceleration time switching function is valid (F1-17 "automatic acceleration and deceleration time switching point" ≠0).

F1-36	Time of positive and reverse rotating dead zone	Default	0.0s	Change	×
Setting range	0.0~3600.0s				

🕮 F1-36 "forward and reversed rotation dead time": i.e., 'waiting time for alternation of forward and reversed rotation', which aims to minimize the impact of forward and reversed rotation on machinery.

F1-37	Jog operation frequency	Default	5.00Hz	Change	○
Setting range	0.10~50.00Hz				
F1-38	Jog acceleration time	Default	Model determination	Change	○
F1-39	Jog deceleration time	Default	Model determination	Change	○
Setting range	0.1~60.0s Note: Jogging acceleration and deceleration time of 22kW and below models are set to be 6.0s when delivering. Jogging acceleration and deceleration time of 30kW and below models are set to be 20.0s when delivering.				

🕮 Under terminal control and standby mode, jogging operation can be achieved via digital input 14 "forward operation jogging operation command" and 15 "reversed operation jogging operation command". When both signals are valid or invalid at the same time, the jogging operation is invalid.

🕮 Auxiliary setting and PID frequency correction are invalid during jogging operation.

🕮 The start and stop mode of jogging operation is set to be starting from starting frequency and stop by means of deceleration stop.

🕮 When the hundreds place of FC-01 "key function and automatic lock"=1 and current running command channel is operation panel, the operation panel can be used for jogging operation (only unidirectional jogging operation can be achieved via the operation panel).

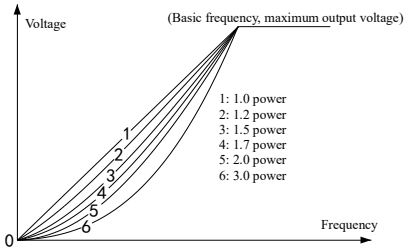
6.3 F2 V/F Control Parameters

F2-00	V/F curve settings	Default	1	Change	×
Setting range	0: Customized (see parameters F2-14~F2-21 for details) 2: Reduced torque V/F curve 1 (1.2 power) 4: Reduced torque V/F curve 3 (1.7 power) 6: Reduced torque V/F curve 5 (3.0 power)	1: Linear V/F curve (1.0 power) 3: Reduced torque V/F curve 2 (1.5 power) 5: Reduced torque V/F curve 4 (2.0 power)			

🕮 The V/F curves can be customized multi-section polyline type, linear type and multifarious reduced torque types.

🕮 The V/F curve of reduced torque can improve the motor efficiency of reduced torque load of fan pump under light load. For this type of load, motor efficiency can also be improved by automatic energy-saving operation (see the description of F2-11).

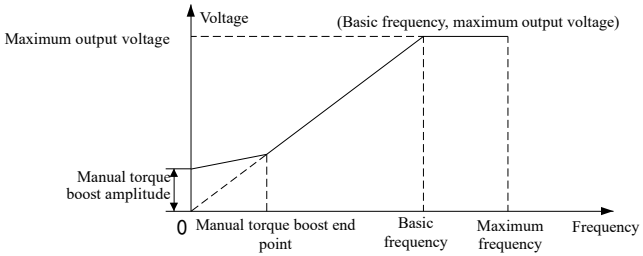
🕮 Reduced torque V/F curve and automatic energy-saving function can improve efficiency and reduce noise. Linear and reduced torque V/F curves are as follows:



F2-01	Torque boost selection	Default	1	Change	×
Setting range	0: No torque lifting 2: Only automatic torque lifting is allowed	1: Only manual torque lifting is allowed 3: Manual torque lifting + automatic torque lifting			
F2-02	**Manual torque boost amplitude**	Default	Model determination	Change	○
Setting range	15kW and below models: 0.0~15.0%, 18.5kW and above models: 0.0~10.0% Take F2-13 'maximum output voltage' as 100%				
F2-03	**Manual torque boost end point**	Default	50.0%	Change	○
Setting range	0.0~100.0%, take F2-12 'basic frequency' as 100%				
F2-04	**Automatic torque boost degree**	Default	80.0%	Change	×
Setting range	0.0~100.0%				

🕮 Manual torque lift can improve the low speed torque and starting torque of the motor. Adjust F2-02 "manual torque lifting amplitude" from small to large until meeting the starting requirements. Do not set it too high, otherwise the motor will overheat or overcurrent.

🕮 The relation curve between output voltage V and frequency F is composed of the set V/F curve, manual torque lift and automatic torque lift. The relationship between F2-02 'manual torque lift amplitude', F2-03 'manual torque lift cutoff point', F2-12 'basic frequency' and F2-13 'maximum output voltage' class is shown below:



🕮 Automatic torque lift can change the voltage value in real time according to the load current size, compensate the voltage loss of stator impedance, automatically adapt to various load conditions, output appropriate voltage, so as to achieve larger output torque under heavy load and smaller output current under no load.

🕮 Tracking start, automatic torque lifting and slip compensation of V/F control use part of motor parameters, so it is recommended to carry out static self-tuning for motor before use, so as to achieve better control performance.

F2-05	Slip compensation gain	Default	0.0%	Change	○
Setting range	0.0~300.0%				
F2-06	**Slip compensation filtering time**	Default	1.0s	Change	×
Setting range	0.1~25.0s				
F2-07	**Electric slip compensation amplitude limiting**	Default	200%	Change	×
F2-08	**Regenerative slip compensation amplitude limiting**	Default	200%	Change	×
Setting range	0 to 250%, with motor rated slip frequency of 100%				

🕮 Slip compensation function: If the output frequency remains unchanged, load changes will cause slip change, and the speed will reduce. Slip compensation function can adjust the output frequency of the VFD online according to the load torque, reduce the change of speed with the load and improve the speed control accuracy.

🕮 Slip compensation is effective when automatic torque lift is turned on (F2-01 = 2 or 3).

🕮 Slip compensation can be adjusted by F2-05 "slip compensation gain", which shall be adjusted according to the reduction of speed under the condition that the temperature of the motor is basically stable under load operation. When the slip compensation gain is 100%, the compensation value is the rated slip frequency at rated torque.

■ The calculation formula of rated slip frequency is: rated slip frequency = rated frequency - (rated speed × number of poles ÷120)

🕮 If the motor oscillates during slip compensation, F2-06 'slip compensation filtering time' can be considered to be increased.

F2-09	Anti-vibration damping	Default	Model determination	Change	○
Setting range	0~200				

🕮 By adjusting the anti-vibration damping, the vibration of the motor can be suppressed under no load or light load, and the vibration can be eliminated by adjusting from small to large level.

F2-10	AVR function settings	Default	1	Change	×
Setting range	0: Invalid, 1: Always valid, 2: Invalid only when decelerating				

🕮 AVR function is the automatic voltage regulation function. When the input voltage or DC bus voltage changes, AVR function can remain that output voltage is free from influence, making production process and product quality stable.

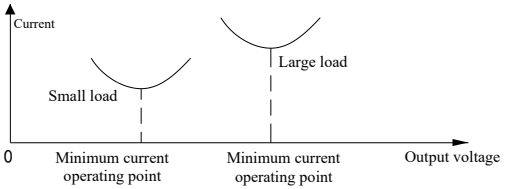
🕮 When the input voltage is higher than the rated value, the AVR function shall be turned on to prevent the motor from running under excessive voltage.

🕮 The AVR allows faster deceleration under the mode of 'invalid only when decelerating' by comparing with the mode of 'always valid', but the deceleration current is slightly larger. This is because deceleration increases the DC bus voltage, and if AVR is invalid, the output voltage will also increase, which increases the motor loss and reduces the mechanical energy feedback of the motor, so that the deceleration time can be set shorter.

⚠ ATTENTION: If the load rotary inertia is large, it shall be set as AVR "always valid" to prevent excessive voltage when decelerating and causing motor heating.

F2-11	Automatic energy saving operation selection	Default	0	Change	○
Setting range	0: Invalid, 1: Valid				

🕮 Automatic energy-saving operation: automatically adjust the output voltage to minimize the load current at the same motor speed and motor loss. This function is particularly effective for fan and pump loads with torque reduction characteristics, as shown in the figure below:



🕮 Automatic energy saving operation is only effective for V/F control mode and is only suitable for smooth load.

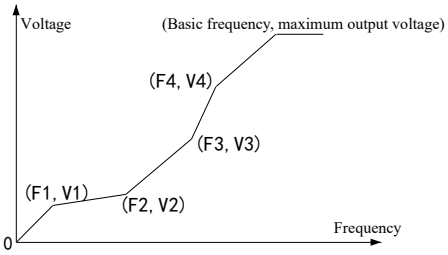
🕮 The automatic energy saving operation under V/F control requires both automatic torque lifting and slip compensation functions.

F2-12	Basic frequency	Default	50.00Hz	Change	×
Setting range	1.00~400.00Hz				
F2-13	Maximum output voltage	Default	380V	Change	×
Setting range	150~500V, default value: 380V				
F2-14	V/F frequency value F4	Default	0.00Hz	Change	×
Setting range	F2-16 'V/F frequency value F3'~F2-12 'basic frequency'				
F2-15	V/F voltage value V4	Default	0.0%	Change	×
Setting range	F2-17 “V/F voltage value V3”~100.0%, F2-13 'maximum output voltage' is 100%				
F2-16	V/F frequency value F3	Default	0.00Hz	Change	×
Setting range	F2-18 'V/F frequency value F2'~F2-14 'V/F frequency value F4'				
F2-17	V/F voltage value V3	Default	0.0%	Change	×
Setting range	F2-19 “V/F voltage value V2”~F2-15 “V/F voltage value V4”, F2-13 “maximum output voltage” is 100%				
F2-18	V/F frequency value F2	Default	0.00Hz	Change	×
Setting range	F2-20 “V/F frequency value F1”~F2-16“V/F frequency value F3”				
F2-19	V/F voltage value V2	Default	0.0%	Change	×
Setting range	F2-21 “V/F voltage value V1” ~F2-17 “V/F voltage value V3”, F2-13 'maximum output voltage' is 100%				
F2-20	V/F frequency value F1	Default	0.00Hz	Change	×
Setting range	0.00Hz~F2-18“V/F frequency value F2”				
F2-21	V/F voltage value V1	Default	0.0%	Change	×
Setting range	0.0%~F2-19 “V/F voltage value V2", F2-13 “maximum output voltage” is 100%				

🕮 F2-12 “basic frequency” is not only valid for V/F control, and it shall be set to be the same as FA-04 “rated

frequency of motor" when vector control is adopted.

🕮 Customized V/F curve is as follows:



F2-22	V/F separation voltage input selection	Default	0	Change	×
Setting range	0: Digital set voltage, determined by F2-23 1: |AI1| 2: |AI2| 3: |AI3| 4: |AI4| 5: |UP/DOWN regulating value| 6: |PFI| 7: |Arithmetic unit 1| 8: |Arithmetic unit 2| 9: |Arithmetic unit 3| 10: |Arithmetic unit 4|				
F2-23	V/F separation voltage digital setting	Default	100.0%	Change	○
Setting range	0.0~100.0%, take F2-13 'maximum output voltage' as 100%				
F2-24	V/F voltage coefficient	Default	0	Change	×
Setting range	0: 100.0% 1: |AI1| 2: |AI2| 3: |AI3| 4: |AI4| 5: |UP/DOWN regulating value| 6: |PFI| 7: |Arithmetic unit 1| 8: |Arithmetic unit 2| 9: |Arithmetic unit 3| 10: |Arithmetic unit 4|				

🕮 The V/F separation control function allows the output voltage and frequency of the VFD to be adjusted independently, which can be used for torque motors, linear motors and other special occasions, and can be used as a programmable power supply.

🕮 In the case of V/F separation control, the functions of torque lifting, slip compensation and anti-vibration damping are invalid.

🕮 In the case of V/F separation control, voltage soft start is related to starting frequency and starting frequency holding time.

🕮 F2-24 "V/F voltage coefficient" can correct the maximum output voltage in many ways for motor test equipment, and it is unnecessary to be set by general users. It is for V/F control only.

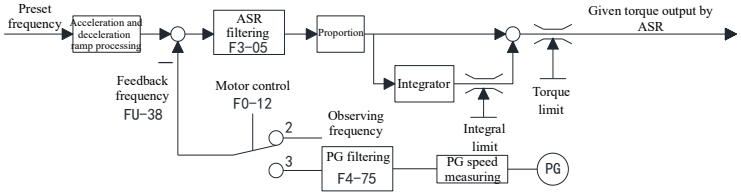
6.4 F3 Speed, Torque and Flux Control Parameters

F3-00	High-speed ASR proportional gain	Default	5.00	Change	×
Setting range	0.00~200.00				
F3-01	High-speed ASR integration time	Default	1.000s	Change	×
Setting range	0.010~30.000s				
F3-02	Low-speed ASR proportional gain	Default	10.00	Change	×
Setting range	0.00~200.00				
F3-03	Low-speed ASR integration time	Default	0.500s	Change	×
Setting range	0.010~30.000s				
F3-04	ASR parameter switching point	Default	0.00Hz	Change	×
Setting range	0.00~400.00Hz				
F3-05	ASR filtering time	Default	0.010s	Change	×
Setting range	0.000~2.000s				

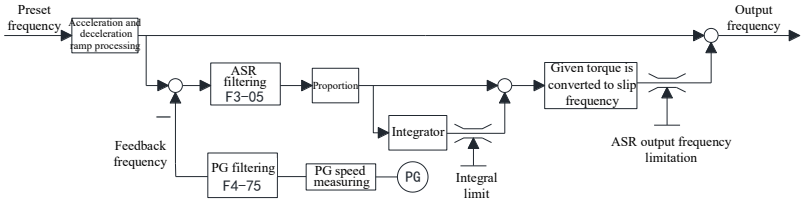
F3-06	Acceleration compensation differential time	Default	0.000s	Change	×
Setting range	0.000~20.000s				
F3-07	**Torque limitation selection**	Default	0	Change	×
Setting range	0: Determined by F3-08 “electric torque limit” and F3-09 “regeneration torque limit”. 1: |AI1|×2.5 2: |AI2|×2.5 3: |AI3|×2.5 4: |AI4|×2.5 5: |Arithmetic unit 1|×2.5 6: |Arithmetic unit 2|×2.5 7: |Arithmetic unit 3|×2.5 8: |Arithmetic unit 4|×2.5				
F3-08	**Electric torque limitation**	Default	180.0%	Change	×
F3-09	**Regenerative torque limitation**	Default	180.0%	Change	×
Setting range	0.0~290.0%, take rated torque of motor as 100%, for vector control only				
F3-10	**ASR output frequency limitation**	Default	10.0%	Change	×
Setting range	0.0~20.0%, maximum frequency is 100%, only for these with PG V/F control				

🕮 ASR: i.e., Automatic Speed Regulator. In vector control, ASR outputs a given torque, which is limited by F3-07~F3-09. In case of PG V/F control, ASR outputs frequency correction, which is limited by F3-10 “ASR output frequency limit”.

🕮 ASR structure diagram for vector control is shown below:

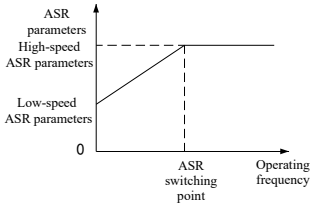


🕮 ASR structure diagram with PG V/F control is shown below:



Note: In case of PG V/F control, F3-07＝0 and ASR is limited by F3-10. When F3-07≠0, the limitation is the items selected in F3-10×F3-07÷2.5.

🕮 F3-04 “ASR parameter switching point”: ASR parameter switching can be used if different ASR parameters are required for high-speed and low-speed operation. Low-speed parameter F3-02 and F3-03 can be adopted when zero speed is adopted, and high-speed parameters F3-00 and F3-01 can be adopted when operating frequency is above the ASR parameter switching point. Besides, there shall be a smooth transition of high and low speed parameters between zero speed and ASR parameter switching point, as shown in the figure below. If only one set of ASR parameters is required, F3-04 "ASR parameter switching point" can be set to 0, that is, only high-speed ASR parameters are used.



🕮 F3-06 “ASR acceleration compensation differential time”: The parameter differentiates the given frequency processed by acceleration and deceleration time to obtain a feedforward torque given, which is added to the given torque to better track the given operating frequency in the process of acceleration and deceleration and reduce overshoot.

🕮 ASR regulation method: Firstly, the proportional gain shall be increased as far as possible under the premise of ensuring the system does not oscillate, then adjust the integration time to make the system respond quickly with a small overshoot.

🕮 When the speed overshoot is too large due to improper ASR parameters, the overpressure may be caused by energy feedback during the deceleration process of speed recovery.

F3-11	**Sag**	Default	0.00Hz	Change	○
Setting range	0.00~50.00Hz				
F3-12	**Sag starting torque**	Default	0.0%	Change	○
Setting range	0.0~100.0%, take rated torque of motor as 100%				

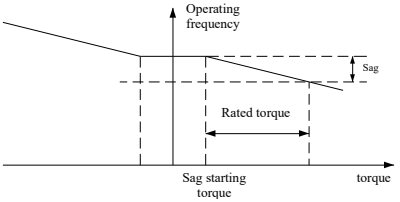
🕮 Control of sag mechanical characteristics: When multiple motors drive the same mechanical load and each motor is controlled by a separate VFD, the load borne by each motor and VFD will be different due to the different rated speed or mechanical characteristics of different motors. The sag function balances the load of each motor by adjusting the level of mechanical characteristics.

🕮 F3-11 “sag”: Set the operating frequency change value when motor torque is in "sag start torque + rated torque".

🕮 Motor torque is above F3-12 “sag start torque”:

🕮 Frequency after sag treatment = initial given frequency - (current torque - sag start torque) × sag

🕮 The sag mechanical characteristics are shown below:



F3-13	**Torque control selection**	Default	0	Change	×
Setting range	0: Conditions valid, select according to digital input 48 “speed/torque control selection” 1: Always valid				
F3-14	**Torque given selection**	Default	0	Change	×
Setting range	0: Given by F3-15 1: AI1×2.5 2: AI2×2.5 3: AI3×2.5 4: AI4×2.5 5: PFI×2.5 6: UP/DOWN regulating value×2.5 7: Arithmetic unit 1×2.5 8: Arithmetic unit 2×2.5 9: Arithmetic unit 3×2.5 10: Arithmetic unit 4×2.5 Note: All above are given with the motor torque rating being 100%. Motor rated torque = motor rated power÷(2π×motor rated speed÷60)				

F3-15	Digital torque setting	Default	0.0%	Change	○
Setting range	-290.0~290.0%, take rated torque of motor as 100%				
F3-16	**Torque control speed limit input selection**	Default	0	Change	○
Setting range	0: Determination of given frequency 1: Determination of F3-17 and F3-18				
F3-17	**Forward limit value of torque control speed**	Default	5.00Hz	Change	○
Setting range	0.00Hz~F0-07 "upper limit frequency"				
F3-18	**Reversed limit value of torque control speed**	Default	5.00Hz	Change	○
Setting range	0.00Hz~F0-07 "upper limit frequency"				
F3-19	**Torque given increase or decrease time**	Default	0.020s	Change	×
Setting range	0.000~10.000s, time of increasing from 0 to 290% motor rated torque				
F3-20	**Speed/torque control switching delay time**	Default	0.050s	Change	×
Setting range	0.001~1.000s				

🕮 Torque control can directly control the torque of the motor according to the given torque, and can be used for tension open-loop winding control, load balance control, etc. The VFD will switch to speed control mode to stop when inputting stop commands in torque control mode.

🕮 The torque control function applies only to vector control. PG vector control is recommended for torque control at low speed or power generation state.

🕮 F3-13 “torque control selection” can be set as always valid or conditionally valid. “Conditionally valid” refers to the torque control switched by digital input 48 “speed/torque control selection”.

🕮 Torque control can limit the speed according to the limiting source determined by F3-16 "torque control speed limit selection".

🕮 F3-19 “torque given increase or decrease time” can reduce the torque command mutation. If the motor vibrates under torque control, the parameter value can be considered to be increased.

🕮 In torque control, FWD indicator and REV indicator on the operation panel respectively represent forward and reversed directions.

F3-21	Pre-excitation time	Default	Model determination	Change	×
Setting range	0.10~5.00s, only valid for vector control				
F3-22	**Magnetic flux intensity**	Default	94.0%	Change	×
Setting range	50.0~150.0%, only valid for vector control				
F3-23	**Low-speed flux lifting**	Default	0%	Change	×
Setting range	0~50%, only valid for vector control				
F3-24	**Weak magnetic regulator integration time**	Default	0.150s	Change	×
Setting range	0.100~3.000s, only valid for vector control				

🕮 F3-21 "pre-excitation time": Before starting the motor, ensure that the motor is fully excited so that there is enough starting torque, this process generally takes 0.1-2.0s. The larger the motor capacity is, the longer the pre-excitation time will be.

🕮 F3-22 "magnetic flux intensity": Too high or too low flux level below the flux weakening point will lead to the decline of torque output capacity and efficiency.

🕮 F3-23 “low-speed flux lifting”: the magnetic flux intensity, when below 10% basic frequency, can be lifted to increase torque output capacity at low speed under vector control.

🕮 F3-24 “weak magnetic regulator integral time”: When operating above basic frequency or bus voltage is low, the motor will be automatically under field weakening control. F3-24 determines the speed of weak magnetic response, and it is necessary to reduce F3-24 when high dynamic performance is required.

F3-25	Electric power limit	Default	120.0%	Change	×
F3-26	Regenerative power limit	Default	120.0%	Change	×
Setting range	0.0~250.0%, rated power of the VFD is 100%, only for vector control to limit the output power				

6.5 F4 Digital Input Terminal and Multistage Speed

F4-00	DI1 digital input terminal function	Default	38	Change	×
F4-01	DI2 digital input terminal function	Default	39	Change	×
F4-02	DI3 digital input terminal function	Default	13	Change	×
F4-03	DI4 digital input terminal function	Default	1	Change	×
F4-04	DI5 digital input terminal function	Default	2	Change	×
Setting range	See the digital input function definition table below				

🕮 Digital input function definition table (a same digital input function cannot be selected for any two digital input terminals at the same time):

0: Not connected to the following signals
1: Multi-segment frequency selection 1
2: Multi-segment frequency selection 2
3: Multi-segment frequency selection 3
4: Multi-segment frequency selection 4
5: Multi-segment frequency selection 5
6: Multi-segment frequency selection 6
7: Multi-segment frequency selection 7
8: Multi-segment frequency selection 8
9: Acceleration / deceleration time selection 1
10: Acceleration / deceleration time selection 2
11: Acceleration and deceleration time selection 3
12: External fault input
13: Fault reset
14: Forward jog operation
15: Reverse jog operation
16: Emergency shutdown
17: VFD operation prohibited
18: Free shutdown
19: Terminal UP/DOWN increase
20: Terminal UP/DOWN decrease
21: Terminal UP/DOWN clear
22: PLC control prohibited
23: PLC suspended
24: PLC standby reset
25: PLC mode selection 1
26: PLC mode selection 2
27: PLC mode selection 328: PLC mode selection 4
29: PLC mode selection 5
30: PLC mode selection 6
31: PLC mode selection 7
32: Auxiliary given channel forbidden
33: Operation interruption
34: Stop DC braking
35: Process PID forbidden
36: PID parameter 2 selection
37: Three line stop command
38: Internal virtual FWD1 terminal
39: Internal virtual REV1 terminal
40: Internal virtual FWD2 terminal
41: Internal virtual REV2 terminal
42: Run command channel 1/2 switch
43: FWD1/REV1 terminal command switching to three-wire type 1
44: Main given frequency channel switching
45: Simultaneous switching of main given frequency channel and run command channel
46: Acceleration & deceleration prohibited
47: Analog quantity given frequency retention
48: Speed/torque control selection
49: Multistage PID selection 1
50: Multistage PID selection 2
51: Multistage PID selection 3
52: Zero servo command
53: Counter presetting
54: Counter reset
55: length counter and counter 2 reset
56: Wobble frequency input
57: Wobble frequency state reset
58: Total fan running time reset
59: PFI is reversed for position setting
60: Motor rated current selection 2
61: Motor rated current selection 3
62: Process PID paused

🕮 Hope530 is provided with five multifunctional programmable digital input terminals (DI1~DI5) and five expanded input terminals. When DI5 is used as a PFI pulse frequency input terminal, F4-04 must be set to 0.

🕮 In addition to the functions that can be selected for digital input terminals from the digital input function definition table, the outputs of comparators, logic units, and timers can also be connected to the digital input function in the table, as described in the FE section.

🕮 Relevant monitoring parameters: FU-42 “digital input terminal state”.

🕮 The digital input function is detailed as follows:

1~8: Multi-stage frequency selection. See F4-19 “multi-stage speed selection mode” for details.

9~11: Acceleration and deceleration time selection Acceleration and deceleration time 1~8 for encoding is shown in the table below. '0' refers to invalid and '1' refers to valid:

Acceleration and deceleration time selection 3	Acceleration and deceleration time selection 2	Acceleration and deceleration time selection 1	Acceleration and deceleration time selected
0	0	0	Acceleration and deceleration time 1 (F1-00, F1-01)
0	0	1	Acceleration and deceleration time 2 (F1-02, F1-03)
0	1	0	Acceleration and deceleration time 3 (F1-04, F1-05)
0	1	1	Acceleration and deceleration time 4 (F1-06, F1-07)
1	0	0	Acceleration and deceleration time 5 (F1-08, F1-09)
1	0	1	Acceleration and deceleration time 6 (F1-10, F1-11)
1	1	0	Acceleration and deceleration time 7 (F1-12, F1-13)
1	1	1	Acceleration and deceleration time 8 (F1-14, F1-15)
Note: Acceleration and deceleration time selection is invalid in case of simple PLC, jogging operation and emergency shutdown.			

12: External fault input. The abnormal or fault information of the peripheral equipment of the VFD is input to the VFD through this signal, so that the VFD stops with external fault reported. The fault cannot be reset automatically and must be manually reset. If normally closed input is required, it can be realized by inverting the digital input terminal of F4-05. External failure can be indicated by digital output 11 "external failure shutdown".

13: Fault reset. The rising edge of the signal resets the fault, and the function is the same as the reset function of the ◯ of operation panel.

14~15: Forward and reverse jogging operation. See the description of jogging function.

16: Emergency stop. If the signal is valid, the VFD will stop according to F1-18 "emergency stop deceleration time".

17: VFD operation prohibited. When the signal is effective, it will prohibit the operation of the VFD, and the VFD will stop freely if in operation.

18: Free stop. If the signal is valid in the operation of the VFD, the output will be blocked immediately, and the motor will stop by inertia sliding.

19~21: UP/DOWN increase and decrease and clear. See the description on UP/DOWN.

22~24: PLC prohibition, suspension and reset. See the F8 section.

25-31: PLC mode selection 1~7. See the F8 section.

32: Auxiliary given channel forbidden. The auxiliary setting is invalid if the signal is valid.
33: Operation interruption. When the VFD is in operation, the VFD will block the output when the signal is valid. When the operation is interrupted and command is lifted, the VFD will start in the way set by FB-25. The command of 17 'operation interruption state' can be output.

34: Stop DC braking. When the operating frequency is less than F1-26 "stop/DC braking frequency" and F1-25 = 2 in the process of stopping, the stop DC braking will be enabled if the signal is valid until the braking time is beyond F1-28 and the command is lifted.

35: Process PID forbidden. When this signal is effective, PID operation will be disabled. Only when this signal is not effective and there is no operation mode of higher priority, PID operation will be started.

36: PID parameter 2 selection. When F7-11 'PID parameter transition mode'=0 and the signal is valid, select PID parameter 2 (F7-08~F7-10). Otherwise, select PID parameter 1 (F7-05~F7-07).

37~39: Three-line shutdown instruction, internal virtual FWD1 and REV1 terminal. See the description on FWD1/REV1 and FWD2/REV2 running mode.

40, 41: Internal virtual FWD2 and REV2 terminal. See the description on FWD1/REV1 and FWD2/REV2 running mode.

42: Running command channel 1/2 switch. This signal realizes the arbitrary switching between running command channel 1 and running command channel 2 set by F0-02. For example, F0-02=30, i.e., switch between operation panel and COMM1 can be achieved. When the terminal input is valid, select COMM1, otherwise, select operation panel control. Switching of running command channels is also affected by the digital input function 45. See digital input function 45. The switching of the running command channel is also affected by the combination key described in the FC-01 thousans place, as described in FC-01 "key functions and automatic locking".

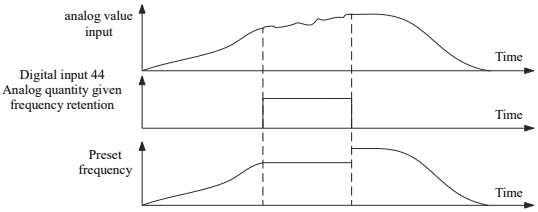
43: FWD1/REV1 terminal command switching to three-wire type 1. When the FWD1/REV1 channel is valid and the signal is also valid, it forcibly switches to three-wire mode 1. See logic and illustration of various modes of FWD1/REV1.

44: Main given frequency channel switching. The signal realizes the arbitrary switching between the given channel 1 and the given channel 2 set by F0-01. For example, F0-01=1201, switch between arithmetic unit 4 and COMM1 can be achieved. When input terminal is valid, select arithmetic unit 4 control, otherwise, select COMM1. Switch of the main given frequency channel is also affected by the digital input function 45. See digital input function 45 for details. The switching of the main given frequency channel is also affected by the combination key described in the FC-01 kilobit place, as described in FC-01 "key functions and automatic locking".

45: Simultaneous switching of main given frequency channel and run command channel. This signal simultaneously realizes the arbitrary switching between running command channels 1 and 2 set by F0-02 and the arbitrary switching between given channels 1 and 2 set by F0-01. Given channel 2 is forcibly selected as main given frequency and running command channel 2 is forcibly selected when the terminal input is valid. If the input of terminal 45, the input of running command channel 1/2 switch terminal 42 and switch of command and frequency channel functions by long pressing ◁ and △ are invalid, running command channel 1 is selected; otherwise, running command channel 2 is selected. When both the input of this terminal 45 and the main given frequency channel switch terminal 44 and switch of command and frequency channel functions by long pressing ◁ and △ are invalid, running given channel 1 is selected, otherwise running given channel 2 is selected.

46: Acceleration & deceleration prohibited. When the signal is effective, the acceleration and deceleration process of the VFD stops; If not, it returns to normal acceleration and deceleration state.

47: Analog quantity given frequency retention. When a given frequency is obtained from an analog input and the signal is valid, the given frequency does not vary with the analog input. If the signal is invalid, the given frequency varies with the analog input. This feature is useful in situations where analog input commands are easily changed due to electromagnetic interference, as shown below:



48: Speed/torque control selection. When the torque control selection condition is effective, the signal can make the VFD switch between torque control and speed control. When it is invalid, the VFD is under speed control, and when it is invalid, it is under torque control.

49~51: Multistage PID selection 1~3. The 3 terminal function selects the given value of the current PID by code.

Multistage PID selection 3	Multistage PID selection 1	Multistage PID selection 2	PID given selected
0	0	0	Determined by F7-01 "given channel selection"
0	0	1	F7-22 'multistage PID given 1'
0	1	0	F7-23 'multistage PID given 2'
0	1	1	F7-24 'multistage PID given 3'
1	0	0	F7-25 'multistage PID given 4'
1	0	1	F7-26 'multistage PID given 5'
1	1	0	F7-27 'multistage PID given 6'
1	1	1	F7-28 'multistage PID given 7'

52: Zero servo command. See zero servo function description.

53, 54: Counter presetting and reset. See counter function description.

55: Length counter and counter 2 reset. See length counter function description and description on counter 2.

56, 57: Wobble frequency input and state reset. See the description for weaving wobble frequency functions.

58: Total fan running time reset. See the description on life expectancy of fan.

59: PFI is reversed for position setting. In PFI position setting, the signal is valid and make the position setting negative.

60, 61: Motor rated current selection 2, 3 It is for multiple motor overload protection.

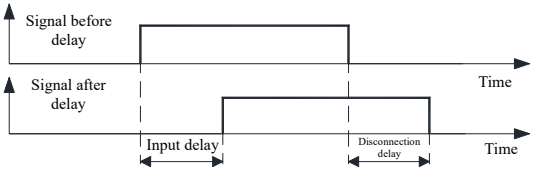
62: Process PID paused. When the signal is valid, the PID output value always remains constant; If the signal is invalid, the PID output value will be adjusted according to the PID feedback value and the PID given value.

F4-05	Positive and negative logic 1 of input terminal	Default	00000	Change	×
Setting range	Ten thousands: DI5 Thousands: DI4 Hundreds: DI3 Tens: DI2 Units: DI1 0: positive logic, valid when there is power in the loop, invalid when power is off 1: negative logic, invalid when there is power in the loop, valid when power is off.				
F4-06	**Shake elimination time of digital input terminal**	Default	10ms	Change	○
Setting range	0~2000ms				

🕮 Shake elimination time of digital input terminal: define the shake elimination time of digital input terminal, the signal with duration shorter than the Shake elimination time will be neglected.

F4-07	DI1 input delay	Default	0.00s	Change	○
F4-08	DI1 disconnection delay	Default	0.00s	Change	○
F4-09	DI2 input delay	Default	0.00s	Change	○
F4-10	DI2 disconnection delay	Default	0.00s	Change	○
F4-11	DI3 input delay	Default	0.00s	Change	○
F4-12	DI3 disconnection delay	Default	0.00s	Change	○
Setting range	0.00~400.00s				

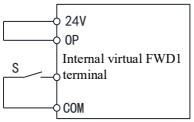
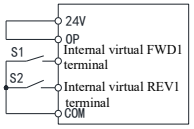
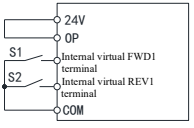
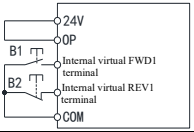
Digital input delay is shown below:

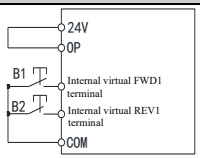
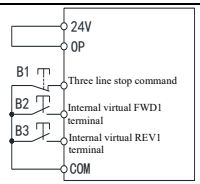
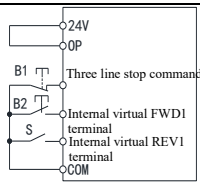


F4-13	FWD1/REV1 and FWD2/REV2 operation mode	Default	01	Change	×
Setting range	Tens: FWD2/REV2 operation mode (0~4) 0: Single-line type (start/stop) 2: Two-line type 2 (start / stop, direction) 4: Two-line type 4 (monopulse start and stop) 6: Three-line type 2 (operation, direction, stop)		Units: FWD1/REV1 operation mode (0~6) 1: Two-line type 1 (forward, reversal) 3: Two-line type 3 (start, stop) 5: Three-line type 1 (forward, reversal, stop)		

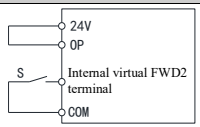
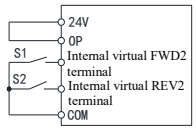
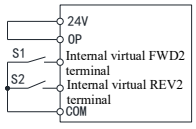
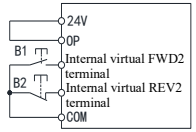
Relevant digital input 37 "3-wire stop command", 38 "Internal virtual FWD1 terminal", 39 "Internal virtual REV1 terminal", 40 "Internal virtual FWD2 terminal", 41 "Internal virtual REV2 terminal".

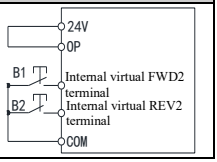
The table below lists the logic and diagrams of various operating modes of FWD1/REV1. In the table, S stands for valid level. B is valid edge:

<table>
<tr><th>F4-13
Units</th><th>Mode name</th><th colspan="4">Running logics</th><th>Diagram</th></tr>
<tr><td>0</td><td>Single-line type
(start/stop)</td><td colspan="4">S: Running switch, run when valid
Note: The direction is determined by the direction of the given frequency</td><td>  </td></tr>
<tr><td rowspan="5">1</td><td rowspan="5">Two-line 1
(Forward, reversal)</td><td>S2
(reversal)</td><td>S1
(forward)</td><td colspan="2">Meaning</td><td rowspan="5">  </td></tr>
<tr><td>Invalid</td><td>Invalid</td><td colspan="2">Stop</td></tr>
<tr><td>Invalid</td><td>Valid</td><td colspan="2">Forward rotation</td></tr>
<tr><td>Valid</td><td>Invalid</td><td colspan="2">Reversed rotation</td></tr>
<tr><td>Valid</td><td>Valid</td><td colspan="2">Stop</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Two-line 2
(Start/stop, direction)</td><td>S2
(direction)</td><td>S1
(start/stop)</td><td colspan="2">Meaning</td><td rowspan="5">  </td></tr>
<tr><td>Invalid</td><td>Invalid</td><td colspan="2">Stop</td></tr>
<tr><td>Invalid</td><td>Valid</td><td colspan="2">Forward rotation</td></tr>
<tr><td>Valid</td><td>Invalid</td><td colspan="2">Stop</td></tr>
<tr><td>Valid</td><td>Valid</td><td colspan="2">Reversed rotation</td></tr>
<tr><td>3</td><td>Two-line 3
(Start, stop)</td><td colspan="4">B1: Run button (normally on)
B2: Stop button (normally off)
Note: The direction is determined by the direction of the given frequency</td><td>  </td></tr>
</table>

F4-13 Units	Mode name	Running logics	Diagram
4	Two-line 4 (Monopulse start and stop)	B1: Forward rotation start/stop button (normally on) B2: Reversed rotation start/stop button (normally off)	
5	Three-line 1 (Forward, reversal, stop) Digital input 37 'three-wire stop command' is required to be attached	B1: Stop button (normally off) B2: Forward running button (normally on) B3: reversal button (normally on)	
6	Three-line 2 (Operation, direction, stop) Digital input 37 'three-wire stop command' is required to be attached	B1: Stop button (normally off) B2: Operation button (normally on) S: Direction switch, reverse when effective	

The table below lists the logic and diagrams of various operating modes of FWD2/REV2. In the table, S stands for valid level. B is valid edge:

<table>
<tr><th>F4-13 Tens</th><th>Mode name</th><th colspan="3">Running logics</th><th>Diagram</th></tr>
<tr><td>0</td><td>Single-line type
(start/stop)</td><td colspan="3">S: Running switch, run when valid
Note: The direction is determined by the direction of the given frequency</td><td>  </td></tr>
<tr><td rowspan="5">1</td><td rowspan="5">Two-line 1
(Forward, reversal)</td><td>S2 (reversal)</td><td>S1 (forward)</td><td>Meaning</td><td rowspan="5">  </td></tr>
<tr><td>Invalid</td><td>Invalid</td><td>Stop</td></tr>
<tr><td>Invalid</td><td>Valid</td><td>Forward rotation</td></tr>
<tr><td>Valid</td><td>Invalid</td><td>Reversed rotation</td></tr>
<tr><td>Valid</td><td>Valid</td><td>Stop</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Two-line 2
(Start/stop, direction)</td><td>S2 (direction)</td><td>S1 (start/stop)</td><td>Meaning</td><td rowspan="5">  </td></tr>
<tr><td>Invalid</td><td>Invalid</td><td>Stop</td></tr>
<tr><td>Invalid</td><td>Valid</td><td>Forward rotation</td></tr>
<tr><td>Valid</td><td>Invalid</td><td>Stop</td></tr>
<tr><td>Valid</td><td>Valid</td><td>Reversed rotation</td></tr>
<tr><td>3</td><td>Two-line 3
(Start, stop)</td><td colspan="3">B1: Run button (normally on)
B2: Stop button (normally off)
Note: The direction is determined by the direction of the given frequency</td><td>  </td></tr>
</table>

F4-13 Tens	Mode name	Running logics	Diagram
4	Two-line 4 (Monopulse start and stop)	B1: Forward rotation start/stop button (normally on) B2: Reversed rotation start/stop button (normally off)	

🕮 In terminal control mode, although single-line or two-line operation mode 1 and 2 are of level valid, it is necessary to restart by giving the stop signal before operation signal when VFD stops due to the stop command generated by other sources.

🕮 For two-line 3 and three-line operation mode, the running button is invalid when the normally-off stop button is turned off.

🕮 Even if the running mode determines the operation direction, it is still limited by the direction locking.

🕮 If the terminal command has no direction information, the operation direction shall be determined by the state (positive and negative) of given frequency channels.

⚠ DANGER: **When the running signal exists and Fb-26 "Power-on self-start Permit" = 1 (default value), the VFD will start automatically when it is powered on.**

F4-14	UP/DOWN adjustment method	Default	0	Change	○
Setting range	0: Terminal level type 1: Terminal pulse type 2: Operation panel level type 3: Operation panel pulse type				
F4-15	UP/DOWN rate/step size	Default	1.00	Change	○
Setting range	0.01~100.00, min. unit: level type 0.01%/s, impulse type: 0.01%				
F4-16	UP/DOWN memory selection	Default	0	Change	○
Setting range	0: Power failure storage, 1: Power failure clear, 2: Cleared at stop and power failure				
F4-17	UP/DOWN upper limit	Default	100.0%	Change	○
Setting range	0.0~100.0%				
F4-18	UP/DOWN lower limit	Default	0.0%	Change	○
Setting range	－100.0~0.0%				

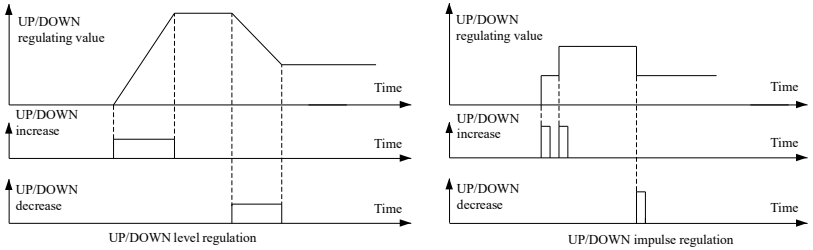
🕮 UP/DOWN function achieves the continuous adjustment of switching mode with the adjustment value can be used for giving frequency PID and so on.

🕮 Under the condition of **F4-14＝0 'terminal level type',** FU-23 “UP/DOWN regulation value increases and decreases at the rate set in F4-15 when digital input 19 'terminal UP/DOWN increase' or 20 'UP/DOWN decrease' is valid. When the digital input 19 and 20 are both valid or invalid, the value of FU-23 remains unchanged.

Under the condition of **F4-14＝1 'terminal pulse type'**, FU-23 “UP/DOWN regulation value increases and decreases at the step length set in F4-15 for each effective impulse of digital input 19 'terminal UP/DOWN increase' or 20 'UP/DOWN decrease'.

The conditions of **F4-14＝2 and 3** are similar to 0 and 1, and the difference is that △ and ▽ of operation panel replaces digital inputs 19 and 20 and △ and ▽ can be used for regulation when the value of FU-23 'UP/DOWN regulation value' is currently displayed.

🕮 Two control modes (UP/DOWN) are shown below:



🕮 Digital input 21 'terminal UP/DOWN clear'. The rising edge of the signal clears the FU-23 "UP/DOWN regulation value".

F4-19	Multi-speed selection	Default	0	Change	×
Setting range	0: Code selection 1: Direct selection 2: Overlapping mode 3: Number selection				
F4-20 ~ F4-67	Multistage frequency 1~48	Default	n.00Hz (n=1~48)	Change	○
Setting range	0.00~400.00Hz, note: Multistage frequency 32~48 is for simple PLC operation Multistage frequencies 1 ~ 48 are the default multistage frequency numbers, for example: the multistage frequency 3 factory default value is 3.00Hz				

F4-19＝0 'code selection': binary code with multistage frequency selection 1~5 can be used to select multistage frequency 1~31. For example, DI1~DI5 are respectively set to be 'multistage frequency selection 1~5', and corresponding code selection relation is shown in the Table below. In the table, '0' refers to invalid case and '1' refers to valid case.

DI5	DI4	DI3	DI2	DI1	Select Results	DI5	DI4	DI3	DI2	DI1	Select Results
0	0	0	0	0	Given frequency for normal operation	1	0	0	0	0	F4-35 Multistage frequency 16
0	0	0	0	1	F4-20 Multistage frequency 1	1	0	0	0	1	F4-36 Multistage frequency 17
0	0	0	1	0	F4-21 Multistage frequency 2	1	0	0	1	0	F4-37 Multistage frequency 18
0	0	0	1	1	F4-22 Multistage frequency 3	1	0	0	1	1	F4-38 Multistage frequency 19
0	0	1	0	0	F4-23 Multistage frequency 4	1	0	1	0	0	F4-39 Multistage frequency 20
0	0	1	0	1	F4-24 Multistage frequency 5	1	0	1	0	1	F4-40 Multistage frequency 21
0	0	1	1	0	F4-25 Multistage frequency 6	1	0	1	1	0	F4-41 Multistage frequency 22
0	0	1	1	1	F4-26 Multistage frequency 7	1	0	1	1	1	F4-42 Multistage frequency 23
0	1	0	0	0	F4-27 Multistage frequency 8	1	1	0	0	0	F4-43 Multistage frequency 24
0	1	0	0	1	F4-28 Multistage frequency 9	1	1	0	0	1	F4-44 Multistage frequency 25
0	1	0	1	0	F4-29 Multistage frequency 10	1	1	0	1	0	F4-45 Multistage frequency 26
0	1	0	1	1	F4-30 Multistage frequency 11	1	1	0	1	1	F4-46 Multistage frequency 27

0	1	1	0	0	F4-31 Multistage frequency 12	1	1	1	0	0	F4-47 Multistage frequency 28
0	1	1	0	1	F4-32 Multistage frequency 13	1	1	1	0	1	F4-48 Multistage frequency 29
0	1	1	1	0	F4-33 Multistage frequency 14	1	1	1	1	0	F4-49 Multistage frequency 30
0	1	1	1	1	F4-34 Multistage frequency 15	1	1	1	1	1	F4-50 Multistage frequency 31

F4-19＝1 'direct selection': 'Multistage frequency selection 1'~'multistage frequency selection 8' directly correspond to 'multistage frequency 1'~'multistage frequency 8'. When multiple selection signals are valid, the selection signal with the smaller number is valid. For example: DI1~DI8① are respectively set to be 'multistage frequency selection 1'~'multistage frequency selection 8', then the corresponding relationship is shown below. In the table, '0' refers to invalid case, '1' refers to valid case and '-' refers to any state:

DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1	Select Results
0	0	0	0	0	0	0	0	Given frequency for normal operation
—	—	—	—	—	—	—	1	F4-20 Multistage frequency 1
—	—	—	—	—	—	1	0	F4-21 Multistage frequency 2
—	—	—	—	—	1	0	0	F4-22 Multistage frequency 3
—	—	—	—	1	0	0	0	F4-23 Multistage frequency 4
—	—	—	1	0	0	0	0	F4-24 Multistage frequency 5
—	—	1	0	0	0	0	0	F4-25 Multistage frequency 6
—	1	0	0	0	0	0	0	F4-26 Multistage frequency 7
1	0	0	0	0	0	0	0	F4-27 Multistage frequency 8

F4-19＝2 'Overlapping selection': The given frequency is the sum of all selected multistage frequencies (limited by upper and lower frequencies).

For example, only 'multistage frequency selection 1', 'multistage frequency selection 3' and 'multistage frequency selection 4' are valid, then:

Given frequency = multistage frequency 1 + multistage frequency 3 + multistage frequency 4

F4-19＝3 'Number selection': The number of effective signals among 'multistage frequency selection 1'~'multistage frequency selection 8' determines that multistage frequency is selected for setting value. For example: if any 3 of them are valid, then given frequency=multistage frequency 3.

F4-68	PG pulse number per revolution	Default	1024	Change	×
Setting range	1~8192				
F4-69	**PG type**	Default	0	Change	×
Setting range	0: Quadrature encoder, 1: Single channel encoder				
F4-70	**PG direction selection**	Default	0	Change	×
Setting range	0: Positive (leading phase B of phase A of orthogonal encoder is positive direction) 1: Negative (leading phase A of phase B of orthogonal encoder is positive direction)				

F4-71	PG disconnection action	Default	2	Change	×
Setting range	0: No action 1: Alarm (display AL.PGo) 2: Fault and free stop (displaying Er.PGo fault code)				
F4-72	PG disconnection detection time	Default	1.0s	Change	×
Setting range	0.1~10.0s				
F4-73	PG gear ratio denominator setting	Default	1	Change	×
F4-74	PG gear ratio molecular setting	Default	1	Change	×
Setting range	1~1000				
F4-75	PG speed measurement filtering time	Default	0.005s	Change	○
Setting range	0.000~2.000s				

🕮 Encoder interface board, such as SL510-PG0, is required for the use of encoder. See the section of encoder interface board in Chapter 9 for the wiring method.

🕮 F4-69 'PG type': When selecting a single-channel encoder, the signal must enter through channel A. Single-channel encoder is not suitable for low speed and forward and reversal operations.

🕮 F4-70 'PG direction selection': If selecting forward direction for single-channel encoder, the speed value of the encoder (FU-38 'testing frequency') is always positive. Otherwise, it is always negative.

🕮 PG disconnection detection and processing: If the speed regulator's given frequency is greater than 0.5Hz and the encoder has no pulse generated within F4-72 "PG disconnection detection time", it will be deemed to be PG disconnection, and the disconnection action will be processed according to the settings of F4-71 "PG disconnection action". PG disconnection detection is only available for these with PG V/F control and PG vector control.

🕮 When the encoder is connected to the motor shaft through gears and other speed shifting devices, it is necessary to set F4-73 and F4-74 correctly, and the relationship between the encoder speed and the motor speed is as follows:

Motor speed = encoder speed × F4-74 "PG gear ratio numerator setting" ÷ F4-73 "PG gear ratio denominator setting"

🕮 F4-75 'PG speed measuring and filtering time': Encoder speed measuring requires F4-75 filtering, so F4-75 cannot be set too large when dynamic performance is required to be high.

🕮 Relevant monitoring parameters: FU-38 “PG detection frequency”.

🕮 **Encoder setting verification method**: Adopt non-PG V/F control mode to run in the direction and frequency allowed by the load, and observe whether the direction of FU-38 "PG detection frequency" is consistent with the direction displayed on the operation panel and whether the value is close to the given frequency.

⚠DANGER: **For PG control mode, it is required to set PG parameters correctly. Improper setting may result in personal injury and property loss. After the motor cable is reconnected, the direction settings of the encoder must be checked again.**

F4-76	DI6 digital input terminal function	Default	0	Change	×
F4-77	DI7 digital input terminal function	Default	0	Change	×
F4-78	DI8 digital input terminal function	Default	0	Change	×
F4-79	DI9 digital input terminal function	Default	0	Change	×
F4-80	DI10 digital input terminal function	Default	0	Change	×
Setting range	See the digital input function definition table.				

🕮 DI6~DI10 digital input terminal is on the extended board. See the section of digital I/O extended board in chapter 9.

🕮 Input of extended DI is always 0 or 1 when expansion board is not connected.

🕮 Dithering elimination for DI6~DI10 digital input terminal is also achieved by F4-06 'digital input terminal dithering elimination time'.

🕮 Relevant monitoring parameters: FU-43 “extended digital input terminal state”.

F4-81	Positive and negative logic 2 of input terminal	Default	00000	Change	×
Setting range	Ten thousands: DI10 Thousands: DI9 Hundreds: DI8 Tens: DI7 Units: DI6 0: positive logic, valid when there is power in the loop, invalid when power is off 1: negative logic, invalid when there is power in the loop, valid when power is off.				

6.6 F5 Digital Output and Relay Output Settings

F5-00	Digital output terminal signal type selection	Default	00000	Change	×
Setting range	**Units: DO2 output selection**	0: Digital output 1: PFO pulse frequency output			
	Tens: DO1 digital output signal type **Hundreds: DO2 digital output signal type** **Kilobit: T1 relay output signal type** **Myriabit: T2 relay output signal type**	0: Level output 1: pulse output			

🕮 F5-00 (units) =0, DO2 output signal is level signal. See F5-02 for output functions. F5-00 (units) =1, DO2 outputs the pulse signal of particular frequencies. See PFO function parameters on 108.

🕮 Output signal type of the corresponding terminals of F5-00 (myriabit, kilobit, hundreds and tens places of F5-00)=0, corresponding terminal (T2, T1, DO2, DO1) output signal type is level signal; output signal type of corresponding terminals of F5-00 (myriabit, kilobit, hundreds and tens places of F5-00)=1, corresponding terminal (T2, T1, DO2, DO1) output signal type is monopulse signal. Monopulse width = corresponding terminal break delay (F5-13, F5-11, F5-09, F5-07)+10ms, The monopulse is output only once when the terminal function is switched from invalid to active, and no output is displayed the rest of the time.In case of digital output, the specific output function selection is detailed in the corresponding terminal function selection parameters (F5-04, F5-03, F5-02, F5-01).

F5-01	DO1 digital output terminal function	Default	1	Change	×
F5-02	Functions of DO2 digital output terminal	Default	2	Change	×
F5-03	T1 relay output function	Default	5	Change	×
F5-04	T2 relay output function	Default	13	Change	×
Setting range	0~73, see the digital output function definition table below.				

🕮 Relevant monitoring parameters: FU-44 “digital input terminal state”.

When DO2 is used as the PFO pulse frequency output terminal, the units place of F5-00 must be set to 1.

🕮 Digital output function definition table

0: VFD ready for operation	25: Host computer digital quantity 1	50: Logic unit 5 output
1: VFD in operation	26: Host computer digital quantity 2	51: Logic unit 6 output
2: Frequency reached	27: Wobble frequency in upper and	52: Timer 1 output
3: Frequency level detection signal 1	lower limits	53: Timer 2 output
4: Frequency level detection signal 2	28: Set count value reached	54: Timer 3 output
5: Fault output	31: Set length of length counter	48: Logic unit 3 output
6: Brake locking signal	reached	49: Logic unit 4 output
7: Heavy motor load	32: DI1 (after positive and negative	55: Timer 4 output
8: Motor overload	logics)	56: A (encoder A channel)
9: Motor underload	33: DI2 (after positive and negative	57: B (encoder B channel)
10: Undervoltage lockout	logics)	58: PFI terminal state
11: External failure shutdown	34: DI3 (after positive and negative	59: Motor virtual loop count pulse

12: Fault self-resetting	logics)	60: PLC running
13: Instant power failure and power-on action	35: DI4 (after positive and negative logics)	61: PLC operation paused
14: Alarm output	36: DI5 (after positive and negative logics)	62: PLC phase operation completion indication
15: In reverse operation	37: DI6 (expansion terminal)	63: PLC cycle completion indication
16: During shutdown process	38: DI7 (expansion terminal)	64: PLC mode 0 indication
17: Operation interruption state	39: DI8 (expansion terminal)	65: PLC mode 1 indication
18: In operation panel control	40: DI9 (expansion terminal)	66: PLC mode 2 indication
19: Torque limiting	41: DI10 (expansion terminal)	67: PLC mode 3 indication
20: Limited by frequency upper limit	42: Comparator 1 output	68: PLC mode 4 indication
21: Limited by frequency lower limit	43: Comparator 2 output	69: PLC mode 5 indication
22: In power generation operation	44: Comparator 3 output	70: PLC mode 6 indication
23: Zero-speed operation	45: Comparator 4 output	71: PLC mode 7 indication
24: Zero servo complete signal	46: Logic unit 1 output	72: Process PID in sleep
29: Specified count value reached	47: Logic unit 2 output	73: Fan life expectancy reached
30: Specified count value reached 2		

📖 The digital output function is detailed as follows:

0: VFD ready for operation. The charging contactor has been closed and free from faults.

1: VFD in operation. When the VFD is running.

2: Frequency arrival It is effective when the operation frequency of the VFD is within the positive and negative detection width of the given frequency. See F5-14 for details.

3~4: Frequency level detection signal 1, 2. See F5-15~F5-18 for details.

5: Fault output. If the VFD is in the fault state, there will be effective signal output.

6: Brake locking signal. See relevant descriptions of F1-25 'stop mode'.

7: Heavy motor load. The signal is valid when the VFD detects heavy motor load.

8: Motor overload. The signal is valid in case of motor overload.

9: Motor underload. The signal is valid in case of motor underload.

10: Undervoltage lockout. This signal is effective when the DC bus undervoltage results in shutdown.

11: External fault shutdown. The signal is valid in case of shutdown due to external fault. The signal is invalid once the external fault is reset.

12: Fault resetting. This signal is valid in the event of a failure and when waiting for the VFD to reset by itself.

13: Instant power failure and power-on action. The signal is effective when the main circuit is undervoltage and waiting for restart.

14: Alarm output. This signal is effective when the VFD alarms.

15: In reverse operation. This signal is effective when the VFD is running in reverse.

16: During shutdown process. This signal is valid when the VFD decelerates for stop.

17: Operation interruption. The signal is valid when the VFD is interrupted from operation.

18: In operation panel control. This signal is valid when the running command channel is the operation panel.

19: Torque limiting. The signal is valid when the torque reaches limiting value.

20: Limited by frequency upper limit. Set frequency ≥ upper frequency, and the signal is valid when the operating frequency reaches the upper limit frequency.

21: Limited by frequency lower limit. Set frequency ≤ lower limit frequency, and the signal is valid. When the operating frequency reaches the lower limit frequency.

22: In power generation operation. The VFD is under power generation state.

23: Zero-speed operation. The signal is valid when the motor speed is lower than F9-23 "zero-speed level".

24: Zero servo complete signal. When the position deviation of zero servo is less than the end amplitude of zero servo, the signal is valid, otherwise, it is invalid.

25~26: Host computer digital quantity 1, 2. Available for programmable units.

27: Wobble frequency in upper and lower limits. See the description for weaving wobble frequency functions.

28~30: Set count value reached, specified count value reached and specified count value reached 2. See F9 counter.

31: Set length of length counter reached. See F9 counter.

32~36: DI1~DI5 (after positive and negative logic). Digital input signals after positive and negative logic and dithering elimination can be used for programmable units.

37~41: DI6~DI10 (expansion terminal). The extended digital input signal after dithering elimination can be used for programmable units.

42~45: comparator 1~4 output. Available for programmable units.

46~51: logical unit 1~6 output. Available for programmable units.

52~55: Timer 1~4 output. Available for programmable units.

56, 57: Encoder channel A and B. Input state of encoder channel A and B can be used as high-speed input of counter and length counter.

58: PFI terminal state. It can be used as high-speed input of counter and length counter.

59: Motor virtual loop count pulse. Pulse signal with duty ratio of 50% can be connected to counter for rolling diameter calculation during rolling control.

60: PLC in operation. The signal is valid when the VFD is under simple PLC operation mode.

61: PLC operation paused. The signal is valid when digital input 23 'PLC operation paused' signal is valid.

62: PLC phase operation completion indication. Simple PLC sends a 500ms pulse signal after completing each phase.

63: PLC cycle completion indication. Simple PLC sends a 500ms pulse signal after completing each circulation.

64~71: PLC mode 0 indication~PLC mode 7 indication. It is used to output PLC mode number indicating current selection.

72: PID in sleep operation. The signal is valid in sleep operation. See PID sleep settings

73: Fan life expectancy reached. See the description on life expectancy of fan.

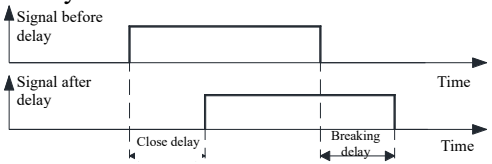
F5-05	DO terminal output positive & negative logic	Default	00	Change	×
Setting range	Tens: DO2 Units: DO1 0: Positive logic, connected when valid and disconnected when invalid 1: Negative logic, disconnected when valid and connected when invalid.				

🕮 The function can be output after taking DO1 and DO2 signal values reversely.

F5-06	DO1 terminal closing delay	Default	0.00s	Change	○
F5-07	DO1 terminal opening delay	Default	0.00s	Change	○
F5-08	DO2 terminal closing delay	Default	0.00s	Change	○
F5-09	DO2 terminal opening delay	Default	0.00s	Change	○
F5-10	T1 terminal closing delay	Default	0.00s	Change	○
F5-11	T1 terminal opening delay	Default	0.00s	Change	○
F5-12	T2 terminal closing delay	Default	0.00s	Change	○

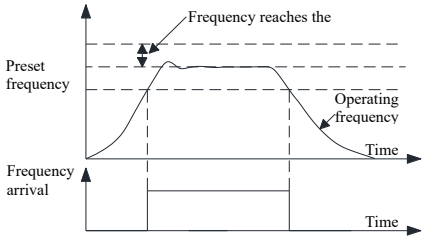
F5-13	T2 terminal opening delay	Default	0.00s	Change	○
Setting range	0.00~400.00s				

🕮 Digital output delay is shown below:



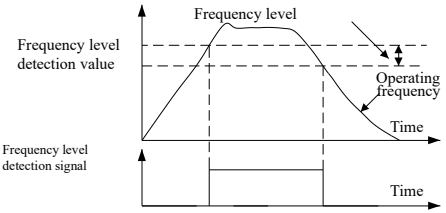
F5-14	Frequency reaches detection width	Default	2.50Hz	Change	○
Setting range	0.00~400.00Hz				

🕮 When the operation frequency of the VFD is within the positive and negative detection width near the given frequency, the frequency arrival signal is sent, as shown in the figure below:



F5-15	Frequency level detection value 1	Default	50.00Hz	Change	○
F5-16	Frequency level detection hysteresis value 1	Default	1.00Hz	Change	○
F5-17	Frequency level detection value 2	Default	25.00Hz	Change	○
F5-18	Frequency level detection hysteresis value 2	Default	1.00Hz	Change	○
Setting range	0.00~400.00Hz				

🕮 When the operating frequency is greater than the "frequency level detection value", the digital output "frequency level detection signal" is effective until the operating frequency is less than the "frequency level detection value - frequency level detection lagged value", as shown in the following figure:



F5-19	T3 relay output function	Default	5	Change	×
F5-20	T4 relay output function	Default	5	Change	×
F5-21	T5 relay output function	Default	5	Change	×
F5-22	T6 relay output function	Default	5	Change	×
Setting range	0~73, see the digital output function definition table.				

T3~T6 relay output terminals are on the extended board. See the section of digital I/O extended board in chapter 9.

Relevant monitoring parameters: FU-45 “expanded digital input terminal state”.

F5-23	**T3 terminal closing delay**	Default	0.00s	Change	○
F5-24	**T3 terminal opening delay**	Default	0.00s	Change	○
F5-25	**T4 terminal closing delay**	Default	0.00s	Change	○
F5-26	**T4 terminal opening delay**	Default	0.00s	Change	○
F5-27	**T5 terminal closing delay**	Default	0.00s	Change	○
F5-28	**T5 terminal opening delay**	Default	0.00s	Change	○
F5-29	**T6 terminal closing delay**	Default	0.00s	Change	○
F5-30	**T6 terminal opening delay**	Default	0.00s	Change	○
Setting range	0.00~400.00s				

T3~T6 relay output terminals are on the extended board. See the section of digital I/O extended board in chapter 9.

Input of T3~T6 is always 0 or 1 when expansion board is not connected.

Closed delay and segmented delay functions of T3~T6 relay output terminal are the same as that of T1.

6.7 F6 Analog and Pulse Frequency Terminal Settings

F6-00	**AI1 minimum input analog**	Default	20.00%	Change	○
F6-01	**AI1 maximum input analog**	Default	100.00%	Change	○
Setting range	-100.00 ~ 100.00%, 100% at 10V or 20mA Note: Select the voltage or current type input through the jumper on the control board.				
F6-02	**Corresponding given value/feedback value of AI1 minimum input analog**	Default	0.00%	Change	○
F6-03	**Corresponding given value/feedback value of AI1 maximum input analog**	Default	100.00%	Change	○
Setting range	－100.00~100.00％ Note: The highest frequency shall be used for reference for the given frequency; PID reference scalar is taken as reference value for PID feedback.				
F6-04	**AI1 inflection point threshold value**	Default	20.00%	Change	○
Setting range	AI1 minimum input analog~maximum input analog				
F6-05	**AI1 inflection point return difference**	Default	0.00％	Change	○
Setting range	0.0~10.00％				
F6-06	**Corresponding given value/feedback value of AI1 inflection point**	Default	0.00％	Change	○
Setting range	The same as F6-02 and F6-03				
F6-07	**AI1 filtering time**	Default	0.100s	Change	○
Setting range	0.000~10.000s				
F6-08	**AI1 connection loss threshold**	Default	0.00％	Change	○
Setting range	－20.00~20.00％				
F6-09	**AI1 offline delay**	Default	1.00s	Change	○
Setting range	0~360.00s				
F6-10	**AI2 minimum input analog**	Default	0.00%	Change	○
F6-11	**AI2 maximum input analog**	Default	100.00%	Change	○
F6-12	**Corresponding given value/feedback value of AI2 minimum input analog**	Default	0.00%	Change	○

F6-13	**Corresponding given value/feedback value of AI2 maximum input analog**	Default	100.00%	Change	○
F6-14	**AI2 inflection point threshold value**	Default	0.00%	Change	○
F6-15	**AI2 inflection point return difference**	Default	0.00%	Change	○
F6-16	**Corresponding given value/feedback value of AI2 inflection point**	Default	0.00%	Change	○
F6-17	**AI2 filtering time**	Default	0.100s	Change	○
F6-18	**AI2 connection loss threshold**	Default	0.00%	Change	○
F6-19	**AI2 offline delay**	Default	1.00s	Change	○
Setting range	All settings for AI2 are the same as that of AI1				

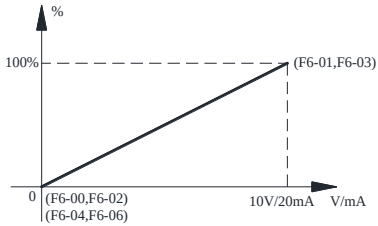
🕮 Maximum and minimum input analog quantity takes -100.00~100.00% corresponding voltage input -10V~10V (or current signal -20mA~20mA). Minimum and maximum input analog amount is the given minimum significant signal. For example: AI1 input signal is 0~10V, while the actual need is 2~8V corresponding to 0~100.00%, then F6-00=20.00(20.00%), F6-01=80.00 (80.00%). Similarly, when the input of AI1 is current signal, the actual demand is 4-20mA corresponding to 0-100.00%, then F6-00=20.00 (20.00%), F6-01=100.00 (100.00%).

🕮 Both analog input AI1 and AI2 can input current signal (-20mA~20mA) or voltage signal (-10V~10V).

🕮 AI1 and AI2 have the same electrical characteristics and the parameter settings with same meanings. The following takes AI1 channel parameters as an example:

Analog input example 1:

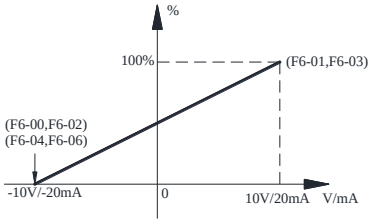
Most applications where the analog input voltage is 0~10V/0~20mA with corresponding given/feedback value of 0~100%, default factory values can be directly used. At this point, the inflexion point input analog quantity coincides with the minimum input analog quantity.



F6-00 = 0.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 0.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 0.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 0.00 Corresponding given value/feedback value of inflection point

Analog input example 2:

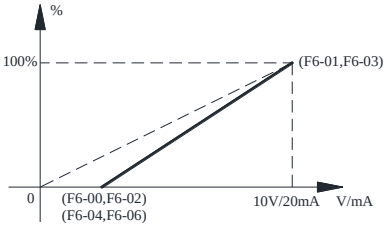
Some applications where the analog input voltage is -10~10V/-20~20mA with corresponding given/feedback value of 0~100%, the parameter settings are as follows.



F6-00 = －100.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 0.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = －100.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 0.00 Corresponding given value/feedback value of inflection point

Analog input example 3:

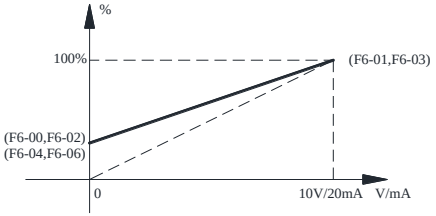
Most applications where the analog input voltage is 2~10V/4~20mA with corresponding given/feedback value of 0~100%, the parameter settings are as follows. At this point, the inflexion point input analog quantity coincides with the minimum input analog quantity.



F6-00 = 20.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 0.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 20.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 0.00 Corresponding given value/feedback value of inflection point

Analog input example 4: (applications with bias)

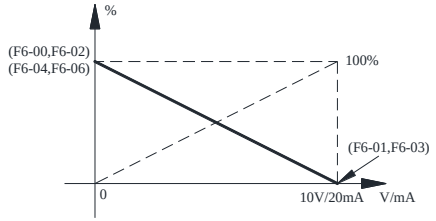
Some applications where the analog input voltage is 0~10V/0~20mA with corresponding given/feedback value of 20~100%, the parameter settings are as follows. At this point, the inflexion point input analog quantity coincides with the minimum input analog quantity.



F6-00 = 0.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 20.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 0.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 20.00 Corresponding given value/feedback value of inflection point

Analog input example 5: (reverse polarity application)

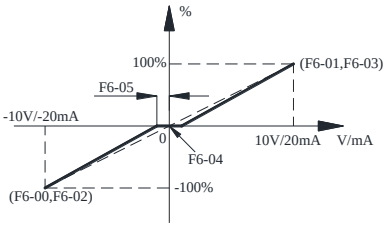
Some applications where the analog input voltage is 0~10V/0~20mA with corresponding given/feedback value of 100~0%, the parameter settings are as follows. At this point, the inflexion point input analog quantity coincides with the minimum input analog quantity.



F6-00 = 0.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 100.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 0.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 0.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 100.00 Corresponding given value/feedback value of inflection point

Analog input example 6: (applications with inflection point)

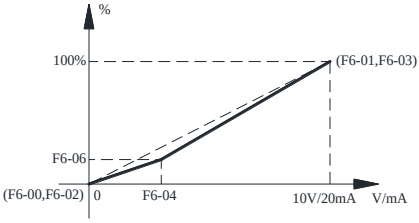
Some applications where the analog input voltage is -10~10V/-20~20mA with corresponding given/feedback value of -100~100%, the parameter settings are as follows. In this application, when the analog input is given as the frequency, the motor's rotating direction is determined by the positive and negative input, and the inflection point is used to set the dead zone of the forward and reversed rotation.



F6-00 = －100.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = －100.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 0.00 Inflection point threshold value
F6-05 = 5.00 Inflection point return difference
F6-06 = 0.00 Corresponding given value/feedback value of inflection point

Analog input example 7: (applications with inflection point)

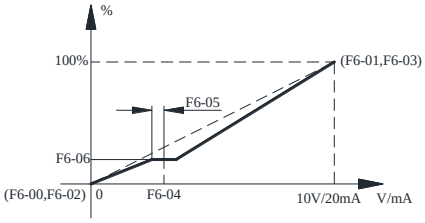
For some applications where the analog input voltage is 0~10V/0~20mA with 2 sections of slope, the parameter settings are as follows.



F6-00 = 0.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 0.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 30.00 Inflection point threshold value
F6-05 = 0.00 Inflection point return difference
F6-06 = 20.00 Corresponding given value/feedback value of inflection point

Analog input example 8: (applications with inflection point)

For some applications where the analog input voltage is 0~10V/0~20mA with 2 sections of slope, the parameter settings are as follows.



F6-00 = 0.00 Minimum input analog
F6-01 = 100.00 Maximum input analog
F6-02 = 0.00 Corresponding given value/feedback value of minimum input analog
F6-03 = 100.00 Corresponding given value/feedback value of maximum input analog
F6-04 = 30.00 Inflection point threshold value
F6-05 = 5.00 Inflection point return difference
F6-06 = 20.00 Corresponding given value/feedback value of inflection point

🕮 All settings for AI2 are the same as that of AI1.

🕮 'Filtering time': Increase it to slow down the response but enhance the anti-interference ability; reduce it to make the response faster, but the anti-interference becomes worse.

🕮 "Offline threshold" and "offline delay": The offline state can be confirmed when the analog input is lower than the offline threshold and the duration exceeds the offline delay time. The offline action is determined by Fb-10 "analog input offline action".

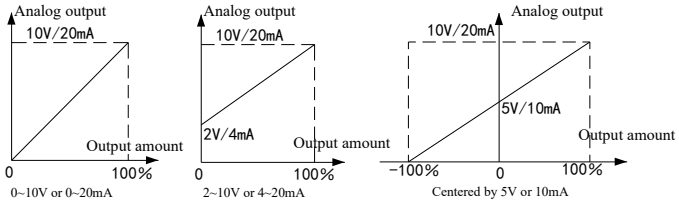
⚠ ATTENTION: When the input signals are positive and negative, and it is impossible to judge the disconnection internal judgement will be unnecessary if the disconnection threshold is set to zero.

F6-20	AO1 function selection	Default	0	Change	○
Setting range	See the analog output definition in the table below.				
F6-21	AO1 type selection	Default	1	Change	○
Setting range	0: 0~10V or 0~20mA 1: 2~10V or 4~20mA 2: centered by 5V or 10mA				
F6-22	AO1 gain	Default	100.0%	Change	○
Setting range	0.0~1000.0%				
F6-23	AO1 bias	Default	0.00%	Change	○
Setting range	-100.00 ~ 100.00%, 100% at 10V or 20mA				
F6-24	AO2 function selection	Default	2	Change	○
F6-25	AO2 type selection	Default	0	Change	○
F6-26	AO2 gain	Default	100.0%	Change	○
F6-27	AO2 bias	Default	0.00%	Change	○
Setting range	All settings for AO2 are the same as that of AO1.				

🕮 Analog Output Definition

0: Operating frequency (take max. frequency as full amplitude)
1: Given frequency (take max. frequency as full amplitude)
2: Output current (take 2-time rated current of VFD as full amplitude)
3: Output voltage (take 1.5-time ratedvoltage of VFD as full amplitude)
4: Output power (take 2-time rated voltage of motor as full amplitude)
torque of motor as full amplitude)
6: Given torque (take 2.5-time rated torque of motor as full amplitude)
7: PID feedback value
8: PID set value
9: PID output value
10: AI1
11: AI2
12: AI3
13: AI4
14: PFI
15: UP/DOWN regulating value
16: DC bus voltage (take 1000V as full amplitude)
17: Given frequency after acceleration and deceleration ramp (take max. frequency as full amplitude)
18: PG detection frequency (take max. frequency as full amplitude)
19: Counter deviation (take set count value as full amplitude)
20: Count percentage (take set count value as full amplitude)
21: Arithmetic unit 1 output
22: Arithmetic unit 2 output
23: Arithmetic unit 3 output
24: Arithmetic unit 4 output
25: Arithmetic unit 5 output
26: Arithmetic unit 6 output
27: Low-pass filter 1 output
28: Low-pass filter 2 output
29: Analog multiway switch output
30: Comparator 1 digital setting
31: Comparator 2 digital setting
32: Comparator 3 digital setting
33: Comparator 4 digital setting
34: Arithmetic unit 1 digital setting
35: Arithmetic unit 2 digital setting
36: Arithmetic unit 3 digital setting
37: Arithmetic unit 4 digital setting
38: Arithmetic unit 5 digital setting
39: Arithmetic unit 6 digital setting
40: COMM1 host computer analog 1
41: COMM1 host computer analog 2
42: Manufacturer output 1
43: Manufacturer output 2
44: COMM2 host computer analog 1
45: COMM2 host computer analog 2

🕮 Three types of analog output are shown below:

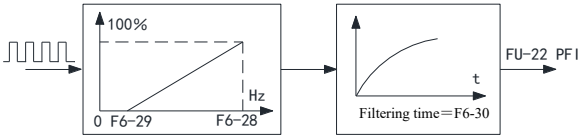


🕮 Range can be changed and zero point can be corrected by adjusting gain and bias. Calculation formula: output = output x gain + bias.

F6-28	100% corresponding PFI frequency	Default	10000Hz	Change	○
F6-29	0% corresponding PFI frequency	Default	0Hz	Change	○
Setting range	0~50000Hz				
F6-30	PFI filtering time	Default	0.100s	Change	○
Setting range	0.000~10.000s				

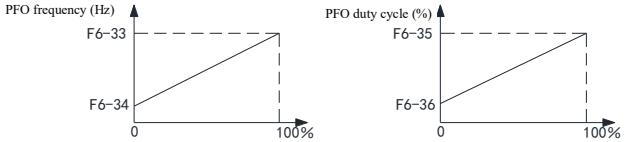
🕮 PFI function: The input pulse frequency is converted to a percentage and filtered, which can be monitored by FU-22 "PFI", as shown in the figure below. It can be used for cascade synchronous control for frequency setting, and can also be used for PID feedback to realize constant linear speed control.

🕮 When DI5 is used as a PFI pulse frequency input terminal, F4-04 must be set to 0.



F6-31	PFO function selection	Default	0	Change	○
Setting range	See analog output definition table				
F6-32	PFO output pulse modulation method	Default	0	Change	○
Setting range	0: Frequency modulation, 1: Duty ratio modulation				
F6-33	100% corresponding PFO frequency	Default	10000Hz	Change	○
Setting range	0 to 50000 Hz, also as the duty ratio modulation frequency				
F6-34	0% corresponding PFO frequency	Default	0Hz	Change	○
Setting range	0~50000Hz				
F6-35	100% corresponding PFO duty ratio	Default	100.0%	Change	○
F6-36	0% corresponding PFO duty ratio	Default	0.0%	Change	○
Setting range	0.0~100.0%				

PFO function: Output the internal percentage signal as pulse frequency or duty cycle, as shown below:



When DO2 is used as the PFO pulse frequency output terminal, the value of F5-00 must be set to 1.

In case of frequency modulation, duty cycle is fixed at 50%; in case of duty cycle modulation, the pulse frequency is fixed as F6-33.

F6-37	**AI3 minimum input analog**	Default	0.00%	Change	○
F6-38	**AI3 maximum input analog**	Default	100.00%	Change	○
F6-39	**Corresponding given value/feedback value of AI3 minimum input analog**	Default	0.00%	Change	○
F6-40	**Corresponding given value/feedback value of AI3 maximum input analog**	Default	100.00%	Change	○
F6-41	**AI3 inflection point threshold value**	Default	0.00%	Change	○
F6-42	**AI3 inflection point return difference**	Default	0.00%	Change	○
F6-43	**Corresponding given value/feedback value of AI3 inflection point**	Default	0.00%	Change	○
F6-44	**AI3 filtering time**	Default	0.100s	Change	○
F6-45	**AI3 connection loss threshold**	Default	0.00%	Change	○
F6-46	**AI3 offline delay**	Default	1.00s	Change	○
F6-47	**AI4 minimum input analog**	Default	0.00%	Change	○
F6-48	**AI4 maximum input analog**	Default	100.00%	Change	○
F6-49	**Corresponding given value/feedback value of AI4 minimum input analog**	Default	0.00%	Change	○
F6-50	**Corresponding given value/feedback value of AI4 maximum input analog**	Default	100.00%	Change	○
F6-51	**AI4 inflection point threshold value**	Default	0.00%	Change	○
F6-52	**AI4 inflection point return difference**	Default	0.00%	Change	○
F6-53	**Corresponding given value/feedback value of AI4 inflection point**	Default	0.00%	Change	○
F6-54	**AI4 filtering time**	Default	0.100s	Change	○
F6-55	**AI4 offline threshold**	Default	0.00%	Change	○
F6-56	**AI4 offline delay**	Default	1.00s	Change	○
Setting range	The settings of AI3 and AI4 are basically the same as those of AI1, except for very few parameters.				

The input voltage range of AI3 and AI4 is 0~10V and the input current range is 0~20mA.

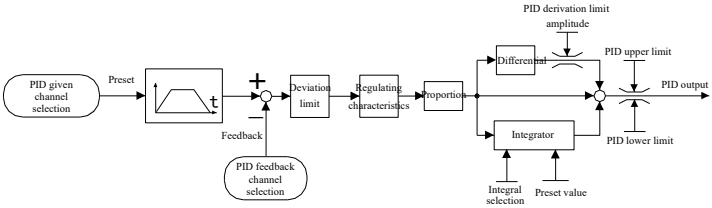
AI3 and AI4 are located on the expansion board, as described in the section of analog input expansion board of Chapter 9.

F6-57	**AO3 function selection**	Default	2	Change	○
F6-58	**AO3 type selection**	Default	0	Change	○
F6-59	**AO3 gain**	Default	100.0%	Change	○
F6-60	**AO3 bias**	Default	0.00%	Change	○
Setting range	All settings for AO3 are the same as that of AO1.				

6.8 F7 Process PID Parameters

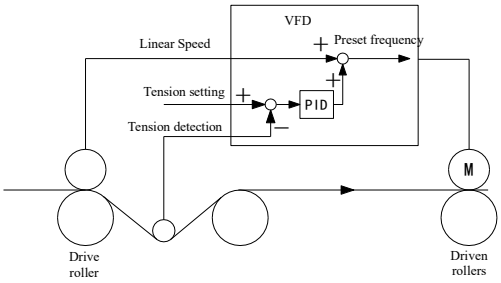
F7-00	PID control function selection	Default	0	Change	×
Setting range	0: Non-selection process PID control 1: Select process PID control (maximum PID output frequency is 100%) 2: Select PID to correct given frequency before acceleration and deceleration ramp (maximum PID output frequency is 100%). 3: Select PID to correct given frequency after acceleration and deceleration ramp (maximum PID output frequency is 100%) 4: Select PID for torque correction (PID output takes 2.5-time rated torque of motor as 100%) 5: Free PID function				

🕮 Process PID can be used to control tension, pressure, flow, liquid level, temperature and other process variables and has the sleep function suitable for constant pressure water supply and other industry applications. The proportional link produces control effects proportional to the deviation to minimize the deviation and the integral link mainly aims to eliminate static difference. The longer the integral time is, the weaker the integral effect is, and the shorter the integral time is, the stronger the integral effect will be. The differential link predicts the change of the deviation signal through the variation trend of the deviation, and produces the control signal to suppress the deviation before the deviation becomes larger, so as to accelerate the response speed of the control. Structure of process PID is as follows:



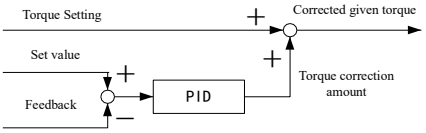
🕮 There are also three correction working modes of process PID: given frequency correction before acceleration and deceleration ramp, given frequency correction after acceleration and deceleration ramp, and torque correction. These correction modes make it easy to use the VFD for master-slave synchronization or tension control.

Given frequency correction before acceleration and deceleration ramp: PID output is overlaid on the given frequency before acceleration and deceleration ramp for correction as shown below:



Given frequency correction after acceleration and deceleration ramp: PID output is overlaid on the given frequency after acceleration and deceleration ramp, which can also achieve correction effect in acceleration and deceleration process by comparing with 'given frequency correction before acceleration and deceleration ramp'.

Torque correction mode: PID output is overlaid on the given torque, and the given torque is corrected as shown in the figure below. Torque correction mode is valid only when torque control is selected. This mode has the fastest response speed and can be used for synchronous control of rigidly connected systems.



🕮 Free PID function: As a programmable module, PID's input and output can be defined separately, and PID output can be connected to analog output, etc.

🕮 Under position control, process PID works as a position loop regulator in process PID or frequency correction mode.

F7-01	Given channel selection	Default	0	Change	×
Setting range	0: F7-04 'PID digital given' 1: AI1 2: AI2 3: AI3 4: AI4 5: PFI 6: UP/DOWN regulating value 7: Arithmetic unit 1 8: Arithmetic unit 2 9: Arithmetic unit 3 10: Arithmetic unit 4				
F7-02	**Feedback channel selection**	Default	0	Change	×
Setting range	0: AI1 1: AI2 2: AI3 3: AI4 4: PFI 5: AI1－AI2 6: AI1＋AI2 7: AI3－AI4 8: AI3＋AI4 9: $\sqrt{\lvert AI1 \rvert}$ 10: $\sqrt{\lvert AI2 \rvert}$ 11: $\sqrt{\lvert AI1-AI2 \rvert}$ 12: $\sqrt{\lvert AI1 \rvert}+\sqrt{\lvert AI2 \rvert}$ 13: Arithmetic unit 1 14: Arithmetic unit 2 15: Arithmetic unit 3 16: Arithmetic unit 4				
F7-03	**PID display coefficient**	Default	1.000	Change	○
Setting range	0.010~10.000, only monitoring menu FU-13 'PID feedback value' and FU-14 'PID set value' are affected				
F7-04	**PID digit given**	Default	0.0%	Change	○
Setting range	－100.0~100.0％				

🕮 The process PID adopts normalized input and output: the input and output ranges are ±100%, and the calibration of the input is related to the selection of feedback channel, sensor characteristics and analog input settings and the output is calibrated at a maximum frequency of 100% during frequency control.

🕮 There are filtering links in the given channel and feedback channel. For example, the filtering time of AI1 is F6-07. These filtering links will affect the control performance and can be set according to actual needs.

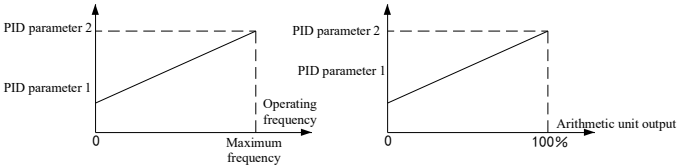
🕮 In some machines (such as centrifuges), the square root of inlet pressure signal and flow rate are linear, and flow rate can be controlled by square root feedback.

🕮 F7-03 'PID display system' is used to calibrate FU-13 'PID feedback value' and FU-14 'PID set value', which achieves to be in line with physical units with no effect on control.

F7-05	Proportional gain 1	Default	0.20	Change	○
Setting range	0.00~100.00				
F7-06	**Integration time 1**	Default	20.00s	Change	○
Setting range	0.01~100.00s				
F7-07	**Derivation time 1**	Default	0.00s	Change	○
Setting range	0.00~10.00s				
F7-08	**Proportional gain 2**	Default	0.20	Change	○
Setting range	0.00~100.00				
F7-09	**Integration time 2**	Default	20.00s	Change	○
Setting range	0.01~100.00s				
F7-10	**Derivation time 2**	Default	0.00s	Change	○
Setting range	0.00~10.00s				

F7-11	PID parameter transition mode	Default	0	Change	×
Setting range	0: Digital input 36 "PID parameter 2 selection"determined 1: Transition based on operation frequency 2: |Arithmetic unit 1| 3: |Arithmetic unit 2| 4: |Arithmetic unit 3| 5: |Arithmetic unit 4|				

🕮 Hope530 has 2 sets of PID parameters, i.e., PID parameter 1 (F7-05, F7-06 and F7-07) and PID parameter 2 (F7-08, F7-09 and F7-10), both of them can be switched by digital input 36 'PID parameter 2 selection'. It can also be switched gradually according to the running frequency or the output of arithmetic unit, so it is especially suitable for revolving system with a large revolving diameter change.



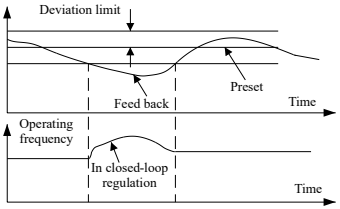
🕮 PID parameter regulation principles: The proportional gain shall be firstly increased from a smaller value (e.g. 0.20) until the feedback signal starts to oscillate, and then reduced by 40-60% to stabilize the feedback signal. The integral time shall be reduced from a larger value (e.g. 20.00s) until the feedback signal starts to oscillate, and then increased it by 10-50% to stabilize the feedback signal. If the demand of system for overshoot and dynamic error is high, differential action can be added.

F7-12	Sampling period	Default	0.010s	Change	○
Setting range	0.001~10.000s				

🕮 PID sampling cycle: general settings shall be 5 to 10 times smaller than the response time of the controlled object.

F7-13	Deviation limit	Default	0.0%	Change	○
Setting range	0.0~20.0%, take PID given value as 100%				

🕮 When the deviation between the given value and the feedback value is less than the deviation limit, the PID stops regulating and the output remains unchanged. This function eliminates the frequent action of the control. As shown in the figure below:



F7-14	Increase or decrease time of quantity given	Default	0.00s	Change	○
Setting range	0.00~20.00s				

🕮 Given quantity increase or decrease time: it can make the increase or decrease time for given quantity smooth to reduce the impact caused at the beginning of PID input.

F7-15	PID regulation characteristics	Default	0	Change	×
Setting range	0: Active, 1: Counteractive				

🕮 PID regulation characteristics: Positive action refers to the increase in speed required for quantitative increase under

stable operating conditions, such as heating control, while negative action indicates that reduction in speed is required when a quantitative increase is given under stable operating conditions, such as refrigeration control.

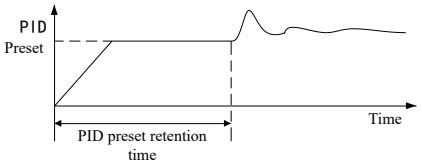
F7-16	Integral adjustment selection	Default	1	Change	×
Setting range	0: Without integral action, 1: With integral action				
F7-17	**PID upper limit amplitude**	Default	100.0%	Change	○
Setting range	F7-18 "PID lower limit amplitude" ~ 100.0%				
F7-18	**PID lower limit amplitude**	Default	0.0%	Change	○
Setting range	-100.0%~F7-17 "PID upper limit amplitude"				
F7-19	**PID derivation limit amplitude**	Default	5.0%	Change	○
Setting range	0.0~100.0%, limit amplitude of the derivation upper and lower limits				

🕮 Users can limit the PID amplitude as needed. Appropriate amplitude limit can reduce overshoot and avoid excessive control quantity.

🕮 When F7-00 setting '1: select process PID control', PID output limit is also limited by F0-08 'lower limit frequency'. When only unidirectional operation is required, the dynamic response capability of system can be improved by appropriately setting the 'lower limit frequency'. For example, after process PID sleep is waken up, quick regulation can be achieved to maintain pipe network voltage stability; It is not recommended to set "lower limit frequency" when forward and reverse operations are required.

F7-20	PID preset	Default	0.0%	Change	○
Setting range	F7-18 'PID lower limit'~F7-17 'PID upper limit'				
F7-21	**PID preset retention time**	Default	0.0s	Change	×
Setting range	0.0~3600.0s				

🕮 PID presetting function: During the preset hold time, the output of PID is kept as the preset value, which is equivalent to open-loop control. At the end of the preset stage, the initial value of PID integrator is set to the preset value and the PID closed-loop control is switched. As shown in the figure below:



🕮 If the preset hold time is set to zero, PID control is carried out with the preset value as the initial value of the integrator, which is equivalent to the preload of PID and can improve the response speed when starting.

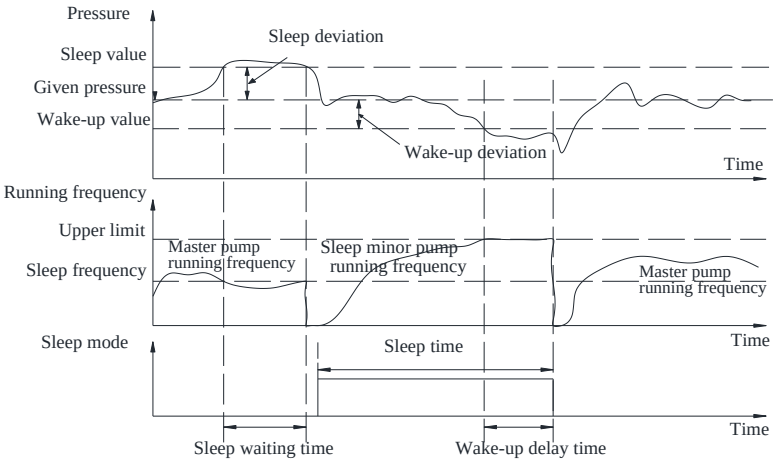
F7-22	Multistage PID given 1	Default	1.0%	Change	○
F7-23	**Multistage PID given 2**	Default	2.0%	Change	○
F7-24	**Multistage PID given 3**	Default	3.0%	Change	○
F7-25	**Multistage PID given 4**	Default	4.0%	Change	○
F7-26	**Multistage PID given 5**	Default	5.0%	Change	○
F7-27	**Multistage PID given 6**	Default	6.0%	Change	○
F7-28	**Multi-segment PID given 7**	Default	7.0%	Change	○
Setting range	－100.0~100.0％				

🕮 For multistage PID control, see digital input 49, 50 and 51 "multistage PID selection 1~3".

F7-29	Sleep frequency	Default	40.00Hz	Change	○
Setting range	0.00~400.00Hz				

F7-30	Sleep waiting time	Default	60.0s	Change	○
Setting range	0.0~3600.0s				
F7-31	**Sleep deviation**	Default	0.00%	Change	○
Setting range	0.00~100.00%				
F7-32	**Wake-up delay time**	Default	0.500s	Change	○
Setting range	0.000~60.000s				
F7-33	**Wake-up deviation**	Default	100.00%	Change	○
Setting range	0.00~100.00%, note: The sleep function is invalid at 100.00%				

🕮 When applying to the process PID, such as the constant-pressure water supply situation, the sleeping function can be used. When water consumption decreases and the operation frequency is lower than F7-29 'sleep frequency', the feedback quantity is larger than the sum of PID given value and F7-31 'sleep deviation' and the hold time is beyond F7-30 'sleep waiting time', and the process PID enters sleep state and enables digital output '72: process PID in sleep'. When the feedback quantity is lower than difference value between PID given value and F7-33 'wakeup deviation' and the hold time is beyond F7-32 'wakeup delay time', the process PID wakes up and enters working state. As shown in the figure below:



🕮 When the process PID sleeping is waked up, the starting method is determined by the Fb-25" restart from instantaneous stop, self-reset and outage" and F1-19 "starting method". It is suggested to start from the starting frequency in occasions not allowing reversal.

🕮 Relevant digital output function “72: process PID in sleep state”, which is applied to start other small-power pumps during sleeping state.

F7-34	PID MODIFIED maximum frequency	Default	1.00Hz	Change	○
Setting range	0.00～300.00Hz. Note: Valid when F7-00“PID control function selection”=2 or 3				

6.9 F8 simple PLC

F8-00	PLC running settings	Default	0000	Change	×
Setting range	Units: PLC operation mode selection 0: No PLC operation 3: Continuous cycle 1: Stop after cycling the number of times set in F8-02 2: Maintain the final value after cycling the number of times set in F8-02				
	Tens: PLC interrupt operation restart mode selection 0: Run from the first section 1: Continue to run from the phase frequency of the interruption moment 2: Continue to run from the operation frequency of the interruption moment				
	Hundreds: PLC state parameter storage selection in case of power outage 0: No storage 1: Storage				
	Thousands: Stage time unit selection 0: Second, 1: Minute				
F8-01	**PLC mode settings**	Default	00	Change	×
Setting range	Units: PLC operation mode and segment number division 0:1×48, a total of 1 mode, 48 segments of each mode 1:2×24, a total of 2 modes, 24 segments of each mode 2:3×16, a total of 3 modes, 16 segments of each mode 3:4×12, a total of 4 modes, 12 segments of each mode 4:6×8, a total of 6 modes, 8 segments of each mode 5:8×6, a total of 8 modes, 6 segments of each mode				
	Tens: PLC operation mode selection 0: Terminal code selection 1: Terminal direct selection 2: Mode 0 3: Mode 1 4: Mode 2 5: Mode 3 6: Mode 4 7: Mode 5 8: Mode 6 9: Mode 7				
F8-02	**PLC cycle times**	Default	1	Change	×
Setting range	1~65535				
F8-03 ~ F8-97	**Phase 1 Direction and Acceleration & Deceleration Settings**	Default	00	Change	○
Setting range	First digit: Running direction 0: Forward 1: Reverse				
	Tens: Acceleration and deceleration time selection 1: acceleration / deceleration time 2 2: acceleration / deceleration time 3 3: acceleration / deceleration time 4 4: acceleration / deceleration time 5 5: acceleration / deceleration time 6 6: acceleration / deceleration time 7 7: acceleration / deceleration time 8 9: Acceleration / deceleration time 1				
F8-04 ~ F8-98	**Phase 1 runtime**	Default	0.0	Change	○
Setting range	0.0~4000.0 (second or minute), the unit is determined by the thousand digit of F8-00 "PLC operation setting"				

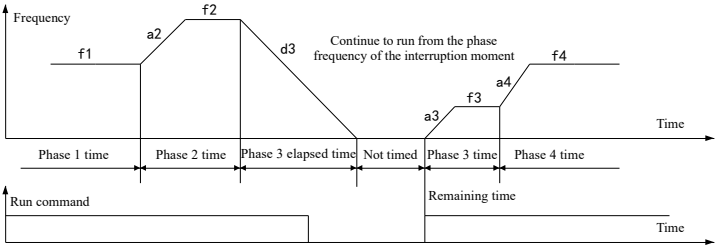
🕮 For the settings of stages 2 to 48, refer to stage 1. The factory value of multi-stage frequency n is the respective stage number. The parameter correspondence table of each stage is as follows:

n	1	2	3	4	5	6	7	8
Stage n settings	F8-03	F8-05	F8-07	F8-09	F8-11	F8-13	F8-15	F8-17
Stage n time	F8-04	F8-06	F8-08	F8-10	F8-12	F8-14	F8-16	F8-18
Multi-segment frequency n	F4-20	F4-21	F4-22	F4-23	F4-24	F4-25	F4-26	F4-27
n	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Stage n settings	F8-19	F8-21	F8-23	F8-25	F8-27	F8-29	F8-31	F8-33
Stage n time	F8-20	F8-22	F8-24	F8-26	F8-28	F8-30	F8-32	F8-34
Multi-segment frequency n	F4-28	F4-29	F4-30	F4-31	F4-32	F4-33	F4-34	F4-35
n	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Stage n settings	F8-35	F8-37	F8-39	F8-41	F8-43	F8-45	F8-47	F8-49
Stage n time	F8-36	F8-38	F8-40	F8-42	F8-44	F8-46	F8-48	F8-50
Multi-segment frequency n	F4-36	F4-37	F4-38	F4-39	F4-40	F4-41	F4-42	F4-43
n	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Stage n settings	F8-51	F8-53	F8-55	F8-57	F8-59	F8-61	F8-63	F8-65
Stage n time	F8-52	F8-54	F8-56	F8-58	F8-60	F8-62	F8-64	F8-66
Multi-segment frequency n	F4-44	F4-45	F4-46	F4-47	F4-48	F4-49	F4-50	F4-51
n	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Stage n settings	F8-67	F8-69	F8-71	F8-73	F8-75	F8-77	F8-79	F8-81
Stage n time	F8-68	F8-70	F8-72	F8-74	F8-76	F8-78	F8-80	F8-82
Multi-segment frequency n	F4-52	F4-53	F4-54	F4-55	F4-56	F4-57	F4-58	F4-59
n	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
Stage n settings	F8-83	F8-85	F8-87	F8-89	F8-91	F8-93	F8-95	F8-97
Stage n time	F8-84	F8-86	F8-88	F8-90	F8-92	F8-94	F8-96	F8-98
Multi-segment frequency n	F4-60	F4-61	F4-62	F4-63	F4-64	F4-65	F4-66	F4-67

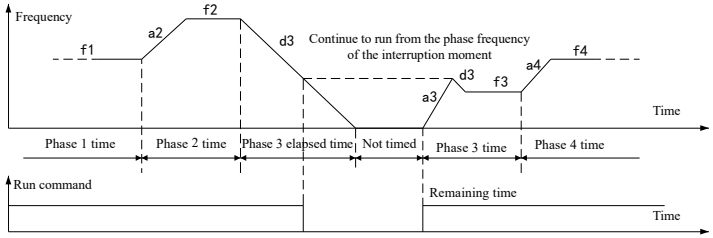
🕮 Simple PLC running function: automatically switch the given frequency according to the set running time to realize the automation of the production process.

🕮 PLC restart mode after interruption of operation: It is determined by the ten-digit of F8-00 "PLC operation setting". When the PLC operation is interrupted (fault or shutdown), select "run from the first stage"; you can also select "continue to run from the stage frequency at the time of interruption" or "continue to run from the running frequency at the time of interruption", the starting method is set by F1-19 is confirmed, as shown below:

🕮 In all the figures in this stage, fn is the multi-segment frequency n of stage n, an and dn are the acceleration and deceleration time of stage n, Tn is the time of stage n, n=1~48.



Continue to run from the phase frequency of the interruption moment



Continue to run from the operation frequency of the interruption moment

🕮 The PLC state can be selected for power-down storage, so that the next time it is restarted, it can continue to run from the state when it was stopped. For example: after one day's work is over, the VFD stops and powers off. The next day, it only needs to be powered on and start running, and the work that was not completed the previous day can be continued.

🕮 When modifying F8-00, F8-01 or F8-02, the status of PLC will be reset automatically.

🕮 The PLC of Hope530 can choose multiple modes, which is equivalent to having multiple sets of simple PLC settings. Users can switch between different modes to meet the production process requirements of products of different specifications. For example, a set of cement pipe pile centrifugal manufacturing equipment can choose different modes to produce pipe piles of different specifications. To produce 6 kinds of pipe piles, each specification requires 8 stages of PLC operation, and can be set to F8-01 one bit = 4 (a total of 6 modes, 8 stages for each mode).

🕮 The switching mode during operation takes effect after stopping, and the maximum mode number that can be selected is determined by the digits of F8-01.

🕮 The division of PLC modes and stages is as follows. You can find the stages included in each mode according to the table below:

1 mode × 48 stages	**Mode 0**		
Stages in each mode	Phase 1~48		
2 modes × 24 stages	**Mode 0**	**Mode 1**	
Stages in each mode	Phase 1~24	Phase 25~48	
3 modes× 16 stages	**Mode 0**	**Mode 1**	**Mode 2**
Stages in each mode	Phase 1~16	Phase 17~32	Phase 33~48

4 modes× 12 stages	Mode 0	Mode 1	Mode 2	Mode 3
Stages in each mode	Phase 1~12	Phase 13~24	Phase 25~36	Phase 37~48

6 modes× 8 stages	Mode 0	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5
Stages in each mode	Phase 1~8	Phase 9~16	Phase 17~24	Phase 25~32	Phase 33~40	Phase 41~48

8 modes× 6 stages	Mode 0	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Stages in each mode	1~6	7~12	13~18	19~24	25~30	31~36	37~42	43~48

🕮 The coding selection method of PLC mode is as follows:

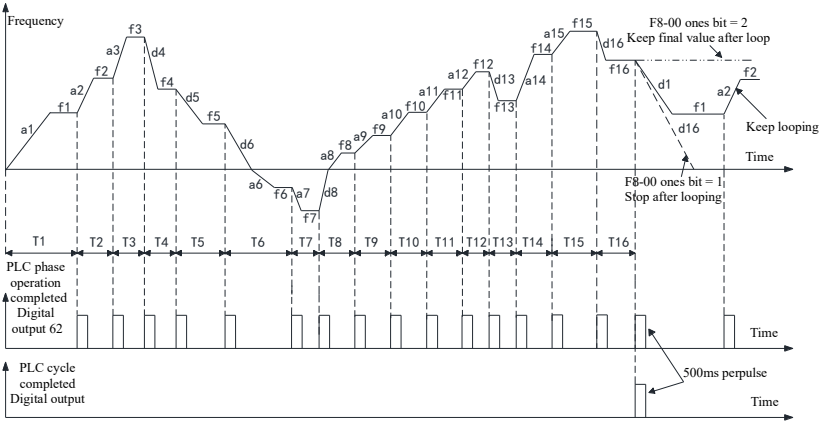
Digital input 27 "PLC mode selection 3"	Digital input 26 "PLC mode selection 2"	Digital input 25 "PLC mode selection 1"	Selected PLC mode
0	0	0	Mode 0
0	0	1	Mode 1
0	1	0	Mode 2
0	1	1	Mode 3
1	0	0	Mode 4
1	0	1	Mode 5
1	1	0	Mode 6
1	1	1	Mode 7

🕮 An example of PLC mode direct selection is shown in the following table, DI1~DI7 are respectively set to "PLC mode selection 1~7" (digital input 25~31):

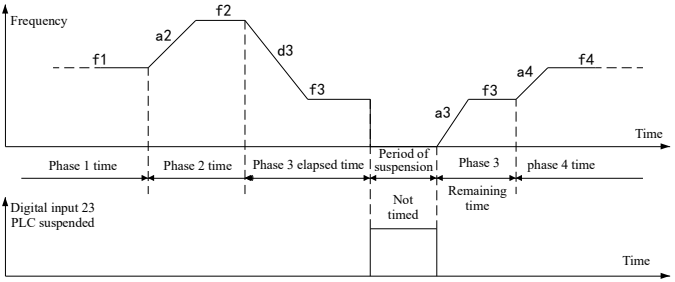
DI7	DI6	DI5	DI4	DI3	DI2	DI1	Selected PLC mode
0	0	0	0	0	0	0	Mode 0
—	—	—	—	—	—	1	Mode 1
—	—	—	—	—	1	0	Mode 2
—	—	—	—	1	0	0	Mode 3
—	—	—	1	0	0	0	Mode 4
—	—	1	0	0	0	0	Mode 5
—	1	0	0	0	0	0	Mode 6
1	0	0	0	0	0	0	Mode 7

🕮 Each stage of the PLC has its own multi-stage frequency as a given, as well as its own stage running time, running direction and acceleration and deceleration time selection. If the user does not need a stage, the running time of the stage can be set to 0.

The following figure shows the operation process of mode 0 when F8-01 one bit = 2:



When the digital input 23 "PLC suspend operation" is valid, the PLC suspends the operation; when it is invalid, it resumes the stage operation before the suspension (the starting mode is determined by F1-19), as shown in the following figure:



When the digital input 22 "PLC control prohibition" is valid, it will switch to the low-priority running mode (see the description of F0-01); when it is invalid, the PLC will resume running.

Digital input 24 "PLC standby state reset": If this signal is valid in standby state, the PLC's running stage, number of cycles, and running timing will be reset.

Relevant digital outputs 60 "PLC running", 61 "PLC running pause", 62 "PLC stage operation completion indication", 63 "PLC cycle completion indication", 64~71 "PLC mode 0 indication" ~ "PLC mode 7 indication" ".

Related monitoring parameters FU-24 "PLC current mode and stage", FU-25 "PLC cycle times", FU-26 "PLC current stage remaining time".

6.10 F9 Textile Wobble Frequency, Counter, Length Counter, Zero Servo and Position Control

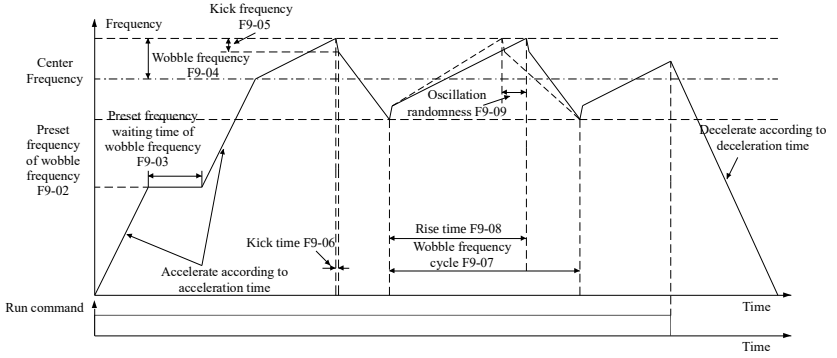
F9-00	**Wobble frequency input mode**	Default	0	Change	×
Setting range	0: Wobble frequency invalid 1: Automatic input 2: Manual input				
F9-01	**Wobble frequency control mode**	Default	0	Change	×
Setting range	0: Center frequency of swing is 100% 1: Maximum frequency of swing is 00%				

F9-02	Preset frequency of wobble frequency	Default	0.00Hz	Change	○
Setting range	F0-08 "lower limit frequency" ~ F0-07 "upper limit frequency"				
F9-03	**Preset frequency waiting time of wobble frequency**	Default	0.0s	Change	○
Setting range	0.0~3600.0s				
F9-04	**Wobble frequency amplitude**	Default	0.0%	Change	○
Setting range	0.0~50.0%, take center frequency or maximum frequency as 100%				
F9-05	**Kick frequency**	Default	0.0%	Change	○
Setting range	0.0~50.0%, actual wobble frequency amplitude is 100%				
F9-06	**Step time**	Default	0ms	Change	○
Setting range	0~50ms				
F9-07	**Wobble frequency cycle**	Default	10.0s	Change	○
Setting range	0.1~1000.0s				
F9-08	**Rise time**	Default	50.0%	Change	○
Setting range	0.0~100.0%, take F9-07 'wobble frequency cycle' as 100%				
F9-09	**Oscillation randomness**	Default	0.0%	Change	○
Setting range	0.0~50.0%, take F9-07 'wobble frequency cycle' as 100%				
F9-10	**Wobble frequency restart and power outage processing**	Default	00	Change	×
Setting range	Units: Restart mode after swing frequency stop 0: Start according to the memory before stop 1: Start again				
	Tens place: Power-down storage selection in wobble frequency state 0: Storage wobble frequency state in power-down state 1: No storage at power-down				

🕮 Wobble frequency function: the forming process of spindle, superimposed by 2 independence movements. A constant rotational motion and a reciprocating motion. Through the superposition of these two movements, the yarn forms a diamond-shaped network on the surface of the drum. If the two movements are in constant speed, it is bound to form bulges at the intersection of yarns. To disrupt the intersection point of each layer, the speed of reciprocating movement needs to change constantly. The wobble frequency function of the VFD is specially designed for this problem, which can make the molding spindle free from bulges and flat and consistent.

🕮 The wobble frequency function is only valid for V/F control, and the wobble frequency function is automatically disabled in vector control mode, jog, and PID closed-loop operation.

🕮 Typical work of wobble frequency is shown below:



🕮 F9-00＝1 'automatic input' process is shown below: first, accelerate to F9-02 'wobble frequency preset frequency' and wait for the F9-03 'wobble frequency preset frequency waiting time' (if 'manual input' mode is adopted, wait until

digital input 56 wobble frequency input is valid), then transit to wobble frequency center frequency and operate according to the preset F9-04 'wobble frequency amplitude', F9-05 'kick frequency', F9-06 'kick time', F9-07 'wobble frequency cycle' and F9-08 'rise time' wobble frequency until there is stop command.

🕮 F9-00＝2 'manual input' mode: The difference from automatic input is that the end condition of the preset state of wobble frequency is that digital input 56 "wobble frequency input" is valid. If digital input 56 is invalid, return to the preset state of wobble frequency, which is irrelevant to F9-03 "preset wobble frequency waiting time".

🕮 The source of the center frequency is the given frequency of ordinary operation, multistage speed and PLC.

🕮 F9-04 'wobble frequency amplitude': the wobble frequency shall be proper, otherwise the motor will be heating. It is generally 0.5~2Hz.

🕮 F9-05 "kick frequency": set the kick frequency at the place of output frequency kick to overcome the actual speed lag caused by the inertia of the cylinder. It is only used when the cylinder inertia is relatively large.

🕮 F9-06 'kick time': set the time of kick frequency.

🕮 F9-07 'wobble frequency cycle': set a complete wobble frequency cycle.

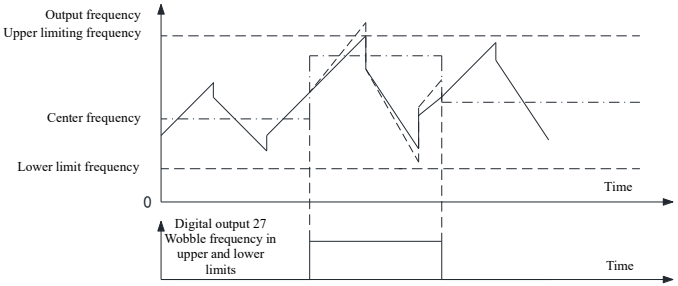
🕮 F9-08 'rise time': set the time of rising stage. Actual rise time = wobble frequency cycle × rise time, actual fall time = wobble frequency cycle × (1- rise time).

🕮 F9-09 “oscillation randomness” : when the value is not 0, the actual rise time will change randomly within a certain range, and the wobble frequency cycle remains unchanged. Random oscillation function can prevent the accumulation of some high-elastic fibers when winding.

🕮 F9-10 "Wobble frequency restart and power-off processing": determine whether to restart according to the memorized state (preset or swing frequency) after shutdown or power-off.

🕮 Digital input 57 "wobble frequency state reset": under "automatic input" mode, switch to the preset frequency for operation; Under manual input mode, the wobble frequency is prohibited and the center wobble frequency is adopted.

🕮 Digital output 27 "upper and lower limits of wobble frequency": if the center frequency or oscillation amplitude is set too high, making the wobble frequency exceed the upper and lower limits of frequency, the size of the wobble frequency will be automatically reduced, so that the wobble frequency range can just meets the requirements of the upper and lower limits of frequency, during which the signal of wobble frequency in upper and lower limits is output. As shown in the figure below:



🕮 Wobble frequency is only effective in stable operation. When the center frequency changes in the operation of the wobble frequency, the wobble frequency function will automatically fail in the transition process, and then it will be automatically put into use after the transition to stable operation.

🕮 It is recommended to set F2-09 'vibration damping' to zero when using the wobble frequency function.

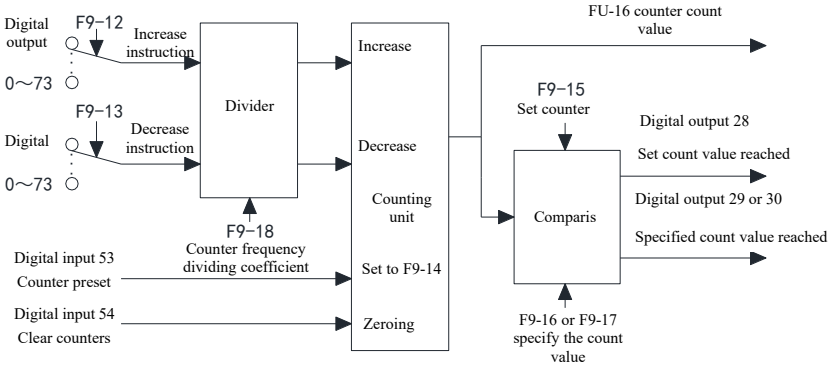
F9-11	**Selection of counting mode**	Default	0	Change	×
Setting range	0: General counting 1: Orthogonal counting				
F9-12	**Counter increment instruction selection**	Default	56	Change	○
Setting range	See the digital output function definition table				

F9-13	Counter decrement instruction selection	Default	57	Change	○
Setting range	See the digital output function definition table				
F9-14	**Counter preset value**	Default	0	Change	○
Setting range	0~65535				
F9-15	**Set counter**	Default	10000	Change	○
Setting range	F9-16 'specified count value'~65535				
F9-16	**Specified count value 1**	Default	0	Change	○
F9-17	**Specified count value 2**	Default	0	Change	○
Setting range	0~F9-15 'set count value'				
F9-18	**Counter frequency dividing coefficient**	Default	1	Change	○
Setting range	1~65535				

🕮 The counter of Hope530 can perform high-speed increment and decrement counting. The maximum frequency of using the encoder interface can reach 300kHz, the maximum frequency of using the PFI terminal state can reach 50kHz, and the maximum frequency of using the common terminal to realize the normal increment and decrement counting can reach 500Hz.

🕮 The counter can be stored after power-off, and the value saved at the time of power-off is used as the initial value of the counter when it is powered on next time.

🕮 The counter can be preset or cleared with digital inputs 53 "counter preset" and 54 "counter reset". The counter function is as follows:



Note: In quadrature counting mode (F9-11=1), the increment and decrement command channels are fixed as encoder A and B channels, no need to select.

🕮 F9-12 "Counter increment instruction selection", F9-13 "Counter down instruction selection":

■ When selecting digital output 32~41 "DI1~DI10", the input signal is affected by F4-06 "Digital input terminal debounce time";

■ Select digital output 56, 57 "encoder A, B channel" to achieve high-speed counting function, the highest input frequency can reach 300kHz;

■ Selecting digital output 58 "PFI terminal status" can also realize high-speed counting function, and the maximum input frequency can reach 50kHz;

■ When other digital outputs are selected, the count sampling time is 1ms.

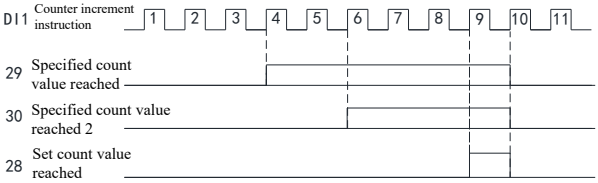
🕮 F9-14 "counter preset value": used for the calculation of FU-37 "counter deviation" and when the digital input 53 "counter preset" is valid, set the counter to F9-14.

🕮 F9-15 "set count value": when the count value reaches F9-15 "set count value", digital output 28 "set count value

reached" becomes valid; when the next count-up pulse signal arrives, digital output 28 changes to invalid.

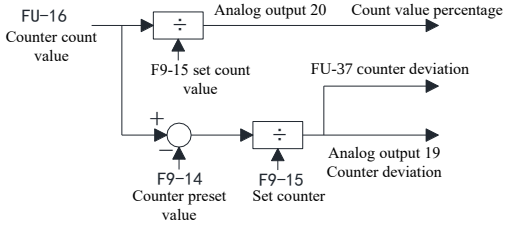
🕮 F9-16 "designated count value 1": when the count value reaches F9-16 "designated count value 1", digital output 29 "designated count value reached" becomes valid; until the number of pulses reaches (F9-15 "designated count value" +1), digital output 29 becomes invalid.

Example: Set F9-12 "Counter increment command selection" = 32 (DI1), F9-15 "Set count value" = 9, F9-16 "Specify count value" = 4, F9-17 "Specify count value 2" =6, then when DI1 input pulse number=4, digital output 29 becomes valid; when input pulse number=6, digital output 30 becomes valid; when input pulse number=9, digital output 28 becomes valid, and the next pulse arrives , digital outputs 29, 30 and 28 are simultaneously deactivated. As shown in the figure below:



🕮 F9-18 "Counter frequency division coefficient": Count the input pulses after combining, and combine the F9-18 pulses into one count pulse.

🕮 The relevant monitoring parameters are FU-16 "counter count value", FU-37 "counter deviation", and the relevant analog output quantities are 19 "counter deviation", 20 "count value percentage", which can be connected to analog output, arithmetic unit, PID feedback, etc. Their meanings are as follows:



F9-19	Length counter input instruction selection	Default	0	Change	○
Setting range	See the digital output function definition table				
F9-20	**Length counter set length**	Default	1000m	Change	○
Setting range	0~65535m				
F9-21	**Pulses per meter of length counter**	Default	100.0	Change	○
Setting range	0.1~6553.5				

🕮 F9-19 "length counter input command selection":

■ When selecting digital output 32~41 "DI1~DI10", the input signal is affected by F4-06 "Digital input terminal debounce time";

■ Select digital output 56, 57 "encoder A, B channel" to achieve high-speed meter counting function, the highest input frequency can reach 300kHz;

■ Selecting the digital output 58 "PFI terminal status" can also realize the high-speed meter counting function, and the maximum input frequency can reach 50kHz; when the PFI is used as the position reference, the position-controlled counter 2 can be started at the same time;

■ When other digital outputs are selected, the sampling time is 1ms.

🕮 F9-20 "length counter set length": when FU-17 "length counter actual length" reaches F9-20 "length counter set length", digital output 31 "length counter set length reached" becomes valid .

🕮 Digital input 55 "length counter and counter 2 clear": when valid, FU-17 "length counter actual length" is cleared.

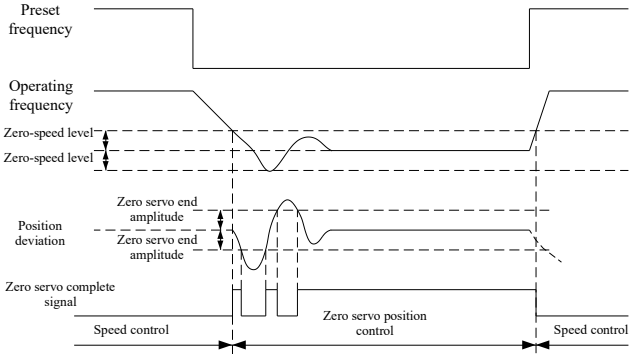
F9-22	Zero servo control selection	Default	0	Change	×
Setting range	0: Invalid 1: Always valid 2: Condition valid, selected through digital input 52 "Zero servo command"				
F9-23	Zero-speed level	Default	30r/min	Change	×
Setting range	0~120r/min				
F9-24	Zero servo end amplitude	Default	10	Change	○
Setting range	1~10000 pulses				
F9-25	Zero servo control gain	Default	1.00	Change	×
Setting range	0.00~50.00				

🕮 Zero servo is only valid for vector control with PG.

🕮 When F9-22 "zero servo control selection" is equal to 1, or equal to 2 and digital input 52 "zero servo command" is valid, zero servo is allowed.

🕮 When the zero servo is allowed, when the given frequency is zero and the motor decelerates to F9-23 "zero speed level", the current position will be memorized, and it will be transferred to zero servo position control.

🕮 When the position deviation of zero servo is less than F9-24 "zero servo end amplitude", digital output 24 "zero servo complete" is valid, otherwise it is invalid. An example of the zero servo control sequence is as follows:

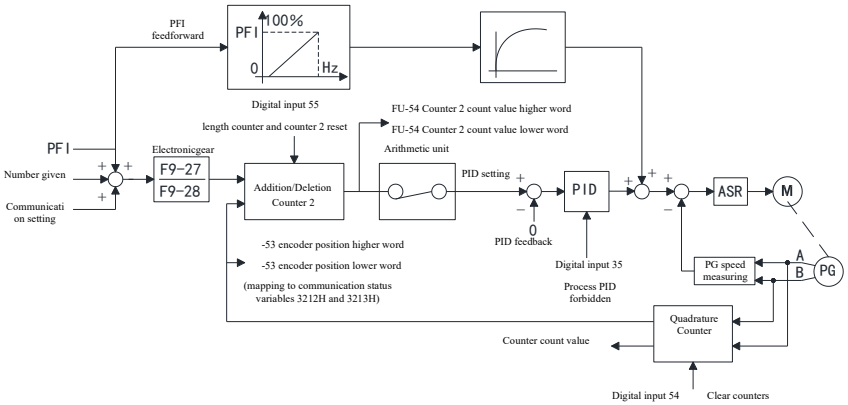


🕮 Only quadrature encoder can be used for zero servo. The number of pulses in F9-24 "zero servo end amplitude" refers to the number of all edges (rising and falling edges) of the quadrature encoder A and B two-phase signals.

🕮 The response characteristics of zero servo control can be adjusted by F9-25 "zero servo control gain". Note: The performance of the ASR speed loop should be adjusted first, and then the zero servo control gain.

F9-26	Position control digital setting	Default	0	Change	○
Setting range	－32768~32767				

🕮 The realization of position control is mainly based on 32-bit bipolar counter 2 and process PID. The functional block diagram is as follows:



🕮 Three ways of position setting: pulse signal (input pulse sequence of the PFI terminal), digital setting (F9-26) and communication setting (analog quantity 1 of the upper computer), the latter two are only read once at the moment of starting, namely, change of the two settings will not take effect during operation and it will works when restarted.

🕮 The frequency VFD is controlled by a PG vector. If there is PG V/F control meeting requirements, the latter is preferred.

🕮 When the digital input "54: counter clear" is valid, clear FU-16 "counter count value", and also clear the position feedback, namely FU-52 "encoder position high word", FU-53 "encoder Bit low word" is cleared at the same time.

🕮 When the digital input "55: length counter and counter 2 clear" is valid, the length counter and counter 2 are cleared at the same time, that is, FU-54 "counter 2 count value high word", FU-55 "counter 2 count value low" word" is cleared

F9-27	**Electronic gear numerator setting**	Default	1	Change	○
F9-28	**Electronic gear denominator setting**	Default	1	Change	○
Setting range	1~65535				

🕮 Please correctly set the parameter to prevent the motor revolving speed from significant change.

F9-29 ~ F9-38	**Reserved**	Default	—	Change	—

6.11 FA Motor Parameters

FA-00	**Motor parameters self-tuning**	Default	00	Change	×
Setting range	11: Static self-tuning 22: No-load complete self-tuning				
FA-01	**Motor rated power**	Default	Model determination	Change	×
Setting range	0.40~500. 0kW				
FA-02	**Pole number of the gear reductor**	Default	4	Change	×
Setting range	2~48				
FA-03	**Motor rated current**	Default	Model determination	Change	×
Setting range	0.5~1200.0A				
FA-04	**Motor rated frequency**	Default	50.00Hz	Change	×
Setting range	1.00~400.00Hz				

FA-05	Motor rated speed	Default	Model determination	Change	×
Setting range	125~40000r/min				
FA-06	Rated motor voltage	Default	380V	Change	×
Setting range	150~500V				

🕮 Be sure to input the motor nameplate parameters FA-01~FA-06 before running the VFD.

🕮 **FA-00＝11 "Stationary self-tuning":** measure the stator resistance, leakage inductance and rotor resistance of the motor. It is recommended to input no-load current before operation.

FA-00=22 "No-load complete self-tuning": in addition to the parameters measured by static self-tuning, it also measures mutual inductance, no-load current, and iron core saturation coefficient. The start of the no-load complete self-tuning process includes a stationary self-tuning process. During a complete self-tuning, the motor will rotate.

🕮 Notes on self-tuning:

1. The nameplate parameters of the motor must be set before self-tuning, otherwise the motor may be damaged;

2. The power levels of the motor and the VFD should match, and the rated current of the motor should not be less than 1/4 of the rated current of the VFD;

3. When changing the rated power of the motor, the motor parameter value determined by the model will be restored to the factory value;

4. When replacing the motor or output cable, be sure to redo the parameter self-tuning;

5. Motor parameter self-tuning needs to set the running command channel to operation panel control;

6. Before performing no-load complete self-tuning, confirm that: the motor and the mechanical load are disengaged; there is no problem in accelerating the motor to 80% of the basic frequency; the mechanical brake device should be released; in the case of a lift, please remove the mechanical load connected to the motor to Prevents slippage during self-tuning.

🕮 Parameter self-tuning operation:

1. Input the nameplate parameters FA-01~FA-06 of the motor, especially when the vector control is used, the input parameters must be correct, otherwise the control performance of the VFD will be affected;

2. Before the no-load complete self-tuning, set F2-12 "basic frequency" and F2-13 "maximum output voltage", and select the appropriate acceleration and deceleration time to ensure that there is no overcurrent or overvoltage during acceleration and deceleration;

3. Confirm that the motor is in a static state, set FA-00 "motor parameter self-tuning" to the corresponding value, and then press ▯ to run;

4. After the measurement is completed, it will automatically stop, the measurement results will be automatically recorded in the motor parameters, and FA-00 will automatically become 00.

🕮 The motor may rotate slightly during the execution of the motor stationary self-tuning.

FA-07	Motor no-load current	Default	Model determination	Change	×
Setting range	0.1A~FA-03 "Motor rated current"				
FA-08	Motor stator resistance	Default	Model determination	Change	○
Setting range	0.00~50.00%				
FA-09	Leakage inductive reactance of motor	Default	Model determination	Change	○
Setting range	0.00~50.00%				

FA-10	Motor rotor resistance	Default	Model determination	Change	○
Setting range	0.00~50.00%				
FA-11	**Mutual inductance resistance of motor**	Default	Model determination	Change	○
Setting range	0.0~2000.0%				
FA-12	**Motor core saturation coefficient 1**	Default	1.300	Change	×
Setting range	1.000~1.500 (iron core saturation coefficient corresponding to 50% magnetic flux)				
FA-13	**Motor core saturation coefficient 2**	Default	1.100	Change	×
Setting range	1.000~FA-12 "motor core saturation coefficient 1" (iron core saturation coefficient corresponding to 75% magnetic flux)				
FA-14	**Motor core saturation coefficient 3**	Default	0.900	Change	×
Setting range	FA-15 "motor core saturation coefficient 4" ~ 1.000 (iron core saturation coefficient corresponding to 125% magnetic flux)				
FA-15	**Motor core saturation coefficient 4**	Default	0.700	Change	×
Setting range	0.500~1.000 (iron core saturation coefficient corresponding to 150% magnetic flux)				

🕮 If the parameter self-tuning cannot be performed, or if you know the exact parameters of the motor, you can manually calculate and input the motor parameters. The formula for calculating the percentage value of motor parameters is as follows:

$$\text{Percentage of resistance or inductance (\%)} = \frac{\text{Resistance or inductance}(\Omega)}{\text{Rated voltage (V)}/(\sqrt{3}\times\text{Rated current (A)})}\times 100\%$$

Note: The inductive reactance is the inductive reactance at the rated frequency of the motor. The calculation formula of the inductive reactance is: Inductive reactance=2π×frequency×inductance.

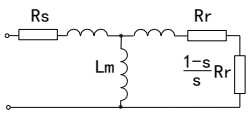
🕮 The VFD adopts the parameters of the T-I type equivalent circuit (as shown in the figure below) of the induction m otor. The conversion relationship between the conventional T type equivalent circuit (as shown in the figure below) to t he T-I type equivalent circuit parameters is as follows:

Type T-I circuit stator resistance $= R_s$

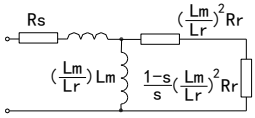
Type T-I circuit rotor resistance $= (L_m/L_r)^2 R_r$

Type T-I circuit leakage inductance $= (L_m/L_r)^2 L_\sigma$

Type T-I circuit mutual inductance $= L_m^2/L_r$



Type T equivalent circuit



Type T-1 equivalent circuit

FA-16	Motor rated current 2	Default	Model determination	Change	○
FA-17	**Motor rated current 3**	Default	Model determination	Change	○
Setting range	0.5~1200.0A				

🕮 By utilizing “motor rated current 2”and “motor rated current 3” and FA-03 “motor rated current” of general machines, overload protection can be conducted to multiple different motors. The used one is chosen via the multifunctional digital input terminals and see the table below for choice:

60: Motor rated current selection 2	61: Motor rated current selection 3	Motor rated current value
Invalid	Invalid	FA-03 "Motor rated current"
Invalid	Current	FA-17 "Motor rated current 3"
Current	×	FA-16 "Motor rated current 2"

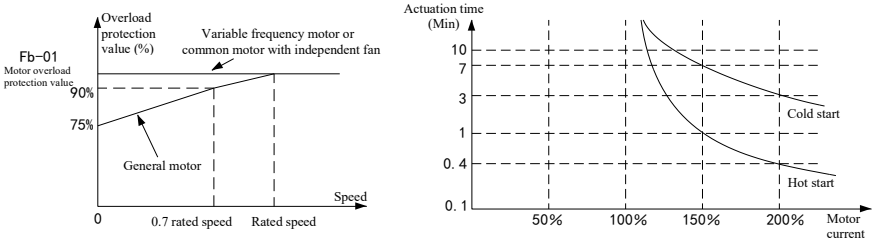
🕮 Relevant digital input functions: "60: Motor rated current selection 2", "61: Motor rated current selection 3", the former has higher priority.

6.12 Fb Protection Function and VFD Advanced Settings

Fb-00	**Motor cooling condition**	Default	0	Change	○
Setting range	0: Common motor 1: Variable frequency motor or common motor with independent fan				
Fb-01	**Motor overload protection value**	Default	100.0%	Change	○
Setting range	50.0~150.0%, rated current of the motor as 100%				
Fb-02	**Motor overload protection action selection**	Default	2	Change	×
Setting range	0: No action, 1: Alarm, still in operation, 2: Fault and free stop				

🕮 Fb-00 "Motor Heat Dissipation Conditions" requires the user to specify the type of motor brought by the VFD to understand the heat dissipation conditions of the motor. When the ordinary motor runs at low speed, the heat dissipation effect of the self-cooling fan becomes poor, and the overload protection value of the VFD decreases correspondingly at low speed, as shown in the following figure:

🕮 Fb-01 "motor overload protection value": used to adjust motor overload protection curve. The motor runs at rated speed. If Fb-01 is set to 100% and the motor runs at 150% rated current suddenly, overload protection will be triggered min later. Protection time curve is shown as follows:



🕮 In case of motor overload protection, it is necessary to wait for a period of time to cool the motor before continuing to run it.

⚠ ATTENTION: Motor overload protection is only applicable to the occasion with one VFD driving one motor. When an VFD drives multiple motors at the same time, install thermal protection devices on each motor separately.

Fb-03	**Heavy load protection option of motor**	Default	00	Change	×
Setting range	Units: Overload detection selection 0: Always detect 1: Only detect when running at constant speed				
	Tens place: overload action selection 0: no action 1: alarm, and continue to run 2: fault, and coast to stop				
Fb-04	**Motor overload detection level**	Default	130.0%	Change	×
Setting range	20.0~200.0%, rated current of the motor as 100%				
Fb-05	**Motor load overweight detection time**	Default	5.0s	Change	×
Setting range	0.0~30.0s				

🕮 Motor overload: when the motor current exceeds Fb-04 and the duration exceeds the time set by Fb-05, it will respond according to the action mode set by Fb-03. This function can be used to detect whether the mechanical load is abnormal and the current is too large.

Fb-06	Motor under-load protection	Default	0	Change	×
Setting range	0: No action, 1: Alarm, still in operation, 2: Fault and free stop				
Fb-07	**Motor underload protection level**	Default	30.0%	Change	×
Setting range	0.0~100.0%, the rated current of the motor is 100%				
Fb-08	**Underload protection detection frequency**	Default	0.00Hz	Change	○
Setting range	0.00~50.00Hz				
Fb-09	**Underload protection detection time**	Default	1.0s	Change	×
Setting range	0.0~100.0s				

🕮 Motor underload protection: when the output current is lower than Fb-07 and the frequency is higher than Fb-08, and the duration exceeds the time set by Fb-09, it will respond according to the action mode set by Fb-06. This function can timely detect faults such as the water pump idling, the transmission belt is broken, and the motor side contactor is open.

🕮 When the VFD is under no-load test, do not open this protection function.

Fb-10	Analog input connection loss action	Default	0	Change	×
Setting range	0: No action 1: Send AL.ACo alarm signal, run at the average running frequency 10s before the disconnection occurs 2: Send out AL.ACo alarm signal, press Fb-11 "Analog input drop forced frequency" to run 3: Send Er.ACo fault signal and free stop				
Fb-11	**Analog input offline force frequency**	Default	0.00Hz	Change	○
Setting range	0.00Hz~F0-06 'maximum frequency'				

🕮 Analog input disconnection protection: When the VFD detects that the analog input signal is less than the corresponding disconnection threshold and the disconnection time is greater than the delay time, it is considered that the disconnection has occurred.

🕮 Related parameters: F6-08 "AI1 disconnection threshold" and F6-18 "AI2 disconnection threshold". F6-45 "AI3 Drop Threshold" and F6-55 "AI4 Drop Threshold".

Fb-12	Other protection action selections	Default	10122	Change	×
Setting range	Units: VFD input phase loss protection 0: No action 1: Alarm and continue to run 2: Fault, and free stop				
	Tens: VFD output phase loss protection 0: No action 1: Alarm and continue to run 2: Fault, and free stop				
	Hundreds: Grounding test 0: No detection 1: Detection only when power on 2: Detection before running 3: Detection during running				
	Thousands place: parameter storage failure action selection 0: alarm, and continue to run 1: fault, and coast to stop				
	Ten thousands place: AC input power failure processing 0: No action 1: Alarm reminder				

🕮 VFD output phase loss protection: In case of VFD output phase loss, the motor operates with single phase and current and torque ripple become larger, so output phase loss protection can avoid damage to motor and mechanical load .

🕮 When the output frequency or current is very low, the output phase loss protection is invalid.

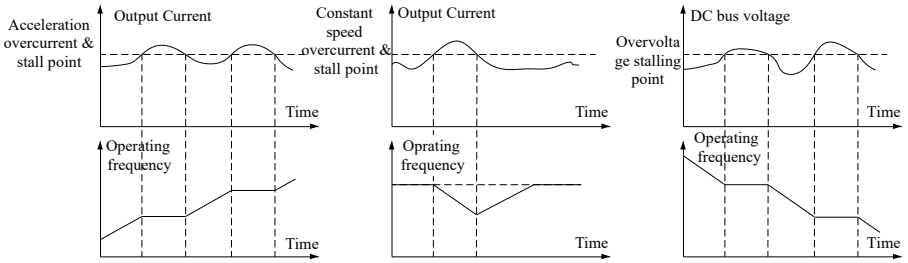
Fb-13	Overcurrent & stall prevention selection	Default	011	Change	×
Setting range	Units: Accelerate overcurrent stall prevention selection Tens place: Constant-speed over-current stall prevention selection 0: Invalid 1: Valid, limited time 1min 2: Valid, unlimited time Hundreds: Stall mode selection 0: Mode 1 (frequency limit) 1: Mode 2 (voltage limit) 2: Mode 3 (frequency, voltage limit)				

Fb-14	Acceleration overcurrent & stall point	Default	150.0%	Change	×
Setting range	50.0~200.0%, the rated current of the VFD is 100%				
Fb-15	**Constant speed overcurrent & stall point**	Default	150.0%	Change	×
Setting range	50.0~200.0%, the rated current of the VFD is 100%				
Fb-16	**Overvoltage & stall prevention selection**	Default	1	Change	×
Setting range	0: Invalid, 1: Valid				
Fb-17	**Overvoltage stalling point**	Default	700V	Change	×
Setting range	400~750V, default value: 700V				

🕮 During the acceleration process, when the Fb-13 "acceleration overcurrent stall prevention selection" is valid and the output current is greater than the Fb-14 "acceleration overcurrent stall point", the acceleration is temporarily stopped, and the acceleration continues after the current decreases, as shown in the following figure (a):

🕮 In the process of constant speed running, when Fb-13 ten bit "constant speed overcurrent stall prevention selection" is valid and the output current is greater than Fb-15 "constant speed overcurrent stall point", decelerate operation, after the current is reduced, accelerate to the original operating frequency, as shown in the following figure (b):

🕮 During the deceleration process, when Fb-16 "Overvoltage stall prevention selection" is valid and the DC bus voltage exceeds Fb-17 "Overvoltage stall point", the deceleration is temporarily stopped, and the DC bus voltage drops to the normal level and then continues to decelerate, as shown in the figure below (c):



(a) (b) (c)

🕮 If the stall duration exceeds 1min in actual operation, the VFD will appear "Er.Abb abnormal shutdown fault", select "2: valid, infinite" to shield this fault.

🕮 Stall mode 1: It is suitable for motor loads. In order to prevent the overcurrent protection caused by the instantaneous increase of the load, the output frequency is automatically adjusted to prevent the current from continuously increasing.

🕮 Stall mode 2: It is suitable for power loads. At this time, the output frequency is usually fixed. In order to prevent the overcurrent protection caused by the instantaneous increase of the load, the output voltage is automatically adjusted to prevent the current from increasing continuously.

🕮 Stall mode 3: By adjusting the output voltage and output current, the overcurrent protection caused by the transient increase of the load is prevented.

Fb-18	DC bus undervoltage action	Default	0	Change	×
Setting range	0: Free shutdown, reporting undervoltage fault (Er.dcL) 1: Free stop, within Fb-20 "Instantaneous power failure allowable time", restart after power recovery, if it exceeds, it will report undervoltage fault (Er.dcL) 2: Free stop, restart when the power supply recovers during CPU operation, no undervoltage fault is reported 3: Deceleration operation, when the power supply recovers during CPU operation, it will accelerate to the given frequency, and no undervoltage fault will be reported				

Fb-19	DC bus undervoltage point	Default	400V	Change	×
Setting range	280~480V				
Fb-20	**Instantaneous power failure allowable time**	Default	0.1s	Change	×
Setting range	0.0~30.0s				
Fb-21	**Instantaneous stop deceleration time**	Default	5.0s	Change	×
Setting range	0.0~200.0s, if set to 0.0, the currently selected deceleration time will be used				

🕮 The detection of instantaneous power outage is achieved by the detection of DC bus voltage. When the DC bus voltage is lower than Fb-19 "DC bus undervoltage point", there are the following treatment methods:

Fb-18＝0: Deem undervoltage as a fault with free stop triggered and DC bus undervoltage fault reported;

Fb-18=1: block the output, so that the DC bus voltage drops slowly, if the voltage recovers within Fb-20 "instantaneous power failure allowable time", it will restart (the starting mode is set by Fb-25 "instant power failure, self-reset, running "Interrupt restart mode" to confirm), a fault will be reported if the undervoltage times out;

Fb-18=2: block the output, so that the DC bus voltage drops slowly, as long as the CPU is not powered down due to undervoltage (it can be judged by whether the display on the operation panel disappears), and the voltage recovery is detected, it will restart (the starting method is determined by Fb -25 "Instant power failure, self-reset, and operation interruption restart mode" is determined);

Fb-18=3: At the moment of undervoltage, it will start to decelerate according to Fb-21 "deceleration time for instantaneous power failure" or the current deceleration time. The DC bus voltage is maintained by the kinetic energy feedback of the load during deceleration. If the voltage recovers, it will accelerate to the given frequency. The DC bus voltage holding time is related to the load inertia, speed, torque and deceleration time.

🕮 Handling method for Fb-18＝1, 2 and 3 can avoid undervoltage shutdown caused by instantaneous power outage for fan, centrifuge and other large-inertia load.

🕮 Fb-20 "Instantaneous power failure allowable time": This parameter is only used when Fb-18=1.

🕮 In case of undervoltage in operation, free stop will be triggered with undervoltage fault reported (Er.dcL). There will only be alarm in case of undervoltage in standby mode (AL.dcL).

Fb-22	Automatic reset times for faults	Default	0	Change	×
Setting range	0~10, module protection and external fault without self-reset function				
Fb-23	**Interval time for automatic reset**	Default	5.0s	Change	×
Setting range	1.0~30.0s				
Fb-24	**Fault output during automatic reset period**	Default	0	Change	×
Setting range	0: No output, 1: Output				
Fb-25	**Instantaneous stop, self-reset, restart mode after operation interruption**	Default	1	Change	×
Setting range	0: Start by start mode, 1: Track & start				

🕮 Automatic fault reset function: For faults occurring during operation, press Fb-23 "automatic reset interval" and Fb-22 "automatic reset times of faults" for automatic reset and restart. It can avoid tripping caused by misoperation, instantaneous overvoltage of power supply or external non-repetitive impact.

🕮 Self-reset process: when a fault occurs during operation, the fault will be reset automatically after the automatic reset interval; if the fault disappears, restart according to the setting mode of Fb-25 "instant power failure, self-reset, operation interruption restart mode"; If the fault still exists and the number of resets has not exceeded Fb-22 at this time, continue to try automatic reset, otherwise it will report a fault and stop.

🕮 Reset conditions for the number of times of fault reset: after the VFD fault self-reset, there is no fault for 10 consecutive minutes; Once fault is detected, fault shall be manually reset, and then power shall be connected again after power outage.

🕮 Fb-24 'automatic reset during failure output': Select digital output 5 "fault output" to check whether it is valid during automatic reset.

Automatic reset is invalid for power device protection (Er.FoP) and external fault (Er.EEF).

DANGER : Use the automatic reset function with caution. Otherwise, personal injury or property loss may occur.

Fb-26	Automatic start after power supply is allowed	Default	1	Change	○
Setting range	0: Forbidden, 1: Allowed				

For the terminal running command channel and the level-type running mode is selected (the tens or ones digit of F4-13 is equal to 0, 1, 2), if the running command is valid when power on, you can choose whether to power on and starts immediately or not according to this parameter.

Fb-27	Built-in braking unit operating point	Default	680V	Change	○
Setting range	620~720V				

Using the braking unit can dissipate energy on the braking resistor to achieve the purpose of fast shutdown. When the DC bus voltage exceeds the working point of the braking unit, the braking unit will be automatically put into use.

Fb-28	Modulation method	Default	0	Change	○
Setting range	0: Auto (automatic switching between continuous and discontinuous modulation) 1: Continuous modulation				

The automatic mode has lower switching loss when switching to discontinuous modulation, but the harmonics are larger than the continuous modulation mode.

Fb-29	Carrier frequency			Default	Model determination	Change	○
Setting range	15kW and below:	1.1k~12.0 kHz	Factory default 4.0kHz				
	18.5~30 kW:	1.1k~10.0 kHz	Factory default 3.0kHz				
	37~160 kW:	1.1k~8.0 kHz	Factory default 2.5kHz				
	200kW and above:	1.1k~5.0 kHz	Factory default 2.0kHz				
Fb-30	Attached PWM settings			Default	0%	Change	○
Setting range	0~30%						
Fb-31	Automatic adjustment selection of carrier frequency			Default	1	Change	○
Setting range	0: Forbidden, 1: Allowed						

Fb-29 'carrier frequency': If the carrier frequency is high, the motor operation noise is low and the harmonic current of the motor is small, so the heating is reduced, but the common-mode current becomes larger, the interference is large and the heat productivity of the VFD is large. It will be opposite if the carrier frequency is low. The carrier frequency can be appropriately raised in case of mute operation is required. When the set carrier frequency is above the factory default, the VFD needs to be derated by 5% for every increase of 1kHz.

Fb-30 "Random PWM Setting": Random PWM scatters the spectrum of the carrier wave and improves the sound. This parameter can be used to make the sound less harsh when the carrier frequency is low. A setting of 0% indicates a fixed carrier frequency.

Fb-31 "Carrier frequency automatic adjustment selection": The carrier frequency can be adjusted automatically according to the temperature of the VFD's radiator, output current, and output frequency to avoid the VFD failure due to overheating. When the temperature of the radiator is too high and the low-frequency current is too large, the carrier frequency will automatically decrease.

Fb-32	Dead zone compensation is allowed	Default	1	Change	×
Setting range	0: Forbidden, 1: Allowed				

Dead time compensation can reduce output harmonics and reduce torque ripple. However, when the VFD isused as a power supply, it is necessary to disable the dead zone compensation function.

Fb-33	Space vector angle stop memory	Default	0	Change	×
Setting range	0: No memory 1: With memory				

🕮 It is used to maintain synchronization when the synchronous motor stops and restarts, and is only valid for V/F control.

Fb-34	Overmodulation enabled	Default	1	Change	×
Setting range	0: Forbidden, 1: Allowed				

🕮 Over-modulation enable: When over-modulation is allowed, the voltage output capability of the VFD is large, and the output voltage can be close to or higher than the power supply voltage, but at this time, due to the over-modulation effect, the torque ripple of the motor is large. When the overmodulation function is disabled, the torque ripple caused by overmodulation can be avoided, and the control performance can be improved for loads such as grinding machines.

Fb-35	Control of cooling fan	Default	0	Change	○
Setting range	0: Power off after 3min of standby 1: Keep running 2: Always running				

🕮 In occasions with frequent starts and stops, it should be set to "always running" to avoid frequent start and stop of the fan.

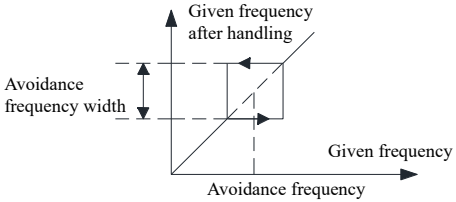
🕮 Automatic operation: The fan runs automatically according to the internal temperature of the VFD.

🕮 Turn off after 3 minutes of standby: automatic control according to the running state.

Fb-36	Avoidance frequency 1	Default	0.00Hz	Change	○
Setting range	0.00~625.00Hz				
Fb-37	Avoidance frequency 1 width	Default	0.00Hz	Change	○
Setting range	0.00~20.00Hz				
Fb-38	Avoidance frequency 2	Default	0.00Hz	Change	○
Setting range	0.00~625.00Hz				
Fb-39	Avoidance frequency 2 width	Default	0.00Hz	Change	○
Setting range	0.00~20.00Hz				
Fb-40	Avoidance frequency 3	Default	0.00Hz	Change	○
Setting range	0.00~625.00Hz				
Fb-41	Avoidance frequency 3 width	Default	0.00Hz	Change	○
Setting range	0.00~20.00Hz				

🕮 Frequency avoidance function is to make the operation frequency of the VFD avoid the mechanical resonance point.

🕮 In the process of acceleration and deceleration, the operating frequency normally passes through the avoidance frequency, which only prevents the VFD from operating within the width of the avoidance frequency steadily.



Fb-42	Fan life expectancy settings	Default	40000h	Change	×
Setting range	1~40000h				

🕮 When the accumulated operation time reaches the fan life expectancy setting, the digital output terminal function of "73: fan life expectancy is reached" will be effective. It is suggested to replace a fan with same model. After replacement, make use of external terminal input of "58: reset the fan accumulated operation time" to realize zero clearing of the accumulated time of the fan, besides, the "73: fan life expectancy is reached" will be invalid.

🕮 Relevant parameters: digital input terminal function 58: reset the accumulated running time of the fan; digital output terminal function 73: the expected life of the fan has reached; monitoring parameter: FU-56 "fan accumulated running time".

6.13 FC Keyboard Operation and Display Settings

FC-00	Display parameter selection	Default	0	Change	○
Setting range	0: Display all menus 1: Display only the parameters selected by the user 2: Display only the parameters different from the factory defaults				

🕮 FC-00=1: Only the parameters selected by FC-15~FC-46 "User Parameters 1~32" are displayed. The user password is invalid for these parameters, but the user password is required to modify FC-00.

🕮 FC-00＝2: Only the parameters that are different from the default values are displayed for easy commissioning and maintenance.

FC-01	Key function and automatic lock	Default	0000	Change	×
Setting range	Units: Automatic locking function of keys 0: Not locked 1: Fully locked 2: Fully locked except ○ 3: All locks except ◁ and ▷ 4: All locks except ○, ◁ , ▷ 5: All locks except ‖, ○				
	Tens place: ○ function selection 0: Valid only when in the operation panel running command channel 1: Valid when on operation panel, and in terminal and communication operation command channel and stop according to stop mode 2: The device stops according to stop mode in running command channel on the operation panel and stops freely in running command channel not on the operation panel, and it also reports Er.Abb				
	Hundreds: ‖ function selection (only for panel command channel) 0: Select run function 1: Select jogging function **Kilobit: Direction key combination function selection** 0: The function of simultaneously switching the main given frequency channel and running command channel is invalid by long pressing ◁ and △ combination key or ▷ and ▽ combination key 1: The function of simultaneously switching the main given frequency channel and running command channel is valid by long pressing ◁ and △ combination key or ▷ and ▽ combination key				

🕮 Automatic key lock function. If there is no button for 1 minute, the button will be automatically locked; in the monitoring state, press ◁ + ENTER, the button will be locked immediately; press ENTER + MENU for 3s to unlock.

🕮 The relation between FC-01 kilobit 'direction key combination function selection' and related digit input status is shown below.

Conditions		Status				
Digital input 45 'Simultaneous switch of the main given frequency channel and running command channel'		**Already associated to terminal**	**Not associated to terminal**			
Digital input 42 'Run the command channel 1/2 switch'		**Any status**	**Valid**		**Invalid**	
Digital input 44 'given frequency channel switching'		**Any status**	**Valid**	**Invalid**	**Valid**	**Invalid**
After long pressing ◁ and △ combination keyfor 1s	Results of running command channel 1 to switch to channel 2	Invalid	Invalid	Invalid	Valid	Valid
	Results of switching main given frequency channel 1 to channel 2	Invalid	Invalid	Valid	Invalid	Valid
After long pressing ▷ and ▽ combination keyfor 1s	Results of running command channel 2 to switch to channel 1	Invalid	Invalid	Invalid	Valid	Valid
	Results of switching main given frequency channel 2 to channel 1	Invalid	Invalid	Valid	Invalid	Valid
Note	Associated to the terminal indicates that it has been selected by a digital input terminal function. For example, F4-00=45 indicates that digital input 45 has been associated to the DI1 terminal Associated to the terminal and the terminal input is valid, abbreviated as valid; Not associated to the terminal or associated to the terminal, but the terminal input is invalid, abbreviated as invalid;					

- The function of running command channel switching and general running of the main given channel switching generated by long pressing ◁ and △ combination key will not be saved in case of power failure or when disabling 'direction key combination function selection' function, and it will be automatically recovered to the status after long pressing ▷ and ▽ combination key for 1s.
- As for the function of running command channel switching and general running of the main given channel switching generated by long pressing ◁ and △ combination key, the results generated by long pressing ▷ and ▽ combination key for 1s can be manually switched.
- After switching main given frequency channel and the running command channel by long pressing ◁ and △ combination key, the main given frequency channel and the running command channel shall be switched back by long pressing ▷ and ▽ combination key, and digital input 42 'run the command channel 1/2 switch' and digital input 44 'given frequency channel switching' status can be responded under such conditions without limiting digital input 45 'simultaneous switching of main given frequency channel and the running command channel'. When the digital input 45 is associated with the terminal, the main given frequency channel and the running command channel will be forcibly associated to the current state of the digital input 45, and when the digital input 45 is unassociated with the terminal, if the result of the ◁ and △ combination key or the ▷ and ▽ combination key is valid when being long pressed before the digital input 45 is associated with the terminal, the running command channel and the main given frequency channel will automatically restore to the corresponding effective state.

FC-02	**Operation & shutdown monitoring parameter 1**	Default	1	Change	○
FC-03	**Operation & shutdown monitoring parameter 2**	Default	−1	Change	○
FC-04	**Operation & shutdown monitoring parameter 3**	Default	−1	Change	○
FC-05	**Operation & shutdown monitoring parameter 4**	Default	−1	Change	○
FC-06	**Operation & shutdown monitoring parameter 5**	Default	−1	Change	○
FC-07	**Operation & shutdown monitoring parameter 6**	Default	−1	Change	○

FC-08	Operation & shutdown monitoring parameter 7	Default	－1	Change	○
FC-09	Operation monitoring parameter 1	Default	0	Change	○
FC-10	Operation monitoring parameter 2	Default	2	Change	○
FC-11	Operation monitoring parameter 3	Default	4	Change	○
FC-12	Operational monitoring parameter 4	Default	－1	Change	○
Setting range	-1~56 Note: -1 means empty; 0~56 means FU-00~FU-56; the minimum value of FC-02 is 0				

🕮 Operation and shutdown monitoring parameters: Select the parameters to be monitored from the FU menu and display them in standby and running state.

🕮 Running monitoring parameters: Select the parameters to be monitored from the FU menu and display them only in the running state

FC-13	Speed display coefficient	Default	1.000	Change	○
Setting range	0.001~10.000 FU-05 'working speed'=120×operating frequency÷number of poles of motor×FC-13 “speed display coefficient” FU-06 “given speed”=120×operating frequency÷number of poles of motor×FC-13 “speed display coefficient”				

🕮 Note: It is only used for speed conversion and has no influence on actual speed and motor control

FC-14	Linear velocity display coefficient	Default	0.01	Change	○
Setting range	0.01~100.00 FU-11 “operation linear speed”=operating frequency×FC-14 “linear speed display coefficient” FU-12 “given linear speed”=given frequency×FC-14 “linear speed display coefficient”				

🕮 It is only used for line speed conversion and has no effect on actual line speed and motor control.

FC-15 ~ FC-44	User parameter 1 ~ User parameter 30	Default	－00.01	Change	○
Setting range	-00.01~FU.56, except the manufacturer parameter Fn, -00.01 is empty, the others are the parameter numbers, for example, F0.01 means F0-01				
FC-45	User parameter 31	Default	FC.00	Change	△
FC-46	User parameter 32	Default	F0.10	Change	△
FC-47	Administrator parameters	Default	F0.17	Change	△
Setting range	Fixed to F0-17 'administrator password'				

🕮 User parameters 1 to 30 are used to select parameters commonly used or concerned by users. When FC-00=1, only these parameters are displayed. This function is especially suitable for supporting users.

🕮 User parameters 31 and 32 are fixed as "display parameter selection" and "parameter write protection" and cannot be modified.

🕮 Setting example: set F0.01 in FC-15 to indicate that the first function of the user parameter is F0-01, and then set FC-00 to 1. In this way, when entering the menu in the monitoring state, only three parameters of F0-01, FC-00 and F0-10 can be seen.

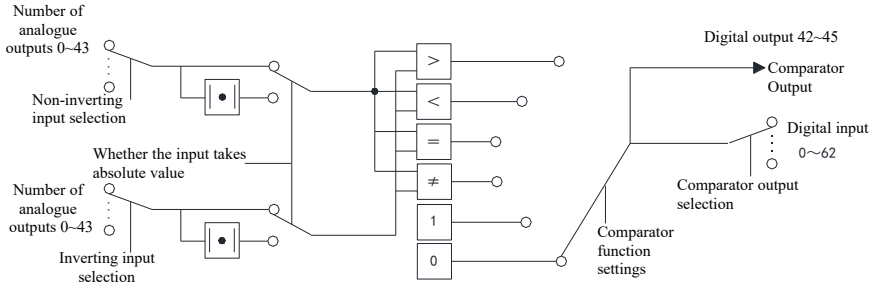
🕮 When the administrator password F0-17≠0 is set, only the user parameters are displayed.

6.14 FE Programmable Unit

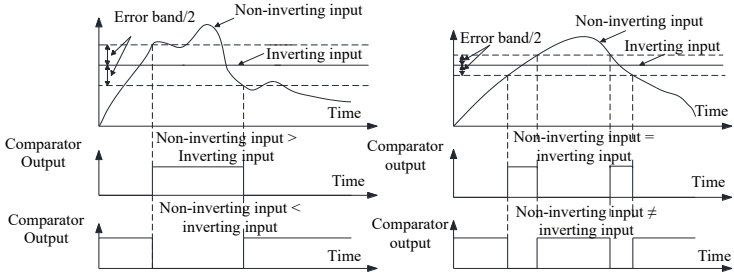
FE-00	Comparator 1 in-phase input selection	Default	0	Change	○
Setting range	See analog output definition table				

FE-01	**Comparator 1 inverted input selection**	Default	0	Change	○
Setting range	See analog output definition table				
FE-02	**Configuration of comparator 1**	Default	005	Change	○
Setting range	Units: function settings 0: non-inverting input > inverting input, the comparator outputs 1, otherwise it is 0 1: Non-inverting input < inverting input, the comparator outputs 1, otherwise it is 0 2: Non-inverting input = inverting input (|non-inverting input - inverting input|≤error band/2), the comparator outputs 1, otherwise it is 0 3: Non-inverting input≠inverting input (|non-inverting input-inverting input|>error band/2), the comparator outputs 1, otherwise it is 0 4: The comparison is invalid, the output is always 1 5: The comparison is invalid, the output is always 0				
	Tens: whether absolute value is required 0: Absolute value not required 1: Absolute value required				
	Hundreds: Comparator output connection protection function selection 0: No action 1: Alarm, and continue to run 2: Report fault (Er.Co1 or Er.Co2), and coast to stop				
FE-03	**Comparator 1 digital setting**	Default	50.0%	Change	○
Setting range	-100.0~100.0%, corresponding to analog output 30				
FE-04	**Comparator 1 error band**	Default	5.0%	Change	○
Setting range	0.0~100.0%				
FE-05	**Comparator 1 output selection**	Default	0	Change	○
Setting range	See the digital input function definition table				
FE-06	**Comparator 2 in-phase input selection**	Default	0	Change	○
FE-07	**Comparator 2 inverted input selection**	Default	0	Change	○
FE-08	**Configuration of comparator 2**	Default	005	Change	○
FE-09	**Comparator 2 digital setting** (corresponding to analog output 31)	Default	50.0%	Change	○
FE-10	**Comparator 2 error band**	Default	5.0%	Change	○
FE-11	**Comparator 2 output selection**	Default	0	Change	○
FE-12	**Comparator 3 in-phase input selection**	Default	0	Change	○
FE-13	**Comparator 3 inverted input selection**	Default	0	Change	○
FE-14	**Configuration of comparator 3**	Default	005	Change	○
FE-15	**Comparator 3 digital setting** (corresponding to analog output 32)	Default	50.0%	Change	○
FE-16	**Comparator 3 error band**	Default	5.0%	Change	○
FE-17	**Comparator 3 output selection**	Default	0	Change	○
FE-18	**Comparator 4 in-phase input selection**	Default	0	Change	○
FE-19	**Comparator 4 inverted input selection**	Default	0	Change	○
FE-20	**Configuration of comparator 4**	Default	005	Change	○
FE-21	**Comparator 4 digital setting** (corresponding to analog output 33)	Default	50.0%	Change	○
FE-22	**Comparator 4 error band**	Default	5.0%	Change	○
FE-23	**Comparator 4 output selection**	Default	0	Change	○
Setting range	All settings of comparators 2 to 4 are the same as those of comparator 1				

🕮 Comparator: compare any two quantities in the analog output definition table, the result of the comparison can select the signal in the digital input function definition table, and output to the digital output function definition table at the same time. The structure of the comparator is as follows:



🕮 The function of the comparator is as follows:

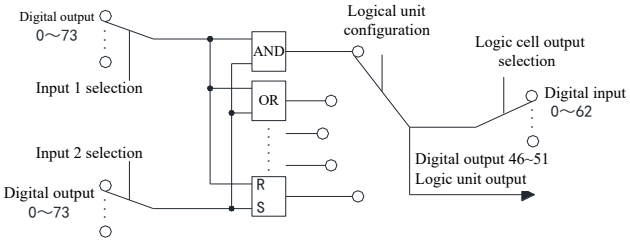


🕮 The VFD can use the result of the comparison of the two signals as the trigger signal of the VFD's protection action, and select the required protection action through the hundreds digit of "comparator configuration".

FE-24	**Logical unit 1 input 1 selection**	Default	0	Change	○
Setting range	See the digital output function definition table				
FE-25	**Logical unit 1 input 2 selection**	Default	0	Change	○
Setting range	See the digital output function definition table				
FE-26	**Configuration of logical unit 1**	Default	9	Change	○
Setting range	0: Logical AND 1: Logical OR 2: Logical AND NOT 3: Logical OR NOT 4: Logical XOR (≠) 5: Logical XOR NOT (=) 6: Input 1 is to output directly, to ignore input 2 7: Invert input 1, ignore input 2 8: output constant 1 9: output constant 0 10: R-S flip-flop function (input 1 is reset terminal R, input 2 is set terminal S)				
FE-27	**Logical unit 1 output selection**	Default	0	Change	○
Setting range	See the digital input function definition table				
FE-28	**Logical unit 2 input 1 selection**	Default	0	Change	○
FE-29	**Logical unit 2 input 2 selection**	Default	0	Change	○
FE-30	**Configuration of logical unit 2**	Default	9	Change	○
FE-31	**Logical unit 2 output selection**	Default	0	Change	○
FE-32	**Logical unit 3 input 1 selection**	Default	0	Change	○
FE-33	**Logical unit 3 input 2 selection**	Default	0	Change	○

FE-34	**Configuration of logical unit 3**	Default	9	Change	○
FE-35	**Logical unit 3 output selection**	Default	0	Change	○
FE-36	**Logical unit 4 input 1 selection**	Default	0	Change	○
FE-37	**Logical unit 4 input 2 selection**	Default	0	Change	○
FE-38	**Configuration of logical unit 4**	Default	9	Change	○
FE-39	**Logical unit 4 output selection**	Default	0	Change	○
FE-40	**Logical unit 5 input 1 selection**	Default	0	Change	○
FE-41	**Logical unit 5 input 2 selection**	Default	0	Change	○
FE-42	**Configuration of logical unit 5**	Default	9	Change	○
FE-43	**Logical unit 5 output selection**	Default	0	Change	○
FE-44	**Logical unit 6 input 1 selection**	Default	0	Change	○
FE-45	**Logical unit 6 input 2 selection**	Default	0	Change	○
FE-46	**Configuration of logical unit 6**	Default	9	Change	○
FE-47	**Logical unit 6 input selection**	Default	0	Change	○
Setting range	All settings of logic unit 2 to 6 are the same as logic unit 1				

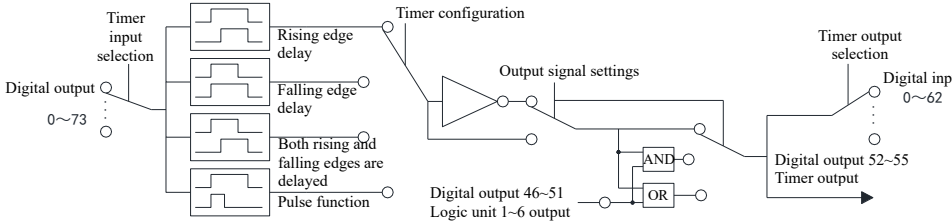
🕮 The logic unit can perform logical operations on the two signals in the digital output function definition table, and the result can select the signal in the digital input function definition table, and output to the digital output function definition table. Logic unit structure diagram as follows:



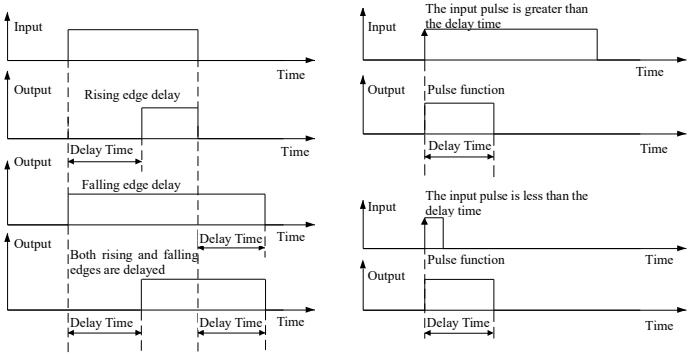
FE-48	**Timer 1 input selection**	Default	0	Change	○
Setting range	See the digital output function definition table				
FE-49	**Configuration of timer 1**	Default	300	Change	○
Setting range	Units: type of timer 0: Rising edge delay 1: Falling edge delay 2: Both rising and falling edges are delayed 3: Pulse function				
	Tens: set time multiplier 0: 1 times 1: 10 times 2: 100 times 3: 1000 times 4: 10000 times 5: 100000 times				
	Hundreds: output signal settings 0: No inversion 1: Inversion 2: Output always 1 3: Output always 0 4: The output of logic unit n 5: The output of AND logic unit n after inversion 6: Output of logic unit n or 7: Inverted and output of logic unit n or Note: n refers to the number of the timer, for example, the number of timer 1 is 1.				
FE-50	**Set time of timer 1**	Default	0ms	Change	○
Setting range	0~40000ms, delay time = set time x multiplier				
FE-51	**Timer 1 output selection**	Default	0	Change	○
Setting range	See the digital input function definition table				
FE-52	**Timer 2 input selection**	Default	0	Change	○
FE-53	**Configuration of timer 2**	Default	300	Change	○
FE-54	**Set time of timer 2**	Default	0ms	Change	○

FE-55	**Timer 2 output selection**	Default	0	Change	○
FE-56	**Timer 3 input selection**	Default	0	Change	○
FE-57	**Configuration of timer 3**	Default	300	Change	○
FE-58	**Set time of timer 2**	Default	0ms	Change	○
FE-59	**Timer 3 output selection**	Default	0	Change	○
FE-60	**Timer 4 output selection**	Default	0	Change	○
FE-61	**Configuration of timer 4**	Default	300	Change	○
FE-62	**Set time of timer 4**	Default	0ms	Change	○
FE-63	**Timer 4 output selection**	Default	0	Change	○
Setting range	All settings of timers 2 to 4 are the same as timer 1				

🕮 The timer can delay any signal in the digital output function definition table. As a result, the signal in the digital input function definition table can be selected and output to the digital output function definition table. The timer structure is shown in the figure below:



🕮 The various functions of the timer are as follows:

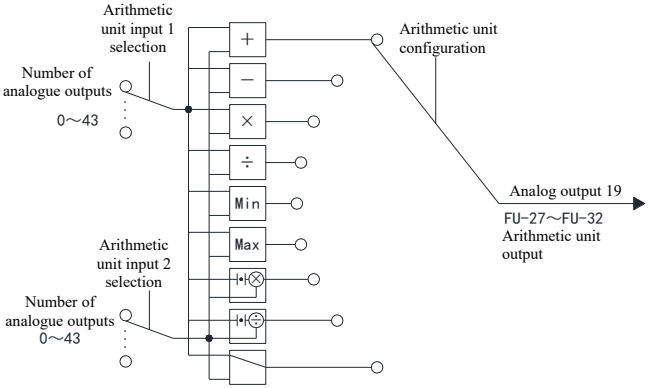


🕮 A timer can be used to debounce the signal, such as the rising edge delay function, when the input pulse is less than the delay time, there is no output.

FE-64	**Arithmetic unit 1 input 1 selection**	Default	0	Change	○
Setting range	See analog output definition table				
FE-65	**Arithmetic unit 1 input 2 selection**	Default	0	Change	○
Setting range	See analog output definition table				

FE-66	Configuration of arithmetic unit 1	Default	0	Change	○
Setting range	0: Input 1+input 2 1: Input 1-input 2 2: Input 1 × input 2 3: Input 1 ÷ input 2 4: Take the smaller of the two inputs 5: Take the larger of the two inputs 6: Take the absolute value of input 1 and multiply itby input 2 7: Take the absolute value of input 1 and divide by input 2 8: Input 1 directly outputs (for connection) 9: Encoder position high word 10: Encoder position low word				
FE-67	**Digital settings of arithmetic unit 1**	Default	0.0%	Change	○
Setting range	-100.0~100.0%, corresponding to analog output 34				
FE-68	**Arithmetic unit 2 input 1 selection**	Default	0	Change	○
FE-69	**Arithmetic unit 2 input 2 selection**	Default	0	Change	○
FE-70	**Configuration of arithmetic unit 2**	Default	0	Change	○
FE-71	**Arithmetic unit 2 digital setting** (corresponding to analog output 35)	Default	0.0%	Change	○
FE-72	**Arithmetic unit 3 input 1 selection**	Default	0	Change	○
FE-73	**Arithmetic unit 3 input 2 selection**	Default	0	Change	○
FE-74	**Configuration of arithmetic unit 3**	Default	0	Change	○
FE-75	**Arithmetic unit 3 digital setting** (corresponding to analog output 36)	Default	0.0%	Change	○
FE-76	**Arithmetic unit 4 input 1 selection**	Default	0	Change	○
FE-77	**Arithmetic unit 4 input 2 selection**	Default	0	Change	○
FE-78	**Configuration of arithmetic unit 4**	Default	0	Change	○
FE-79	**Arithmetic unit 4 digital setting** (corresponding to analog output 37)	Default	0.0%	Change	○
FE-80	**Arithmetic unit 5 input 1 selection**	Default	0	Change	○
FE-81	**Arithmetic unit 5 input 2 selection**	Default	0	Change	○
FE-82	**Configuration of arithmetic unit 5**	Default	0	Change	○
FE-83	**Arithmetic unit 5 digital setting** (corresponding to analog output 38)	Default	0.0%	Change	○
FE-84	**Arithmetic unit 6 input 1 selection**	Default	0	Change	○
FE-85	**Arithmetic unit 6 input 2 selection**	Default	0	Change	○
FE-86	**Configuration of arithmetic unit 6**	Default	0	Change	○
FE-87	**Arithmetic unit 6 digital setting** (corresponding to analog output 39)	Default	0.0%	Change	○
Setting range	All settings of arithmetic units 2 to 6 are the same as those of arithmetic unit 1, but the configuration range of arithmetic units 3 to 6 is 0 to 8.				

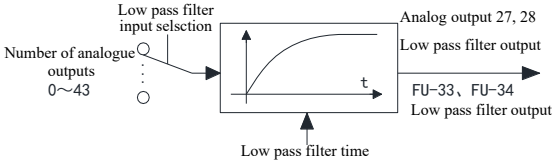
📖 Arithmetic unit: perform mathematical operations on any two quantities in the analog output definition table, and the results can be queried in the FU menu, which can be used as frequency given, PID given, PID feedback, etc.; at the same time output to analog output definition table. The arithmetic unit structure is as follows:



🕮 Arithmetic units 1 and 2 can map the high word and low word of the encoder position of FU-52 and 53. Please refer to the description of position control for details.

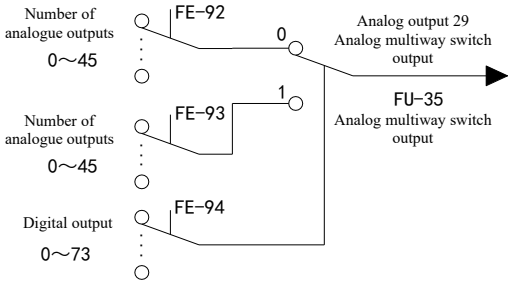
FE-88	**Low pass filter 1 input selection**	Default	0	Change	○
Setting range	See analog output definition table				
FE-89	**Low pass filter 1 filtering time**	Default	0.010s	Change	○
Setting range	0.000~10.000s				
FE-90	**Low pass filter 2 input selection**	Default	0	Change	○
Setting range	See analog output definition table				
FE-91	**Low pass filter 2 filtering time**	Default	0.010s	Change	○
Setting range	0.000~10.000s				

🕮 Low-pass filter: digital low-pass filter can be performed on any quantity in the analog output definition table, and the result can be queried in the FU menu; at the same time, it is output to the analog output definition table. The structure of the low-pass filter is as follows:



FE-92	**Analog multiway switch output 1**	Default	0	Change	○
Setting range	See analog output definition table				
FE-93	**Analog multiway switch output 2**	Default	0	Change	○
Setting range	See analog output definition table				
FE-94	**Analog multiway switch control signal**	Default	0	Change	○
Setting range	See the digital output function definition table				

🕮 Analog multiway switch: The output of the analog multiway switch is selected by FE-94, and the results can be checked in FU-35 “analog multiway switch output”, which is also shown in analog output definition table. The block diagram of the analog multiway switch is as follows:



6.15 FF Communication Parameters

FF-00	COMM2 communication protocol selection	Default	0	Change	×
Setting range	0: Modbus protocol 1: Compatible with USS commands 2: CAN bus Note: COMM1 only supports Modbus communication				
FF-01	Communication data format	Default	00	Change	×
Setting range	Tens place: COMM2 data format Units: COMM1 data format 0:8,N,1 (1 start bit, 8 data bits, no odd-even check, 1 stop bit) 1:8,E,1 (1 start bit, 8 data bits, even parity check, 1 stop bit) 2:8,O,1 (1 start bit, 8 data bits, odd parity check, 1 stop bit) 3:8,N,2 (1 start bit, 8 data bits, no odd-even check, 2 stop bits) 4:8,E,2 (1 start bit, 8 data bits, even parity check, 2 stop bits) 5:8,O,2（1 start bit, 8 data bits, odd parity check, 2 stop bits）				
FF-02	Baud rate selection	Default	34	Change	×
Setting range	Tens place: COMM2 baud rate Units: COMM1 baud rate 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 115200bps 8: 250000bps 9: 500000bps Note: Modbus and compatible USS command protocol selection range is 0~5, CAN bus selection range is 0~9				
FF-03	COMM1 address of the machine	Default	1	Change	×
FF-04	COMM2 address of the machine	Default	1	Change	×
Setting range	0~247 Note: Modbus selection range is 1~247, compatible with USS command selection range 0~31, CAN bus selection range is 0~127				
FF-05	Communication timeout detection time	Default	10.0s	Change	○
Setting range	0.1~600.0s				
FF-06	COMM1 response delay of the machine	Default	5ms	Change	○
FF-07	COMM2 response delay of the machine	Default	5ms	Change	○
Setting range	0~1000ms				
FF-08	Communication timeout action	Default	00	Change	×
Setting range	Tens place: COMM2 communication overtime action Units: COMM1 communication overtime action 0: No action 1: Alarm 2: Fault and coast to stop 3: Alarm, run according to F0-00 4: Alarm, run at the upper limit frequency 5: Alarm, run at the lower limit frequency				
FF-09	COMM2 USS message PZD word count	Default	2	Change	×
Setting range	0~4				
FF-10	COMM1 communication set frequency ratio	Default	1.000	Change	○
FF-11	COMM2 communication set frequency ratio	Default	1.000	Change	○
Setting range	0.001~30.000, the communication given frequency is multiplied by this parameter as the frequency given				

🕮 The COMM1 communication port is the RS485 interface of the local control board , and the COMM2 is the optional communication port, see Chapter 9 Communication Components.

🕮 Hope530 VFD RS485 Modbus protocol includes three layers: physical layer, data link layer and application layer. The physical layer and data link layer adopt Modbus protocol based on RS485, and the application layer controls VFD operation, stop, parameter reading and writing and other operations.

🕮 The Modbus protocol is a Master-slave protocol. The communication between the host and the slave has two types, i.e., the host requests, the slave replies, or hole is broadcasting, and slave is not answering. Only one device can transmit on the bus at any time, and the host polls the slave. The slave cannot send messages without receiving the command from the host. The host can send the command repeatedly if the communication is not correct. If no response is received within a given period of time, the polled slave is considered lost. If the slave cannot execute a certain message, it sends an exception message to the host.

🕮 Communication writes to the VFD parameters only by modifying the values in RAM. If it is required to write RAM parameters to EEPROM, it is necessary to rewrite the communication variable "EEP write command" (Modbus address 3209H) to 1.

🕮 VFD parameter addressing method: the high 8 bits of 16-bit Modbus parameter address are the group number of parameters, and the lower 8 bits are the number in the group of the parameter, all of them are addressed in hexadecimal way. For example, the address of parameter F4-17 is 0411H. For communication variables (control words, status words, etc.), the parameter group number is 50 (32H). Note: Communication variables include VFD parameters that can be accessed by communication, special instruction variables for communication and special state variables for communication. Corresponding communication parameter group number of menu code is shown in the table below:

Menu code	Parameter group number	Menu code	Parameter group number	Menu code	Parameter group number	Menu code	Parameter group number
F0	0 (00H)	F5	5 (05H)	FA	10 (0AH)	FF	15 (0FH)
F1	1 (01H)	F6	6 (06H)	Fb	11 (0BH)	Fn	16 (10H)
F2	2 (02H)	F7	7 (07H)	FC	12 (0CH)	FP	17 (11H)
F3	3 (03H)	F8	8 (08H)	Fd	13 (0DH)	FU	18 (12H)
F4	4 (04H)	F9	9 (09H)	FE	14 (0EH)	Communication variable	50 (32H)

🕮 Data type in communication: The data transmitted in communication is a 16-bit integer. The smallest unit can be seen from the decimal point position of the parameter in the parameter list. For example, for F0-00 'digital given frequency', the minimum unit of is 0.01Hz, so for Modbus protocol, communication transmission 5000 represents 50.00Hz.

🕮 Communication command variable:

Name	Modbus address	Change	Description
Main control word	3200H	○	Bit 0: ON/OFF1 (rising edge operation, stop when it is 0) Bit 1: OFF2 (free stop if it is 0) Bit 2: OFF3 (0 means emergency stop) Bit 3: Drive lockout (0 means drive lockout) Bit 4: Ramp enabling (stop acceleration and deceleration if it is 0) Bit 5: Not used Bit 6: Not used Bit 7: Fault reset (fault reset on rising edge) Bit 8: Jog forward Bit 9: Reverse jog Bit 10: Not used Bit 11: Set value is reversed (given frequency is reversed if it is 1 and given frequency is not reversed if it is 0) Bit 12: Host computer digital quantity 1 (for programmable unit) Bit 13: UP Bit 14: DOWN Bit 15: Host computer digital quantity 2 (for programmable unit)

Name	Modbus address	Change	Description
Communication set frequency	3201H	○	A non-negative number with a unit of 0.01Hz, multiplied by the communication set frequency ratio and used as frequency reference
Host computer analog 1	3202H	○	Range: -32768~32767 Except for position control, please set it within -10000~10000
Host computer analog 2	3203H	○	
Extended control word 1	3204H	○	Bits 0 to 15 correspond to digital inputs 1 to 16
Extended control word 2	3205H	○	Bits 0 to 15 correspond to digital inputs 17 to 32
Extended control word 3	3206H	○	Bits 0 to 15 correspond to digital inputs 33 to 48
Extended control word 4	3207H	○	Bits 0 to 13 correspond to digital inputs 49 to 62, and the remaining bits are reserved
Extended control word 5	3208H	○	Reserved
EEPROM write-in	3209H	○	When writing 1 in the address, the parameters in RAM of the VFD will write in EEPROM

Note: Digital input 37 "3-wire stop command", 38 "Internal virtual FWD1 terminal", 39 "Internal virtual REV1 terminal", 40 "Internal virtual FWD2 terminal", 41 "Internal virtual REV2 terminal" are only used for terminal control, communication modification is invalid.、

🕮 Communication state variables:

Name	Modbus address	Change	Description
Main state word	3210H	△	Bit 0: Ready Bit 1: Operational readiness Bit 2: Operating Bit 3: Fault Bit 4: OFF2 is effective (effective when it is 0) Bit 5: OFF3 is in shutdown (0 is valid) Bit 6: Charging contactor is disconnected Bit 7: Alarm Bit 8: reserved Bit 9: reserved Bit 10: Frequency level detection signal 1 Bit 11: reserved Bit 12: reserved Bit 13: reserved Bit 14: Forward operating Bit 151: Reserving
Operating frequency	3211H	△	Nonnegative number of unit 0.01Hz
Arithmetic unit 1 output	3212H	△	Unit 0.01%, When used as encoder position high and low word, the unit is the number of pulses
Arithmetic unit 2 output	3213H	△	
Preset frequency	3214H	△	Nonnegative number of unit 0.01Hz
Output Current	3215H	△	Unit 0.1A
Output torque	3216H	△	Unit 0.1% rated torque
Output Voltage	3217H	△	Unit 0.1V
Busbar voltage	3218H	△	Unit 0.1V
Failure Codes	3219H	△	See faults and solutions
Alarm word 1	321AH	△	See faults and solutions
Alarm word 2	321BH	△	See faults and solutions
Extended status word 1	321CH	△	Bits 0 to 15 correspond to digital outputs 0 to 15
Extended status word 2	321DH	△	Bits 0 to 15 correspond to digital outputs 16 to 31

Name	Modbus address	Change	Description
Extended status word 3	321EH	△	Bits 0 to 15 correspond to digital outputs 32 to 47
Extended status word 4	321FH	△	Bits 0 to 15 correspond to digital outputs 48 to 63
Extended status word 5	3220H	△	Bits 0 to 9 correspond to digital outputs 64 to 73

🕮 Hope530 VFD supports Modbus protocol in RTU (remote terminal unit) mode. The supported functions are: function 3 (read multiple parameters, the maximum number of words is 50), function 6 (write a single parameter), function 8 (loop test), function 16 (write multiple parameters, the maximum number of words is 10), function 22 (mask write). Among them, functions 6, 16 and 22 support broadcasting (the address of the broadcast message is 0). The start and end of an RTU frame are marked by at least 3.5 character intervals (Baud rate of 19200bit/s and 38400bit/s: 2ms). The format of RTU frames is as follows:

Slave address (1 byte)	Modbus function number (1 byte)	Data (multiple bytes)	CRC16 (2 bytes)

🕮 Function 3: multi-reading The range of the word to be read is 1-50. The format of message is as follows.

Example: read the master status word, operating frequency and arithmetic unit 1 output of slave No. 1 (the address is 3 words starting from 3210H):

The host sends out:

Slave address	01H
Modbus function number	03H
Initial address (high byte)	32H
Initial address (low byte)	10H
Number read (high byte)	00H
Number read (low byte)	03H
CRC (low byte)	0AH
CRC (high byte)	B6H

The slave responds:

Slave address	01H
Modbus function number	03H
Returning bytes	06H
High byte of 3210H contents	44H
Low byte of 3210H contents	37H
High byte of 3211H contents	13H
Low byte of 3211H contents	88H
High byte of 3212H contents	00H
Low byte of 3212H contents	00H
CRC (low byte)	5FH
CRC (high byte)	5BH

🕮 Function 6: one writing The number of words written is fixed as 1, and the content returned by slave is consistent with that issued by the host. Format of report is shown below.

Example: The contents of address 3200H can be changed to be 003FH to make the 1# slave operate forward:

The host sends out:

Slave address	01H
Modbus function number	06H
Initial address (high byte)	32H
Initial address (low byte)	00H
Write data high bytes	00H
Write data low bytes	3FH
CRC (low byte)	C7H
CRC (high byte)	62H

The slave responds:

Slave address	01H
Modbus function number	06H
Initial address (high byte)	32H
Initial address (low byte)	00H
Write data high bytes	00H
Write data low bytes	3FH
CRC (low byte)	C7H
CRC (high byte)	62H

🕮 Function 16: multi-writing The number written ranges from 1 to 10. The format of report is shown below.

Example: Change the two words starting at address 3200H to 003FH and 1388H to make the 1# slave operate forward at 50.00Hz:

The host sends out:

Slave address	01H
Modbus function number	10H
Initial address (high byte)	32H
Initial address (low byte)	00H
Number written (high byte)	00H
Number written (low byte)	02H
Number of bytes written	04H
High byte of the first number	00H
Low byte of the first number	3FH
High byte of the second number	13H
Low byte of the second number	88H
CRC (low byte)	83H
CRC (high byte)	94H

The slave responds:

Slave address	01H
Modbus function number	10H
Initial address (high byte)	32H
Initial address (low byte)	00H
Number written (high byte)	00H
Number written (low byte)	02H
CRC (low byte)	4FH
CRC (high byte)	70H

Example: Change the two words starting at address 003EH and 1388H and 1388H to stop 1# slave at forward 50.00Hz:

The host sends out:

Slave address	01H
Modbus function number	10H
Initial address (high byte)	32H
Initial address (low byte)	00H
Number written (high byte)	00H
Number written (low byte)	02H
Number of bytes written	04H
High byte of the first number	00H
Low byte of the first number	3EH
High byte of the second number	13H
Low byte of the second number	88H
CRC (low byte)	D2H
CRC (high byte)	54H

The slave responds:

Slave address	01H
Modbus function number	10H
Initial address (high byte)	32H
Initial address (low byte)	00H
Number written (high byte)	00H
Number written (low byte)	02H
CRC (low byte)	4FH
CRC (high byte)	70H

🕮 Feature 22: Mask Write

When operating on the control word, the “read-change-write” method is cumbersome and time-consuming, and the mask write function provides users with a convenient way to modify one or several bits of the control word. This function is only valid for control word (including main control word and extended control word, but invalid for communication fault reset). The operation is described as follows:

result = (operand & AndMask) | (OrMask & (~AndMask)), i.e.:

When OrMask is all 0, the result is the AND of the operand and AndMask, which can be used to clear one or several bits to 0;

When OrMask is all 1, the bit of the operand corresponding to AndMask is 0 will be rewritten to 1, which can be used to set a certain bit or several bits to 1;

When AndMask is all 0, the result is OrMask;

When AndMask is all 1, the result is unchanged.

Example: Set bit 7 (digital input 24: PLC standby state reset) of the 3205H address (extended control word 2) of slave machine 1 to 1 and clear it to zero. The master sends and the slave responds as follows (the slave returns the master command as it is):

Set bit 7 of extended control word 2 to 1

Slave address	01H
Modbus function number	16H
Operand address high byte	32H
Operand address low byte	05H
AndMask higher byte	FFH
AndMask lower byte	7FH
OrMask higher byte	FFH
OrMask lower byte	FFH
CRC (low byte)	3EH
CRC (high byte)	68H

Clears bit 7 of extended control word 2

Slave address	01H
Modbus function number	16H
Operand address high byte	32H
Operand address low byte	05H
AndMask higher byte	FFH
AndMask lower byte	7FH
OrMask higher byte	00H
OrMask lower byte	00H
CRC (low byte)	3FH
CRC (high byte)	D8H

🕮 Function 8: Loop test, the test function number is 0000H, and the frame is required to be returned as it is, as shown in the following example.

🕮 Abnormal response: When the slave station cannot complete the request sent by the master station, it returns an abnormal response message, as shown in the following example.

Example of loop test:

Slave address	01H
Modbus function number	08H
Test function number higher byte	00H
Test function number lower byte	00H
Test data higher byte	37H
test data lower byte	DAH
CRC (low byte)	77H
CRC (high byte)	A0H

Example of abnormal response:

Slave address	1 Byte
Response Code	1 byte (Modbus function number + 80H)
Error code	1 byte, meaning as follows: 1: Modbus function number that cannot be processed 2: Unreasonable data address 3: Data value out of range 4: Operation failed (write read-only parameters, change parameters that cannot be changed during operation, etc.)
CRC (low byte)	—
CRC (high byte)	—

🕮 USS Directive Compatibility

Hope530 also has a compatible USS command mode, which is designed to be compatible with the host computer instructions that support the USS protocol. It can control the operation of the Hope530 series VFD through the host computer software (including PC, PLC and other host computer software) supporting the USS protocol. , Set the given frequency of the VFD, read the running state parameters of the VFD, the running frequency of the VFD, the output current, output voltage, and DC bus voltage of the VFD. If the user has this demand, please consult the manufacturer.

6.16 FP Fault Record

FP-00	**Last fault type**	Minimum Unit	1	Change	△
Content description	See list of faults below				
FP-01	**Total running time during last fault**	Minimum Unit	1h	Change	△
FP-02	**Operation frequency in the most recent failure**	Minimum Unit	0.01Hz	Change	△
FP-03	**Preset frequency in the most recent failure**	Minimum Unit	0.01Hz	Change	△
FP-04	**Output current in the most recent failure**	Minimum Unit	0.1A	Change	△
FP-05	**Output voltage in the most recent failure**	Minimum Unit	0.1V	Change	△
FP-06	**Output power in the most recent failure**	Minimum Unit	0.1kW	Change	△
FP-07	**Bus voltage in the most recent failure**	Minimum Unit	0.1V	Change	△
FP-08	**VFD temperature of the latest fault**	Minimum Unit	0.1℃	Change	△
FP-09	**Terminal input state 1 in the most recent failure**	Minimum Unit	1	Change	△
Content description	Ten thousands: DI5 Thousands: DI4 Hundreds: DI3 Tens: DI2 Units: DI1 (0: Invalid state 1: Valid state)				
FP-10	**Terminal input state 2 in the most recent failure**	Minimum Unit	1	Change	△
Content description	Ten Thousand: DI10 Thousand: DI9 Hundred: DI8 Ten: DI7 Piece: DI6 (0: Invalid state 1: Valid state)				
FP-11	**Second last failure type**	Minimum Unit	1	Change	△
FP-12	**Total operation time in second last failure**	Minimum Unit	1h	Change	△
FP-13	**Third last failure type**	Minimum Unit	1	Change	△
FP-14	**Total operation time in third last failure**	Minimum Unit	1h	Change	△
FP-15	**Fourth last failure type**	Minimum Unit	1	Change	△
FP-16	**Total operation time in fourth last failure**	Minimum Unit	1h	Change	△
FP-17	**Fifth last failure type**	Minimum Unit	1	Change	△
FP-18	**Total operation time in fifth last failure**	Minimum Unit	1h	Change	△
FP-19	**Single operation time in case of fault**	Minimum Unit	0.1h	Change	△
FP-20	**Fault record clearing**	Minimum Unit	1	Change	○
Setting range	11: Clear this menu parameter, it will automatically change to 00 after the operation is completed				

🕮 The VFD fault list is as follows:

0: No fault	13. oHI: VFD overheat	26. ccF: Current detection fault
1. ocb: Instantaneous start overcurrent	14. oLI: VFD overload	27. ArF: Poor self-tuning
2. ocA: Overcurrent at accelerated operation	15. oLL: Motor overload	28. Aco: Analog input offline
3. ocd: Overcurrent at decelerated operation	16. EEF: External fault	29: PGo: PG disconnection
4. ocn: Overcurrent at constant speed operation	17. oLP: Heavy motor load	30: rHo: Thermistor open circuit
5. ouA: Overvoltage at accelerated operation	18. ULd: Motor underload	31: Abb: Abnormal shutdown fault
6. oud: Overvoltage at decelerated operation	19: Co1: Output protection signal of comparator 1	32: cno: Charging contactor is abnormal
7. oun: Overvoltage at constant speed operation	20. Co2: Output protection signal of comparator 2	33: GFF: Output grounding fault
8. ouE: Overvoltage in standby mode	21. Co3: Output protection signal of comparator 3	34: Io1: Remained
9. dcL: Undervoltage during operation	22. Co4: Output protection signal of comparator 4	35: Io2: Remained
10. PLI: Input phase loss	23. EEP: Parameter storage failure	36: PnL: Remained
11. PLo: Output phase loss	24. C1E: COMM1 communication abnormal	37: dcE: DC bus voltage is abnormal
12. FoP: Power device protection	25. C2E: COMM2 communication abnormal	

6.17 FU Data Monitoring

FU-00	**Operating frequency**	Minimum Unit	0.01Hz	Change	△
Content description	Frequency reflecting motor speed				
FU-01	**Preset frequency**	Minimum Unit	0.01Hz	Change	△
Content description	Unit indicator flashes				
FU-02	**Output Current**	Minimum Unit	0.1A	Change	△
FU-03	**Load current percentage**	Minimum Unit	0.1%	Change	△
Content description	The rated current of the VFD is 100%				
FU-04	**Output Voltage**	Minimum Unit	0.1V	Change	△
FU-05	**Running speed or speeds**	Minimum Unit	1r/min	Change	△
Content description	FU-05 = 120 × operating frequency ÷ number of motor poles × FC-13 "speed display coefficient"				
FU-06	**Given rotating speed**	Minimum Unit	1r/min	Change	△
Content description	FU-06 = 120 × given frequency ÷ number of motor poles × FC-13 "speed display coefficient", the unit indicator flashes				
FU-07	**DC bus voltage**	Minimum Unit	0.1V	Change	△
FU-08	**The output power**	Minimum Unit	0.1kW	Change	△
FU-09	**Output torque**	Minimum Unit	0.1%	Change	△
FU-10	**Given torque**	Minimum Unit	0.1%	Change	△
Content description	When the rated torque is 100%, the unit indicator flashes				
FU-11	**Operating line speed**	Minimum Unit	1m/s	Change	△
Content description	FU-11 “operation linear speed”=operating frequency×FC-14“linear speed display coefficient”				

FU-12	**Given line speed**	Minimum Unit	1m/s	Change	△
Content description	FU-12 "given line speed" = given frequency × FC-14 "line speed display coefficient", the unit indicator flashes when displayed				
FU-13	**PID feedback value**	Minimum Unit	0.1%	Change	△
Content description	FU-13 "PID feedback value" = PID feedback channel × F7-03 "PID display coefficient"				
FU-14	**PID given value**	Minimum Unit	0.1%	Change	△
Content description	FU-14 "PID given value" = PID given channel × F7-03 "PID display coefficient", the unit indicator flashes				
FU-15	**PID output value**	Minimum Unit	0.1%	Change	△
FU-16	**Counter count value**	Minimum Unit	1	Change	△
FU-17	**Actual length of length counter**	Minimum Unit	1m	Change	△
FU-18	**AI1**	Minimum Unit	0.1%	Change	△
FU-19	**AI2**	Minimum Unit	0.1%	Change	△
FU-20	**AI3**	Minimum Unit	0.1%	Change	△
FU-21	**AI4**	Minimum Unit	0.1%	Change	△
FU-22	**PFI**	Minimum Unit	0.1%	Change	△
FU-23	**UP/DOWN regulating value**	Minimum Unit	0.1%	Change	△
Content description	Unit indicator flashes				
FU-24	**PLC current mode and stage**	Minimum Unit	0.01	Change	△
Content description	Example: 2.03 refers to the stage 3 of mode 2				
FU-25	**Cycled times of PLC**	Minimum Unit	1	Change	△
FU-26	**PLC time left in current stage**	Minimum Unit	0.1s/min	Change	△
FU-27	**Arithmetic unit 1 output**	Minimum Unit	0.1%	Change	△
FU-28	**Arithmetic unit 2 output**	Minimum Unit	0.1%	Change	△
FU-29	**Arithmetic unit 3 output**	Minimum Unit	0.1%	Change	△
FU-30	**Arithmetic unit 4 output**	Minimum Unit	0.1%	Change	△
FU-31	**Arithmetic unit 5 output**	Minimum Unit	0.1%	Change	△
FU-32	**Arithmetic unit 6 output**	Minimum Unit	0.1%	Change	△
FU-33	**Low-pass filter 1 output**	Minimum Unit	0.1%	Change	△
FU-34	**Low-pass filter 2 output**	Minimum Unit	0.1%	Change	△
FU-35	**Analog multiway switch output**	Minimum Unit	0.1%	Change	△
FU-36	**Radiator temperature**	Minimum Unit	0.1ºC	Change	△
FU-37	**Counter deviation**	Minimum Unit	0.01%	Change	△
Content description	FU-37 = (FU-16 "Counter count value" - F9-14 "Counter preset value")÷F9-15 "Set count value"×100%				
FU-38	**PG detection frequency**	Minimum Unit	0.1Hz	Change	△
Content description	Signed number, which can represent forward and reverse				
FU-39	**Output power factor**	Minimum Unit	0.01	Change	△

FU-40	**Watt-hour meter (KWh)**	Minimum Unit	0.1kWh	Change	△
Content description	0.0~6553.5kWh, when this parameter is displayed, press △ and ▽ at the same time, this parameter and the watt-hour meter timer will be cleared at the same time				
FU-41	**Watt-hour meter timer**	Minimum Unit	0.01h	Change	△
Content description	0.00~655.35h, when this parameter is displayed, press △ and ▽ at the same time, this parameter and the kWh of the watt-hour meter will be cleared at the same time				
FU-42	**Digital input terminal state**	Minimum Unit	1	Change	△
Content description	Ten Thousand: DI5 Thousand: DI4 Hundred: DI3 Ten: DI2 One: DI1 (0: Invalid 1: Valid)				
FU-43	**Extended digital input terminal state**	Minimum Unit	1	Change	△
Content description	Ten Thousand: DI10 Thousand: DI9 Hundred: DI8 Ten: DI7 One: DI6 (0: Invalid 1: Valid)				
FU-44	**Digital output terminal state**	Minimum Unit	1	Change	△
Content description	Thousands place: T2 Hundreds: T1 Tens place: DO2 Units: DO1 (0: invalid 1: valid)				
FU-45	**Extended digital output terminal state**	Minimum Unit	1	Change	△
Content description	Thousands place: T6 Hundreds: T5 Tens place: T4 Units: T3 (0: invalid 1: valid)				
FU-46	**Comparator output state**	Minimum Unit	1	Change	△
Content description	Thousands place: Comparator 4 Hundreds: Comparator 3 Tens place: Comparator 2 Units: Comparator 1 (0: Output 0 1: Output 1)				
FU-47	**Number of COMM1 communication errors**	Minimum Unit	1	Change	△
Content description	0~ 40000				
FU-48	**Number of COMM2 communication errors**	Minimum Unit	1	Change	△
Content description	0~ 40000				
FU-49	**COMM1 communication polling time**	Minimum Unit	0.001s	Change	△
FU-50	**COMM2 communication polling time**	Minimum Unit	0.001s	Change	△
FU-51	**Given frequency of acceleration and deceleration ramp**	Minimum Unit	0.01Hz	Change	△
Content description	The frequency generated after the acceleration and deceleration ramps				
FU-52	**PG position high word**	Minimum Unit	1	Change	△
FU-53	**PG position high word**	Minimum Unit	1	Change	△
Content description	The size of the actual position is reflected in the position control, expressed in 32-bit binary numbers, the high word is the high 16 bits, and the low word is the low 16 bits				
FU-54	**Counter 2 count value high word**	Minimum Unit	1	Change	△
FU-55	**Counter 2 count value low word**	Minimum Unit	1	Change	△
Content description	In position control, it reflects the deviation between the given position and the actual position. Expressed in 32-bit binary numbers, the high word is the high 16 bits, and the low word is the low 16 bits				
FU-56	**Accumulated running time of fan**	Minimum Unit	1h	Change	△
FU-57	**Manufacturing Date**	Minimum Unit	00.01	Change	△
Content description	Example: 19.01 means January 19				
FU-58	**VFD No.**	Minimum Unit	0001	Change	△
Miscellaneous	**Reserved**	Minimum Unit	—	Change	—

7. Troubleshooting and Exception Handling

7.1 Faults of VFD and Solutions

Table for faults and solutions:

Failure indications (Fault code)	Failure type	Possible cause	Troubleshooting
Er.ocb Er.ocb (1)	Overcurrent at starting moment	There is phase fault or short circuit to ground inside the motor or wiring	Check the motor and wiring
		The VFD module is damaged	Seek for service
		The starting voltage is too high	Check the torque boost setting
Er.ocA Er.ocA (2)	Overcurrent of acceleration operation	Acceleration time is too short	Extended acceleration time.
		V/F curve is improper	Adjust the V/F curve or the torque boost setting
		Restart the rotating motor	Set to be speed tracking starting Restart the motor after it is completely stopped
		Power grid voltage is low	Inspect input power
		The power of VFD is too small	Use the VFD with large power class
		Vector control does not perform parameter self-tuning	Perform parameter self-tuning
Er.ocd Er.ocd (3)	Overcurrent of deceleration operation	Deceleration time is too short	Extend deceleration time
		There is potential energy load or the inertia torque is too large	Equip proper dynamic braking assembly outside
		The power of VFD is too small	Use the VFD with large power class
		Vector control does not perform parameter self-tuning	Perform parameter self-tuning
Er.ocn Er.ocn (4)	Overcurrent of constant-speed operation	The load changes suddenly	Reduce the sudden change of load
		The load is abnormal	Inspect the load
		Power grid voltage is low	Inspect input power
		The power of VFD is too small	Use the VFD with large power class
		Vector control does not perform parameter self-tuning	Perform parameter self-tuning
Er.ouA Er.ouA (5)	Accelerated running overvoltage	Input voltage is abnormal	Inspect input power
		Restart the rotating motor	Set to be speed tracking starting Restart the motor after it is completely stopped
Er.oud Er.oud (6)	Decelerated running overpressure	Deceleration time is too short	Extend deceleration time
		There is potential energy load or the load inertia is too large	Select proper dynamic braking assembly outside
		Input voltage is abnormal	Inspect input power
		Inappropriate ASR parameters	Adjust ASR parameters to reduce overshoot

Failure indications (Fault code)	Failure type	Possible cause	Troubleshooting
Er.oun Er.oun (7)	Constant speed running overvoltage	Input voltage is abnormal	Inspect input power
		The time of acceleration and deceleration is too short	Extend the time of acceleration and deceleration properly
		Input voltage has abnormal changes	Install the input reactor
		Load inertia is too large	Adopt the dynamic braking assembly
Er.ouE Er.ouE (8)	Overvoltage in standby mode	Input voltage is too high	Inspect input power
		Detect circuit fault by DC bus voltage	Seek for service
Er.dcL Er.dcL (9)	Undervoltage in operation	Input voltage is abnormal or power fails during operation	Inspect the input power supply and wiring
		There is heavy load impact	Examine loads
		Charging contactor is damaged	Check and replace it
		Missing of input phase	Inspect the input power supply and wiring
Er.PLI Er.PLI (10)	Missing of input phase	Input R, S, T have phase loss	Check installation wiring
		Three input phases are unbalanced	Check input voltage
Er.PLo Er.PLo (11)	Output phase loss	Output phases U, V and W are lost	Check output wiring Check the motor and cables
Er.FoP Er.FoP (12)	Protection for power devices	Output with interphase short circuit or grounding short circuit	Re-wiring
		Connection wires or plug-ins of the control board are loose	Check connect again
		The connection wire between the motor and the converter is too long	Provide an output reactor or filter
		Overcurrent of brake unit of 15kW and below models	Check the resistance value and wiring of the external braking resistor
		There is serious interference or VFD is damaged	Seek for service
Er.oHI Er.oHI (13)	VFD is overheated	Ambient temperature too high	Decrease the ambient temperature
		Air ducts are blocked or fans are damaged	Clean the air ducts or replace the fans
		Excessive load	Check the load or select large-power VFD
Er.oLI Er.oLI (14)	Overload of VFD	Excessive load	Check the load or select large-power VFD
		Temperature of VFD is too high	Check fans, air ducts and ambient temperature
		Acceleration time is too short	Extended acceleration time.
		Carrier frequency is too high	Reduce the carries frequency or select the VFD with larger capacity
		V/F curve is improper	Adjust the V/F curve and the torque boost
		Restart the rotating motor	Set to be speed tracking starting Or restart the motor after it is completely stopped
		Input voltage is too low	Check input voltage

Failure indications (Fault code)	Failure type	Possible cause	Troubleshooting
Er.oLL Er.oLL (15)	Motor overload	V/F curve is improper	Correctly set the V/F curve and the torque boost
		Input voltage is too low	Check input voltage
		The general motor runs with heavy load at low speed for a long time	Add an independent cooling fan or select the variable frequency motor
		Motor nameplate or overload protection is not properly set	Correctly set FA-03, Fb-00 and Fb-01
		Motor locked-rotor or too large sudden load change	Examine loads
Er.EEF Er.EEF (16)	External fault	External fault terminal is closed	Solve the external fault
Er.oLP Er.oLP (17)	Motor overload	Motor current exceeds the overload detection level and is beyond the detection time	Examine loads Check the overload protection setting
Er.ULd Er.ULd (18)	Motor underload	Output current of frequency converter is less than the underload protection level and beyond the detection time	Examine loads Check the underload protection setting
Er.Co1 Er.Co1 (19)	Comparator 1 output Protection signal	Generated by comparator 1	Check comparator 1 output definition
Er.Co2 Er.Co2 (20)	Comparator 2 output Protection signal	Generated by comparator 2	Check comparator 2 output definition
Er.Co3 Er.Co3 (21)	Comparator 3 output Protection signal	Generated by comparator 3	Check comparator 3 output definition
Er.Co4 Er.Co4 (22)	Comparator 4 output Protection signal	Generated by comparator 4	Check comparator 4 output definition
Er.EEP Er.EEP (23)	Parameter storage failure	Error writing parameter	After reset, try again, if the problem still exists, please seek service
Er.C1E Er.C1E (24)	COMM1 Abnormal communication	Communication parameters are not properly set	Check the FF menu setting
		There is severe communication interference	Check the wiring and grounding of communication loop
Er.C2E Er.C2E (25)	COMM2 Abnormal communication	Upper computer is not working	Check the upper computer and wiring
Er.ccF Er.ccF (26)	Current detection fault	The internal cable or plug-in of the VFD is loose	Check connect again
		Current sensor is damaged or the circuit is abnormal	Seek for service
Er.ArF Er.ArF (27)	Poor self-tuning	Motor nameplate parameter setting error	Set the parameters correctly according to the motor nameplate
		Missing motor or motor phase loss	Check motor wiring

Failure indications (Fault code)	Failure type	Possible cause	Troubleshooting
		During complete self-tuning, the motor is not at no load	Take the motor off the mechanical load
		Self-tuning oscillation	Adjust F2-09 "Anti-Vibration Damping"
Er.Aco Er.Aco (28)	Analog input connection loss	The connection is lost or external equipment is damaged	Check the external connection and equipment
		The threshold of connection loss is not properly set	Check the settings of F6-06, F6-13
Er.PGo Er.PGo (29)	PG disconnection	The connection with encoder interface board fails	Check the connection
		Jumper of encoder interface board is set incorrectly	Refer to section 9.6 to check the jumper
		Fd-72 "PG disconnection detection time" is too short	Increase the set value properly
		The encoder is broken	Check and replace the damaged encoder
Er.rHo Er.rHo (30)	Thermistor is open-circuit	Thermistor is disconnected	Check thermistor connections or seek service
Er.Abb Er.Abb (31)	Abnormal shutdown	The stall condition lasts for 1 minute	Set the operating parameters correctly
		Use ◯ to stop when not operating panel	—
		PG is connected reversely which causes overspeed	Check PG wiring
Er.cno Er.cno (32)	Charging contactor is abnormal (only valid for hardware detection)	The power grid voltage is too low	Check the power grid
		Contactor damage	Replace contactor and seek service
		The power-on buffer resistor is damaged	Replace the buffer resistor and seek service
		Control loop is sdamaged	Seek for service
Er.GFF Er.GFF (33)	Output grounding failure	Output U, V, W have ground current	Check output wiring, check motor and cable
Er.Io1 Er.Io1 (34)	Reserved	—	—
Er.Io2 Er.Io2 (35)	Reserved	—	—
Er.PnL Er.PnL (36)	Reserved	—	—
Er.dcE Er.dcE (37)	DC bar Voltage is abnormal	Detect loop abnormality	Seek for service

7.2 Alarms of VFD and Solutions

Table for alarms and solutions:

Alarm display	Alarm name	Content and description	Solution	Alarm words Corresponding bit
AL.oLL AL.oLL	Motor overload	Too high temperature rise of motor is detected by the thermal model	Refer to solutions to corresponding faults	Word 1 Bit 0
AL.oLP AL.oLP	Motor overload prediction	Motor current exceeds the overload detection level and is beyond the detection time	Refer to solutions to corresponding faults	Word 1 Bit 1
AL.ULd AL.ULd	Motor underload	Output current of frequency converter is less than the underload protection level and beyond the detection time	Refer to solutions to corresponding faults	Word 1 Bit 2
AL.Aco AL.Aco	Analog input connection loss	Analog input signal is lower than the connection loss threshold	Refer to solutions to corresponding faults	Word 1 Bit 4
AL.PLI AL.PLI	Missing of input phase	Input phase is lost or three phases are imbalanced	Refer to solutions to corresponding faults	Word 1 Bit 5
AL.PLo AL.PLo	Output phase loss	Output phase loss	Refer to solutions to corresponding faults	Word 1 Bit 6
AL.C1E AL.C1E	COMM1 communication is abnormal	Communication timeout	Refer to solutions to corresponding faults	Word 1 Bit7
AL.C2E AL.C2E	COMM2 communication is abnormal			Word 1 Bit 8
AL.EEP AL.EEP	EEP storage abnormal	Parameter write failure	Refer to solutions to corresponding faults Press ENTER to clear	Word 1 Bit 9
AL.dcL AL.dcL	DC bus undervoltage	The DC bus voltage is below the undervoltage point	The information is normal as per switching off display	Word 1 Bit 11
AL.Co1 AL.Co1	Comparator 1 alarm	Generated by comparator 1	Check comparator 1 output definition	Word 1 Bit 12
AL.Co2 AL.Co2	Comparator 2 alarm	Generated by comparator 2	Check comparator 2 output definition	Word 1 Bit 13
AL.Co3 AL.Co3	Comparator 3 alarm	Generated by comparator 3	Check comparator 3 output definition	Word 1 Bit 14
AL.Co4 AL.Co4	Comparator 4 alarm	Generated by comparator 4	Check comparator 4 output definition	Word 1 Bit15
AL.PGo AL.PGo	Encoder offline	Encoder no signal	Refer to solutions to corresponding faults	Word 2 Bit 0

AL.cno	Contactor abnormal	The power grid voltage is too low	Check the power grid	Word 2 Bit 1
		Contactor damage	Replace contactor and seek service	
		The power-on buffer resistor is damaged	Replace the buffer resistor and seek service	
		Control loop is sdamaged	Seek for service	
AL.PLL	AC INPUT POWER Power down alarm	Three-phase power outage	Check the three-phase input line of the grid	Word 2 Bit 2
AL.PcE	Abnormal parameters	Improper parameter setting	Correct parameter settings or restore factory defaults, press ENTER to clear	Word 2 Bit 3
AL.oHI	VFD is overheated	Ambient temperature too high	Decrease the ambient temperature	Word 2 Bit 4
		Air ducts are blocked or fans are damaged	Clean the air ducts or replace the fans	
		Excessive load	Check the load or select large-power VFD	

7.3 Abnormal Operation of the VFD and Solutions

Table for abnormal operation and solutions:

Phenomena	Conditions	Possible cause	Solution
Operation panel No response when pressing key	Some keys or all keys have no response	Operation panel keys are automatically locked	Press ENTER+MENU for 3s to unlock
		The connection wire of the operation panel is in poor contact	Check the connecting line and seek for service from our company
		The keys on the operation panel are damaged	Replace the operation panel
		Chip is damaged	Seek service from the Company
Parameters cannot be modified	Partial parameters cannot be modified	F0-10 is set to 1 or 2	Set F0-10 into 0
		Attributes of parameters are changed to read only	Users cannot modify parameters that can only be read
	No modification under operating state	Attributes of parameters are changed to no modification under operating state	Modify them under standby mode
VFD stops accidentally in operation	The VFD stops automatically with no stop command, and the running indicator light is off	Faulty	Find out fault causes and reset faults
		PLC cycle completed	Check PLC parameter setting
		Run command channel 1/2 switch	Check operation and state of operation command channel
		Fb-18=3 "Deceleration during instantaneous power failure", and the power failure time is too long	Check DC bus undervoltage action settings and input voltage
	The motor automatically stops with no stop command, and the VFD operation indicator light is on	It's in the fault automatic reset period	Check the setting of fault automatic reset and fault causes
		It's in PLC suspended state	Check PLC function setting
		Operation interruption	Check the interruption setting
		Given frequency is 0, under zero frequency operation	Check the given frequency
		PID direct action, feedback＞given PID reverse action, feedback＜given	Check the feedback and given PID
VFD Out of service	The VFD does not start after giving starting command, and the running indicator light is not on	"Free shutdown" is valid with the digit 18 inputted	Check the free shutdown terminal
		"Operation prohibition of frequency converter" is valid with the digit 17 inputted	Check the operation prohibition terminal of frequency converter
		Shutdown button is not closed under the control mode of three-wire 1 and 2 or two-wire 3	Check the shutdown button and connection

		Wrong operation command channel	Modify the operation command channel
		VFD is in fault	Remedying malfunctions
		The logic of input terminal is set improperly	Check F4-05, F4-81 settings
		Inconsistent bus voltage of parallel models	Check the power input circuit, voltage detection circuit, etc.

8. Maintenance and After-sales Service

DANGER

1. Only professionally trained personnel can disassemble components, perform maintenance and replace components;
2. Before inspection and maintenance, please confirm that the VFD has been cut off from the power supply, the high-voltage indicator light is off, and the voltage between DC+ and DC- is less than 36V, otherwise there will be danger of electric shock;
3. Do not leave screw, washer and other metal parts in the machine, otherwise equipment may be damaged and there will be fire risks;
4. After replacing the control board, relevant parameters must be set before operation, otherwise equipment may be damaged.

8.1 Daily Care and Maintenance

It is necessary to periodically check the VFD and its operating environment because faults may be caused by dust, humidity, vibration and other factors in the environment, as well as aging and failure of devices. Maintaining a good operating environment, recording daily operation data, and finding out abnormal phenomena early are good ways to prolong the service life of the VFD. Following aspects shall be inspected in the daily maintenance of VFD:

1. Whether the operating environment of VFD is in conformity with requirements;

2. Whether operating parameters of VFD are within the specified range;

3. Whether there are abnormal vibration or sound;

4. Whether there are abnormal smell;

5. Whether the fan rotates normally;

6. Whether the input voltage is within the specified range and voltage of each phase is in balance.

8.2 Regular Maintenance

Users can inspect the VFD regularly once every three/six months as per the using environment. Inspection contents are as follows generally:

1. Whether screws of control terminals are loosened;

2. Whether terminals of main loop are in poor contact, and whether the copper bar joints are overheated;

3. Whether power cables and control cables are damaged, especially the surface contacting with metal surface, whether there are scratches;

4. Whether the insulation binder of cold-pressed terminal of power cable has fallen off;

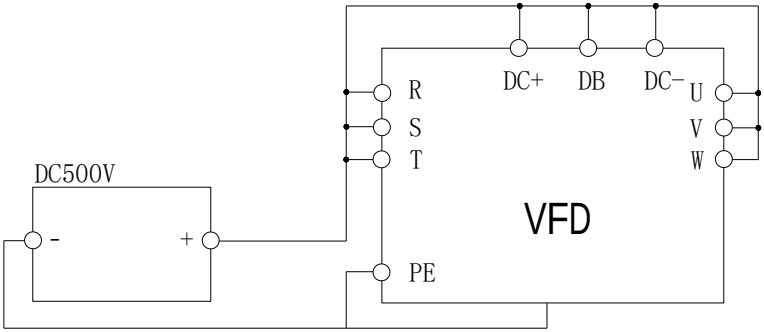
5. The dust in circuit board and air duct shall be cleaned thoroughly, and the dust collector shall be used for the best;

6. VFDs stored for a long time must go through one power-on test within two years, which shall last for nearly five hours; a voltage regulator shall be used to increase the voltage to rated value slowly without load.

DANGER: **If the insulation test of the motor is carried out, the connection between the motor and the frequency converter must be disconnected, otherwise the frequency converter will be damaged.**

DANGER: **The control circuit shall not go through the withstand voltage test and insulation test, or circuit components will be damaged.**

If you need to perform insulation test on the VFD, please connect as shown in the figure below, and you need to loosen the two Phillips screws corresponding to VAR and EMC (see Chapter 3, Section 3.3 for details); the high-voltage (>500V) test has been completed before leaving the factory , it is strictly forbidden to perform the test again. The measurement result is required to be greater than 1MΩ.



8.3 Replacement for Vulnerable Parts of VFD

Vulnerable parts of the VFD mainly include filtering electrolytic capacitors and cooling fans, with service life closely related to the operating environment and maintenance status. Users can determine whether the vulnerable parts need to be replaced according to the operating time.

◆ Cooling fan

Possible damage causes: Bearing wear and blade aging (the service life of fan is generally 30,000-40,000 hours).

Determination criteria: whether there are cracks on fan blades and abnormal vibration sound when starting the machine.

Replacement precautions:

1. Replace the fan with the model specified by the manufacturer (rated voltage, current, speed, and air volume must be the same);

2. The direction marked on the fan must be consistent with the supply air direction of the fan;

3. Don't forget to install the fan grille.

◆ Filter electrolytic capacitor

Possible cause of damage: High ambient temperature, frequent load jump, resulting in increased pulsating current, electrolyte aging.

Determination criteria: whether there is liquid leakage, whether the safety valve has bulged, the determination of electrostatic capacitance and insulation resistance.

It is recommended to replace the busbar electrolytic capacitor every 4 to 5 years.

8.4 Storage of the VFD

After the user purchases the VFD, the following aspects must be paid attention to for temporary storage and long-term storage:

◆ Avoid storage in places with high temperature, high humidity, and dust and metal dust;

◆ Long-time storage will lead to deterioration of electrolytic capacitor, it must be guaranteed to be powered at least once for 5h every time within 2 years, the input voltage must be increased slowly to the rated value with the voltage regulator.

8.5 After-sale Service

The warranty period of the product is 12 months from the date of purchase, but repair is paid even within the warranty period in the following cases.

1. Damage caused by failure to operate and use according to user's manual;

2. Man-made damage caused by self-modification;

3. Damage caused by use beyond the requirements of standard specifications;

4. Damage caused by falling down after purchase or damage caused in transport;

5. Damage caused by fire, flood, abnormal voltage, strong lightning strike, etc.

In case of abnormal working conditions of the VFD, check and adjust according to the Manual. Inn case of fault, please contact the Company in time. Within the warranty period, the Company will provide free repair service for any fault due to the product manufacturing and design defects, and any defect beyond the warranty period will be repaired by the Company after being paid according to customer requirements.

9. Optional Accessories

The optional accessories listed below, if necessary, please order from our company.

9.1 Brake Assembly

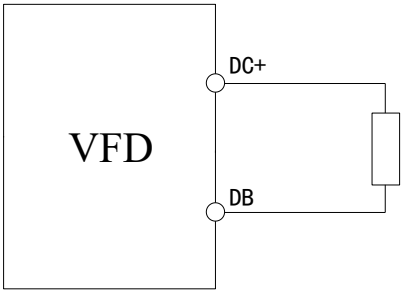
For the VFD with built-in braking unit, you can choose a suitable braking resistor; the recommended selection of braking resistor and insulated cable is as follows:

VFD specifications and models	Resistance value (Ω)	Brake copper wire range (mm²)	Recommended for braking copper wire model (mm²)	Recommended wiring terminal model	Screw spec.	Tightening torque (N•m)
Hope530G0.75T4B*	≥300	2.5	2.5	—	—	2~3
Hope530G1.5T4B*	≥150	2.5	2.5	—	—	2~3
Hope530G2.2T4B*	≥130	2.5	2.5	—	—	2~3
Hope530G4T4B*	≥100	2.5	2.5	—	—	2~3
Hope530G5.5T4B*	≥90	4	4	—	—	2~3
Hope530G7.5T4B*	≥65	6	6	—	—	2~3
Hope530G11T4B*	≥65	6	6	SC6-5	M5	2~3
Hope530G15T4B*	≥32	6	6	SC6-5	M5	2~3
Hope530G18.5T4B*	≥20	10~16	16	SC16-6	M6	3~6
Hope530G22T4B*	≥20	16~25	25	SC25-6	M6	3~6
Hope530G30T4B*	≥12	16~25	25	SC25-6	M6	3~6
Hope530G37T4B*	≥12	25~35	35	SC35-6	M6	3~6
Hope530G45T4B*	≥8	35~50	50	SC50-8	M8	8~11
Hope530G55T4B*	≥8	35~50	50	SC50-8	M8	8~11
Hope530G75T4B*	≥5	70~95	95	SC95-10	M10	17~22
Hope530G90T4BL	≥5	70~95	95	SC95-10	M10	17~22
Hope530G110T4BL	≥4	95	95	SC95-10	M10	17~22
Hope530G132T4BL	≥3	95~185	120	SC120-12	M12	30~39
Hope530G160T4BL	≥3	120~185	150	SC150-12	M12	30~39

Note: When the resistance value exceeds the recommended data in the table, the braking ability will be weakened; generally, it should not be greater than 1.5 to 2.0 times the recommended resistance value.

For the detailed dimension data of SC terminals, see the list of SC terminal models and dimensions.

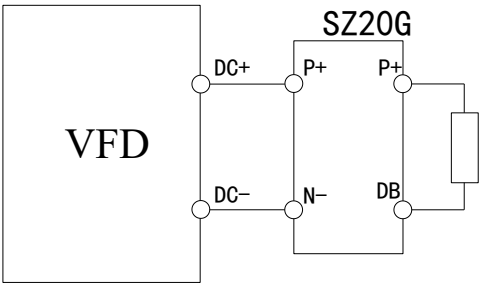
The wiring diagram of the built-in braking unit is as follows:



For VFDs without built-in braking unit, SZ20G series braking unit and braking resistor are required. The resistance value of the braking resistor should not be less than the recommended value, otherwise the VFD may be damaged. The power of the braking resistor must be determined according to the power generation conditions of the actual load (the size of the power generation, the frequency of power generation, etc.).

The SZ20G series brake unit cooperates with the brake resistor to absorb the regenerative electric energy during motor

braking and prevent overvoltage of the frequency converter. In addition to being used in SLANVERT VFDs, it can also be used in VFDs of other brands; at the same time, four braking voltages of 660V, 680V, 700V, and 720V are available, and multiple units can be used in parallel to obtain greater control. dynamic power. The wiring diagram of SZ series braking unit is as follows:



The wiring between the braking unit and the VFD, the braking unit and the braking resistor should be within 5m, and the surrounding loop area should be minimized.

SZ series brake unit specifications are as follows:

Brake unit model	Resistance value (Ω)	Adapted VFD (kW)	Braking voltage (V)
SZ20G-30	≥22	18.5/22	680
SZ20G-60	≥11	30/37	680
SZ20G-85	≥8	45/55	680
SZ20G-130	≥5	75/90	680
SZ20G-170	≥4	110	680
SZ20G-260	≥2.6	132/160	680
SZ20G-380	≥1.8	200/250	680

Note: When the resistance value exceeds the recommended data in the table, the braking ability will be weakened; generally, it should not be greater than 1.5 to 2.0 times the recommended resistance value.

ATTENTION: The braking resistor is a heating device, so be sure to install the cabinet independently when using it, otherwise there is a risk of fire.

9.2 Communication Components

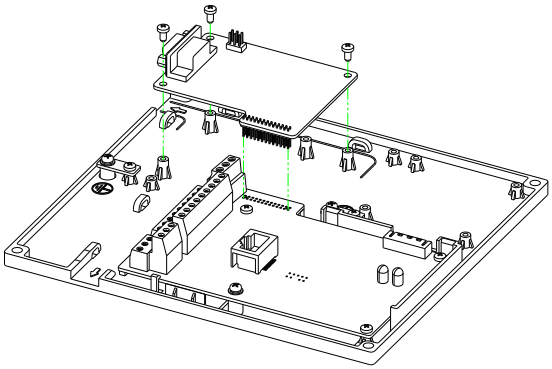
- Operation panel extension cable: The length of the extension cord of the operation panel can be customized.
- Other communication modules are listed in the table below:

Communication modules	Adaptive models (11kW and above)	Adaptive models (7.5kW and below)
Profibus-DP module	SL510-DP	—
PROFINET module	SL510-PN	SL530-PN
Isolated RS485 communication module	SL510-COMM1	SL530-COMM1
Isolated RS485 communication module (supporting TCP)	SL510-COMM2	SL530-COMM2

Note: In case 7.5kW and below models require DP communication, it shall be indicated in advance when ordering.

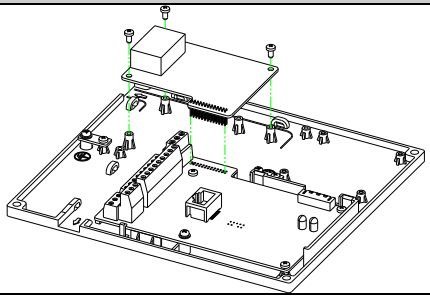
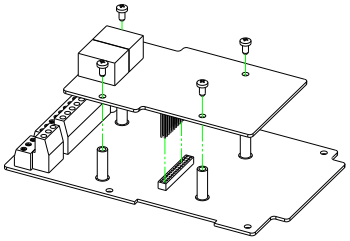
(I) Profibus-DP module

The schematic diagram of the installation and wiring of the Profibus-DP module on the control board of 11kW above models is as follows:



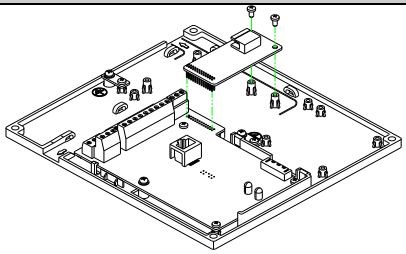
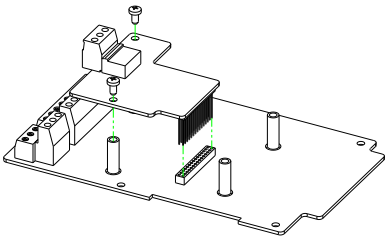
(II) PROFINET module

The schematic diagram of the installation and wiring of the PROFINET module on the control board is as follows:

Installation and Wiring Diagram of 11kW and above Model	Installation and Wiring Diagram of 7.5kW and below Model
	

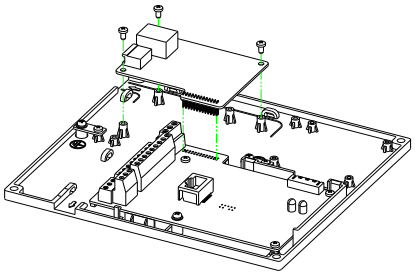
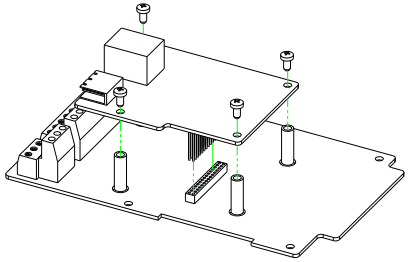
(III) Isolated RS485 communication module

The installation and wiring diagram of the isolated RS485 communication module on the control board is as follows:

Installation and Wiring Diagram of 11kW and above Model	Installation and Wiring Diagram of 7.5kW and below Model
	

(IV) Isolated RS485 communication module (supporting TCP)

The installation and wiring diagram of the isolated RS485 communication module (supporting TCP) on the control board is as follows:

Installation and Wiring Diagram of 11kW and above Model	Installation and Wiring Diagram of 7.5kW and below Model
	

9.3 AC Reactor

The AC reactor on the input side can suppress the higher harmonics of the input current of the VFD and improve the power factor on the input side. It is recommended to use in the following situations:

- The grid capacity is much greater than the VFD capacity and the VFD power is greater than 30kW;
- A thyristor load or a power factor compensation device with switch control is connected to the same power supply;
- The voltage unbalance of the three-phase power supply is greater than 3%;
- The power factor on the input side needs to be improved.

The AC reactor on the output side has the following functions:

- Reduce output harmonics;
- Prevent motor insulation damage;
- Reduce the common mode interference on the output side and reduce the motor shaft current.

9.4 EMI Filters and Ferrite Common Mode Filters

The EMI filter is used to suppress the radiation interference generated by the VFD, as well as external radio interference and the interference of the instantaneous impact and surge to the VFD. The ferrite common mode filter (magnetic ring) is used to suppress the radiated interference generated by the VFD.

Filters should be used in situations where there is a high requirement to prevent radio interference and compliance with CE, UL, and CSA standards, or when there are equipment with insufficient anti-interference ability around the VFD. When installing, keep the wiring as short as possible, and the filter should be as close to the VFD as possible.

9.5 Digital I/O Expansion Board

Digital I/O expansion board is used to expand the number of digital input terminals and relay output terminals.

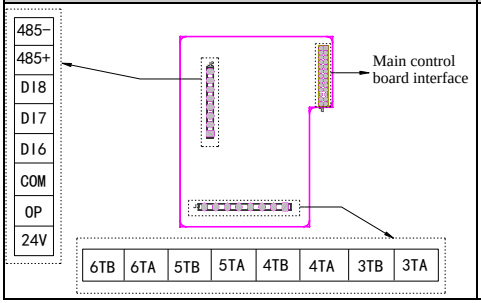
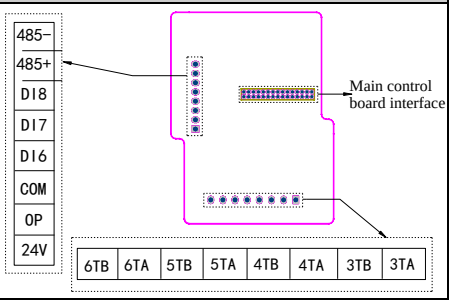
For the basic wiring of the digital input part, see the connection diagram of the multi-function input terminals and external devices.

The digital I/O expansion board provides multiple digital inputs and relay outputs, which can be selected by the user. The following table lists the models of the digital I/O expansion boards applicable to the Hope530 series:

Expansion board model		Extension functions	Remark
Applicable to 11kW and above models	**Applicable to 7.5kW and below models**		
SL510 DIO1	SL530 DIO1	3DI + 4T + RS485	3-channel digital input, 4-channel relay output, RS485 communication
SL510-DIO3	—	5DI + 2T	5 digital inputs, 2 relay outputs

Taking SL510-DIO1and SL530-DIO1 as examples, the functional specifications are as follows:

Terminals of some expansion boards are distributed as follows:

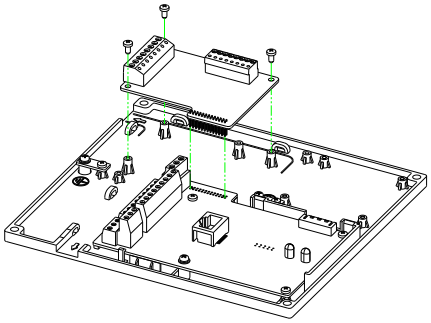
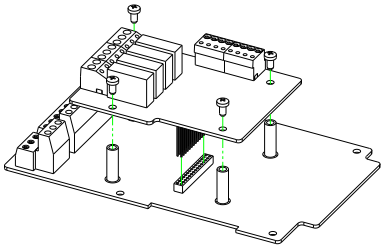
Distribution of SL510-DIO1 Expansion Board Wiring Terminals	Distribution of SL530-DIO1 Expansion Board Wiring Terminals
	

The functions of the SL510-DIO1 and SL530-DIO1 expansion board terminals are described as follows:

Terminal symbol	Terminal name	Terminal function & description	Technical specification
24V	24V power terminal	Provide users with 24V voltage	24V maximum output current 80mA
COM		24V power field	
OP	Digital input common terminal	Common terminal of DI6~DI8 terminals	The interior is isolated from COM and 24V. For the use of the OP terminal, see the basic operation wiring connection diagram.
DI6	DI6 digital input terminal	See F4 menus for function selection and settings. Monitoring parameters: FU-43	Photo coupler isolation Support bi-directional input Input impedance: >3k Ω Input voltage range: <30V Sampling period: 1ms High level: voltage difference with OP>10V Low level: voltage difference with OP<3V
DI7	DI7 digital input terminal		
DI8	DI8 digital input terminal		

Terminal symbol	Terminal name	Terminal function & description	Technical specification
485+	Positive terminal of 485 differential signal	RS485 communication interface	Can connect 1~32 RS485 sites Input impedance: >10kΩ
485-	Negative terminal of 485 differential signal		
3TA	Output terminal of relay 3	See F5 menus for function selection and configurations. Monitoring parameters: FU-45	TA-TB: normally open Contact specifications: 250V AC/3A 24V DC/5A
3TB			
4TA	Output terminal of relay 4		
4TB			
5TA	Output terminal of relay 5		
5TB			
6TA	Output terminal of relay 6		
6TB			

Installation method: Confirm that the VFD is powered off, and then install the SL510-DIO1 and SL530-DIO1 expansion board on the control board as shown in the figure below.

Installation Diagram of SL510-DIO1 on 11kW and above Models	Installation Diagram of SL530-DIO1 on 7.5kW and below Models
	

9.6 Encoder Interface Board

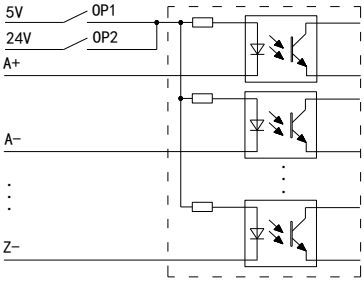
The encoder interface board is used to receive the encoder signal, so that the VFD can carry out PG V/F control or PG vector control; it can also be used for high-speed counting or meter counting by a counter or length counter; it can also be used for analog output 18" PG detection frequency" is connected to the frequency given and other purposes.

Encoder interface boards	Applicable models (11kW and above)	Applicable models (7.5kW and below)
Pulse encoder signal adapter board	SL510-PG0	SL530-PG0
Rotary encoder signal adapter board	SL530-PG1	—

The pulse encoder signal adapter board provides 24V and 5V isolated power supply.

⚠ ATTENTION: The interface type and power supply of the encoder must be correctly selected for SL510-PG0 and SL530-PG0 through the jumper. The factory jumper is 24V.

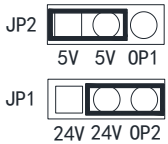
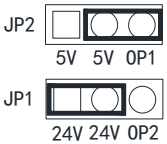
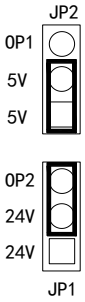
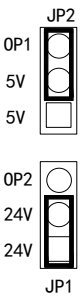
The basic wiring of SL510-PG0 and SL530-PG0 is as follows:



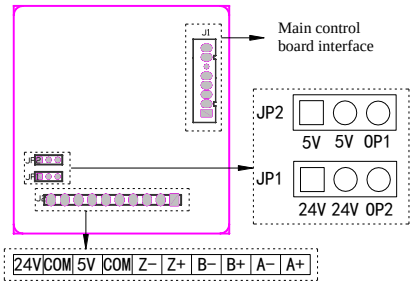
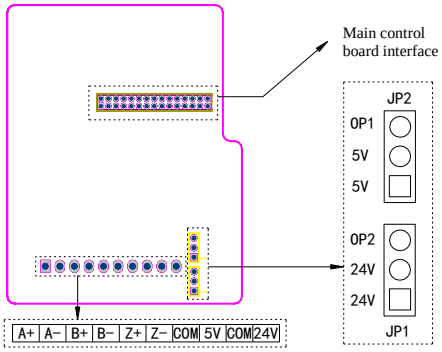
The functions and specifications of the SL510-PG0 and SL530-PG0 encoder interface board terminals are as follows:

Terminal symbol	Terminal name	Terminal function & description	Technical specification
A＋	Encoder A+ input terminal	Encoder A same-phase signal input	Maximum input frequency: 390kHz; The single-channel encoder is only connected to the A channel; Non-differential input type must be connected from A+, B+ or Z+. At this time, A-, B- and Z- must be short-circuited with the COM on the encoder interface board
A－	Encoder A- input terminal	Encoder A phase signal input	
B＋	Encoder B+ input terminal	Encoder B same-phase signal input	
B－	Encoder B- input terminal	Encoder B phase signal input	
Z＋	Encoder Z+ input terminal	Encoder Z same-phase signal input	
Z－	Encoder Z- input terminal	Encoder Z phase signal input	
COM	Power ground wire	24V and 5V power supply and input signal ground Isolated from the GND of the main control board	—
24V	24V power terminal	24V power supply for users	Maximum output current 80mA
5V	5V power terminal	5V power supply for user	Maximum output current 200mA

The instructions for using the power jumper of the encoder interface board are as follows:

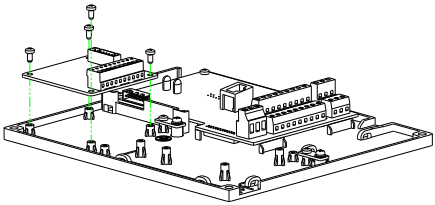
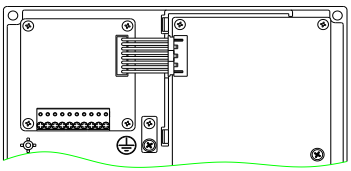
SL510-PG0		SL530-PG0	
Position using 24V power jumper	Position using 5V power jumper	Position using 24V power jumper	Position using 5V power jumper
			

The wiring terminals of the encoder expansion board are distributed as follows:

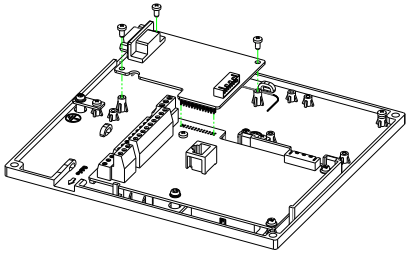
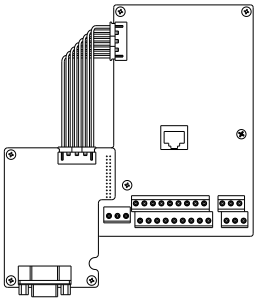
Distribution Diagram of SL510-PG0 Terminal	Distribution Diagram of SL530-PG0 Terminal
	

Installation method: (1) Confirm that the VFD is powered off; (2) Install the encoder signal adapter board according to the encoder installation diagram; (3) Connect the encoder expansion board to the control board according to the method shown in the encoder wiring diagram .

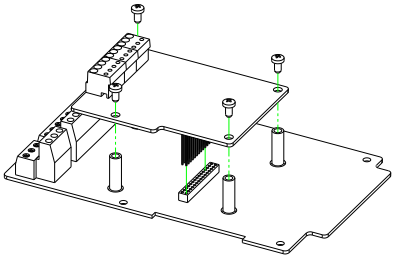
Installation and wiring diagram of SL510-PG0 on 11kW and above models:

Installation diagram	Wiring diagram
	

Installation and wiring diagram of SL530-PG1 on 11kW and above models:

Installation diagram	Wiring diagram
	

Installation and wiring diagram of SL530-PG0 on 7.5kW and below models (additional domain control board wiring not required by SL530-PG0):



⚠ ATTENTION	1. Check whether the coaxiality of the connection between the mechanical shaft and the encoder meets the requirements. If not, torque fluctuation and mechanical vibration will occur. 2. It is recommended to use a shielded twisted pair to connect the encoder and the encoder interface board. The shielding layer of the shielded line close to the VFD end must be connected to the COM of the encoder interface board. 3. The encoder signal line and power line must be separated, otherwise electric magnetic interference will affect the output signal of the encoder. 4. The grounding of the encoder shell can reduce interference.

9.7 Operation Panel Option

The operation panel option can be installed away from the VFD. The operation panel options are as follows:

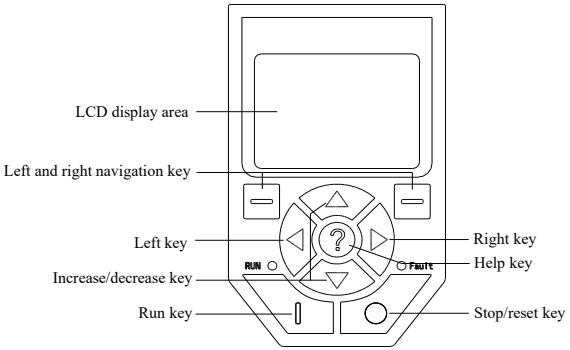
List of operation panel options

Booking No.	Product details
H510-E-1-0m	HOPE-PU04 + mounting box
H510-E-1-2m	HOPE-PU04 + mounting box + 2m extension cable
H510-E-1-3m	HOPE-PU04 + mounting box + 3m extension cable
H510-E-1-5m	HOPE-PU04 + mounting box + 5m extension cable
H510-E-2-0m	HOPE-PU07 + mounting box
H510-E-2-2m	HOPE-PU07 + mounting box + 2m extension cable
H510-E-2-3m	HOPE-PU07 + mounting box + 3m extension cable
H510-E-2-5m	HOPE-PU07 + mounting box + 5m extension cable

9.7.1 Functions of the operator panel

HOPE-PU07 is a standard LED operation panel, and HOPE-PU04 (liquid crystal LCD operation panel) or HOPE-PU10 (LED operating panel with potentiometer) can also be configured according to customer requirements. The external expansion operation panel can be HOPE-PU04, HOPE-PU07 or HOPE- PU10. For functions and display information, please refer to the related content in Chapter 4.

HOPE-PU04 liquid crystal display (LCD) operation panel can set and view parameters, run control, display faults, alarm information, help information, parameter copying and other functions. The operation panel is as follows:



Note 1: The communication data format of the LCD operation panel is fixed to the range 0 (ie: 8, N, 1), please refer to the description of parameters FF-01 for details.

Note 2: The LCD panel adopts the COMM1 communication port. Therefore, COMM1 is not available for external communication. A communication expansion card is required in case communicatrion is needed.

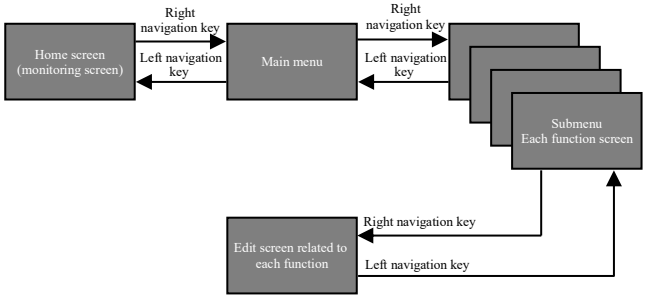
The meanings of the two status indicators RUN and Fault on the operation panel are shown in the following table:

Indicator light	Display	Indicated current status of the VFD
RUN indicator	Off	Standby state
	On	Stable operation state
	Flashing	Accelerating or decelerating
Fault indicator light	Off	Fault-free state
	On	Failed status

Functions of keys on HOPE-PU04 operation panel are shown below:

Key Logo	Key Name	Functions
	Left/right navigation key	The corresponding function is completed according to the display of its corresponding position.
	Increase key	The number increases progressively, and increases faster when long pressing it down
	Decrease key	The number decreases progressively, and decreases faster when long pressing it down
	Left key	Select the position to be modified. The monitoring parameters can be displayed circularly in the monitoring state
	Right key	
	Run key	Run command
	Stop/reset key	Shutdown, fault reset
	Help key	When there are alarms and faults displayed, press this key to display help information

The basic hierarchical structure of the LCD operation panel is as follows:



Menu structure function table:

Main menu	Submenu	Functions
All Items	Each functional group number	Set VFD parameters
PID regulator	—	Set PID related parameters
I/O port settings	Digital input	Enter related parameters
	Digital output	
	Analog inputs	
	Analog output	
I/O port status	DI terminal status	Show related status
	DO terminal status	
	Relay terminal	
	Analog input terminal	
Parameter backup	Upload to panel	Perform related operations
	Download to the VFD	
	Parameters different from the panel	
	Clear backup data	
Modified parameters	—	Display parameters different from factory values
Customer parameters	User parameter list	Modify related functions
	Change user parameters	Define user parameter function number

Main menu	Submenu	Functions
LCD settings	LCD contrast adjustment	Modify display contrast
	Time setting	Set time
	Monitor menu font	Modify the main screen display mode
	Watch item switching time	Modify the main screen monitoring item switching time
	∧ ∨ key given selection	Define the role of the ∧ ∨ keys in the main screen
	LCD software version Vx.xx	Current software version
	LCD monitor content selection	Modify the monitoring content of 6 monitoring items on the main screen
	Language selection	Select language (Chinese/English)

Description of key combinations:

■ Lock the keyboard: (the function of FC-01 needs to be modified) Hold down left  key and then press  , and it will return to the monitoring screen display after success.

■ Keyboard unlock: Press and hold the left  key and the right  key at the same time for more than 3 seconds.

■ Password lock: Press the right  key and  key at the same time.

■ Free stop: (The panel is not locked, and the running command channel is non-communication control) First hold down the left  key, and then double-click the  key.

■ In the parameter setting interface, press the  key and the  key at the same time to enter the previous parameter setting interface.

■ In the parameter setting interface, press the  key and the  key at the same time to enter the next parameter setting interface.

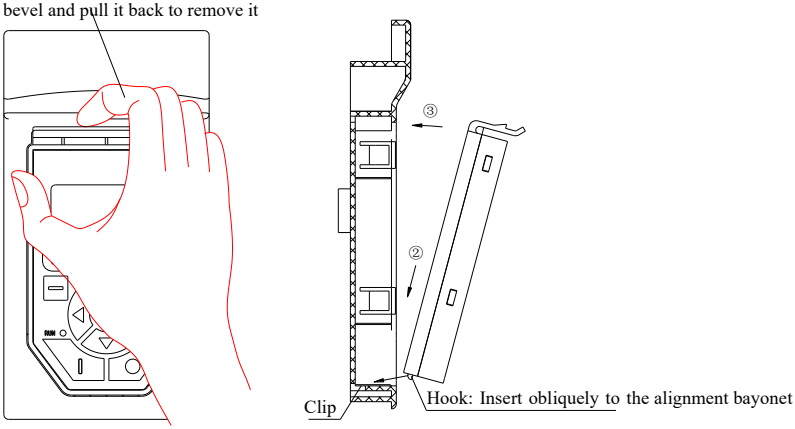
■ Administrator password input: Press the right  key and  key at the same time.

9.7.2 Removal and Installation of Operation Panel

Removal: Put your fingers on the protrusions above the operation panel and below the arc-shaped slope, press firmly on the shrapnel on the upper end of the operation panel and pull it out, as shown in the figure below.

Installation: firstly, connect the bottom fixing bayonet of the operation panel to the bayonet hook under the installation slot of the operation panel, press and hold the upper part of the operation panel and push it inward with your finger, and then release it, as shown in the following figure:

Hold down the elastic card on the operation panel from the raised position above the operation panel and below the curved bevel and pull it back to remove it



9.7.3 Installation of the Operation Panel on the Cabinet Panel

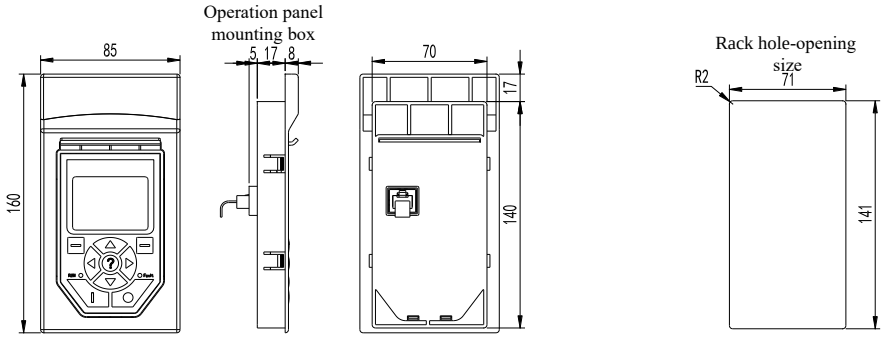
The operation panels HOPE-PU04 or HOPE-PU07 of Hope530 VFD can be also installed on the panel of cabinet and can be connected with VFD body via extended cables. Users can install it via the operation panel installation box according to the steps below:

① Opening holes on the rack panel as shown in the following figure;

② Install the operation panel mounting box (optional) on the rack panel;

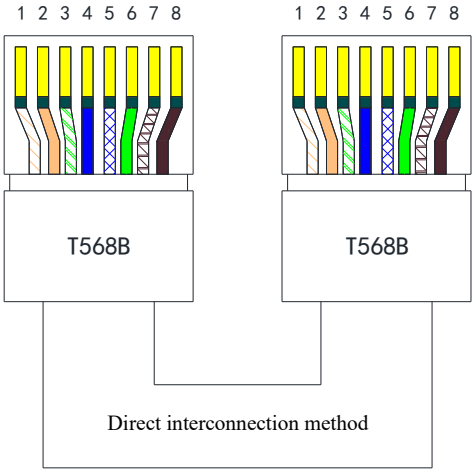
③ Install the operation panel into the mounting box;

④ Insert the socket at the end of the extension cable into the operation panel. Insert the other end into the corresponding socket on the circuit board of VFD and lock it; put the rack cover carefully.



Note: Requirements for extended cables of operation panel are as follows:

Connection of extended cables of operation panel for HOPE-PU04 and HOPE-PU07 shall be subject to standard T568B (direct interconnection method) with RJ-45 joint (crystal head) adopted in crimping mode of corresponding relationship, i.e., 1-1, 2-2, 3-3, …., 8-8 (colors of cables crimped in slot position 1~8 of crystal head are respectively white-orange, orange, white-green, blue, white-blue, green, white-brown, brown according to T568B). As shown in the figure below:



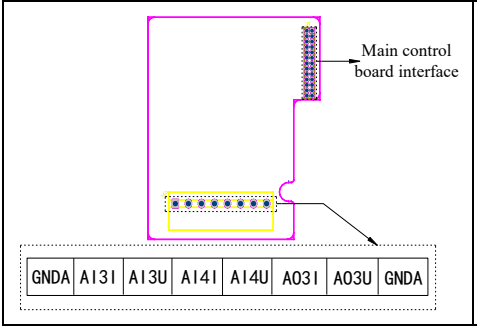
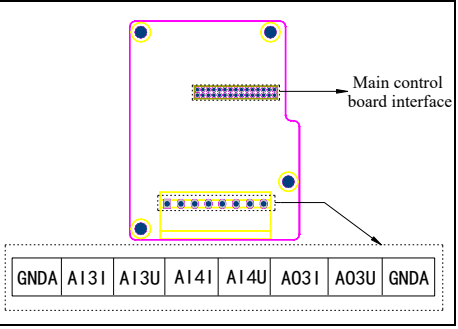
9.8 Analog I/O Expansion Board

The analog I/O expansion board is used to expand the number of analog input and analog output terminals.

The analog I/O expansion board provides multiple analog inputs and outputs, and supports analog voltage input and analog current input. The models of analog I/O expansion boards applicable to all models of Hope530 series are shown in the table below:

Expansion board model		Extension functions	Remark
Applicable to 11kW and above models	**Applicable to 7.5kW and below models**		
SL510-AIO1	SL530-AIO1	2AI + 1AO	2 analog inputs (both voltage and current) 1 analog input (both voltage and current)

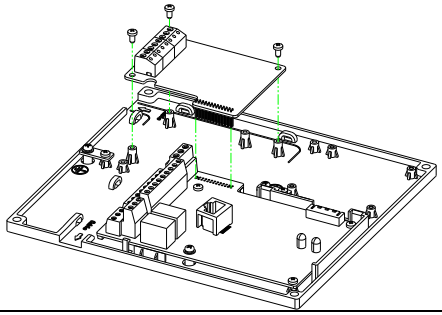
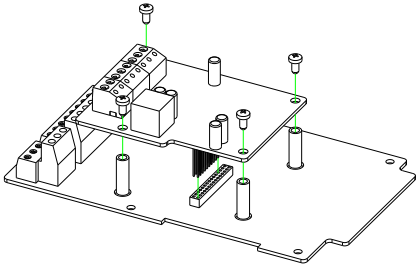
The wiring terminal distribution is shown in the following figure:

SL510-AIO1 expansion board terminals	SL530-AIO1 expansion board terminals
	

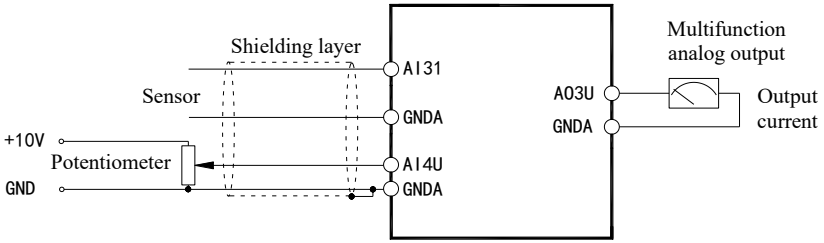
The functions of the SL510-AIO1 and SL530-AIO1 expansion board terminals are described as follows:

Terminal symbol	Terminal name	Terminal function & description	Technical specification
GNDA	Underground water transmission and drainage layer	Ground terminal for analog input/output	GNDA is internally isolated from COM, OP, CME
AI3I	Analog input 3I (current input)	Function selection: see description for parameters F6-37~F6-56.	Input voltage range: 0~10V Input current range: 0~＋20mA Input impedance: voltage input: 110kΩ Current input: 250Ω
AI3U	Analog input 3U (voltage input)		
AI4I	Analog input 4I (current input)		
AI4U	Analog input 3U (voltage input)		
AO3I	Multi-function analog output 3I (current output)	Function selection: see description for parameters F6-57~F6-60.	Current type: 0 ~ 20mA, load ≤ 500Ω Voltage type: 0~10V, output ≤10mA
AO3U	Multi-function analog output 3U (voltage output)		

Installation method: Confirm that the VFD is powered off, and then install the expansion board on the control board as shown in the figure below.

Installation Diagram of SL510-AIO1 on 11kW amd above Models	Installation Diagram of SL530-AIO1 on 7.5kW amd below Models
	

Wiring method: The AI and AO terminals of the SL510-AIO1 and SL530-AIO1 expansion boards have two types: voltage type and current type. The current type or voltage type of the same channel can only be used. For example, current type input is selected for AI3, voltage type input is selected for AI4, and voltage type output is selected for AO3. The actual wiring method is shown in the figure below:



SL510-AI01 and SL530-AI01 Wiring Diagram

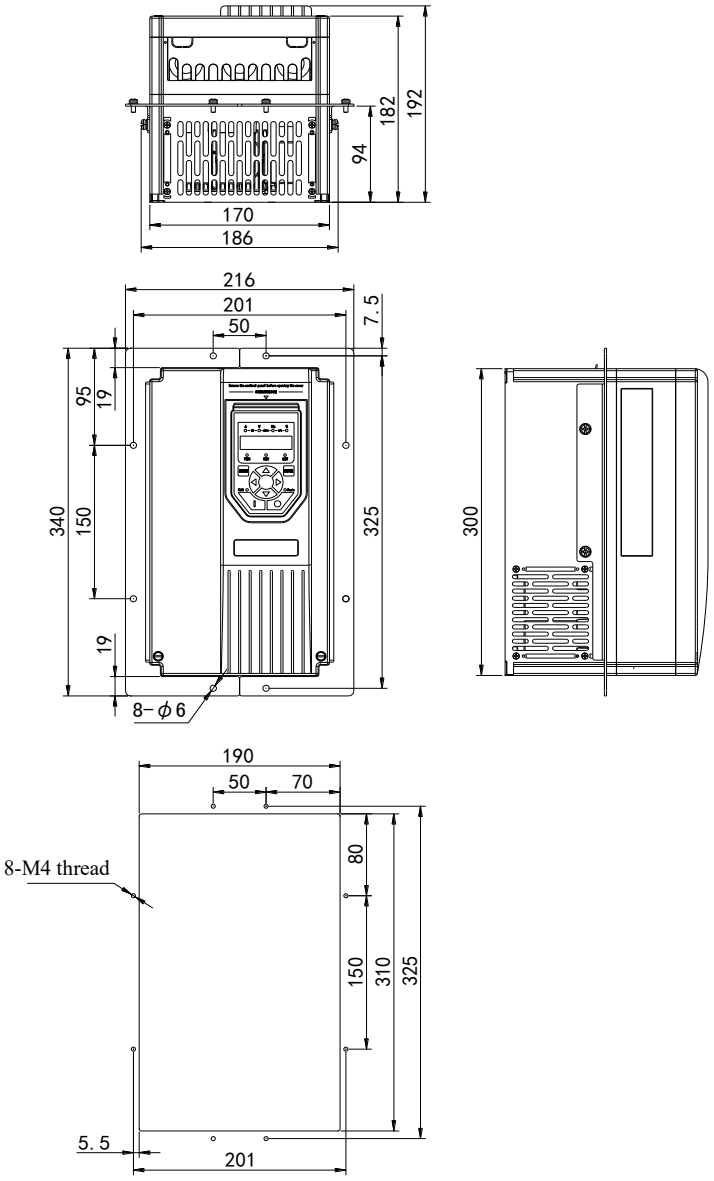
9.9 Flush Mounted Lanyards

The embedded installation hanging strip is used to connect the VFD with the installation cabinet. The corresponding models of the hanging strip suitable for each model are as follows:

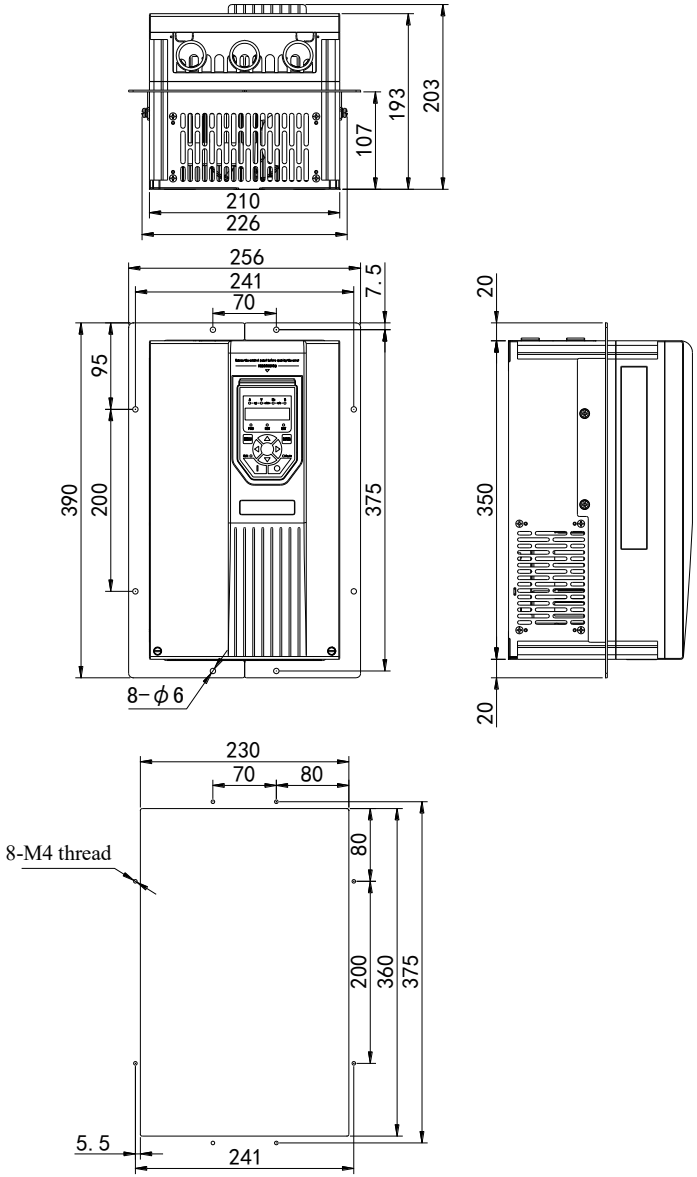
List of Flush Mounted Lanyard Models

VFD model	Corresponding to the order number of the flush mounted lanyards	Size
Hope530G11T4B*	H510-A-1	Please refer to the following illustrations for the flush-mounted hanging rails and cut-out dimensions.
Hope530G15T4B*		
Hope530G18.5T4B*	H510-A-2	
Hope530G22T4B*		
Hope530G30T4**	H510-A-3	
Hope530G37T4**		
Hope530G45T4**	H510-A-4	
Hope530G55T4**		
Hope530G75T4**	H510-A-5	
Hope530G90T4*L		
Hope530G110T4*L		
Hope530G132T4*L	H530-A-6	
Hope530G160T4*L		

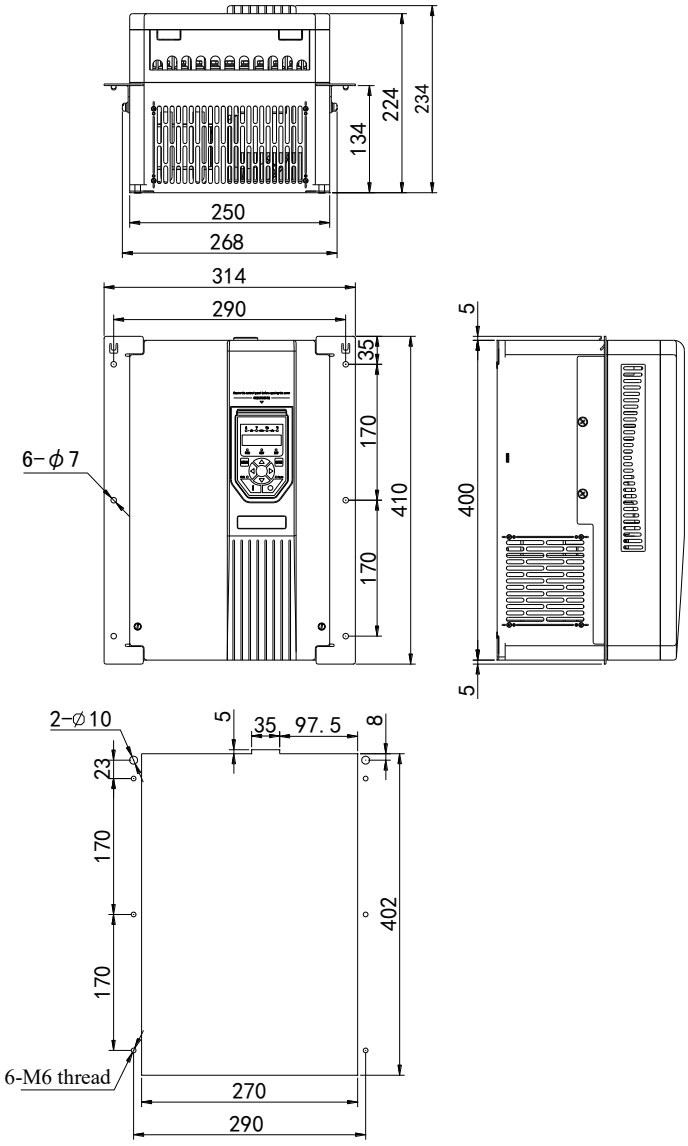
200kW and above power requires embedded installation, please contact the manufacturer.



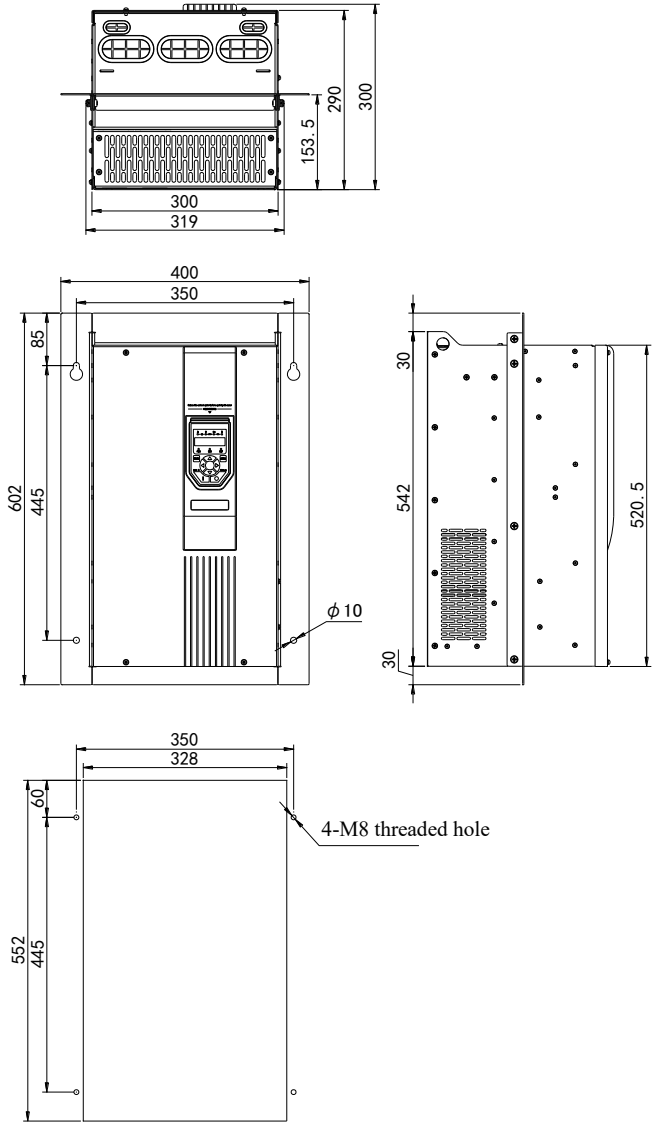
H510-A-1 Installation Lanyard and Opening Size Diagram



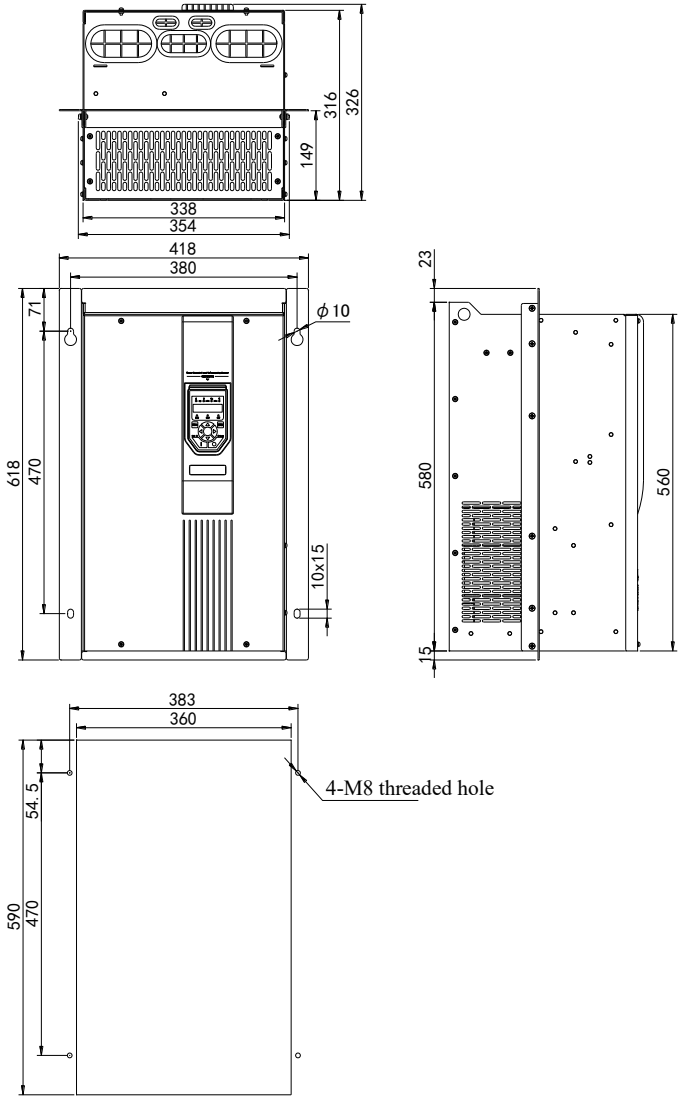
H510-A-2 Installation Lanyard and Opening Size Diagram



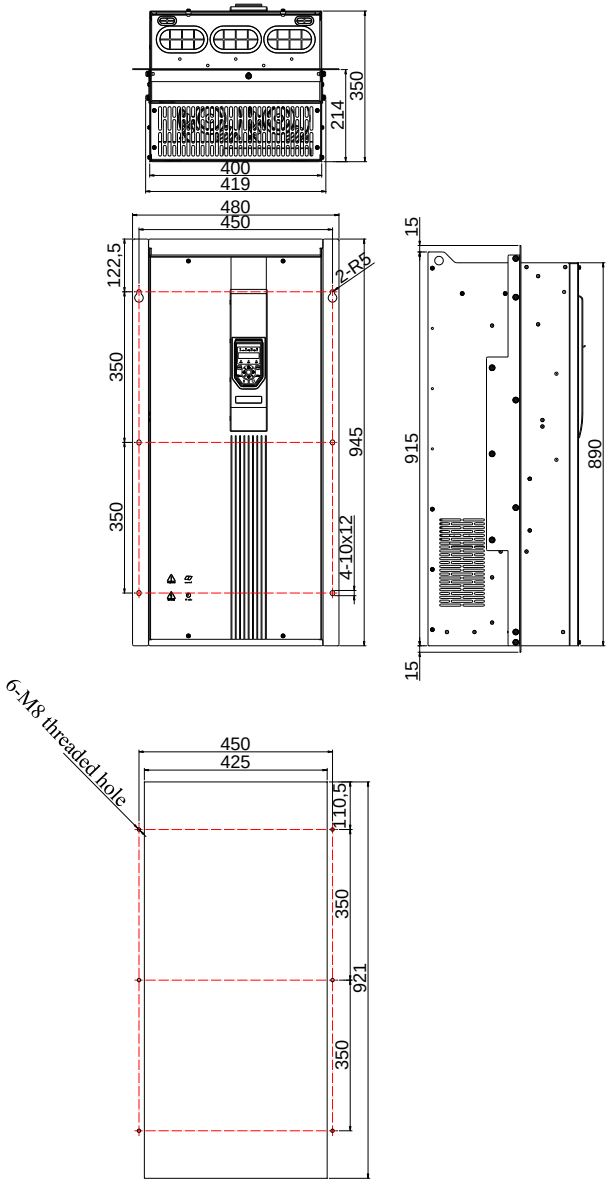
H510-A-3 Installation Lanyard and Opening Size Diagram



H510-A-4 Installation Lanyard and Opening Size Diagram



H510-A-5 Installation Lanyard and Opening Size Diagram



H530-A-6 Installation Lanyard and Opening Size Diagram

9.10 Wiring Aid Kit

When wiring the main circuit of the VFD, the auxiliary kit can be used to make the cable installation more secure.

There are two main types of wiring auxiliary kits, namely cable brackets and cable trays.

9.10.1 Cable Holder

Cable brackets can be used on Hope530G45T4～Hope530G375T4 models. For the selection of cable brackets for each type of VFD, refer to the Hope530 series cable bracket selection table. See the illustration for the appearance of the cable bracket, and the illustration for the wiring effect with the cable bracket installed.

Hope530 Series Cable Bracket Selection Table

VFD model	Corresponding cable bracket order number
Hope530G45T4**	H510-B-1
Hope530G55T4**	
Hope530G75T4**	H510-B-2
Hope530G90T4*L	
Hope530G110T4*L	
Hope530G132T4*L	H530-B-3
Hope530G160T4*L	
Hope530G200T4L	H510-B-4
Hope530G220T4L	
Hope530G250T4L	H510-B-5
Hope530G280T4L	
Hope530G315T4L	H510-B-6
Hope530G375T4L	

9.10.2 Wiring Board

The wiring board can be used on the Hope530G11T4~Hope530G37T4 models. It is recommended to use this auxiliary kit when the power cable is thick or the power cable is multi-stranded. Please refer to the selection table of the Hope530 series cable routing board for the selection of the cable routing board of each type of VFD. See the illustration for the outline of the wiring board, and see the illustration for the wiring effect of the main circuit with the wiring board installed.

Hope530 Series Wiring Board Selection Table

VFD model	Corresponding to the order number of the wiring board
Hope530G11T4B*	H510-C-1
Hope530G15T4B*	
Hope530G18.5T4B*	H510-C-2
Hope530G22T4B*	
Hope530G30T4**	H510-C-3
Hope530G37T4**	

9.11 Protective Cover

The protective cover can enhance the dustproof capability of the VFD, and the Hope530G11T4~Hope530G37T4 models can be equipped with a protective cover. See the illustration for the overall appearance of the machine with the protective cover installed.

Hope530 Series Protective Cover Selection Table

VFD model	Corresponding protective cover order number
Hope530G11T4B*	H510-D-1
Hope530G15T4B*	
Hope530G18.5T4B*	H510-D-2
Hope530G22T4B*	
Hope530G30T4**	H510-D-3
Hope530G37T4**	

Note: The protective cover needs to be cleaned regularly. It is recommended to use a brush to clean it or rinse it with clean water. Do not use a steel brush, otherwise the protective cover may be damaged.

The installation steps of the chassis protective cover are as follows:

①Install four countersunk head screws and tighten them with tools.

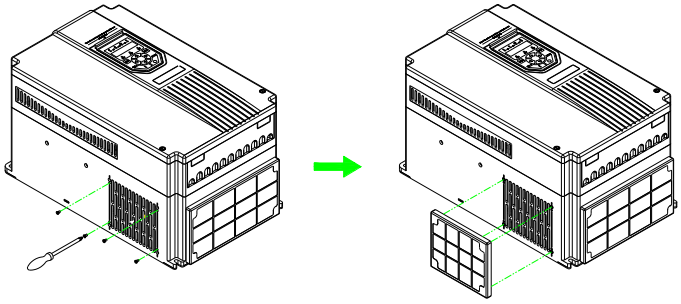
②Align the four corners of the protective cover with the four countersunk head screws of the chassis and fasten them.

③Complete the installation of the protective cover.

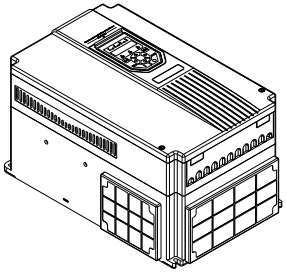
The following figure shows the installation steps of the protective cover on the left side of the chassis, and the installation method of the protective cover on the other two sides is the same as above.

1. Install four countersunk head screws and tighten them with tools.

2. with the four countersunk head screws of the chassis and fasten them.



3. Complete the installation of the rotective cover.



9.12 Base Components

Base components are available for Hope530G45T4~Hope530G375T4 models. With base components, the VFD can be mounted on the floor, which makes the mounting position more flexible.

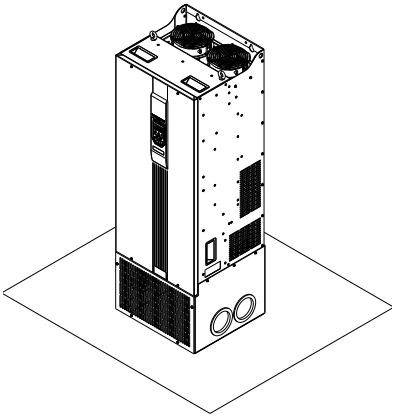
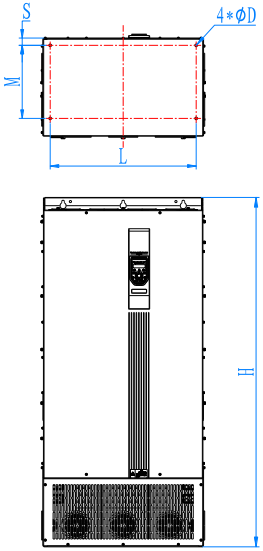
List for Model Selection of Hope530 Series Base Components

VFDmodel	Corresponding base component order No.	H(mm)	L(mm)	M(mm)	S(mm)	D(mm)
Hope530G45T4**	H510-F-6	725	240	180	35	9
Hope530G55T4**						
Hope530G75T4**	H510-F-1	870	276	205	45	9
Hope530G90T4*L						
Hope530G110T4*						
LHope530G132T4*	H510-F-2	1162	352	265	32	9
LHope530G160T4*						

L

Hope530G200T4L	H510-F-3	1282	380	280	44	11
Hope530G220T4L						
Hope530G250T4L	H510-F-4	1412	425	290	35	11
Hope530G280T4L						
Hope530G315T4L	H510-F-5	1435	595	300	30	11
Hope530G375T4L						

Floor mounting diagram and size:

Floor mounting diagram	Floor mounting size diagram
	

User Parameter Record Table

Parameter code	Parameters	Remark

Parameter code	Parameters	Remark

The contents of this manual are subject to change without notice

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