Hopewind

HV350 Series

General-Purpose Vector Inverter

User Manual

Version: V1.0

Shenzhen Hopewind Electric Co.,Ltd.

Preface

Thank you for purchasing the HV350 series general-purpose vector inverter by Shenzhen Hopewind Electric Co., Ltd.

Please read this manual carefully before using the product in order to ensure your personal safety. If you have any questions about functions or performance of this product, please contact our technical personnel.

This manual provides detailed technical data of HV350 series inverter for users. We are not liable for any consequences resulting from the user's negligence, improper installation, or inappropriate selection of the product model.

The manual has been audited, but there may still be some omissions. We will regularly review the content in the manual and make revisions and supplements in future versions. Any suggestion will be highly appreciated.

Inverter Software Version

The software used for the product is the latest version. If the product is used together with other inverters of different software versions, please note that there may be some differences between the software, which may lead to different product functions.

Contents

1 Safety Precautions

This chapter describes the safety precautions that must be observed during the transport, storage, installation, wiring and other operations of this product. Failure to observe these rules might cause device damage or serious personal injury.

1.1 Transportation and Storage

DANGER

- The product should be lifted and placed gently in order to avoid any damage.
- If the product is stored for more than 2 years, the voltage must be gradually increased with a regulator during power-on to avoid electric shock or explosion.
- Do not tilt the product during transport to ensure personal safety.

CAUTION

- The product should be protected from physical shocks and vibrations during transport and storage.

1.2 Unpacking Inspection

NOTE

Although the product has undergone strict factory inspection and reliable packaging treatment, damage may occur due to negligence during transport, loading and unloading. Please inspect the product immediately after unpacking:

- Check whether the product is packed in a sealed plastic bag and the components are in good condition;
- Check the nameplate of the product to see if it is delivered as ordered.

If any problems are found, please contact us or the supplier as soon as possible.

1.3 Warning Labels

Following warning symbols may be affixed to product, and their meanings are as follows:

	PE: Indicating the position of the PE terminals that need to be reliably grounded to ensure the safety of operators and equipment.
	Warning: Ordinary potential hazards. Failure to observe the rules might cause personal injury or property loss.
	Electrostatic: The component may be damaged by electrostatic discharge.
	Danger: High voltage hazard. Failure to observe the rules might cause serious personal injury or property loss.
	Hot surface sign: Pay attention to the hot surface to prevent being burnt.
约52kg	**Weight:** Pay attention to the weight of the component when handling and moving it.
10 Min	**Discharge sign:** The component contains energy storage elements and is subject to high voltage hazards. Please wait for no less than the time indicated on the sign and confirm that the discharge is complete before operating and maintaining the components.

1.4 Installation

CAUTION

- Install the product on a flame-retardant object and do not place inflammables and explosives around it to avoid fire hazard.
- Do not install the product in an environment containing explosive gases to avoid the risk of explosion.
- Do not install the product in areas with direct sunlight or strong vibrations.
- During installation, ensure that the environment is well-ventilated and heat-dissipating. When two or more products are placed in the same cabinet, pay attention to the installation space to ensure good heat dissipation.
- During installation and maintenance, it is necessary to prevent liquid, dust or debris from entering the inside of the product. Conductive liquids and debris may cause internal short circuit and result in equipment damage.
- When connecting external cables to the internal cables of the product, correct torque must be ensured. Excessive torque may cause fatigue damage of the screw while too small torque may cause the contact resistance to become large, resulting in overheating.
- The power cable terminals used must comply with national standards. If the terminals are not in accordance with the standards, the power cable may be overheated. In severe cases, a fire hazard may occur.

1.5 Wiring

DANGER

- Cable connections of all peripheral accessories must comply with the instructions in this manual to avoid any dangers.
- Confirm that the power supply is disconnected before cable connections.
- The product should be properly grounded according to relevant standards.
- Pay attention to the markings of output terminals and connect cables correctly to avoid device damage.
- Do not connect the brake resistor between the DC + and DC- terminals directly to avoid fire hazard.
- Do not open the panels of the product after power-on. Otherwise, there is a risk of electric shock.
- Do not touch the product and the surrounding circuits with wet hands after power-on to ensure safety.
- Do not touch any input or output terminals of the product after power-on to avoid electric shock.
- Before testing other external equipment such as power cables, remove their cables connected to the product to prevent accidental damage.

NOTE

- Confirm that the voltage level of the input power supply is the same as the rated voltage level of the product.
- It is prohibited to conduct any voltage withstand test on the product as it has been done before leaving the factory. Wrong voltage withstand test will damage the product or cause other accidents.
- Ensure that the wiring complies with EMC requirements and the safety standards of the local area.
- It is not recommended to use contactors to control the on/off of the product as this may cause unpredictable damage to the equipment.

1.6 Operation and Commissioning

CAUTION
● It is strictly forbidden to touch the cooling fan, the cooling plate and the braking resistor during operation to prevent being burnt. ● It is strictly forbidden to detect signals manually during operation to avoid physical injury or equipment damage. ● Do not allow other items to fall in the equipment during operation. ● Do not cover the ventilation holes of the product during operation. ● Do not open the panel of the product during operation.

1.7 Maintenance

DANGER
● It is forbidden to maintain the product or the motor during power-on. After power-off, wait for no less than the time indicated on the discharge sign, and use the discharge device to consume the energy stored inside the product before maintenance. Otherwise, the residual charge on the capacitors may cause physical injury. ● Do not repair or maintain this product without professional training personnel authorized by Hopewind. Otherwise, physical injury or damage to the equipment may occur. ● All pluggable inserts must be plugged and unplugged with power-off. Otherwise, physical injury or damage to the equipment may occur. ● Do not leave thread residues or tools inside the machine to avoid fire hazard or property loss.

1.8 Other Precautions

NOTE
● Installation of switching devices such as contactors on the output side If switching devices such as contactors need to be installed between the output of the product and the motor, relevant operations shall be conducted when the product has no output. Otherwise, the internal module of the product may be damaged. ● Altitude and derating In areas where the altitude exceeds 2000m, it is necessary to derate when using the product due to the lower average temperature and thin air. Please contact us for technical advice in this case. ● Product disposal When disposing the product, please note that electrolytic capacitors on the main circuit and on the printed circuit boards may explode when incinerated, and plastic parts (such as front panels) may generate toxic gases. Please dispose and handle them as industrial wastes.

--End of the chapter--

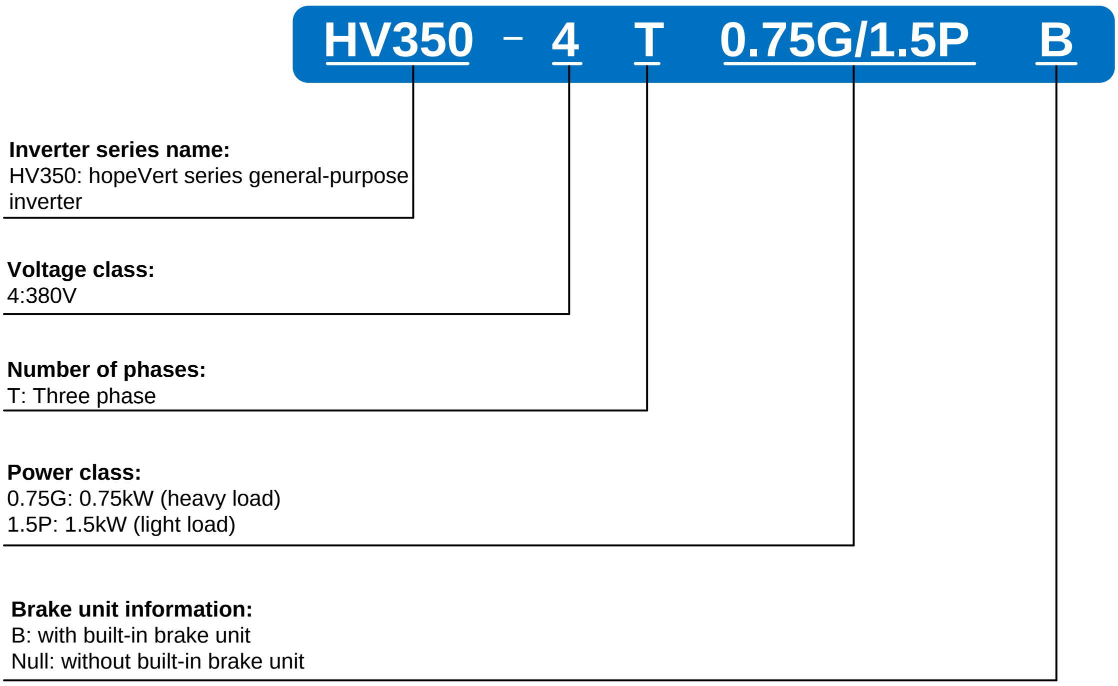
2 Product Overview

2.1 Product Introduction

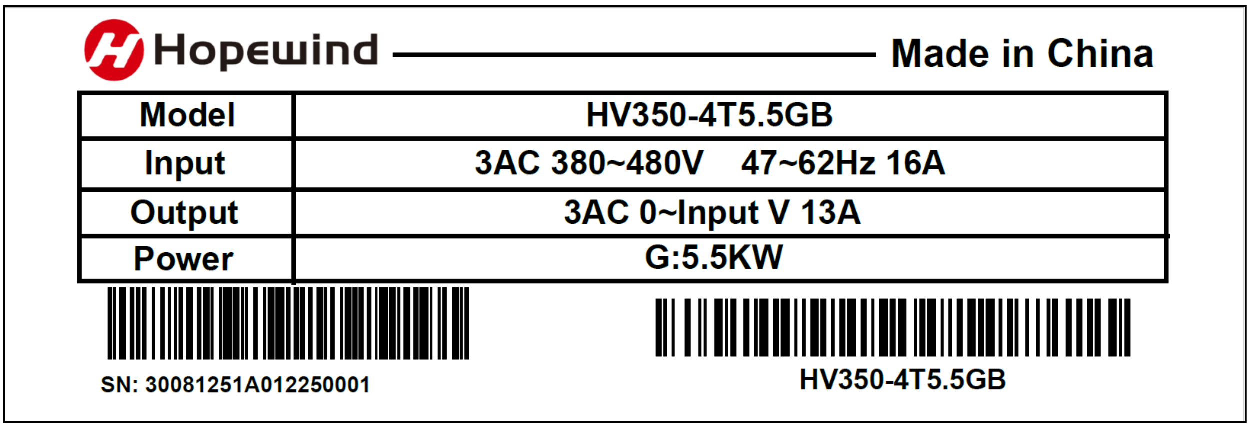
The HV350 series inverters are general-purpose vector inverters developed by Hopewind. The product adopts new open-loop vector and closed-loop vector control technology and supports asynchronous motor drive control. Under the design premise of enriching software functions and improving the performance and reliability of the whole machine, it achieves more compact size, stronger scalability, more communication types and ease-of-use to better meet customers' application requirements.

HV350 can be widely used in different industries, such as textile, papermaking, lifting, plastics, metal products, printing and packaging, building materials, engineering machinery and various automated production equipment.

2.2 Naming Rules



2.3 Nameplate



2.4 Power Specifications

Rated voltage: Three-phase 380Vac/50Hz					
Model	Heavy load		Light load		Frame
	Rated power (kW)	Rated output current (A)	Rated power (kW)	Rated output current (A)	
HV350-4T0.75G/1.5PB	0.75	2.5	1.5	4.2	FA
HV350-4T1.5G/2.2PB	1.5	4.2	2.2	5.8	
HV350-4T2.2GB	2.2	5.8	-	-	
HV350-4T4G/5.5PB	4	9.5	5.5	13	FB
HV350-4T5.5GB	5.5	13	-	-	
HV350-4T7.5G/11PB	7.5	17	11	25	FC
HV350-4T11GB	11	25	-	-	
HV350-4T15G/18PB	15	32	18.5	38	FD
HV350-4T18G/22PB	18.5	38	22	46	
HV350-4T22GB	22	46	-	-	
HV350-4T30G/37P(B)	30	60	37	75	FE
HV350-4T37G/45P(B)	37	75	45	91	
HV350-4T45G/55P(B)	45	91	55	125	
HV350-4T55G/75P(B)	55	125	75	150	FF
HV350-4T75G/90P(B)	75	150	90	180	
HV350-4T90G/110P(B)	90	180	110	210	FG
HV350-4T110G/132P(B)	110	210	132	250	

NOTE

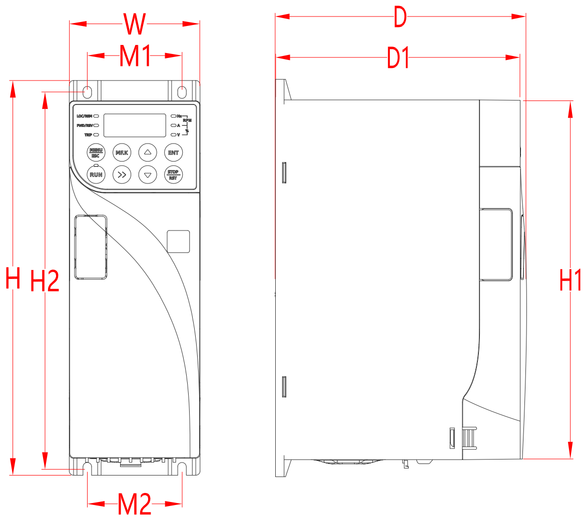
- For frames of FA~FD, built-in braking units are configured; for frames of FE and above, braking units can be purchased by adding "B" at the end of the model number, e.g. "HV350-4T75GB/90PB".
- All models cannot be connected to DC reactors. Please install AC input reactors if needed.
- 150% cyclic overload is allowed under heavy load rated conditions while 110% cyclic overload is allowed under light load rated conditions. The overload period is 1 minute every 5 minutes.

2.5 General Technical Specifications

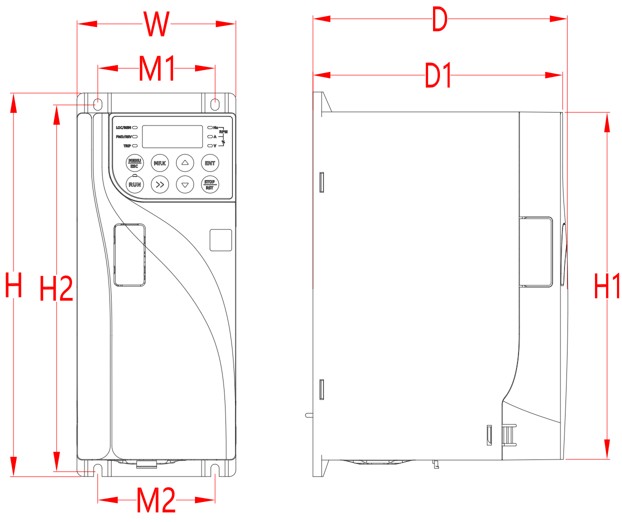
Power input/output	Input voltage (Uin)	380V (-15%) ~ 480V (+10%), three-phase
	Input power frequency	(50Hz/60Hz)±5%
	Input voltage imbalance	≤3%
	Output voltage	0V~input voltage
	Output frequency	0Hz~600Hz
Main control performance	Motor type	Asynchronous motor
	Control mode	V/F, OLVC (open loop vector control), CLVC (closed loop vector control)
	Speed range	1:10 V/F; 1:100 OLVC; 1:1000 CLVC
	Starting torque	VF: 100% (0.5Hz); OLVC: 150% (0.5Hz); CLVC: 200% (0Hz)
	Torque precision	≤±5%, in vector control mode
	Torque pulsation	≤±5%, in vector control mode
	Speed stability	OLVC: 0.2%; CLVC: 0.1%
	Torque response	≤ 5ms, in vector control mode
	Acceleration/deceleration time	0.0s ~ 3200.0s; 0.0min ~ 3200.0min
	Torque boost	0.0%~30.0%
	Overload capacity	G-model: 150% 1min/5min, 180% 10s/5min P-model: 110% 1min/5min, 150% 10s/5min
	V/F curve	Straight-line type, multi-point type, V/F half separation mode, V/F complete separation mode
	Input frequency resolution	Digital setting: 0.01Hz; analog setting: 0.01Hz
Main functions	Acceleration/deceleration curves	Straight-line, S-curve
	Simple PLC, multi-speed reference	16 speed segments supported through control terminals
	Automatic voltage regulation (AVR)	Automatically keeps the output voltage constant when grid voltage varies within a certain range
	Fixed length control	Fixed length control
	Built-in PID	Easily forms a closed-loop control system
	Multi-motor switchover	With 2 sets of motor parameters, the switchover between 2 motors can be realized
	Virtual IO	With 8 sets of virtual DI/DO, simple logic control can be realized
	Overvoltage/overcurrent stall control	The current and voltage can be automatically limited during operation to prevent frequent trips due to overcurrent and overvoltage
	Restart after power failure	The inverter can operate automatically when powering on again after a power failure
	Fast current limiting	Frequent overcurrent faults can be avoided
Input and output functions	Frequency reference mode	Keypad, terminal UP/DOWN, multi-reference, pulse reference, communication
	Analog input terminals	AI1, AI2: 0V~10V/0 (4)mA~20mA

	Digital input terminals	DI1-DI5, 5 programmable digital input terminals with opto-isolation, compatible with both sinking/sourcing inputs. DI5 supports high-speed pulse input with a maximum input frequency of 100kHz.
	Digital output terminals	Open-collector output; output voltage range: 0V~24V; current load capacity: 50mA. DO1 supports high-speed pulse output with a maximum output frequency of 100kHz.
	Analog output terminals	1-channel 0V~10V/0(4)mA~20mA
	Relay output	1-channel Form C contact, NO+NC
Corresponde nce	Communication protocol	Modbus RTU (standard configuration); Profibus-DP, CANopen, Profinet IO, Modbus TCP/IP, EtherCAT, EtherNet/IP (optional configuration)
Usage	Altitude	≤1000m: no need for derating 1000~3000m: with current derating by 1% per 100m increased
	Ambient temperature	-25°C~+40°C (derating is allowed within 40°C~55°C)
	Humidity	15%~95%, no condensation
	Vibration	3M3, IEC60721-3-3
	Storage temperature	−40°C~+70°C
	Operating place	Indoors without direct sunlight, flammable and corrosive gases, liquids and conductive particles, etc.
Optional accessories		Encoder card, communication expansion card, IO expansion card
Protections		Protection against short circuit , overcurrent, overload, overvoltage, undervoltage, phase loss, overtemperature, external faults, etc.
Installation method		Installed in a cabinet
Protection rating		IP20
Cooling method		Air cooling

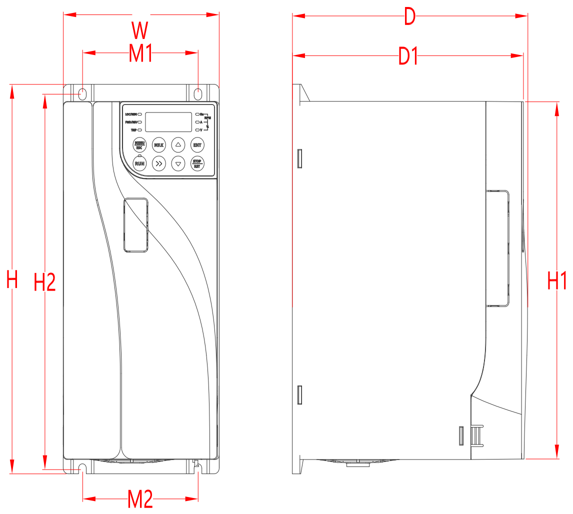
2.6 Product Dimensions



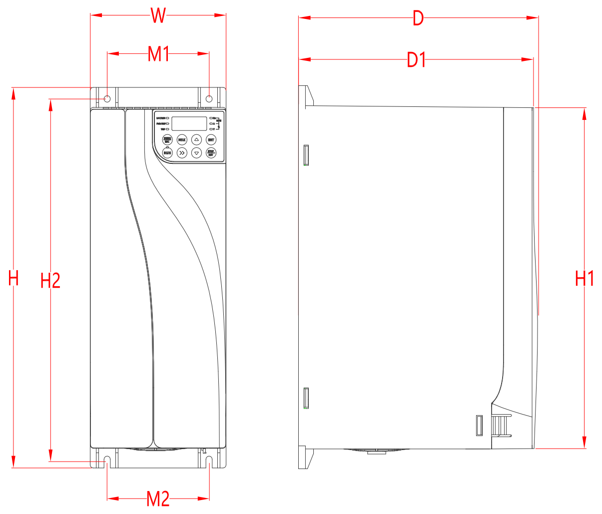
Outline dimensions and mounting dimensions of FA model



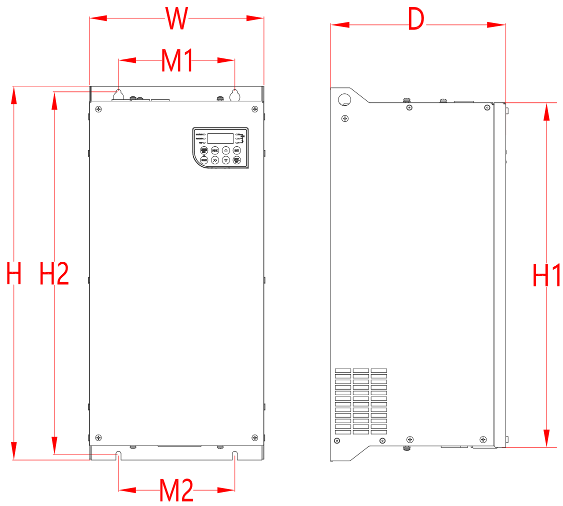
Outline dimensions and mounting dimensions of FB model



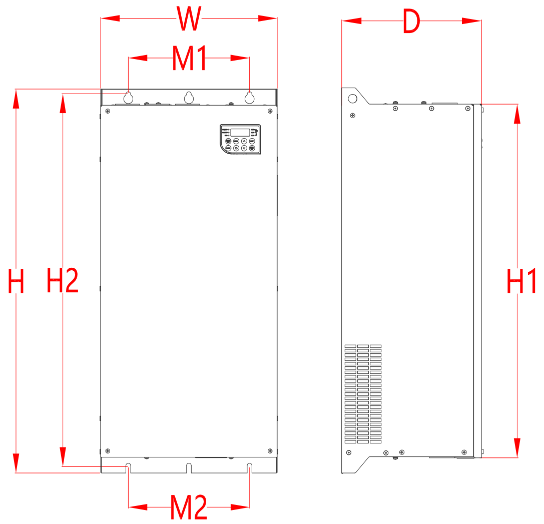
Outline dimensions and mounting dimensions of FC model



Outline dimensions and mounting dimensions of FD model



Outline dimensions and mounting dimensions of FE & FF model



Outline dimensions and mounting dimensions of FG model

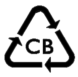
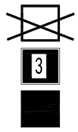
Table 2-1 Dimensions and specification

Frame	Overall width: W (mm)	Overall height: H (mm)	Overall depth: D (mm)	Mounting hole horizontal spacing: M1 (mm)	Mounting hole horizontal spacing: M2 (mm)	Mounting hole vertical spacing: H2 (mm)	Mounting hole diameter Φ (mm)	Net weight (kg)
FA	76	232	175.5	55	55	221	5	1.7
FB	95	232	175.5	70	70	221	5	1.8
FC	121.5	272	187	90	90	262	6	3.3
FD	140	377	237	105	105	357	6.5	5.5
FE	240	500	225	160	160	485	7	16
FF	270	615	240	200	200	594	9	24
FG	335	712	255	230	230	688	9	38

--End of the chapter--

3.1 Installation Preparation

In order to keep the inverter in a good condition, try to ensure that it is well-packaged during transport and please operate according to the labels on the packaging. The meanings of these labels are as follows:

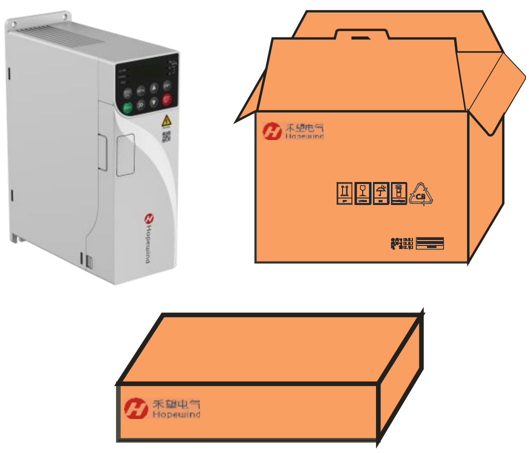
Label	Meaning	Label	Meaning
	The outer packing box is corrugated cardboard		The maximum number of stacks is 3
	Handle with care	CE	The product is CE approved
	The orientation is upwards, with no tilting		Recyclable
	Keep dry	/	/

3.1.1 Receiving Inspection

After confirming that the outer packaging is in good condition, conduct the unpacking inspection to check the goods for damage, steps as follows:

1) Unpack and check whether the product appearance is in good condition. During unpacking inspection, please use tools carefully so as not to scratch the product;
2) Check the nameplate of the product to verify whether it is delivered as ordered (For details of the nameplate, see “2.3 Nameplate”);
3) Check whether the goods received are complete:

- Inverter
- Optional accessories (which need to be ordered)



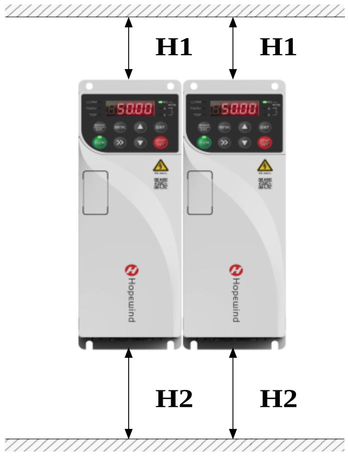
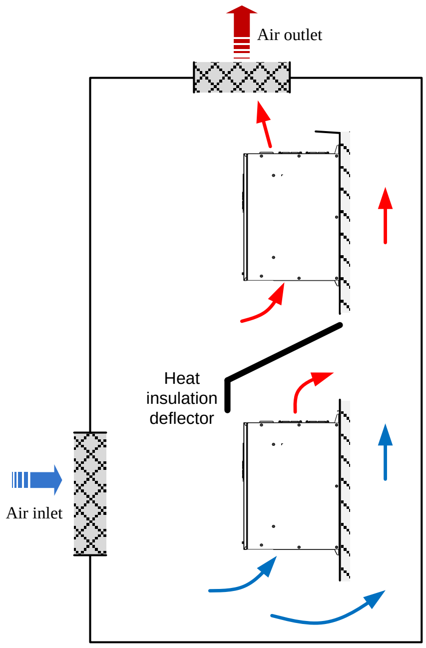
Note: Please scan the QR code (on the inverter enclosure) to download the electronic user manual.

The inverter has been rigorously tested and inspected at the factory, but accidental damage may occur during transport. Therefore, check the inverter immediately once you receive it. If you find any damage or omission, please contact Hopewind as soon as possible. Our staff will help you solve your problems at once.

3.1.2 Installation Tools

Phillips screwdriver, wire stripper, tape measure, drill, spanner, etc.

3.2 Installation Space Requirements

(a) Single inverter installation Requirements: H1≥200 mm, H2≥300 mm.	
(b) Side-by-side installation Requirements: H1≥200 mm, H2≥300 mm.	
(c) Vertical installation **Note:** When installing multiple inverters vertically, please install a heat insulation deflector as shown in the diagram.	

Note: When FC and below models use Profibus-DP and Profinet IO for communications and multiple units need to be installed seamlessly side by side, optional inline communications expansion cards must be fitted. If you choose to use a side-mounted expansion card, seamless side-by-side installation is not supported.

3.3 Environmental Requirements

Table 3-1 Environmental requirements

Working environment	Requirement	Standard	Class
Installation site	Indoor, no temperature regulation	IEC 61800-2: 2016	---
Pollution level	2	IEC60664-1	2
Ambient temperature	-25℃~55℃, derating is required when above 40℃	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3K3
Relative humidity	15%~95%, no condensation	IEC 60146-1-1: 2009	---
Altitude	≤3000m, derating is required when above 1000m	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3K3
Vibration conditions	3M3 vibration conditions: 2~9Hz: 1.5mm displacement 9~200Hz, 5m/s2 acceleration	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3M3
Chemically active substances	---	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3C1
Mechanically active substances	---	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3S1
Biological conditions	---	IEC 60721-3-3: 2002 GB/T 4798.3-2007	3B1
Storage environment	**Requirement**	**Standard**	**Class**
Chemically active substances	1C2	IEC 60721-3-1: 2018	1C2
Climatic conditions	1K22	IEC 60721-3-1: 2018	1K22
Mechanical conditions	1M11	IEC 60721-3-1: 2018	1M11
Biological conditions	1B1	IEC 60721-3-1: 2018	1B1
Mechanically active substances	1S12	IEC 60721-3-1: 2018	1S12
Transportation environment	**Requirement**	**Standard**	**Class**
Transport mode	Waterways, railways, roads, airways, etc.	IEC 60721-3-2: 2018	---
Chemically active substances	2C2	IEC 60721-3-2: 2018	2C2
Climatic conditions	2K12	IEC 60721-3-2: 2018	2K12
Mechanical conditions	2M5	IEC 60721-3-2: 2018	2M5
Biological conditions	2B1	IEC 60721-3-2: 2018	2B1
Mechanically active substances	2S5	IEC 60721-3-2: 2018	2S5

3.4 Cable Connection Requirements

DANGER

- Before connecting the grid-side cables, ensure that the voltage on the grid side does not exceed the specified limits and confirm the phase sequence of the grid-side cables. Before starting the connection, ensure that there is no voltage on the grid-side incoming cable. If necessary, short-circuit the wiring copper bar to the ground to ensure personal safety.
- The withstand voltage performance of all power cables needs to meet the working voltage requirements of the inverter.
- The total current load capacity of all power cables used must meet the working current requirements of the inverter.
- Do not carry out any insulation resistance or withstand voltage tests to the inverter or its internal modules. The product has been tested before leaving the factory. The incorrect withstand voltage tests can cause damage to the inverter.
- Before connecting the generator-side cables, make sure that the motor has been braked to ensure personal safety.
- The external terminal connector must not be made of aluminum. If copper and aluminum materials are connected to each other, a dedicated connector must be used. Therefore, do not connect them directly!

3.4.1 PE Cable

When the materials of the protective conductors are the same as those of the phase conductors, the conductivity of the shielding layer must meet the requirements of IEC 61439-1.

According to the latest standard EN/IEC 61800-5-1, you can refer to the table below for the requirements of the cross-sectional area of the protective conductors:

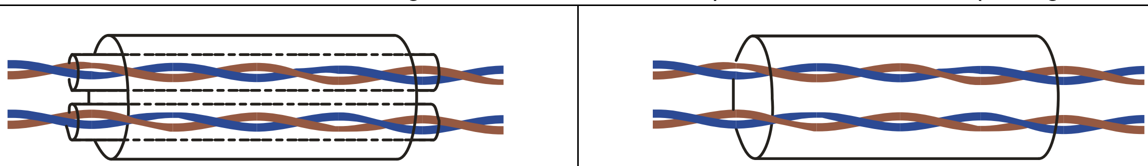
Table 3-2 Cross-sectional area of protective conductors

Cross-sectional area of phase conductor S (mm^2)	Minimum cross-sectional area of the corresponding protective conductor S_p (mm^2)
$S \le 16$	S
$16 < S \le 35$	16
$35 < S$	S/2

3.4.2 Control Cable

As the weak control signals are susceptible to external interference, generally it is necessary to adopt cables with shielding layers. The wiring should comply with the regulations. The control cables should be directly shielded in the inverter. If both ends of the shielding cable are on the same grounding cables and there is no significant voltage drop, the shielding cable can also be directly grounded at both ends.

Analog signals need adopt double-shielded twisted pair cables (see figure A below). It is also recommended to use double-shielded twisted pair cables as the signal cables of the pulse encoder. Do not use the same grounding cable for different analog signals. For low-voltage digital signals, the double-shielded cable is more recommended, but the single-shielded multi twisted pair can also be used (see figure B below).



(a) Double-shielded twisted pair cable

(b) Single-shielded multi twisted pair cable

Figure 3-1 Twisted pair with shielding layers

Analog and digital signals should be routed separately. Signal cables controlled by the relay are recommended to adopt twisted pairs. When control and power cables have to be crossed over, the crossover angle should be 90 degrees. Signal and data cables should be routed as close as possible to grounded surfaces, for example, a support beam, metal rail, etc.

3.4.3 RS485 Communication Bus

The control board of HV350 series inverter is equipped with RS485 communication interface, which are labeled terminal A, B and AGND (see 3.5.6.2 for details). If shielded cables are used for communication connections, the shielding layer must be connected to the AGND terminal. Do not connect the shielding layer to any intermediate position except AGND of the inverter (including the onsite enclosure and the device ground terminal). Because of the attenuation effect of cables, AGW26 or thicker cables are recommended for cables with a length greater than 3m. Twisted pair cables are recommended for terminal A and B at any time.

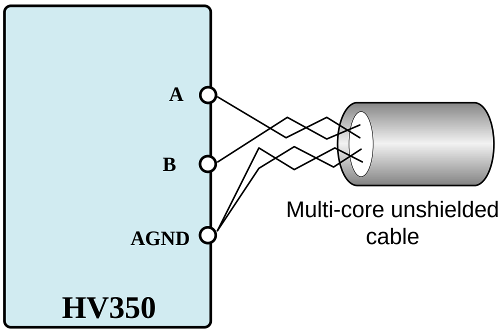


Figure 3-2 Multi-core unshielded cable

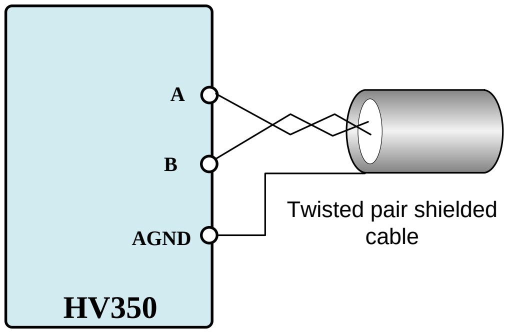


Figure 3-3 Twisted pair shielded cable

Recommended cable connection mode 1: Multi-core twisted pair cables

Take one pair of twisted pair cables as the connection cable of A and B, and twist other redundant cables together as the connection cable of AGND.

Recommended cable connection mode 2: Twisted pair shielded cables

Twisted-pair cables are used for connecting A and B, and the shielding layer is used for connecting AGND. When shielded cables are used to connect to terminals, ensure that the shielding layer is connected only to AGND, not to PE.

3.4.4 Power Interface

The cable inlet and outlet of the FE~FG frame of the HV350 series inverter are equipped with wire protection rings. To improve the dustproof performance and environmental adaptability of the device, connect cables in the following ways.

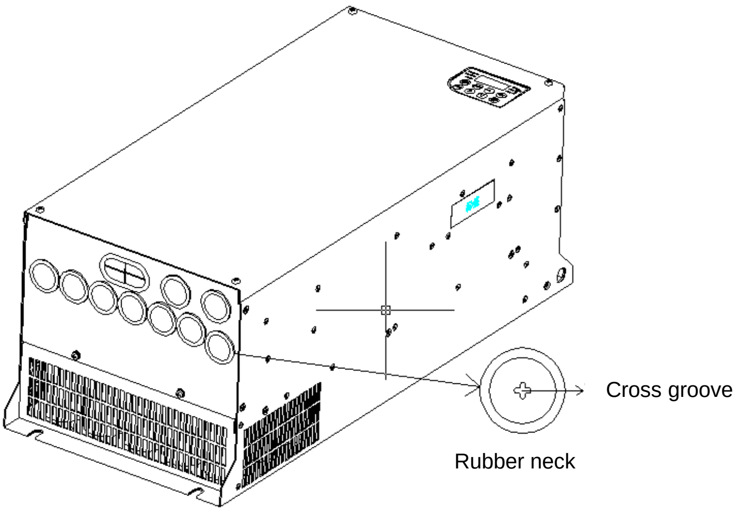


Figure 3-4 Position of the rubber neck

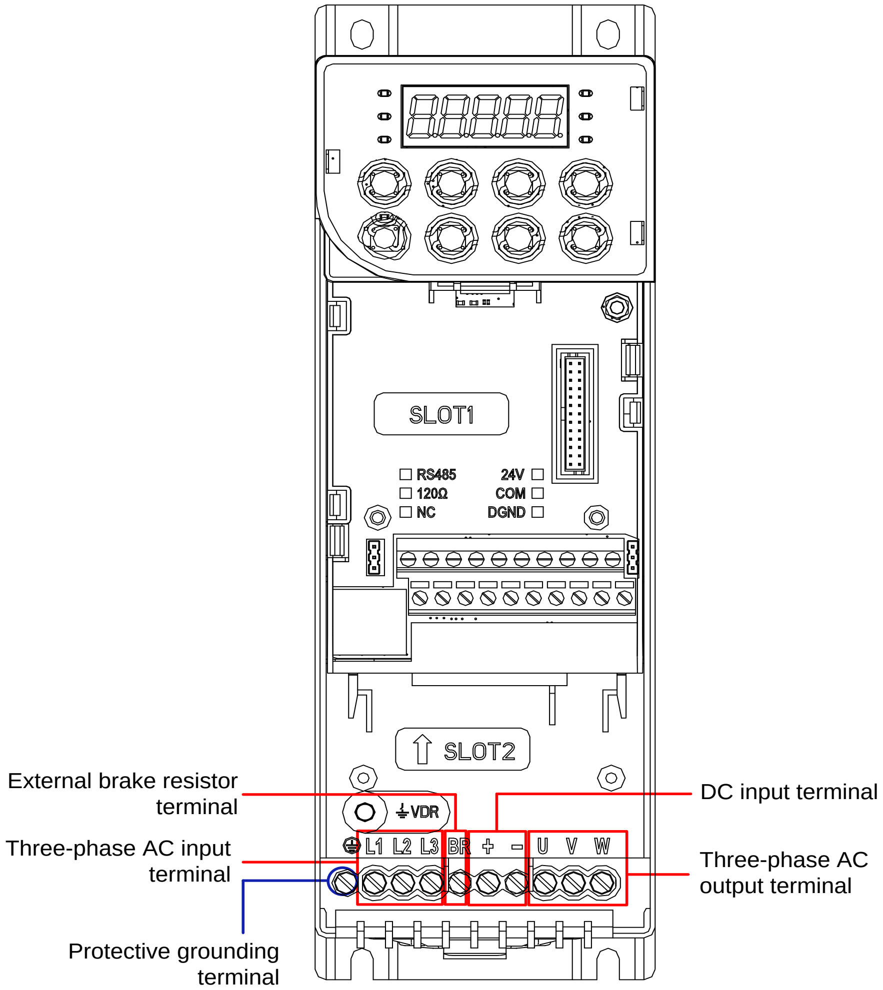
Method 1: If the cable is thin, directly poke or cut the cross groove in the middle of the wire protection ring.

Method 2: If the cable is thick, cut a round mouth in line with the size of the cable diameter on the ring.

3.5 Electrical Installation

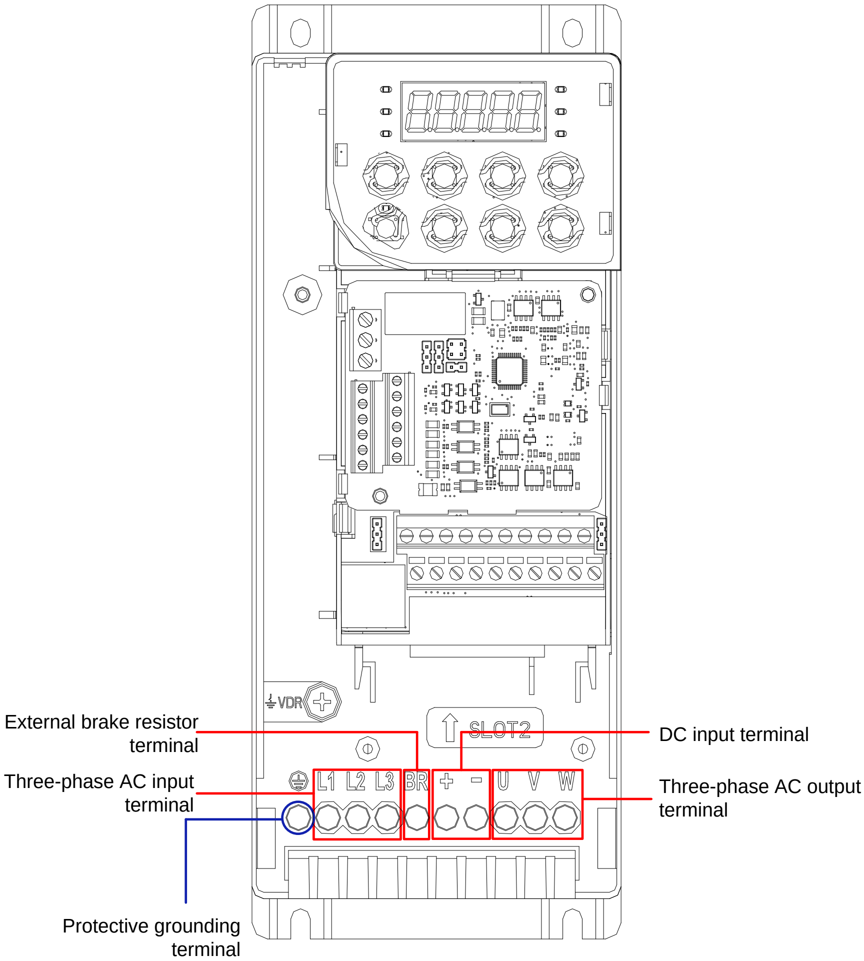
3.5.1 Power Terminal Connections

FA model



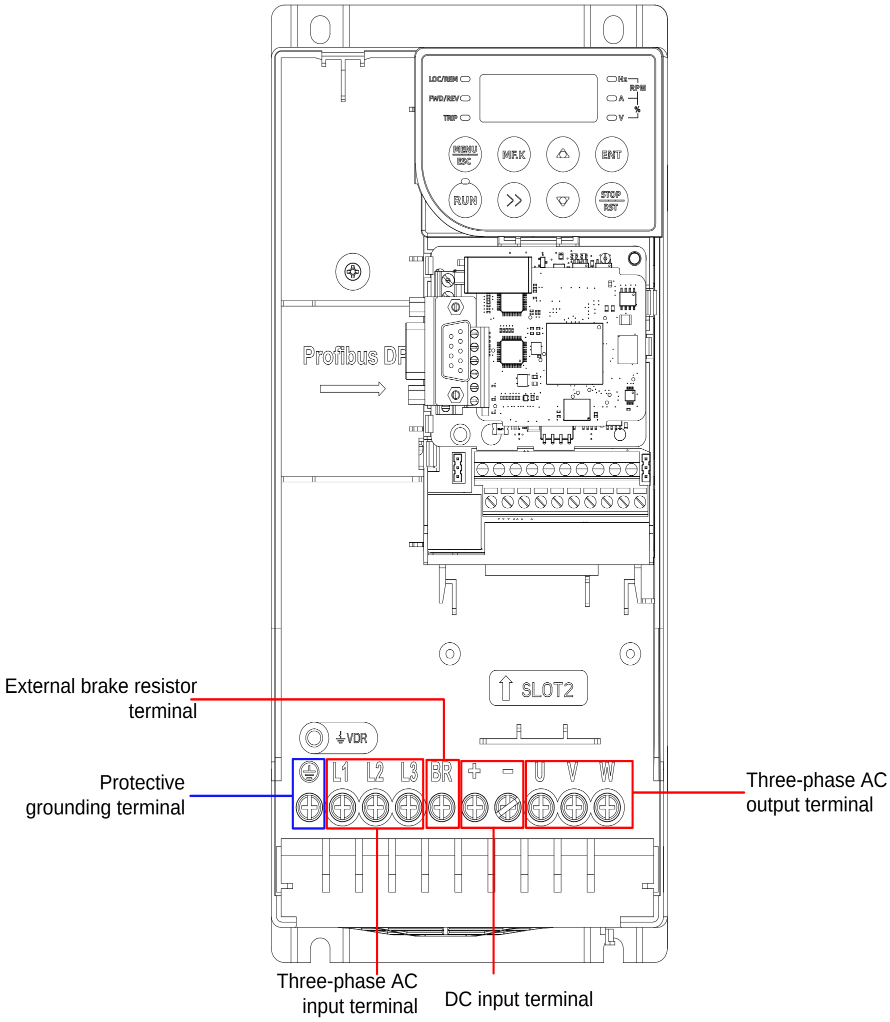
Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M3(0.6)	0.75
+, -	DC input terminal	M3(0.6)	0.75
+, BR	External brake resistor terminal	M3(0.6)	0.75
PE	Protective grounding terminal	M3(0.6)	0.75
U, V, W	Three-phase AC output terminal	M3(0.6)	0.75

FB model



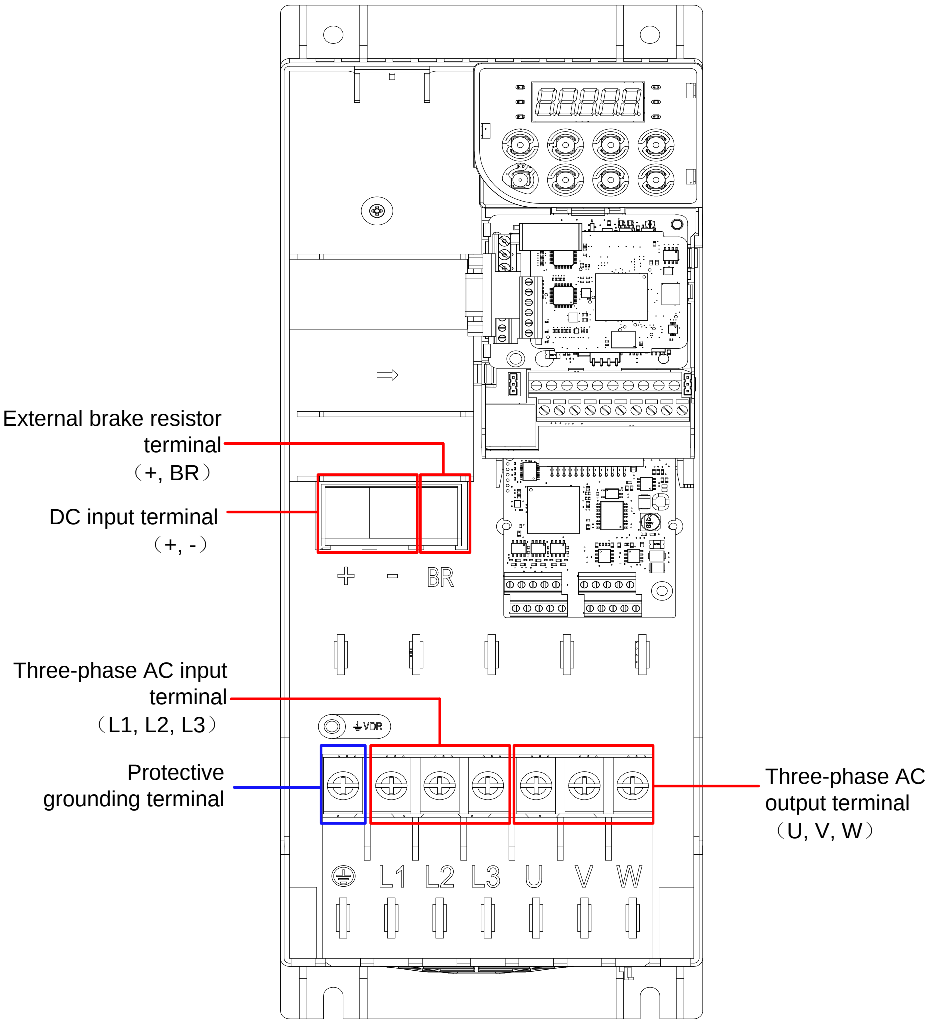
Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M3(0.6)	2.5
+, -	DC input terminal	M3(0.6)	2.5
+, BR	External brake resistor terminal	M3(0.6)	2.5
PE	Protective grounding terminal	M3(0.6)	2.5
U, V, W	Three-phase AC output terminal	M3(0.6)	2.5

FC model



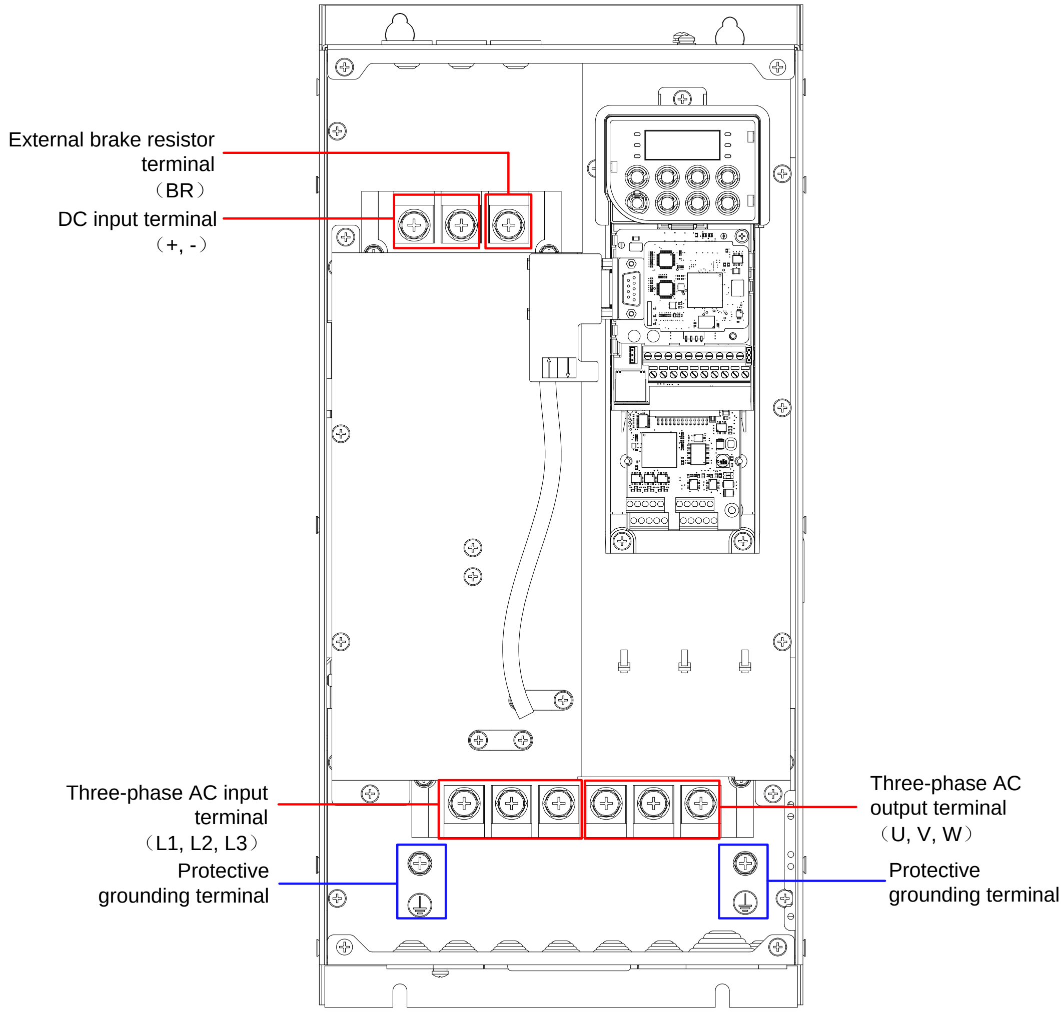
Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M4(1.4)	4
+, -	DC input terminal	M4(1.4)	4
+, BR	External brake resistor terminal	M4(1.4)	4
PE	Protective grounding terminal	M4(1.4)	4
U, V, W	Three-phase AC output terminal	M4(1.4)	4

FD model



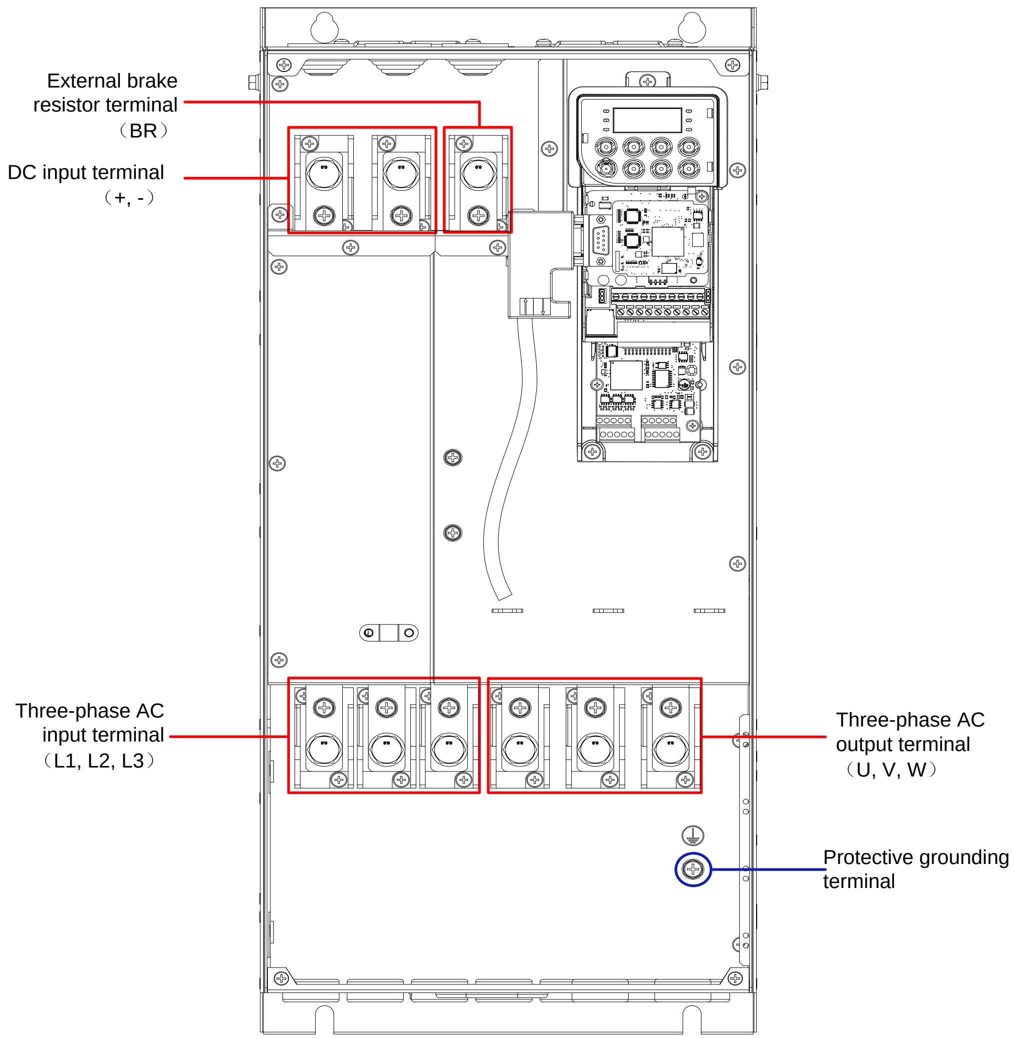
Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M5(2.5)	10
+, -	DC input terminal	M5(2.5)	10
+, BR	External brake resistor terminal	M5(2.5)	10
PE	Protective grounding terminal	M5(2.5)	10
U, V, W	Three-phase AC output terminal	M5(2.5)	10

FE model



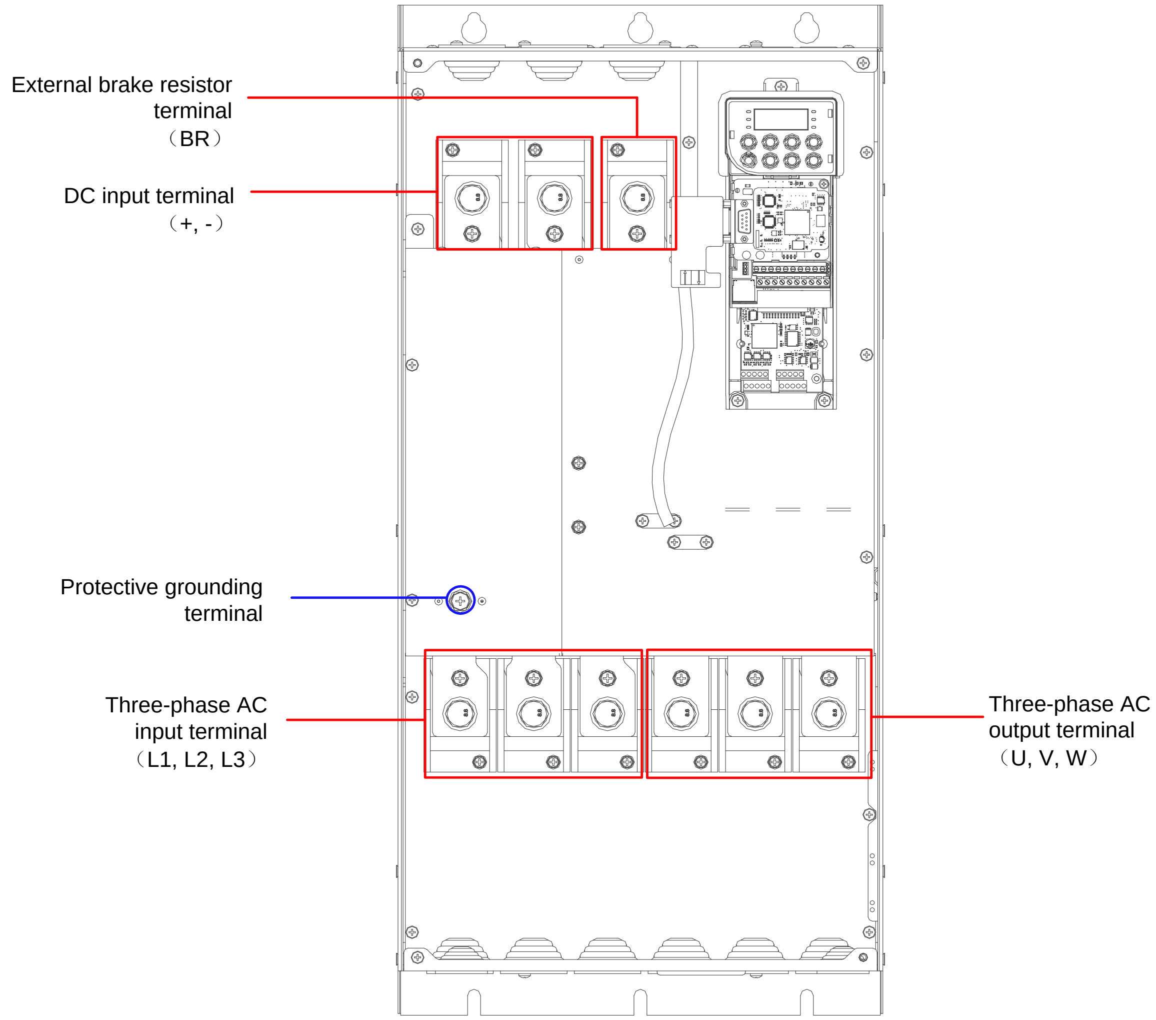
Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M8(12)	50
+, -	DC input terminal	M8(12)	50
+, BR	External brake resistor terminal	M8(12)	50
PE	Protective grounding terminal	M6(3)	16
U, V, W	Three-phase AC output terminal	M8(12)	50

FF model



Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M10(22)	70
+, -	DC input terminal	M10(22)	70
+, BR	External brake resistor terminal	M10(22)	70
PE	Protective grounding terminal	M6(3)	35
U, V, W	Three-phase AC output terminal	M10(22)	70

FG model



Terminal name	Terminal function	Wiring terminals (torque, N*m)	Cable specification (mm^2)
L1, L2, L3	Three-phase AC input terminal	M12(40)	120
+, -	DC input terminal	M12(40)	120
+, BR	External brake resistor terminal	M12(40)	120
PE	Protective grounding terminal	M6(3)	70
U, V, W	Three-phase AC output terminal	M12(40)	120

3.5.2 System Connection Diagram

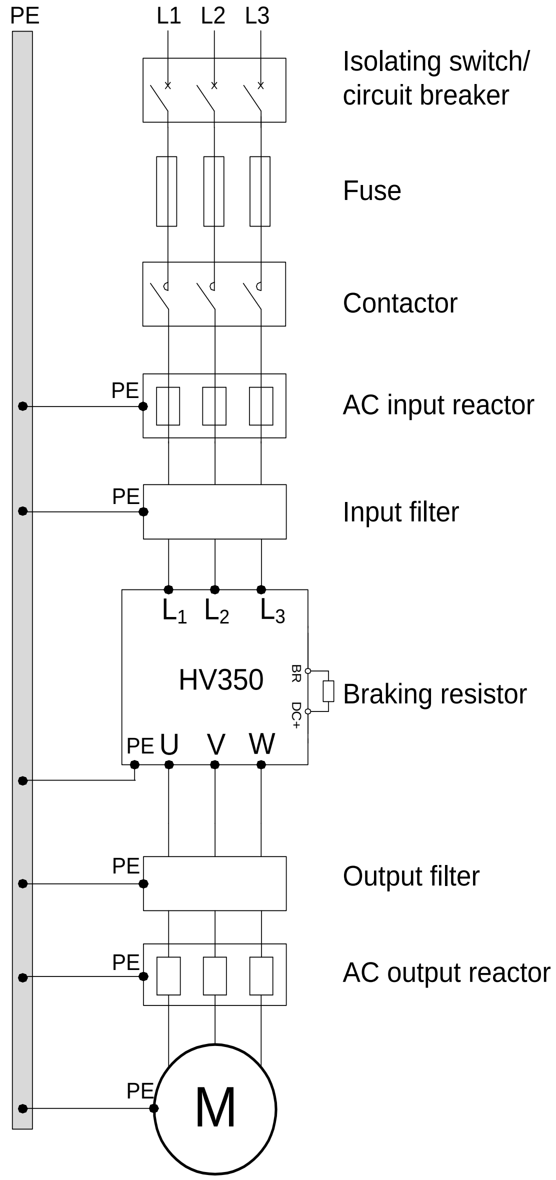


Figure 3-5 Typical wiring of main circuit and optional accessories

NOTE
● Refer to Table 3-5 for the selection of fuses and specifications of copper-core insulated cables. ● The contactors are not recommended to be used to control the startup and shutdown of the inverter when it is used for the power supply control. ● The maximum motor cable length of the inverter is 100m at the default carrier frequency. When the cable connecting the inverter and the motor exceeds 100m, it is recommended to use a multi-stranded cable and to install an AC output reactor that can suppress high frequency oscillations to avoid damage to the motor insulation, excessive leakage currents and inverter frequent protection. ● To ensure safety, the inverter and motor must be grounded. The grounding resistance should be less than 10Ω and the cross-sectional area of the grounding conductor should comply with the standards in listed Table 3-2. ● The HV350 series inverters do not support the connection of a DC reactor. If required, customers can install the external AC reactor. ● High power switches and contactors need to be grounded, which is depended on the actual application.

3.5.3 System Composition

Table 3-3 Using instruction of peripheral electrical components

Name	Installation place	Function
Breaker	Between power supply and input side of the inverter	Short circuit breaker: Cut off the power supply in case of overcurrent in downstream equipment to prevent accidents. Earth leakage circuit breaker: The inverter may generate high-frequency leakage current during operation. To prevent electric shock and fire hazard, please choose and install a suitable earth leakage circuit breaker based on the on-site situation.
Fuse	Between power supply and input side of the inverter	Prevent accidents due to short circuits and protect the back-end semiconductor devices
(Electromagnetic) contactor	Between circuit breaker and input side of the inverter	Perform power on/off operation on the inverter. Frequent power on and off operations or direct startup operations through contactors should be avoided (The interval time shall not be less than one hour).
AC input reactor	On the input side of the inverter	Improve the power factor on the input side; Effectively eliminate high harmonics on the input side to prevent damage to other equipment caused by distortion of the voltage waveform; eliminate input current imbalance caused by phase imbalance of the power supply.
Input filter	On the input side of the inverter	Reduce external conduction and radiation interference of inverter; Reduce the conduction and interference from the power supply to the inverter, and improve its anti-interference ability.
Braking resistor	Between the main circuit terminals BR and DC+	For models with B, please use braking resistor; The motor consumes regenerative energy through the braking resistor when decelerating.
Brake unit	Between the main circuit terminals DC+ and DC-	For models without B, please use brake units and recommended braking resistors; The motor consumes regenerative energy through the braking resistor when decelerating.
Output filter	Between the output side of the inverter and the motor, close to the inverter	Reduce external conduction and radiation interference of inverter; Reduce the internal interference generated by the inverter to the external so as not to affect the normal operation of other external electrical components.
AC output reactor	Between the output side of the inverter and the motor, close to the inverter	The transmission line between the inverter and the motor should not be too long. If the cable is too long, its distributed capacitance will be large and high harmonic currents will be generated. Generally if the distance between the inverter and the motor exceeds 100m, it is recommended to install an additional output AC reactors.

3.5.4 Recommended Model of Fuses and Reactors

Table 3-4 Recommended fuses and specifications of copper-core insulated cables

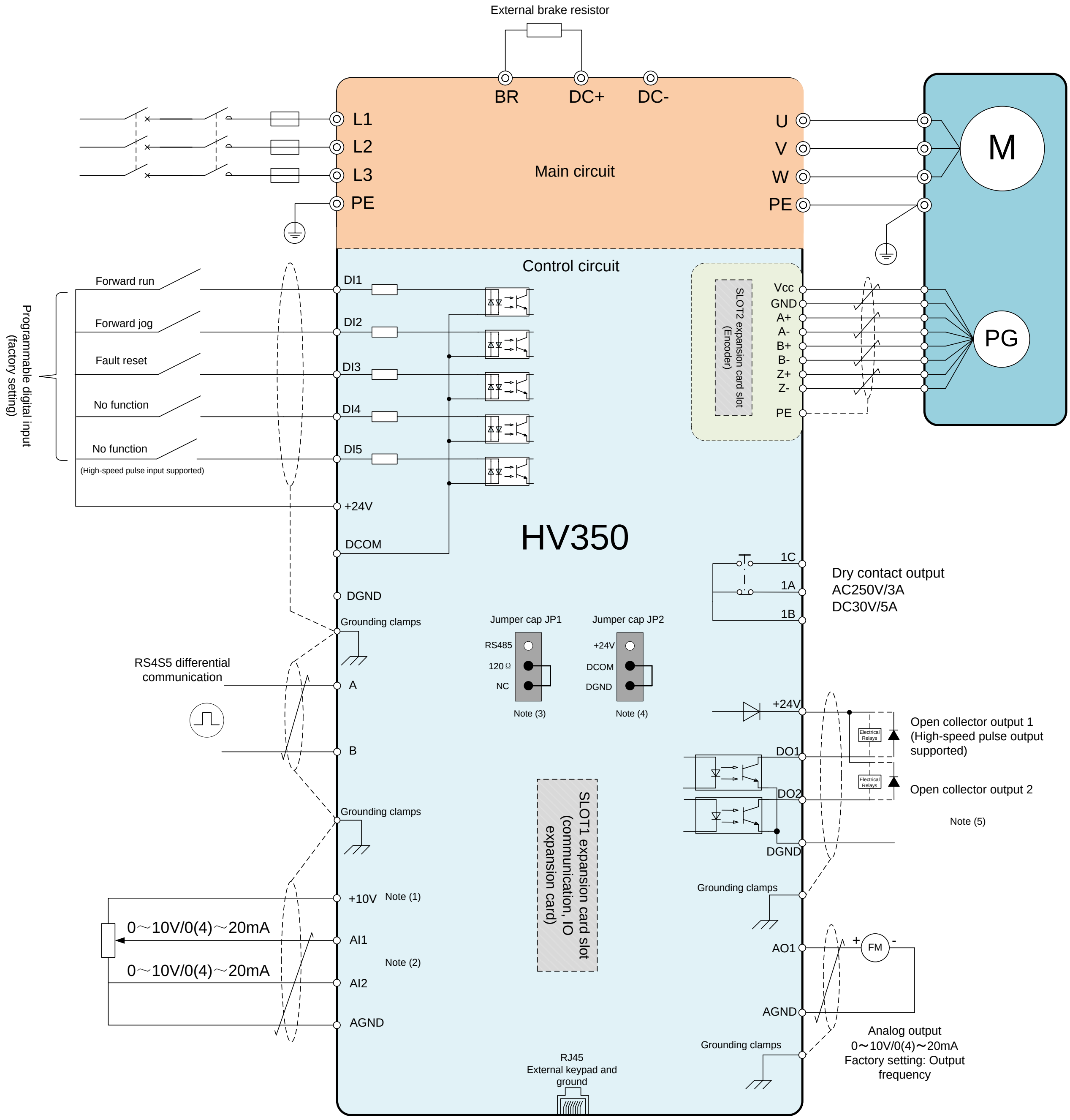
Inverter model	Fuse		Main circuit			Control cable (mm^2)
	IEC gG(A)	<30A, class CC >30A, class T (A)	Input current (A)	Input cable (mm^2)	Output cable (mm^2)	
	Three-phase	Three-phase	Three-phase	Three-phase	Three-phase	
HV350-4T0.75G/1.5PB	8	8	3.6	1.0	1.0	≥0.5
HV350-4T1.5G/2.2PB	10	10	5.7	1.0	1.0	≥0.5
HV350-4T2.2GB	16	15	8.3	1.5	1.0	≥0.5
HV350-4T4G/5.5PB	20	20	13.2	2.5	1.5	≥0.5
HV350-4T5.5GB	20	20	12.4	2.5	2.5	≥0.5
HV350-4T7.5G/11PB	25	25	16.1	4.0	4.0	≥0.5
HV350-4T11GB	40	40	24	4.0	4.0	≥0.5
HV350-4T15G/18PB	50	50	31	6.0	6.0	≥0.5
HV350-4T18G/22PB	63	63	36	10	10	≥0.5
HV350-4T22GB(B)	80	80	44	16	16	≥0.5
HV350-4T30G/37P(B)	110	110	58	25	25	≥0.5
HV350-4T37G/45P(B)	125	125	72	25	25	≥0.5
HV350-4T45G/55P(B)	200	200	93	35	35	≥0.5
HV350-4T55G/75P(B)	250	250	121	70	70	≥0.5
HV350-4T75G/90P(B)	250	250	151	95	95	≥0.5
HV350-4T90G/110P(B)	250	250	204	120	120	≥0.5
HV350-4T110G/132P(B)	315	300	248	150	150	≥0.5

Table 3-5 External reactor specifications

Inverter model	AC input reactor		AC output reactor	
	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)
HV350-4T0.75G/1.5PB	8	5	2	5
HV350-4T1.5G/2.2PB	4	7	1.6	6
HV350-4T2.2GB	3	12	1.2	10
HV350-4T4G/5.5PB	1.5	16	0.7	14
HV350-4T5.5GB	1.2	20	0.5	18
HV350-4T7.5G/11PB	0.8	32	0.4	26
HV350-4T11GB	0.6	45	0.25	32
HV350-4T15G/18PB	0.4	55	0.2	40
HV350-4T18G/22PB	0.35	65	0.18	48
HV350-4T22GB(B)	0.3	80	0.15	60
HV350-4T30G/37P(B)	0.2	100	0.11	75
HV350-4T37G/45P(B)	0.18	120	0.09	95
HV350-4T45G/55P(B)	0.15	145	0.07	130
HV350-4T55G/75P(B)	0.11	200	0.055	160
HV350-4T75G/90P(B)	0.09	220	0.04	190
HV350-4T90G/110P(B)	0.07	275	0.035	220
HV350-4T110G/132P(B)	0.06	330	0.03	260

Note: Dedicated inverter AC output reactors should be used.

3.5.5 Electrical Wiring Diagram



Note (1): Maximum output of +10V port: 25mA
Note (2): Internal resistance of port AI1 and AI2 (in current mode): 500Ω
Note (3): RS485 terminal resistor (120Ω) activation port
Note (4): Terminals DI1～DI5 can select NPN or PNP transistor signal as input. The bias voltage can select inverter internal power supply (+24V terminal) or external power supply (DGND terminal).
Note (5): When the digital output terminal drives a relay, a current-continuity diode must be added to both ends of the relay coil. Pay attention to the polarity when installing it. Otherwise, the internal circuit may be damaged. The driving capacity shall not be greater than 50mA.

Figure 3-6 Wiring diagram

3.5.6 Distribution and Wiring of Control Circuit Terminal

DANGER

- Wiring must be carried out by qualified personnel to avoid physical injury or equipment damage.
- The wiring process must be carried out in strict accordance with this manual. Otherwise, physical injury or damage to the equipment may occur!
- Make sure that the input power is off before wiring. Otherwise, physical injury may occur!
- All cables and routing should comply with EMC and safety standards. Refer to the recommendations in this manual for wire diameters. Otherwise, physical injury or damage to the equipment may occur!
- Terminal cabling screws or bolts must be tightened to avoid damage to the equipment.
- It is forbidden to connect AC 220V voltage signals at terminals other than terminal 1A, 1B and 1C. Otherwise, damage to the equipment may occur!

NOTE

- Signal lines of the inverter terminal should be routed as far away from the main power line as possible. If the distance cannot be guaranteed, the vertical crossover distribution shall be adopted. Otherwise, control signals will be affected!
- The encoder must be connected with a shielded cable and the shielding layer must be properly grounded!

3.5.6.1 Control Board Schematic Diagram

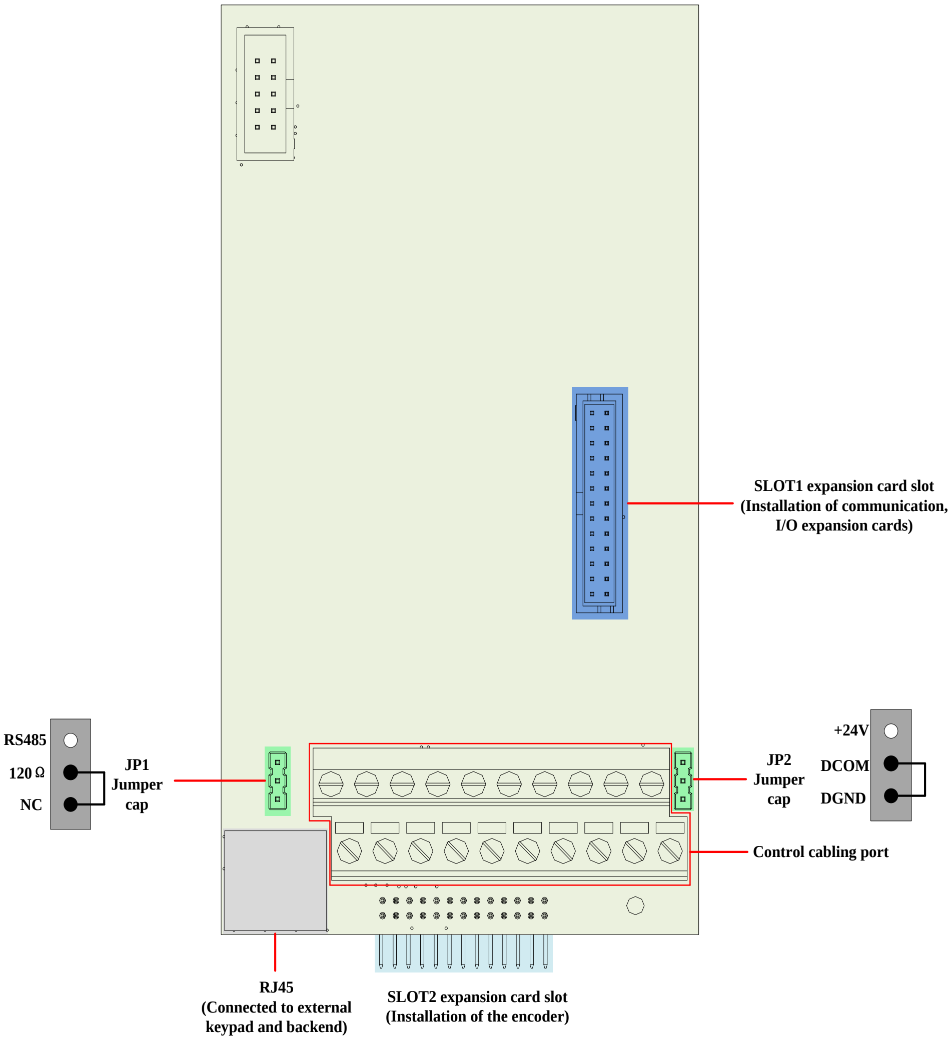


Figure 3-8 Control board schematic diagram

3.5.6.2 Distribution Schematic Diagram of the Control Circuit Terminals

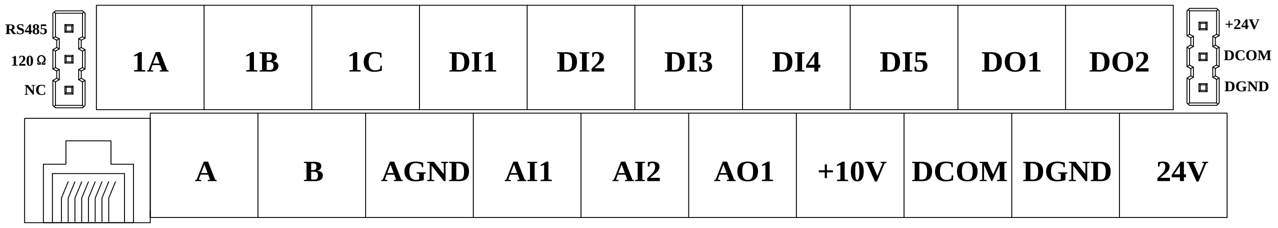


Figure 3-7 Distribution schematic diagram of the control circuit terminals

Table 3-6 Performance specifications of control circuit terminal

Interface type	Quantity	Specifications	Remarks
RS485 **Fieldbus interface**	1	Interface type: RS485 Communication protocol: Modbus RTU Baud rate: ≤25 kbps Communication distance: 100m	A: Positive end of 485 differential signal B: Negative end of 485 differential signal Baud rate software adjustable Communication distance increases as baud rate decreases
DO **Digital output interface**	2	**Fast pulse output (only DO1 supported)** Output voltage range: 0V - 24V Current load capacity: 50mA Output delay: 50μs Output frequency: 100Hz - 100kHz Short circuit protection	---
		Open collector output Output voltage range: 0V - 24V Current load capacity: 50mA Output delay: 50μs Short circuit protection	
DI **Digital input interface**	5	1. Compatible with sinking/sourcing input Input high level: 15~30V Input low level: 0~5V Typical input impedance: 2kΩ Hardware filter time: 0.05ms Software filter time: 500ms max. 2. One channel can support high speed pulse input 100kHz (DI5)	---
AI **Analog input interface**	2	**Voltage mode** Input voltage range: 0~10V Input impedance: 200kΩ Resolution: 12bit Accuracy: 2% Hardware filter time: 0.25ms Software filter time: 10s max.	Voltage and current mode can be switched through function code
		Current mode Input current range: 0~20mA Input impedance: 500Ω Resolution: 12bit Accuracy: 2% Hardware filter time: 0.25ms Software filter time: 10s max	

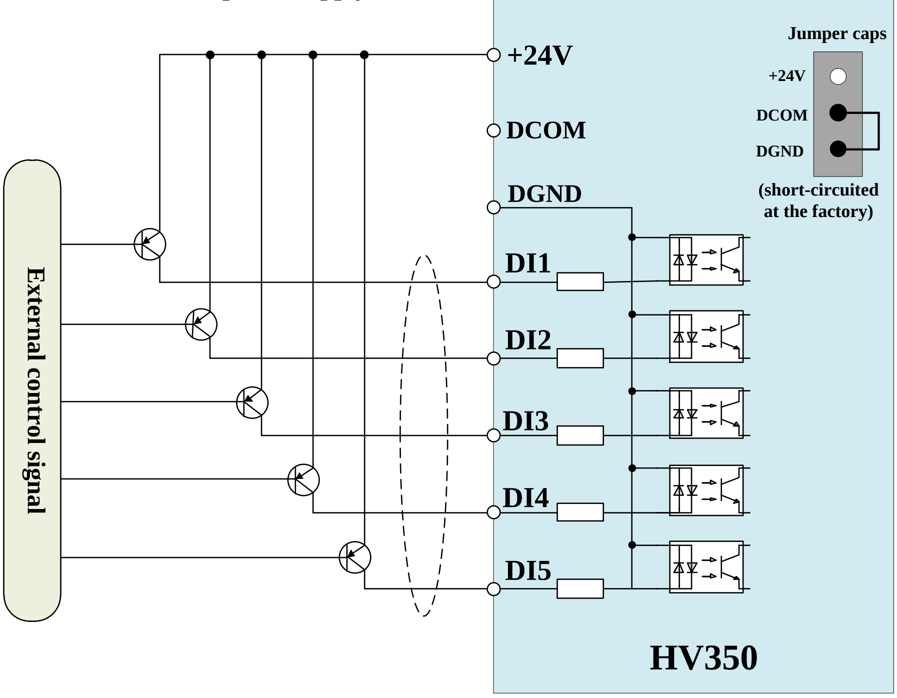
Interface type	Quantity	Specifications	Remarks
AO Analog output interface	1	**Voltage mode** Output voltage range: 0~10V Load capacity: 10mA Accuracy: 2% Overload protection	Voltage and current mode can be switched through parameter code
		Current mode Output current range: 0~20mA Load capacity: 500Ω Accuracy: 2%	
Relay output	1	Contact current load capacity: 3A Contact voltage: 250V AC/30V DC Mechanical life: 100,000 cycles	---
Power output	1	Output voltage: 24V±10% Load capacity: 100mA Short circuit protection	
Reference voltage output	1	Output voltage: +10V±2% Load capacity: 20mA	
Keypad interface	1	Physical interface type: RJ45 Electrical interface type: RS485 Baud rate: ≤250kbps Communication distance: 100m	Two interfaces share one RJ45 interface
Background interface	1	Physical interface type: RJ45 Electrical interface type: RS422 Baud rate: ≤250kbps Communication distance: 100m	

3.5.6.3 Wiring of Digital Input Terminal

◆ **Open collector PNP wiring method**

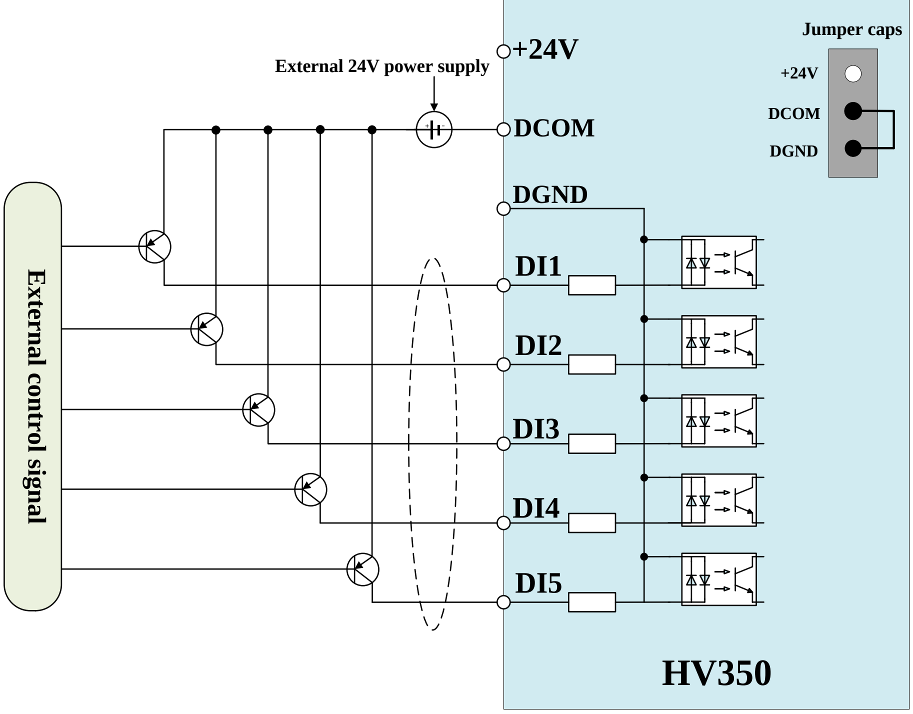
➢ When using the internal +24V power supply of the inverter, short-circuit DCOM and DGND on the JP2.

Use internal 24V power supply



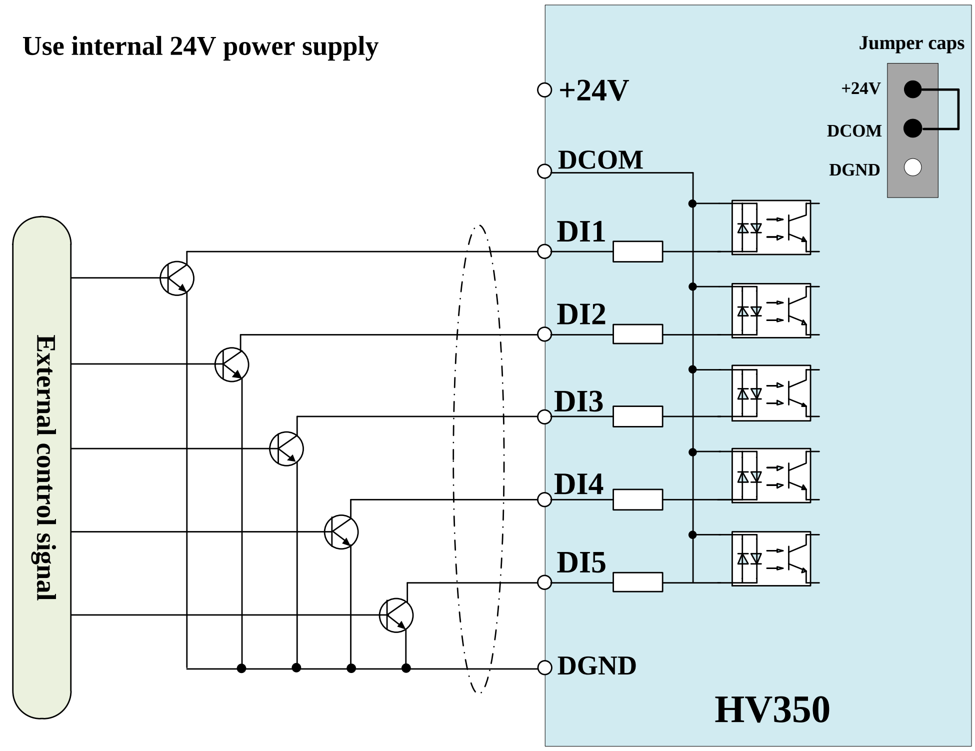
➢ When using the external power supply, short-circuit DCOM and DGND on the JP2, and connect DCOM to 0V of the external power supply. Connect the +24V of the external power supply to the corresponding DI terminal through the control contact of the external controller.

Use external 24V power supply

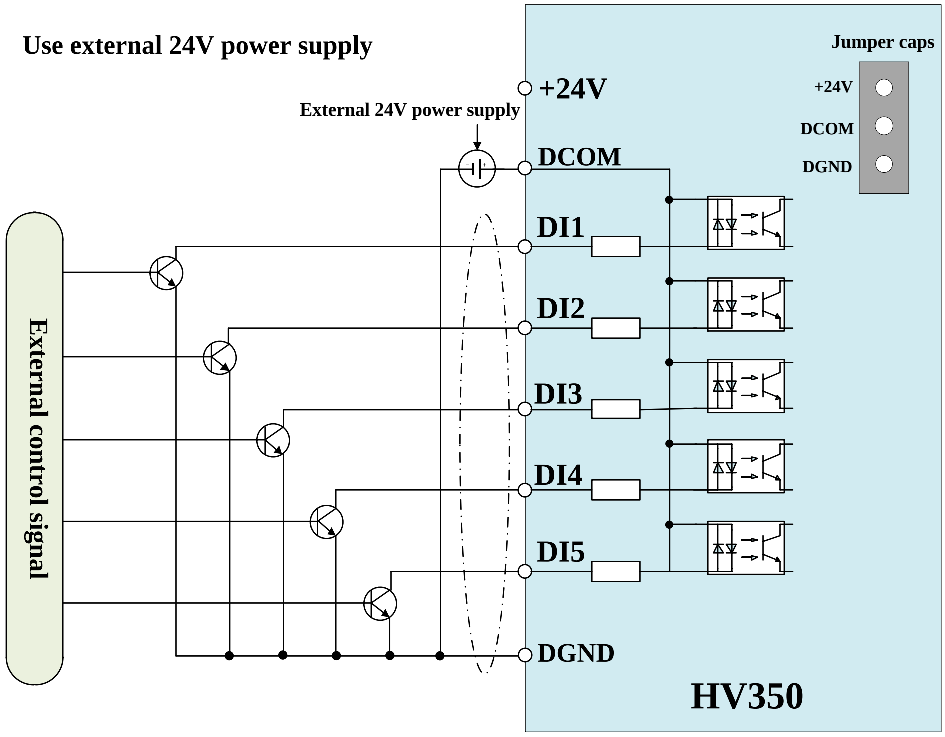


◆ **Open collector NPN wiring method**

➢ When using the internal +24V power supply of the inverter, short-circuit +24V and DCOM on the JP2.



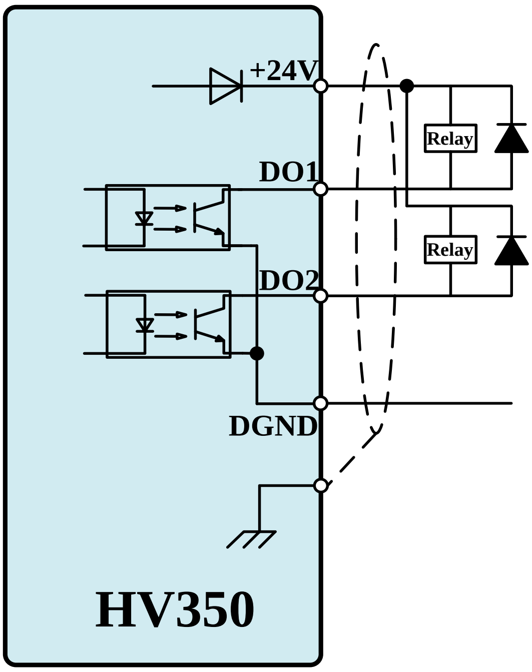
➢ When using external power supply, remove the jumper cap between +24V and DCOM, connect the DCOM terminal to +24V of the external power supply, and connect the DGND terminal to 0V of the external power supply.



3.5.6.4 Wiring of Digital Output Terminal

The inverter is equipped with two DO outputs, and both are open collector outputs. DO1 can be optionally used as a high speed pulse output with a maximum output of 100kHz.

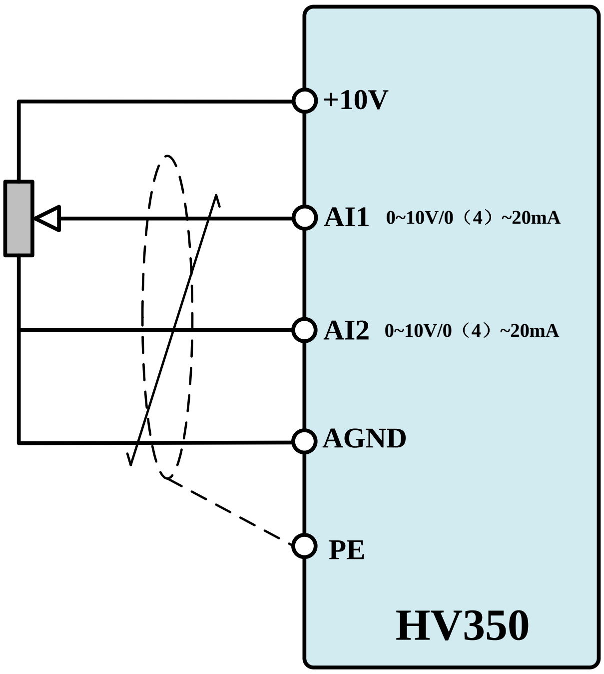
When the digital output terminal drives a relay, a freewheel diode must be installed at both ends of the relay coil. Pay attention to the polarity when installing. Otherwise, the internal circuit may be damaged. The driving capacity shall not greater than 50mA.



3.5.6.5 Wiring of Analog Input Terminals

As the analog signal is susceptible to external interference, shielded cables are generally used for transmission, and the wiring distance shall be as short as possible. In addition, the end of the shielding layer near the inverter shall be well grounded, and the transmission distance should not exceed 20m.

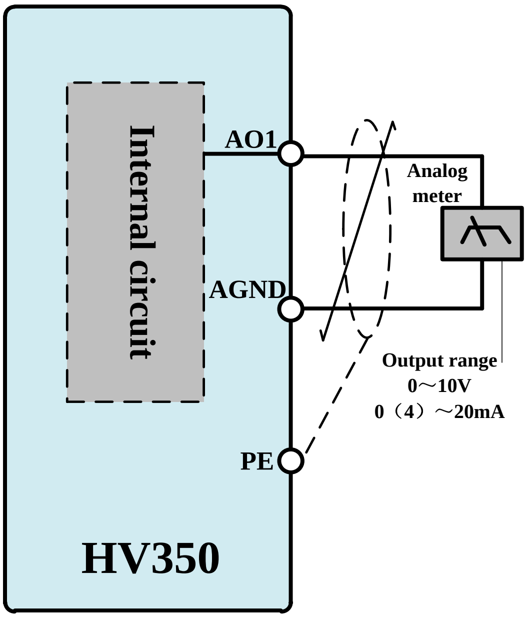
When the analog signal is seriously subject to interference, a filtering capacitor or common mode inductor can be installed between the input signal and AGND.



3.5.6.6 Wiring of Analog Output Terminals

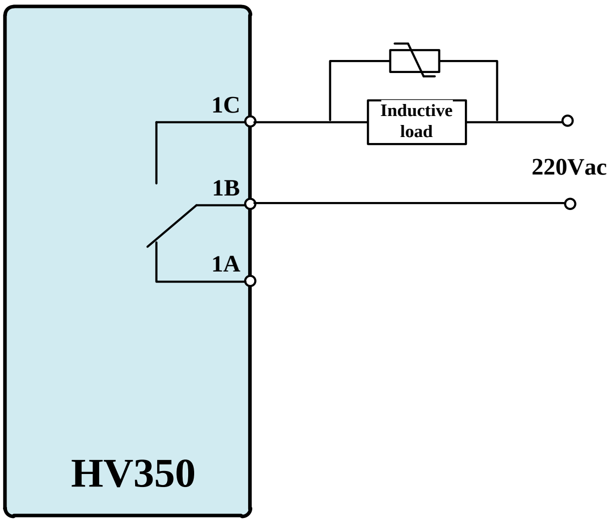
Whether the output signal is a voltage signal or a current signal can be selected through parameter codes. The voltage range is 0~10V and the output current is less than 10mA. The wiring distance shall be as short as possible.

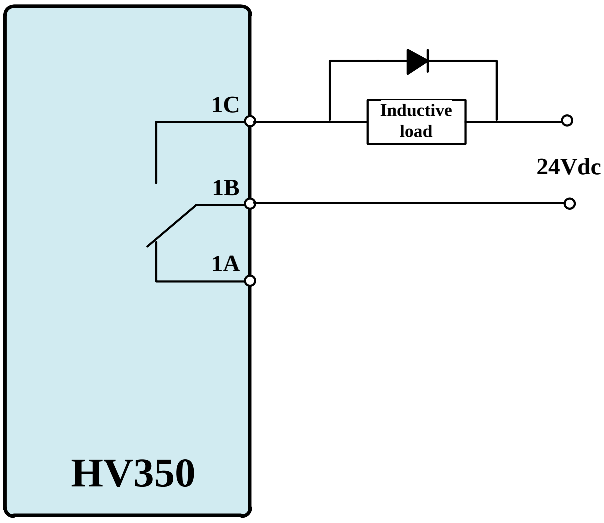
The current range is 0/4mA to 20mA, and the user load impedance should be less than 500Ω.



3.5.6.7 Wiring of Relay Output Terminals

Inductive loads (relays, contactors and motors) may cause voltage spikes when the current is cut off. Carry out the protection at the relay contacts with varistors and install absorption circuits such as varistors, RC absorption circuits, and diodes on the inductive loads to ensure minimal interference during shutdown.





3.5.7 Braking Resistor Specifications

The selection of the braking resistor needs to be determined according to the power generated by the motor in the actual application, which is related to the system inertia, deceleration time, etc. Users can choose as required.

Common occasion	Elevator	Unwinding and rewinding	Lifting or centrifugal machine	Occasional braking load	General occasion
Braking frequency	20%~30%	20%~30%	50%~60%	5%	10%

Power of braking resistor $P = \dfrac{U^2 \times D}{R \times K}$

In this formula, U is the braking voltage;

D is the braking frequency;

R is the resistance of the braking resistor;

K is the derating coefficient.

The recommended power of braking resistor is calculated based on a braking frequency of D=10% and a derating coefficient of K=50%.

Table 3-7 Braking resistor selection specification table for 380V voltage class

Specifications / Inverter model	Min. braking resistance (Ω)	Max. braking current (A)	Recommended resistance R(Ω)/power P	Brake unit
HV350-4T0.75G/1.5PB	120	7	750Ω/150W	Standard built-in
HV350-4T1.5G/2.2PB	80	10.5	350Ω/320W	
HV350-4T2.2GB	80	10.5	250Ω/450W	
HV350-4T4G/5.5PB	47	17.5	150Ω/750W	
HV350-4T5.5GB	29.6	28	150Ω/750W	
HV350-4T7.5G/11PB	29.6	28	100Ω/1125W	
HV350-4T11GB	29.6	28	100Ω/1125W	
HV350-4T15G/18PB	29.6	28	30Ω/3750W	
HV350-4T18G/22PB	29.6	28	30Ω/3750W	
HV350-4T22GB	24	35	30Ω/3750W	
HV350-4T30G/37P(B)	24	35	25Ω/4500W	Optional built-in
HV350-4T37G/45P(B)	16	52.5	25Ω/4500W	
HV350-4T45G/55P (B)	16	52.5	25Ω/4500W	
HV350-4T55G/75P(B)	8	105	10Ω/14000W	
HV350-4T75G/90P(B)	8	105	10Ω/14000W	
HV350-4T90G/110P(B)	5.6	157	6Ω/21000W	
HV350-4T110G/132P(B)	5.6	157	6Ω/21000W	

3.5.8 EMC Recommendations and Filter Using Instructions

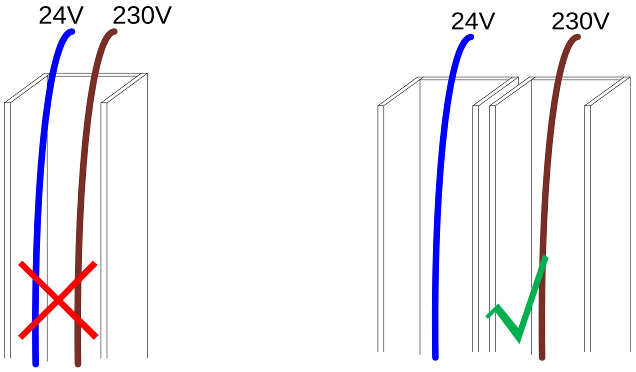
3.5.8.1 EMC-Compliant Installation

1. Noise suppression

Use cable clips to form a 360-degree loop for the grounding of the shielding layer, and avoid twisting the shielding layer into a braid before connecting it to the inverter. The power cable connecting the inverter to the motor needs to be shielded and wired with an independent wiring duct. One end of the shielding layer of the motor cable or the metal shell of the wiring duct is connected to the inverter, and the other end is connected to the motor shell. If the noise filter is installed at the same time, electromagnetic noise can be greatly suppressed.

2. On-site wiring requirements

Strong-current and weak-current cables should be wired separately, and the spacing should be at least 50cm. If the spacing requirement cannot be met, the vertical crossover cabling is required. In addition, the input and output cables shall be wired separately.



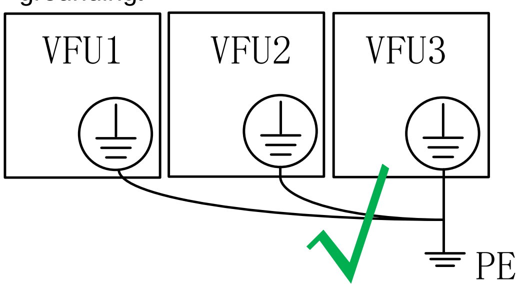
3. Grounding

The inverter must be safely and reliably grounded when working. Grounding is a guarantee for no physical injury or no damage to equipment. In addition, it is the simplest and the most efficient and cost-effective way to solve EMC problems.

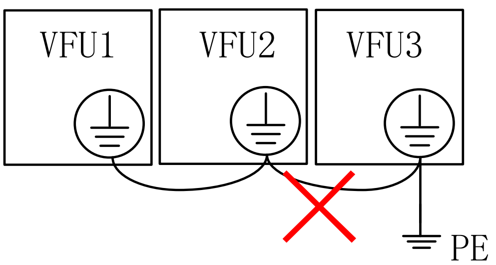
One end of the grounding cable is connected to the grounding terminal of the inverter and the other end is connected to the grounding terminal of the motor. It is even better if the motor and inverter have a special grounding pole.

NOTE

- To guarantee the personnel safety and reduce the electromagnetic radiation, the inverter and the motor shall be well grounded.
- The diameter of the grounding conductor must comply with safety regulations.
- The grounding conductor shall be as short and close to the inverter as possible. Remember to remove the insulating paint from the fixing points.
- When installing multiple inverters, please use single-point grounding instead of multiple-point grounding.



Correct grounding – single-point grounding



Incorrect grounding - grounding in series

3.5.8.2 Instructions for EMC Noise Filter

Precautions for external EMI filter	● The filter should be installed close to the input side of the inverter. The filter power input cable should be as short as possible inside the cabinet. ● The filter shell must be reliably connected to the PE.

Method to disconnect/install the built-in EMC filter	● For the HV350 inverter, the built-in EMC filter is connected to the inverter via a short-circuiting piece, and the access to the EMC components is controlled by the EMC screw. ● Unscrewing the EMC screw completely means the disconnection with the internal EMC filter; ● Screwing in the EMC screw completely means the connection with the internal EMC filter.

The specific position of the EMC screw is shown in the diagram below:

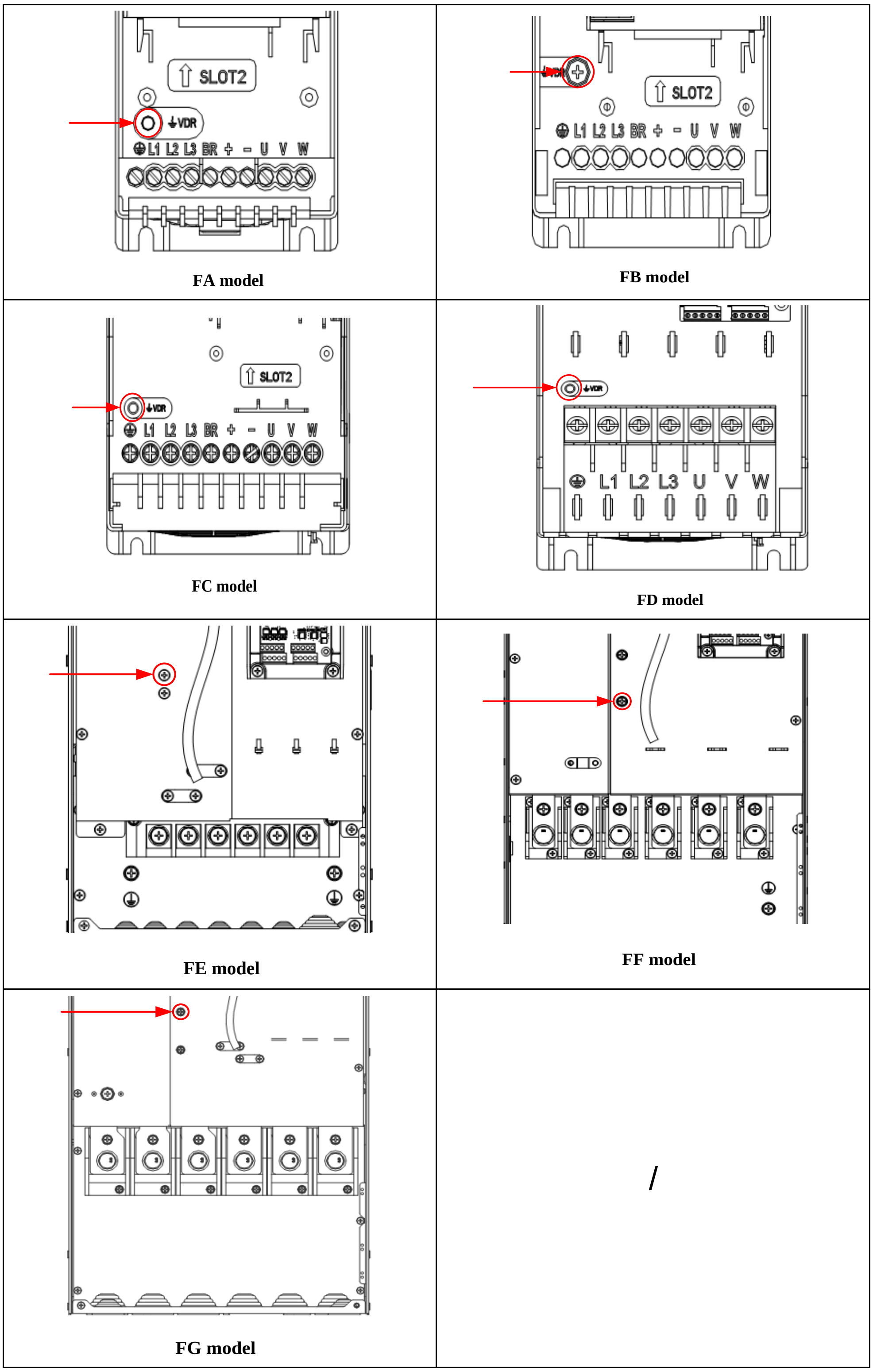
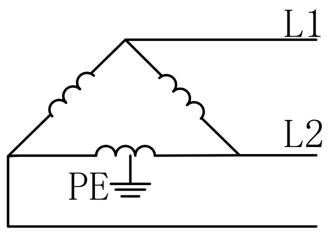
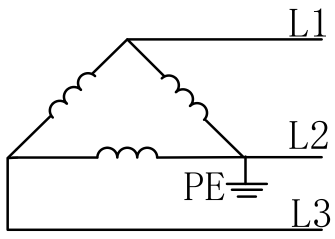
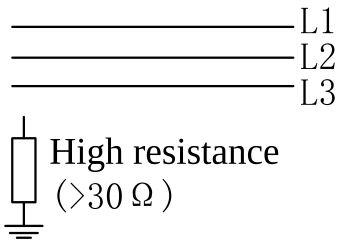


Figure 3-8 EMC screw position

NOTE

- When the inverter grounding system is an IT system or corner grounded TN system, the voltage relative to the ground will exceed the specifications of the built-in EMC filter, resulting in damage to the EMC filter. At this time, you need to remove the EMC short circuit screw.
- Removal of the EMC short circuit screw should be carried out when the main power supply is disconnected.
- Do not unscrew the short circuit screw in the IT system or corner grounded TN system. The built-in EMC can reduce electromagnetic radiation interference and the internal varistor can protect the inverter from momentary lightning surges at the power supply side.

<table>
<tr><td>
</td><td>
</td><td>
</td></tr>
<tr><td colspan="2">Corner grounded TN system</td><td>IT system</td></tr>
</table>

--End of the chapter--

4 Operation and Display

4.1 Introduction to the LED Keypad

This section introduces the appearance, key functions, indicators, and interface displays of the keypad.

The HV350 series inverters are equipped with an LED keypad (the keypad does not support external connection). Through the keypad, users can read and modify parameters, monitor state, and perform the drive control.

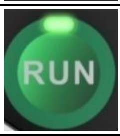
If the HV350 series inverters need to connect to an external keypad, users can choose a separate LED keypad. The external LED keypad can be used for parameter modification, query, startup control, parameter copying, uploading and downloading.

4.2 Keypad Appearance

The LED keypad has a 5-digit 8-segment LED digital tube, 3 status indicators (on the left), 3 unit indicators (on the right), 1 operation indicator and 8 function keys, as shown in the figure below:

Figure 4-1 Keypad appearance

4.3 Keys

Key identification	Key name	Meanings
	Menu/Escape key	Menu key: To enter level-1 menu or exit. Escape key: To return to the previous level menu.
	Multi-function key	You can use this key to set different functions such as jog, forward run, reverse run, command channel switchover, menu mode switchover (by default) and so on via parameter F08.08.
	Enter key	To enter the menu step by step, set the parameter and confirm the settings.
	Run key	To start the inverter in the keypad start/stop control mode.
	Stop/Reset key	Stop key: To stop the inverter from the running state. This key has the highest priority when the keypad is not fully locked. Reset key: To reset faults. It is valid in any mode when the keypad is not fully locked.

Key identification	Key name	Meanings
	UP (increment) key	To increase the parameter group number, parameter number and parameter data progressively when pressing this key in the programming state. In the shutdown or running state, when “0 Digital setting” is selected for main frequency reference channel (F01.04=0), the frequency reference value will increase progressively after pressing the key.
	DOWN (decrement) key	To decrease the parameter group number, parameter number and parameter data progressively when pressing this key in the programming state. In the shutdown or running state, when “0 Digital setting” is selected for main frequency reference channel (F01.04=0), the frequency reference value will decrease progressively after pressing the key.
	Shift key	When pressing the key cyclically in the shutdown or running state, the display will indicate the output frequency, frequency reference values, output current, output voltage, and DC bus voltage in turn. When editing the parameter content in the programming state, you can use the key to shit to the digit that you want to modify.

➢ **MF.K (Multi-function Key)**

The functions of the MF.K key can be set via “F08.08: Keypad MF.K key function”. It can support the switch between the command channel, operation direction or menu mode of the inverter as well as the forward and reverse jog.

Parameter	Function	Default	Value range	Description
F08.08	MF.K	5	0: Invalid	This key is disabled.
			1: Command channel switchover	1. F01.03 is set to “0: Keypad”: MF.K disabled. 2. F01.03 is set to “1: Terminal”: Press MF.K to switch between terminal and keypad. 3. F01.03 is set to “2: Communication”: Press MF.K to switch between communication and keypad.
			2: Switchover between forward and reverse run	Press MF.K to switch frequency reference directions, only valid when the keypad is selected as the command source.
			3: Forward jog	Press MF.K to enable forward jog, only valid when the keypad is selected as the command source.
			4: Reverse jog	Press MF.K to enable reverse jog, only valid when the keypad is selected as the command source.
			5: Menu mode switchover	Press MF.K to switch the menu mode.

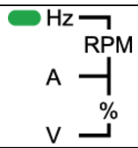
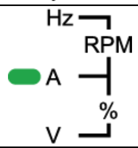
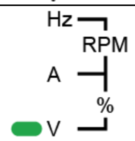
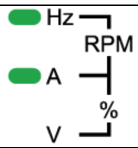
4.4 Indicators

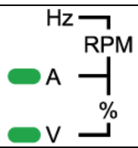
4.4.1 Indicator Introduction

Name	Description
RUN	Operating indicator
LOC/REM	Local/remote indicator
FWD/REV	Forward/reverse indicator
TRIP	Fault indicator
Hz	Frequency unit indicator
A	Current unit indicator
V	Voltage unit indicator

4.4.2 Status Description

Table 4-1 Description of indicators

Name	Status	Description
RUN Operating indicator	Off	Shutdown
	On	Operation
	Blinking	Ready for operation
FWD/REV Forward/reverse indicator	Off	Forward run
	On	Reverse run
	Blinking	1. Forward and reverse switching (speed control) 2. Motor dragged to operate reversely (torque control)
LOC/REM Local/remote indicator	Off	Keypad control
	On	Terminal control
	Blinking	Communication control
TRIP Fault indicator	Off	Normal status
	On	Fault status
	Blinking	Alarm status
		Frequency unit: Hz
		Current unit: A
		Voltage unit: V
		Speed unit: RPM

	Percentage: %

4.5 Interface Display

4.5.1 LED Display Correspondence Table

The data display area is equipped with a five-digit LED digital tube, which can show parameters such as parameter codes, frequency reference, output frequency, parameter values, function codes, monitoring data and fault codes.

The table lists the correspondence between the LED display values and the actual values.

Table 4-2 Correspondence between LED display values and actual values

LED display	Actual value	LED display	Actual value	LED display	Actual value	LED display	Actual value
0	0	6	6	C	C	n	N
1	1	7	7	c	c	P	P
2	2	8	8	d	D	r	R
3	3	9	9	E	E	T	T
4	4	A	A	F	F	U	U
5	5/S	b	B	L	L	u	u/v
H	H	W	W	G	G	-	-

4.5.2 Special LED Characters

1) Power-on: The digital tube shows -H-W- and the indicators are all on.
2) Fault/alarm: The digital tube displays Exx or Axx. The indicator is always on when there is an alarm. The indicator blinks rapidly when there is a fault. When the alarm and fault occur at the same time, the fault is indicated first. On the home page, the fault codes and alarm codes can be displayed by pressing “>> (SHIFT)” key.
3) Motor parameters auto-tuning: The digital tube shows TUNE.
4) Power-off: The digital tube shows P.oFF.
5) Version No.: The digital tube shows prefix v, b, d.
6) Hexadecimal: The digital tube shows prefix H.
7) For Level-3 menu, add 0 in the front if the digit of parameter display value is less than 5. However, this rule is not suitable for the read-only parameter group or other menus.

4.5.3 LED Blinking Description

The LED segment display module flickers once per second in the following states:

The LED digital tube blinks once per second in the following states:

1) On Level-0 menu (the home page), the digital tube blinks to show shutdown parameters.

2) The digital tube blinks to show the position of the shift key, where the parameters of Level-1 menu, Level-2 menu and Level-3 menu are being modified.

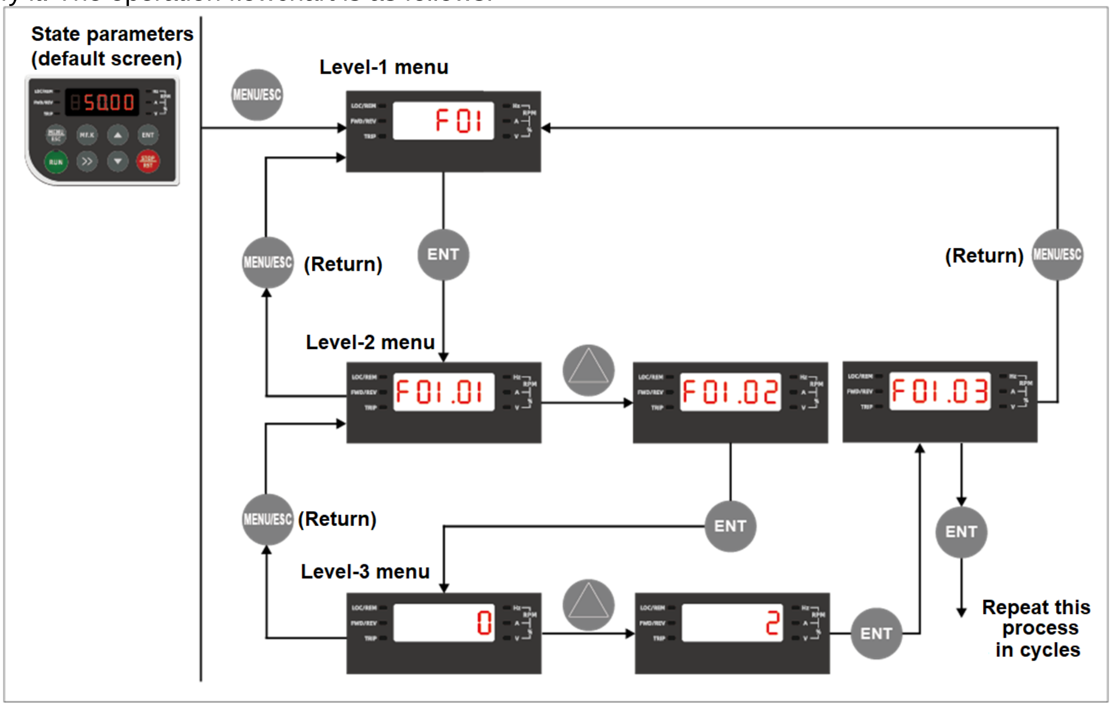
3) The digital tube blinks when the tens of F08.06 Keypad display self-test is set to "1: valid".

4.6 Viewing and Modifying Parameters

4.6.1 Viewing and Modifying General Parameters

The keypad of HV350 inverter is adopted with a 3-level menu for parameter settings. The menu is as follows:

After entering each level of the menu, when the digit is blinking, you can press the UP, DOWN or shift keys to modify it. The operation flowchart is as follows:



4.6.2 32-Bit Display and Operations

If the parameter display value exceeds 5 digits, the digit tube keypad cannot be displayed in its entirety. Therefore, HV350 is developed to support 32-bit displays. The 32-bit parameter display and operation rules are as follows:

1) Positive numbers: When the display value is greater than 99999, the decimal place will be automatically hidden. For example, when a parameter is 1500.00 and its display value 150000 is greater than 99999, 1 decimal place will be hidden and the display value will be 1500.0.

2) Negative numbers: When the display value is less than -9999, the decimal place will be automatically hidden. For example, when a parameter is -1500.00 and its display value -150000 is less than -9999, 2 decimal places will be hidden and the display value will be -1500.

3) When the display value is greater than 99999 or less than -9999, the decimal places of the parameter will be automatically hidden, and the SHIFT key minimally acts on the lowest digit of the current display value. When the display value is less than 99999, or greater than -9999, the decimal places of will be restored automatically, and the SHIFT key minimally acts on the lowest digit of the current display value.

4.6.3 Modifying Parameters through Keypad Arrow Keys

You can press △ (UP key) or ▽ (DOWN key) to modify the parameters, with long-press and short-press acceptable. But this is valid only when the operation/shutdown parameters on the home page are displayed.

Short-press: Shortly press the key, and the lowest digit of the digital tube will add or subtract itself at a rate of about 10 times/second. Release the key, then parameter modification is completed after about 1 second and operation/shutdown parameters are displayed again.

Long-press: Long-press supports automatic carry according to the number of decimal places. For example, if the frequency is 2 decimal places, press ▽ (DOWN key) for several seconds, and the lowest digit decreases 10 times at a rate of about 10 times/second. Then the next lowest digit decreases 10 times at a rate of about 6 times/second, and then the ones place decreases at a rate of about 4 times/second. Release the key and press △ (UP key) or ▽ (DOWN key) again within 1 second, and the above process will be repeated.

“F08.11 Keypad UP/DOWN key parameter resetting” provides decimal parameter settings, excluding F08 group: system parameters, F14 group: user-defined parameters, and read-only parameter group. The parameter modification is only valid when the ones place of “F08.10: Keypad UP/DOWN key function” is set to 4.

Ones: Reset parameters 0: Disabled 1: Digital setting 2: Terminal UP/DOWN 3: PID reference 4: F08.11 reference **Tens: Retention at power failure** 0: Non-retentive at power failure 1: Retentive at power failure **Hundreds: Reserved** **Thousands: Reserved**

F08.10: Keypad UP/DOWN key function

4.6.4 Viewing Version No.

F08.20 is the product model.

F08.21 shows the product version. Enter the level-3 menu of this parameter and press the “>>” key to switch version V, B and D cyclically.

4.6.5 Viewing and Modifying Factory Parameters

The F99 group is the factory parameters. Enter level-2 menu F99.01 (factory password) and press UP, DOWN or ENT key to enter the password for access.

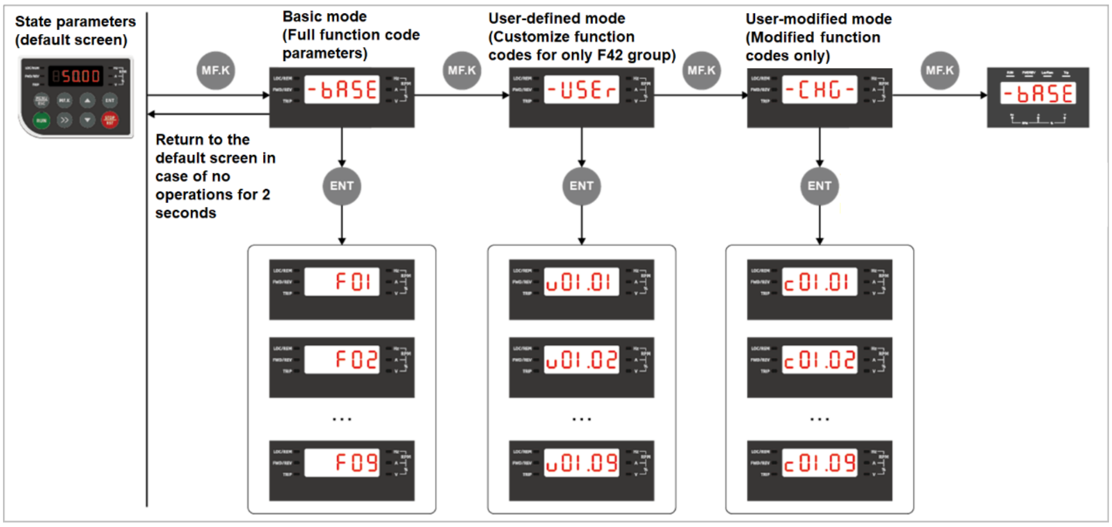
To enter the password, move to the corresponding tube through the SHIFT key, enter the password through UP and DOWN keys and press the ENT key to confirm. If the password is correct, the factory parameter group is available. Otherwise, enter the password again.

4.7 Parameter Composition

Parameter group	Function description	Description
F01~F64	Basic parameter group	Running command, frequency command, motor parameter, control mode, AIAO correction, control optimization, etc.
F80, F82	Monitoring parameter group	Displaying inverter monitoring parameters, i.e., read-only parameters
F90~F99	Factory parameter group	Factory-related parameters. F90~F98 parameter groups are not displayed by default.

4.8 Viewing Parameters

The parameters of HV 350 series inverters can be viewed in three modes, including basic menu mode (default, all parameter groups accessible) and two modes for quick access to parameters (i.e. user-defined menu mode and user-modified menu mode).



As for the user-defined menu above, the parameters are displayed, for example, as "u03.02", indicating the function parameter F03.02. The method for modifying parameters in the user-defined menu mode is the same as that in the basic menu mode.

The display modes and the corresponding display codes of the parameters are as follows:

Parameter display mode	Display	Description
Basic menu mode	-bASE-	Access for all parameters
User-defined menu mode	-USEr-	Access for user-defined parameters
User-modified menu mode	-CHG-	Access for all parameters that differ from factory values

1) Basic viewing mode

The basic parameter group refers to all parameters of the inverter. And the three parameter display modes are switched via the MF.K key. For details about query or modification of the parameters, please refer to Chapter 4.6.1.

2) Quick viewing mode

◆ View user-defined parameters

Press MF.K key to enter the "User-defined menu" mode and view relevant parameters. The user can customize commonly used parameters with a maximum of 36 by setting the parameters of F14 (F14.01 to F14.36) group. If a parameter in F14 group is set to F00.00, it means that no custom parameter has been set. After pressing the MF.K key, if the "u.NULL" is displayed, it indicates that the user-defined menu is empty.

◆View the user-modified parameters

Press the MF.K key on the keypad to enter the "User-modified menu" mode and quickly view the parameters that differ from the factory value. In the user-modified parameter group, parameters that have been modified are automatically listed by the inverter. If "c.NULL" is displayed after the MF.K key is pressed, it means that there are no parameters different from the factory values.

◆ Query state parameters

In the shutdown or running state, press the SHIFT key on the keypad to switch each byte of parameters F08.12, F08.13 and F08.14 to display several state parameters.

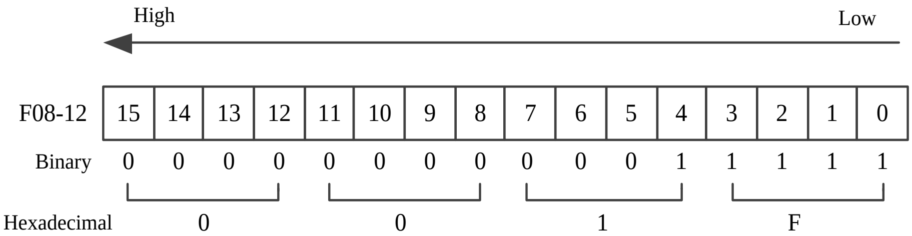
In the running state, there are 32 relevant parameters, and whether the corresponding parameter for each binary bit is displayed is determined by “F08.12: Display parameter 1 in running state” and “F08.13: Display parameter 2 in running state”. In the shutdown state, there are 13 relevant parameters, and whether the corresponding parameter for each binary bit is displayed is determined by “F08.14: Display parameter 1 in shutdown state”.

The parameters in the running state can be viewed via the keypad: operating frequency, bus voltage, output voltage, output current, output power, PID setting.

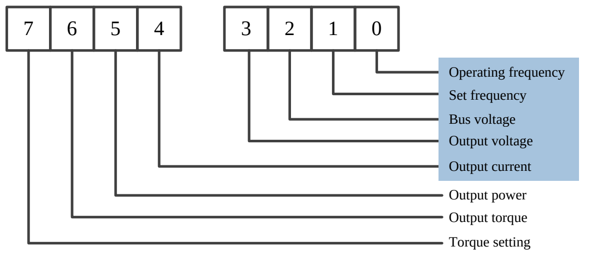
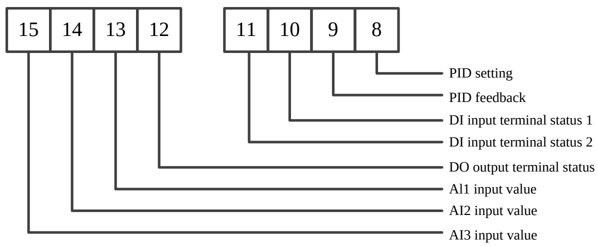
1. Set the corresponding bit to 1 according to the correspondence of each byte in parameter “F08.12: Display parameter 1 in running state” to the above parameters.

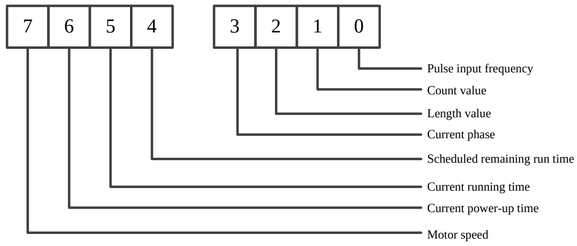
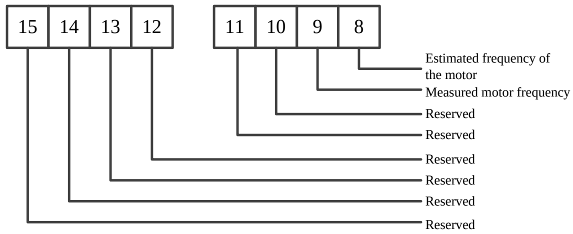
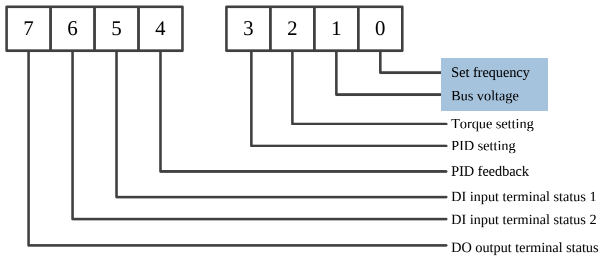
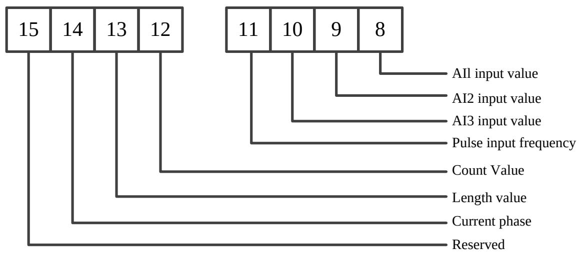
2. Set this binary number to F08.12 after converting it to hexadecimal, and the setting value on the keypad is displayed as H.001F.

3. Use the SHIFT key on the keypad to toggle each byte of F08.12 to view the values of relevant parameters. The settings are shown in the following figure:



The other state parameters are viewed in the same way as F08.12. The state parameters correspond to each byte in F08.12, F08.13 and F08.14 as follows:

Parameter	Definition	Factory value	Setting scope	Description
F08.12	Display parameter 1 in running state	1F	0000~FFFF	If the following parameters are to be displayed during operation, set the corresponding bit to 1, convert the binary number to hexadecimal, and set it to F08.12. Meaning of low-order bits:  Meaning of high-order bits:  Note: The underlined part is the default factory display
F08.13	Display parameter 2 in running state	33	0000~FFFF	If the following parameters are to be displayed during operation, set the corresponding bit to 1, convert the binary number to hexadecimal and set it to F08.13.

Parameter	Definition	Factory value	Setting scope	Description
				Meaning of low-order bits  Meaning of high-order bits 
F08.14	Display parameter 1 in shutdown state	0	0000~FFFF	If the following parameters are to be displayed during shutdown, set the corresponding bit to 1 and convert the binary number to hexadecimal and set it to F08.14 Meaning of low-order bits  Meaning of high-order bits  Note: The underlined part is the default factory display

4.9 Parameter and Key Locking Mode

[F08.02: Parameter and key lock]

0: No locking

The parameters and key locking are invalid.

1: Parameter locked

All parameters are forbidden to be modified (only the preset frequency can be modified by pressing the UP and DOWN keys) and the parameter modification screen is not accessible. With all keys available, the number of parameters to be monitored can be selected through the SHIFT key.

2: Parameters and some keys locked

All parameters are locked and cannot be modified, and the number of parameters to be monitored cannot be selected. And all keys on the keypad except MENU/RUN/STOP are locked.

3: Parameters and all keys locked

All parameters are locked and cannot be modified. All keys on the keypad except MENU are also locked.

[Unlocking]

If “F08.01: User password” is not 0, press the MENU key and the keypad will display "-----". Then press the “>>” SHIFT key, UP and DOWN keys or the ENT key, and the digital tube will display a flickering cursor. Then enter the user password through the UP and DOWN keys and press ENT to confirm. If the password is correct, it will be unlocked.

Then return to the main interface, and it will be automatically locked again. It will also be locked again in case of restart after power failure.

4.10 Parameter Copy

The parameter F08.05 can be used to achieve local parameter backup and recovery.

4.11 Keypad Display Self-Test

In the shutdown state, the ones place of “F08.06: Keypad display self-inspection” is set to "1: Enabled". Then the display self-inspection begins, and both digital tube and indicators are all on and off alternately for about 10s.

4.12 Keypad Priority

The ones place of the parameter “F08.07: Keypad special function” can be used to select the priority of the built-in and external keypads.

If "0" is selected, both built-in and external keypads are enabled.

Both built-in and external keypads are enabled, and the stop/reset command are preferred.

If "1" is selected, the built-in keypad is enabled.

The built-in keypad is enabled, but the external keypad is disabled.

If "2" is selected, the external keypad is enabled.

The external keypad is enabled, but the built-in keypad is disabled.

4.13 Auto Jump to Home Page

4.13.1 No Key Operation

If there are no key operations for more than 5min in a non-home menu, it will automatically jump to the home page, which is controlled by the tens place of “F08.07: Keypad special function”, but it is disabled by default.

4.13.2 Fault or Alarm

If a fault or alarm occurs, it will automatically jump to the home page and the fault code (Exx) or alarm code (Axx) will be displayed.

4.13.3 Power-Down

When the bus voltage falls below the threshold and it is in a power-down state, it will jump to the home page and “P.oFF” will be displayed with the highest priority.

--End of the chapter--

5 Basic Operations and Commissioning

5.1 Quick Commissioning Guide

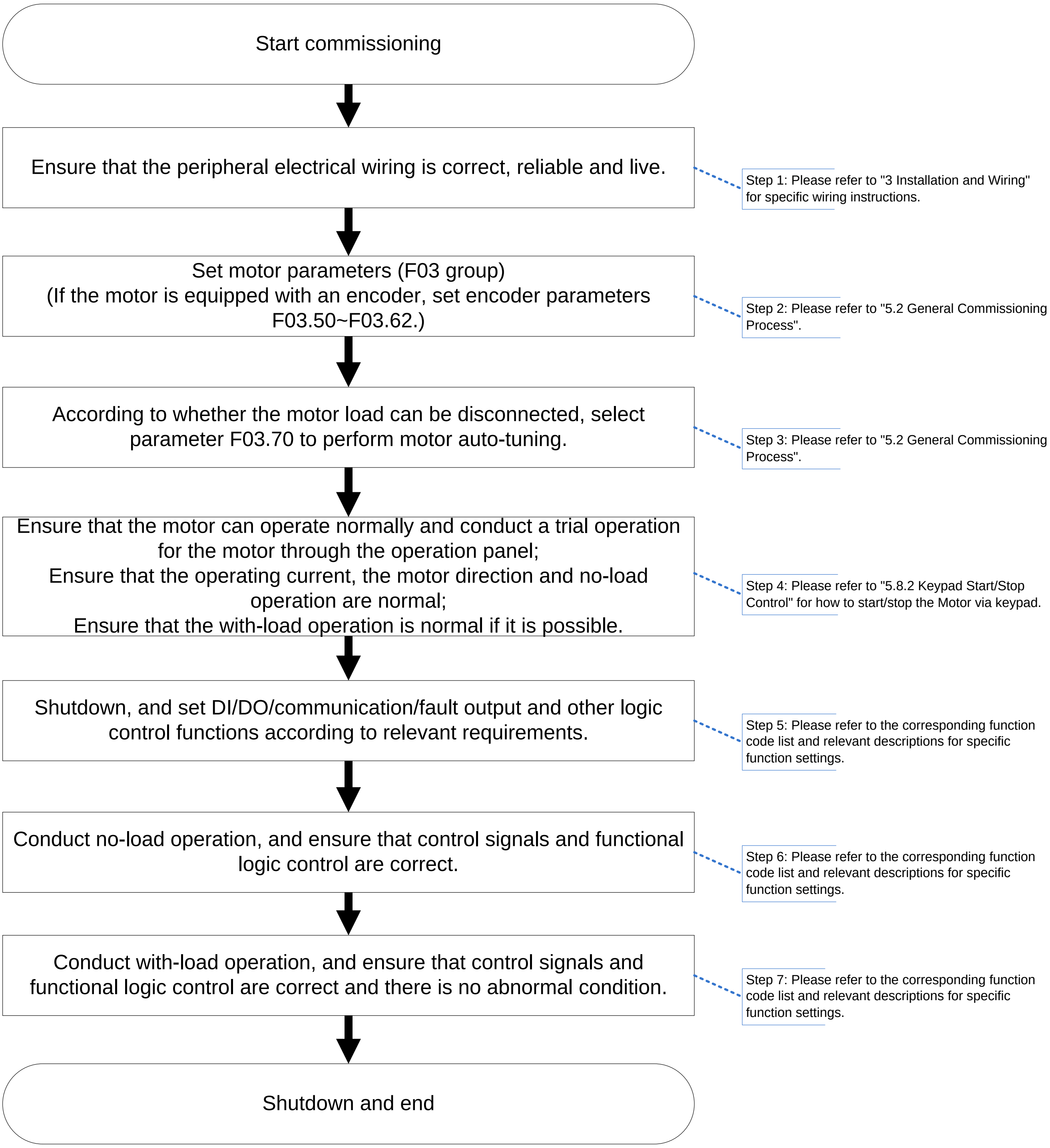


Figure 5-1 Quick commissioning guide

5.2 General Commissioning Process

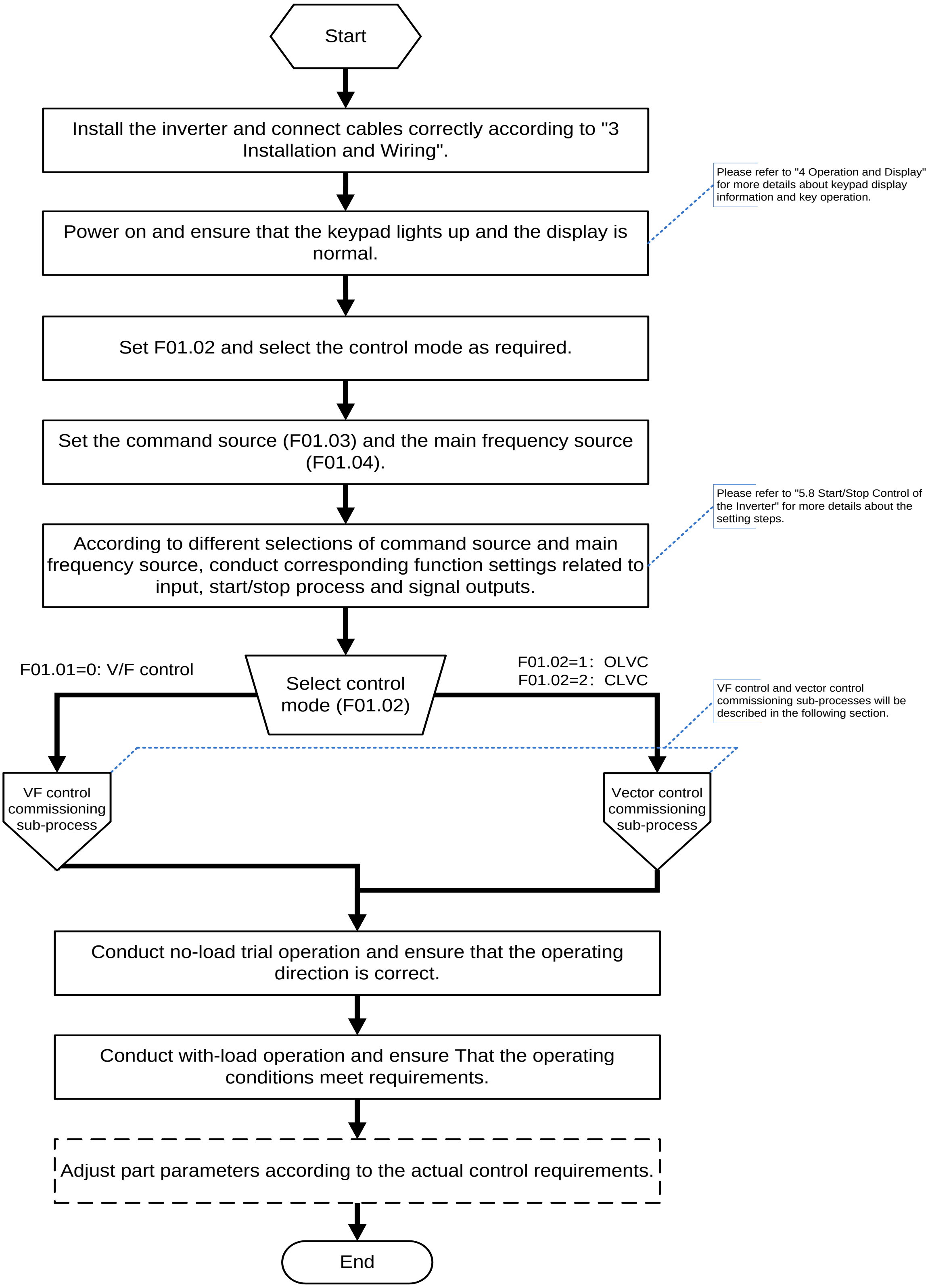


Figure 5-2 General commissioning process

5.3 Checking before Power-On

Please check the following items before power-on.

Check items	Contents
The power voltage	Ensure that the power voltage is correct, i.e. AC380V~480V 50/60Hz.
	Ensure that the power input terminals (L1/L2/L3) are wired reliably.
	Ensure that the inverter and motor are properly grounded.
The connection between the inverter output terminal and motor terminal	Ensure that the connection between the inverter output terminals (U/V/W) and the motor terminals is secure.
The connection with the control circuit terminal of the inverter	Ensure that the connection between the control circuit terminals of the inverter and other control devices is secure.
The status of the inverter control terminals	Ensure that the control circuit terminals of the inverter are all OFF (When the inverter is not running).
The load	Ensure that the motor is in a no-load state and not connected to the mechanical system.

5.4 Checking the Display Status after Power-On

When the power is on, the keypad in the normal status will be displayed as below.

Status	Display	Description
Normal	**50.00**	The factory default display is 50.00Hz.
Abnormal	**E XX**	When a fault occurs, the inverter is in a shutdown state and the fault code is displayed.

5.5 Parameter Initialization

ID	Name	Reference	Default value	Change
F08.03	Parameter initialization	0: No operation 1: Restore default settings (excluding motor parameters) 2: Restore all factory parameters 3: Clear records	0	Changeable only at stop

- When F08.03 is set to 1, most of the functional parameters of the inverter will be restored to factory parameters, except for the motor parameters, fault record, accumulative running time, accumulative power-on time, accumulative fan running time and accumulative power consumption.
- When F08.03 is set to 2, restore the motor parameters on the basis of 1.
- When F08.03 is set to 3, clear the inverter fault record information, accumulative running time, accumulative power-on time, accumulative fan running time, and accumulative power consumption.

5.6 Criteria for Selecting Motor Control Mode

Parameter	Description	Application scenario
F01.02 Motor group 1 control mode	0: V/F control	Suitable for loads with low requirements, such as fans, pumps, etc. and applicable to the scenarios where one inverter drives multiple motors.
	1: Open-loop vector control (OLVC)	Suitable for high-performance control scenarios where one inverter can only drive one motor, such as machine tools, centrifugal machines, wire drawing machines, injection molding machines and other loads.
	2: Closed-loop vector control (CLVC)	Suitable for high-precision speed control or torque control scenarios where one inverter can only drive one motor, such as high-speed paper making machinery, hoisting machinery, elevators, etc. An encoder must be added to the motor and the inverter must be equipped with a PG card of the same type as the encoder.

5.6.1 V/F Control Commissioning Subprocess

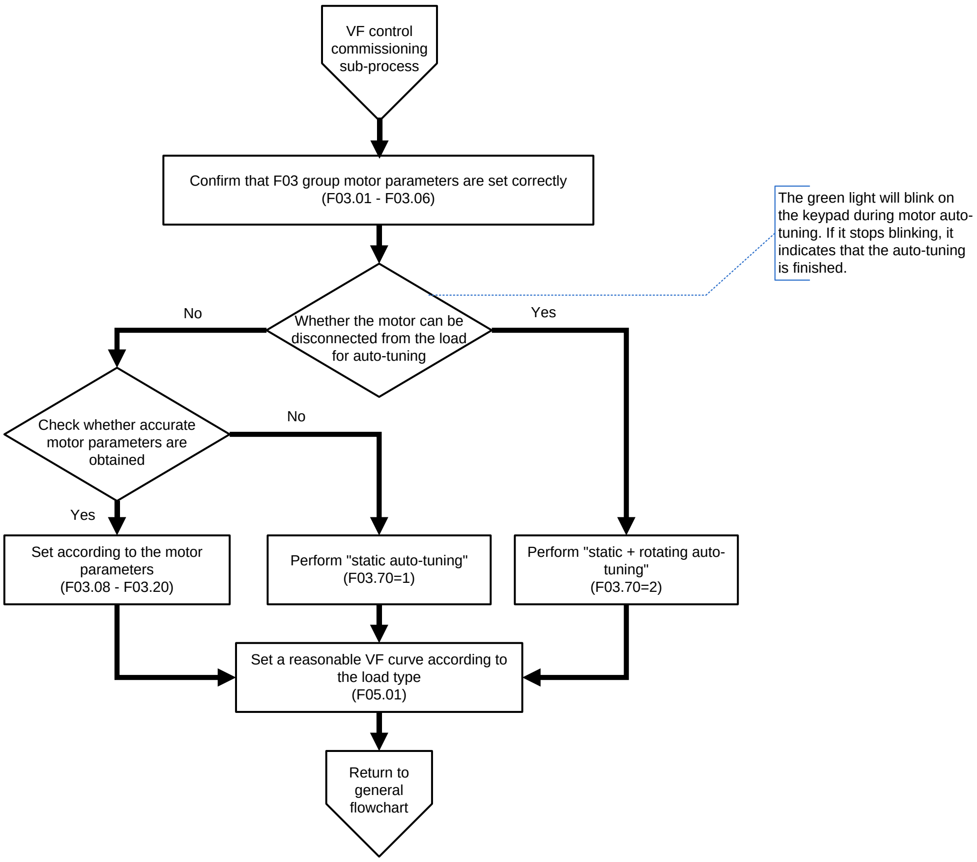


Figure 5-3 VF control commissioning sub-process

5.6.2 Vector Control Commissioning Subprocess

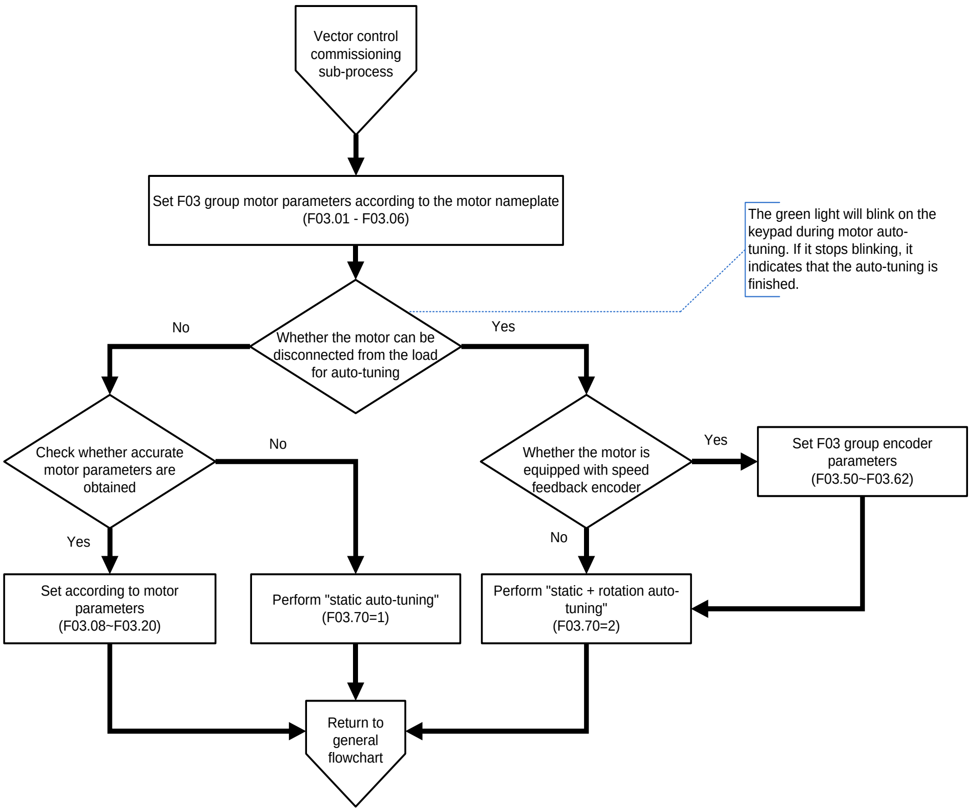


Figure 5-4 Vector control commissioning sub-process

Note: When debugging the closed-loop vector for the first time, it is necessary to set correct encoder parameters before performing rotation auto-tuning. If incorrect parameters are set, "E32 Motor encoder fault" will be reported after the rotation auto-tuning is completed. After replacing or repairing the encoder, please set encoder parameters correctly and perform rotation auto-tuning.

5.7 Main Frequency Source

ID	Name	Reference	Default value	Change
F01.04	Main frequency source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID 8: Communication 9: Terminal UP/DOWN 10: Expansion card (reserved)	0	Changeable only at stop

- **Set F01.04 = 0: Digital setting**

  The initial frequency reference is the preset frequency (F01.11). The value can be changed through “F08.10: Keypad UP/DOWN key function”. For details about parameter retention at power failure and keypad operation scopes, please refer to F08.10.

➢ **Set F01.04 = 1: AI1/ 2: AI2/ 3: AI3**

Table 5-1 AI terminal characteristics

Terminal	Name	Type	Input range
AI1-AGND	Control board analog input terminal 1	Voltage input	DC 0V~10V
		Current input	0mA~20mA
AI2-AGND	Control board analog input terminal 2	Voltage input	DC 0V~10V
		Current input	0mA~20mA
AI3-AGND	IO expansion card analog input terminal	Voltage input	DC -10V~10V
		Current input	0mA~20mA

You can choose voltage input type or current input type for AI via parameter F06.49.

Table 5-2 Step to set AI as main frequency reference

Steps	Related parameters	Description	
Select AI terminal: Select corresponding AI input terminal as the main frequency reference according to the terminal characteristics	F01.04	F01.04=1	AI1 is selected
		F01.04=2	AI2 is selected
		F01.04=3	AI3 is selected
Select AI input type	F06.49	[[0000]~[0011] Ones: AI1 0: Voltage input 1: Current input Tens: AI2 0: Voltage input 1: Current input Hundreds: AI3 (reserved) 0: Voltage input Thousands: Reserved	
Select AI1 voltage and frequency corresponding curve: Choose one from the 5 AI curves	F06.51	Select the AI curve to be used as required	
Select AI1 voltage and frequency corresponding curve: Set the correspondence between the AI1 voltage input and the set reference	F06.52~F06.55	Setting of AI curve 1	Note (1)
	F06.56~F06.59	Setting of AI curve 2	
	F06.60~F06.63	Setting of AI curve 3	
	F06.64~F06.71	Setting of AI curve 4	Note (2)
	F06.72~F06.79	Setting of AI curve 5	

Steps	Related parameters	Description
	F06.50	Select the percentage corresponding to AI input overlimit.
	F01.12	When AI is selected as the main frequency reference, the percentage of 100% corresponding to voltage/current input is relative to “F01.12: Maximum frequency”.
AI filter time	F06.46~06.48	The AI filter time is 0.1s by default. The parameter shall be set according the requirements for fast response and interference of on-site signals. For scenarios requiring fast response, the value of the parameter shall be reduced; for scenarios with strong signal interference, the value shall be increased.

Note (1):

AI curve minimum input: This parameter defines the signal accepted by the AI terminal. Voltage signals below this value will be processed by the inverter as the AI lower limit.

Percentage corresponding to AI curve minimum input: This parameter is used to set the percentage corresponding to the AI lower limit.

AI curve maximum input: This parameter defines the signal accepted by the AI terminal. Voltage signals exceeding this value will be processed by the inverter as the AI upper limit.

Percentage corresponding to AI curve maximum input: This parameter is used to set the percentage corresponding to the AI upper limit.

Note (2):

AI curve 4 and AI curve 5 can be set with two inflexions and divided into three straight lines. With the slope of each line varying, the correspondence relationship can be more flexible. See the figure below for details:

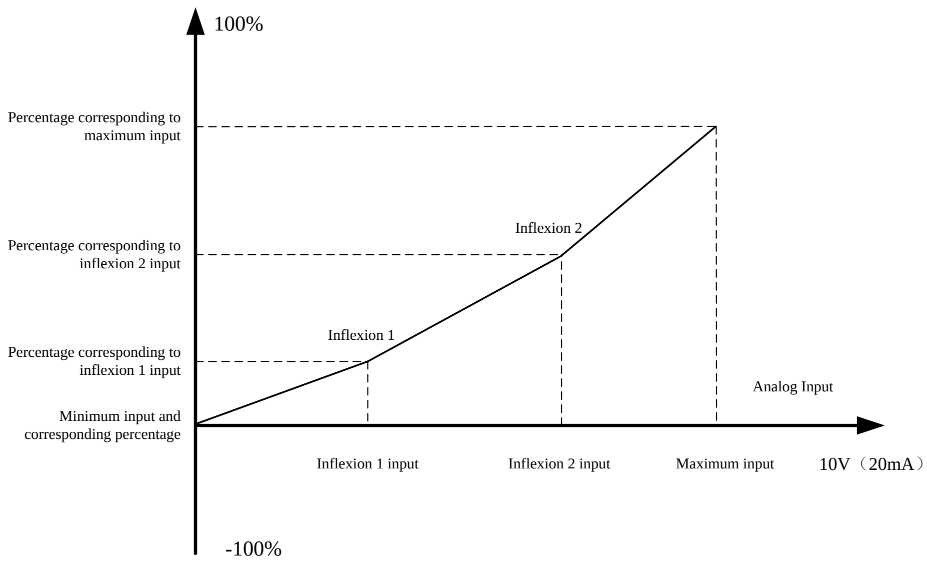


Figure 5-5 AI multi-inflexion curve

If AI curve 4 or AI curve 5 are chosen for AI1 and AI2, the input should be voltage with the current twice the voltage, e.g. 4mA corresponds to 2V, 20mA corresponds to 2V.

- **Set F01.04 = 4: Pulse reference (DI5)**

DI5 high-speed pulse reference is selected as the frequency reference.
Frequency range: 0kHz - 100kHz.

Table 5-3 Steps to set pulse input (DI5) as main frequency reference

Step	Related parameters	Description
Select pulse input (DI5) as the main frequency reference	F01.04 F06.05	If setting F01.04=4, it means that “4: Pulse reference” is selected for “F01.04: Main frequency source”. If setting F06.05=56, it means that “56: Pulse input” is selected for “F06.05: DI5 input function”.
Set the relation curve of the pulse frequency corresponding to the set frequency	F06.40~F06.43	Pulse input curve
	F01.12	When the digital pulse is selected as the frequency reference, the percentage of 100% is corresponding to “F01.12: Maximum frequency”.
Set the pulse filter time	F06.44	Set the pulse input filter time.

- **Set F01.04 = 5: Multi-reference**

When multi-reference is selected as the main frequency source, the frequency reference is set via the on-off of terminal DI.

Table 5-4 Steps to set multi-reference as main frequency reference

<table>
<tr><th>Step</th><th>Related parameters</th><th colspan="2">Description</th></tr>
<tr><td>Select multi-reference as the main frequency source</td><td>F01.04</td><td colspan="2">F01.04=5</td></tr>
<tr><td>Determine the number of segments required</td><td>/</td><td colspan="2">Up to 16 speed segments are supported, and 4 DI terminals are needed. The corresponding relationship between the number of segments and that of the DI terminals is as follows:
2 speed segments: 1 DI terminal
3-4 speed segments: 2 DI terminals
5-8 speed segments: 3 DI terminals
9-16 speed segments: 4 DI terminals</td></tr>
<tr><td rowspan="4">Set multi-speed reference function for DI input terminals</td><td rowspan="4">F06.01~F06.10</td><td>Multi-speed reference terminal 1</td><td>Set to 38</td></tr>
<tr><td>Multi-speed reference terminal 2</td><td>Set to 39</td></tr>
<tr><td>Multi-speed reference terminal 3</td><td>Set to 40</td></tr>
<tr><td>Multi-speed reference terminal 4</td><td>Set to 41</td></tr>
<tr><td rowspan="2">Set the frequency corresponding to each speed segment</td><td>F13.01~F13.16</td><td colspan="2">Set the frequency corresponding to each speed segment in percentage, with the percentage of 100% corresponding to “F01.12: Maximum frequency”.</td></tr>
<tr><td>F13.53~F13.68</td><td colspan="2">When multi-reference is selected as the main frequency source, the percentage of 100.0% of parameter F13.01~F13.16 corresponds to “F01.12: Maximum frequency”.</td></tr>
</table>

The on-off of 4 multi-speed reference terminals can combined into 16 different states with corresponding multi-speed segment, as shown in the figure below.

Table 5-5 Terminal combinations for multi-speed reference

DI terminal 4	DI terminal 3	DI terminal 2	DI terminal 1	Multi-speed segment setting	Correspond to parameters
OFF	OFF	OFF	OFF	Multi-speed segment 1	F13.01
OFF	OFF	OFF	ON	Multi-speed segment 2	F13.02
OFF	OFF	ON	OFF	Multi-speed segment 3	F13.03
OFF	OFF	ON	ON	Multi-speed segment 4	F13.04
OFF	ON	OFF	OFF	Multi-speed segment 5	F13.05
OFF	ON	OFF	ON	Multi-speed segment 6	F13.06
OFF	ON	ON	OFF	Multi-speed segment 7	F13.07
OFF	ON	ON	ON	Multi-speed segment 8	F13.08
ON	OFF	OFF	OFF	Multi-speed segment 9	F13.09
ON	OFF	OFF	ON	Multi-speed segment 10	F13.10
ON	OFF	ON	OFF	Multi-speed segment 11	F13.11
ON	OFF	ON	ON	Multi-speed segment 12	F13.12
ON	ON	OFF	OFF	Multi-speed segment 13	F13.13
ON	ON	OFF	ON	Multi-speed segment 14	F13.14
ON	ON	ON	OFF	Multi-speed segment 15	F13.15
ON	ON	ON	ON	Multi-speed segment 16	F13.16

➢ **Set F01.04 = 6: Simple PLC**

When simple PLC is selected as the main frequency source, parameters F13.01~F13.16 need to be set (You can refer to above descriptions when F01.04=5: Multi-reference for more details). And the running time and acceleration/deceleration time of each PLC reference can be set via F13.21~F13.52.

Table 5-6 Steps to set simple PLC as main frequency reference

Step	Related parameters	Description
Select the simple PLC as the main frequency source	F01.04	F01.04=6
Determine the number of segments required	/	Up to 16 speed segments are supported
Set the frequency corresponding to each speed segment	F13.01~F13.16	Set the frequency corresponding to each speed segment in percentage, with the percentage of 100% corresponding to “F01.12: Maximum frequency”.
	F01.12	When simple PLC is selected as the main frequency source, the percentage of 100.0% of parameter F13.01~F13.16 corresponds to “F01.12: Maximum frequency”.
Set the running time and acceleration/deceleration time of each PLC reference	F13.21~F13.52 F13.20	The running time units support second (default), minute and hour, which can be modified via F13.20.

Step	Related parameters	Description	
Set simple PLC running mode	F13.17	0: Stop after running for one cycle	The inverter will stop automatically after running for one cycle, and it will only restart after a new running command is received.
		1: Keep final values after running for one cycle	The inverter will keep the operating frequency and direction of the last segment automatically after running for one cycle, and it will start from the PLC initial state after restarting.
		2: Repeat after running for one cycle	The inverter will start the next cycle automatically after running for one cycle, and it will only stop after a stop command is received.
Set simple PLC memory retention upon power failure	F13.19	0: Non-retentive upon power failure	The PLC process will restart upon each power-on.
		1: Retentive upon power failure	The PLC operating stage and operating frequency before power failure will be retained, and the inverter will continue running from the operating stage at the next power-on.
Set the start-up method	F13.18	0: Re-run from the first stage	The PLC process will restart every time the inverter restarts after interruption.
		1: Continue running with the stage frequency at the moment of interruption	The previous operating stage and operating time before interruption will be retained, and the inverter will continue running from the operating stage at the next power-on.
		2: Continue running with the operating frequency at the moment of interruption	The previous operating stage, operating frequency and remaining time before interruption will be retained, and the inverter will continue running from the operating frequency at the next power-on.

➢ **Set F01.04 = 7: PID**

PID control is commonly used in process control. By performing proportional, integral and differential operations on the difference between the feedback signal of the controlled variable and the target signal, a closed-loop system is formed by adjusting the output frequency of the inverter to stabilize the controlled variable at the target value. Generally, the output of the PID control is selected as the operating frequency for on-site process closed-loop control, such as constant pressure closed-loop control, constant tension closed-loop control, and etc.

Table 5-7 Steps to set PID as main frequency source

Steps	Related parameters	Description	
Select the PID as the main frequency source	F01.04	F01.04=7	
Set PID reference source	F11.01	Select PID reference channel	
Set PID feedback source	F11.04	Select PID feedback channel	
Set PID reference	F11.02	This parameter needs to be set when F11.01 is set to “0: Digital setting”. The percentage of 100% corresponds to the maximum feedback value.	
Set PID action direction	F11.09	Forward	If the feedback value is less than the PID reference, the output frequency increases.

Steps	Related parameters	Description	
		Reverse	If the feedback value is less than the PID reference, the output frequency decreases.
Set PID output upper/lower limit	F11.20 F11.21	Set the minimum and maximum value of PID output in percentage, with the percentage of 100% corresponding to F01.12 Maximum frequency.	

The above are settings of main parameters related to PID. See Chapter 6.2.11 for specific parameter codes.

➢ **Set F01.04 = 8: Communication**

The HV350 supports the Modbus-RTU communication protocol (standard configuration). Different communication methods can be set via F01.27 as shown in the table below.

Table 5-8 Steps to set communication as main frequency source

Steps	Related parameters	Description
Select communication as the main frequency source	F01.04	F01.04=8
Select communication protocol	F01.27	[0000]~[0011] Ones: Communication protocol 0: Modbus communication protocol (RTU/ASCII) 1: Fieldbus communication protocol

5.8 Start/Stop Control of the Inverter

5.8.1 Start/Stop Signal Source Selection

Before running, please set relevant motor parameters:

Parameter ID	Name	Reference	Default value	Change
F03.01	Motor type	0: Asynchronous motor	0	Changeable only at stop
F03.02	Rated motor power	0.00kW~30000.00kW	Model dependent	Changeable only at stop
F03.03	Rated motor voltage	0V~30000V	Model dependent	Changeable only at stop
F03.04	Rated motor current	0.00A ~30000.00A	Model dependent	Changeable only at stop
F03.05	Rated motor frequency	0.00Hz~600.00Hz	Model dependent	Changeable only at stop
F03.06	Rated motor speed	0.0RPM~36000.0RPM	Model dependent	Changeable only at stop

There are 2 sources for the start/stop control commands of the inverter, namely local control and remote control (terminal control and communication control), which can be selected through the LOC/REM keys on the keyboard.

	Keypad indicator	Description
MF.K	Local: LOC	Can be controlled only by keypad
	Remote: REM	Can be controlled by terminal and communications

5.8.2 Keypad Start/Stop Control

When the LOC/REW indicator light on the keyboard is off, it indicates that the keyboard is in start/stop control mode. By pressing the RUN key, the green light above the RUN key will be on and the inverter will start to run; by pressing the STOP key, the green light above the RUN key will be off and the inverter will stop running.

5.8.3 Terminal Start/Stop Control

➢ **Two-wire control mode 1: F06.35 = 0**

Two-wire mode is the most commonly used mode. Terminals DI1 and DI2 can be set to determine the forward run or reverse run of the motor. You can refer to the table below for relevant settings:

F06.35	Terminal control mode	0: Two-wire mode 1
F06.01	DI1 input function	1: Forward run
F06.02	DI2 input function	2: Reverse run

K1	K2	Run command
1	0	Forward run
0	1	Reverse run
1	1	Stop
0	0	Stop

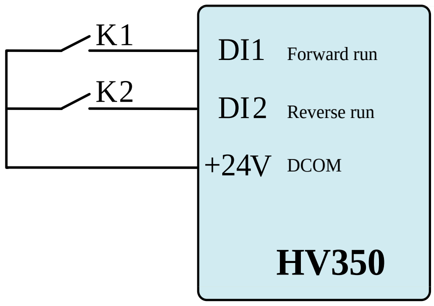


Figure 5-6 Two-wire mode 1

- **Two-wire mode 2: F06.35 = 1**

In this mode, DI1 is set to running enable, and DI2 is set to forward/reverse run. You can refer to the table below for relevant settings:

F06.35	Terminal control mode	1: Two-wire mode 2
F06.01	DI1 input function	1: Running enable
F06.02	DI2 input function	2: Reverse run

K1	K2	Run command
1	0	Forward run
1	1	Reverse run
0	0	Stop
0	1	Stop

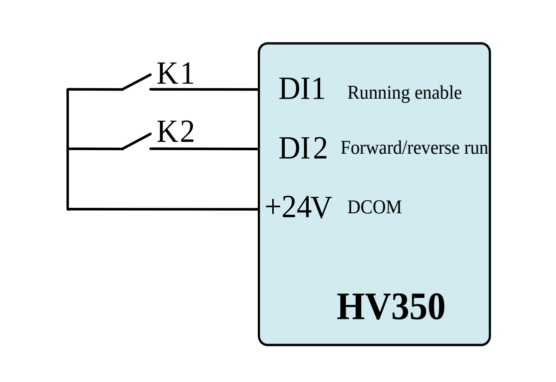


Figure 5-7 Two-wire mode 2

- **Three-wire mode 1: F06.35 = 2**

In this mode, DI3 is set to three-wire control (running enable), DI2 is set to reverse run and DI1 is set to forward run. You can refer to the table below for relevant settings:

F06.35	Terminal control mode	2: Three-wire mode 1
F06.01	DI1 input function	1: Forward run
F06.02	DI2 input function	2: Reverse run
F06.03	DI3 input function	3: Three-wire control

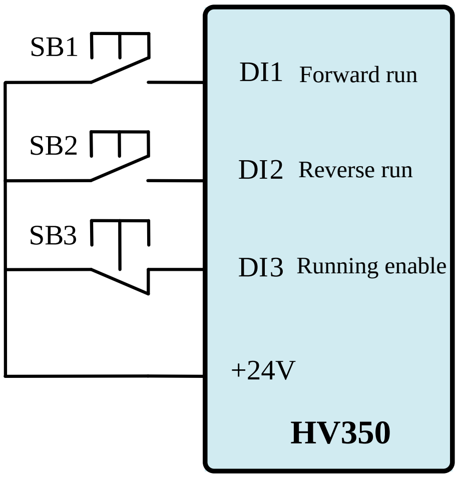


Figure 5-8 Three-wire mode 1

➢ **Three-wire mode 2: F06.35 = 3**

In this mode, DI3 is set to three-wire control (stop running), the running command is given by DI1, and the direction is determined by DI2. You can refer to the table below for relevant settings:

F06.35	Terminal control mode	3: Three-wire mode 2
F06.01	DI1 input function	6: Running enable
F06.02	DI2 input function	1/2: Forward/reverse run
F06.03	DI3 input function	3: Three-wire control

K	Run command
0	Forward run
1	Reverse run

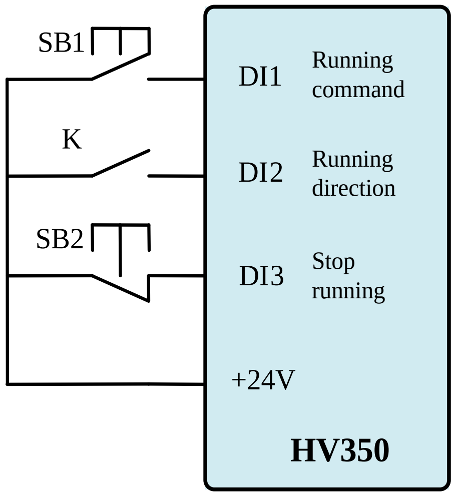


Figure 5-9 Three-wire mode 2

5.8.4 Communication Start/Stop Control

The running command is given by the upper computer through communication method. The HV350 supports the Modbus-RTU communication protocol. Different communication methods can be set via F01.27, as shown in the table below.

Step	**Related parameters**	**Description**
Select “2: Communication” for command source	F01.03	F01.03=2
Select “8: Communication” for main frequency source	F01.04	F01.04=8
Select communication protocol	F01.27	F01.27=0: Modbus communication protocol (RTU/ASCII) F01.27=1: Fieldbus communication protocol

5.9 Startup Process Settings

5.9.1 Startup Mode Selection

F02.01	Startup mode		Default value	0
	Reference	0	Direct start	
		1	DC braking start	
		2	Speed tracking start	

- **0: Direct start**

The startup of the inverter is controlled by parameters “F02.05: Start frequency” and “F02.06: Start frequency hold time”. This mode is applicable to scenarios requiring large static friction torque and small load inertia, or to those with external mechanical braking equipment which enables the motor shaft to remain stationary before restarting after the motor has stopped.

- **1: DC braking start**

In this mode, the load motor obtains a certain DC braking energy (i.e. electromagnetic brake) through parameters “F02.07: DC braking current at startup” and “F02.08: DC braking time at startup” and starts with the start frequency. This mode is applicable to scenarios with small inertia loads, that is, with forward or reverse running in shutdown state.

- **2: Speed tracking start**

The inverter first detects the speed and direction of the motor and then start running at the detected speed to reach the frequency reference according to the acceleration/deceleration time.

5.9.2 Start Frequency

F02.05	Start frequency	Default value	0.00Hz
	Reference	0.00Hz~10.00Hz	
F02.06	Startup frequency hold time	Default value	0.0s
	Reference	0.0s~320.0s	

Please set a suitable start frequency to ensure that the motor torque at startup is maintained. In order to fully establish the flux when the motor starts, the start frequency needs to be maintained for a certain period of time.

“F02.05: Start frequency” is not limited by the frequency lower limit. However, if the target frequency is set less than the start frequency, the inverter won’t start and will be in standby mode.

5.10 Stop Process Settings

5.10.1 Stop Mode Selection

F02.11	Stop mode	Default value	0
	Reference	0	Decelerate to stop
		1	Coast to stop

- **0: Deceleration stop**

In this mode, the inverter decelerates according to the set time and mode and stops output when it reaches the stop speed. During deceleration to stop, when the output frequency is less than “F02.12: Start frequency of DC braking at stop”, the inverter output frequency will jump to zero and stops working after carrying out DC braking. Otherwise, the inverter will stop working after decelerating to the minimum output frequency.

During deceleration to stop, for machines with built-in braking unit, an external braking resistor (optional) can be connected. When the DC bus voltage exceeds “F02.32: Braking unit action voltage”, the inverter starts braking with energy consumption.

Machines without a built-in braking unit can be equipped with an optional external braking unit and braking resistor. This mode is mainly used when quick braking is required during shutdown.

- **1: Coast to stop**

The inverter stops output once it receives the stop command and the motor coasts to stop. This mode is mainly used together with an external mechanical brake to realize quick stop.

Note: In the jog mode, only deceleration to stop can be applied.

5.10.2 DC Braking at Stop

ID	Name	Reference	Default value	Change
F02.12	Start frequency of DC braking at stop	0.00Hz~600.00Hz	0.00Hz	Changeable at any time
F02.13	DC braking delay at stop	0.0s~3200.0s	0.0s	Changeable at any time
F02.14	DC braking current at stop	0.0%~300.0%	50.0%	Changeable at any time
F02.15	DC braking time at stop	0.0s~3200.0s	0.0s	Changeable at any time

➢ **Start frequency of DC braking at stop**

When the inverter decelerates to the start frequency of DC braking at stop, it will stop output and starts DC braking. During shutdown, when the output frequency is less than start frequency of DC braking at stop, the DC braking function is enabled.

During the deceleration to stop, when the frequency reference is less than the start frequency of DC braking at stop, DC braking is enabled and the inverter output frequency jumps to zero. If the operating conditions do not have strict requirements for braking at stop, the start frequency of DC braking at stop should be set as low as possible.

➢ **DC braking delay at stop**

DC braking delay at stop refers to the delay between the inverter stops output and starts DC braking. This time is used for the motor to demagnetize to prevent overcurrent caused by high speeds during DC braking.

➢ **DC braking current at stop**

DC braking current at stop refers to the amount of braking current sent by the inverter to the motor during DC braking with 100% corresponding to motor rated current. Inside the inverter, the DC braking current should not exceed 80% of the rated current.

DC braking provides zero speed torque. It is normally used to improve shutdown accuracy and speed. However, it cannot be used for deceleration braking during normal operation. That is, the inverter stops output once DC braking starts. If the DC braking current is set too large, the inverter is prone to overcurrent when shutting down. If this parameter is set to 0, DC braking is disabled.

➢ **DC braking time at stop**

DC braking time at stop refers to the duration of the DC braking current during shutting down. There is no DC braking when the braking time is 0.0 second, that is, DC braking is disabled.

When both DC braking and short-circuit braking are enabled, the inverter will carry out short-circuit braking and then DC braking.

5.11 Motor Auto-Tuning

The inverter can obtain the internal electrical parameters of the controlled motor in the following ways: static auto-tuning, rotating auto-tuning, static auto-tuning + rotating auto-tuning, inertia auto-tuning, etc.

Tuning mode	Applicable scenario	Tuning effect
Static auto-tuning F03.70=1	For scenarios where the motor is hard to disconnect from the load and dynamic tuning is not allowed.	★★
Static auto-tuning + rotating auto-tuning F03.70=2	For scenarios where the motor is easy to disconnect from the application system and the motor must be in the no-load status.	★★★★★
Rotating auto-tuning F03.70=3	For scenarios where the motor is easy to disconnect from the application system and the motor must be in the no-load status.	★★★

Tuning mode	Applicable scenario	Tuning effect
Inertia auto-tuning F03.70=4	For scenarios where the motor is easy to disconnect from the application system and the motor must be in the no-load status.	★★★★

The steps of motor parameter auto-tuning are as follows:

The auto-tuning method for motor 1 is described as below, and the auto-tuning method for motor 2 is similar, but the parameter number needs to be changed accordingly.

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

Step 2: After power-on, select the "F01.03: Command source" as keypad.

Step 3: Enter the nameplate parameters (such as F03.01~ F03.06) of the motor correctly, and input the following parameters according to the actual motor parameters (selected according to the current motor):

Motor	Parameter	
Motor 1	F03.01: Motor type F03.03: Rated motor voltage F03.05: Rated motor frequency	F03.02: Rated motor power F03.04: Rated motor current F03.06: Rated motor speed
Motor 2	F17.01~F17.06: the same as above definitions	

If there is an encoder, enter the encoder parameters (F03.50~F03.54).

Step 4: Select motor parameter auto-tuning mode via parameter F03.70 according to current load conditions. Generally, "2: Static auto-tuning + rotating auto-tuning" is selected if the motor can be completely disconnected from the load and the motor is allowed to rotate. Then press the RUN key on the keypad. After that, the inverter will drive the motor to accelerate/decelerate and forward/reverse run, the operating indicator will be on, and the auto-tuning will last 1~2 minutes. When the motor stops, if the keypad returns to the normal parameter display state, it indicates that the auto-tuning is completed.

After complete auto-tuning, the inverter will automatically calculate the following parameters of the motor:

Motor	Parameter
Motor 1	F03.08: Asynchronous motor stator resistance F03.09: Asynchronous motor rotor resistance F03.10: Asynchronous motor stator leakage inductance F03.11: Asynchronous motor rotor leakage inductance F03.12: Asynchronous motor mutual inductance F03.13: Asynchronous motor no-load current
Motor 2	F17.08~F17.13: Same as above definition

If the motor can't be completely disconnected from the load, select 1 Static auto-tuning or manually enter the above parameters, and press the RUN key, then the motor parameter will start auto-tuning (The motor during static auto-tuning will not rotate).

--End of the chapter--

6.1 Parameter Description

ID	Group number and index number of parameters
Name	Description and simple definition of parameters
Reference	Value range for parameter setting with [XXXX] indicating hexadecimal system
Default value	Default value set by the factory
Change	Parameter properties and when and whether they can be modified which are often in the following forms: ● Unchangeable: You can only read the parameters; ● Changeable only at stop: You can read and write parameters but can only change them in shutdown state. ● Changeable at any time: You can read and write parameters and change them at any time.

6.2 List of Parameters

6.2.1 F01 Group: Standard Function Parameters

Parameter ID	Name	Reference	Default value	Change
F01.01	Type G/P	0: Type G 1: Type P	0	Changeable only at stop
F01.02	Motor group 1 control mode	0: V/F control 1: Open-loop vector control (OLVC) 2: Closed-loop vector control (CLVC)	0	Changeable only at stop
F01.03	Command source	0: Keypad/background 1: Terminal 2: Communication 3: Expansion card (reserved)	0	Changeable at any time
F01.04	Main frequency source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID 8: Communication 9: Terminal UP/DOWN 10: Expansion card (reserved)	0	Changeable only at stop
F01.05	Auxiliary frequency source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		8: Communication 9: Terminal UP/DOWN 10: Expansion card (reserved)		
F01.06	Base value of range of auxiliary frequency source for superposition	0: Relative to maximum frequency 1: Relative to main frequency source	0	Changeable only at stop
F01.07	Range of auxiliary frequency source for superposition	0.0-150.0%	100%	Changeable at any time
F01.08	Offset frequency at superposition	0.00Hz-F01.12	0.00Hz	Changeable at any time
F01.09	Frequency source superposition	0: Main 1: Auxiliary 2: Main + Auxiliary 3: Main - Auxiliary 4: Max (main, auxiliary) 5: Min (main, auxiliary)	0	Changeable at any time
F01.10	Frequency source bound to command source	[0000]-[AAAA] Ones: Frequency source bound to keypad control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN 11: Expansion card (reserved) Tens: Frequency source bound to terminal control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN 11: Expansion card (reserved) Hundreds: Frequency source bound to communication control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		11: Expansion card (reserved) Thousands: Reserved		
F01.11	Frequency of digital setting	0.00Hz- F01.12	50.00Hz	Changeable at any time
F01.12	Maximum frequency	50.00-600.00Hz	50.00Hz	Changeable only at stop
F01.13	Source of frequency upper limit	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: Expansion card (reserved)	0	Changeable only at stop
F01.14	Frequency upper limit	F01.16-F01.12	50.00Hz	Changeable at any time
F01.15	Frequency upper limit offset	0.00Hz- F01.12	0.00 Hz	Changeable at any time
F01.16	Frequency lower limit	0.00Hz-F01.14	0.00 Hz	Changeable at any time
F01.17	Action when frequency reference below frequency lower limit	0: Run at frequency lower limit 1: Shutdown 2: Run at zero speed	0	Changeable at any time
F01.18	Carrier frequency	Model dependent	Model dependent	Changeable at any time
F01.19	Carrier frequency adjusted with temperature	0: Disabled 1: Enabled	1	Changeable at any time
F01.20	Acceleration/Deceleration time base frequency	0: Maximum frequency 1: Frequency reference 2: 100.00Hz	0	Changeable only at stop
F01.21	Acceleration/Deceleration time unit	0: s (second) 1: m (minute)	0	Changeable only at stop
F01.22	Acceleration time 1	0.0sec/min-3200.0sec/min	Model dependent	Changeable only at stop
F01.23	Deceleration time 1	0.0sec/min-3200.0sec/min	Model dependent	Changeable only at stop
F01.24	Running direction	[0000]-[1121] Ones: Running direction (Keypad) 0: Forward run 1: Reverse run Tens: Direction inhibition 0: Disabled 1: Reverse run inhibited 2. Forward run inhibited Hundreds: Reserved Thousands digit: Reserved	[0000]	Changeable at any time
F01.25	Output phase sequence reverse	0: Disabled 1: Enabled	0	Changeable only at stop
F01.26	Motor parameter group	0: Group 1 1: Group 2	0	Changeable only at stop
F01.27	Communication control	[0000]-[0011] Ones: Communication protocol 0: Modbus communication protocol (RTU/ASCII) 1: Fieldbus communication protocol Tens: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Hundreds: Reserved Thousands: Reserved	[0000]	Changeable only at stop

6.2.2 F02 Group: Start/Stop Control Parameters

Parameter ID	Name	Reference	Default value	Change
F02.01	Startup mode	0: Direct start 1: DC braking start 2: Speed tracking start	0	Changeable at any time
F02.02	Speed tracking mode	0: From the stop frequency 1: From the power frequency 2: From the maximum frequency	2	Changeable only at stop
F02.03	Speed tracking current settings	10.0%-200.0%	100.0%	Changeable at any time
F02.04	Speed tracking search coefficient	10.0%-1000.0%	100.0%	Changeable at any time
F02.05	Start frequency	0.00Hz-10.00Hz	0.00 Hz	Changeable at any time
F02.06	Startup frequency hold time	0.0s-320.0s	0.00s	Changeable only at stop
F02.07	DC braking current at startup	0.0% to 300.0% (percentage relative to the rated current of the motor)	50.0%	Changeable only at stop
F02.08	DC braking time at startup	0.0s-3200.0s	0.0s	Changeable only at stop
F02.09	Pre-excitation current	0.0%-100.0%	50.0%	Changeable only at stop
F02.10	Pre-excitation time	0.0s-100.0s	0.0s	Changeable only at stop
F02.11	Stop mode	0: Decelerate to stop 1: Coast to stop	0	Changeable at any time
F02.12	Start frequency of DC braking at stop	0.00Hz-600.00Hz	0.00 Hz	Changeable at any time
F02.13	DC braking delay at stop	0.0s-3200.0s	0.0s	Changeable at any time
F02.14	DC braking current at stop	0.0%-300.0%	50.0%	Changeable at any time
F02.15	DC braking time at stop	0.0s-3200.0s	0.0s	Changeable at any time
F02.16	Acceleration/Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration	0	Changeable only at stop
F02.17	Time proportion of S-curve at start of acceleration	1.0%-100.0%	30.0%	Changeable only at stop
F02.18	Time proportion of S-curve at end of acceleration	1.0%-100.0%	30.0%	Changeable only at stop
F02.19	Time proportion of S-curve at start of deceleration	1.0%-100.0%	30.0%	Changeable only at stop
F02.20	Time proportion of S-curve at end of deceleration	1.0%-100.0%	30.0%	Changeable only at stop
F02.21	Switchover between forward and reverse run	0: Switch over zero frequency 1: Switch over startup frequency	0	Changeable only at stop
F02.22	Forward and reverse deadzone time	0.0s-3200.0s	0.0s	Changeable at any time
F02.23	Stop speed	0.00Hz-600.00Hz	0.50 Hz	Changeable only at stop
F02.24	Stop speed detection mode	0: Detect by the speed set value or the speed feedback value 1: Detect by the speed feedback value	0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F02.25	Detect time by speed set value	0.00s-320.00s	0.05s	Changeable only at stop
F02.26	Detect time by speed feedback value	0.00s-320.00s	0.50s	Changeable only at stop
F02.27	Fan control mode	0: Working always 1: Working automatically 2: Working during inverter running	2	Changeable at any time
F02.30	Fan stop delay time	0.0s-3200.0s	60.0s	Changeable at any time
F02.31	Braking unit enable	Model dependent	0	Changeable only at stop
F02.32	Braking unit action voltage	Model dependent	Model dependent	Changeable only at stop
F02.33	Braking usage	0.0%-100.0%	50.0%	Changeable at any time
F02.35	Overexcitation enable	0: Disabled 1: Enabled during deceleration 2: Enabled always	0	Changeable at any time
F02.36	Overexcitation suppression current	0%-300.0%	100.0%	Changeable at any time
F02.37	Overexcitation gain	100%-300.0%	125.0%	Changeable at any time
F02.38	Position lock start frequency	0.01Hz-600.00Hz	0.10Hz	Changeable at any time
F02.39	Position lock gain	0.0-100.0	25.0	Changeable at any time
F02.40	Position lock end amplitude	0-30000	600	Changeable at any time
F02.41	Startup protection	[0000]-[0011] Ones: Power-On protection 0: Disabled 1: Enabled Tens: Command channel switching protection 0: Disabled 1: Enabled Hundreds: Reserved 0: Disabled 1: Enabled Thousands: Reserved	[0011]	Changeable at any time
F02.42	Restart upon power failure	0: Disabled 1: Enabled	0	Changeable at any time
F02.43	Restart time upon power failure	0.0s-3200.0s	1.0s	Changeable at any time

6.2.3 F03 Group: Group 1 Motor Parameters

Parameter ID	Name	Reference	Default value	Change
F03.01	Motor type	0: Asynchronous motor	0	Changeable only at stop
F03.02	Rated motor power	0.00kW-30000.00kW	Model dependent	Changeable only at stop
F03.03	Rated motor voltage	0V-30000V	Model dependent	Changeable only at stop
F03.04	Rated motor current	0.00A -30000.00A	Model dependent	Changeable only at stop
F03.05	Rated motor frequency	0.00Hz-600.00Hz	Model dependent	Changeable only at stop
F03.06	Rated motor speed	0.0RPM-90000.0RPM	Model dependent	Changeable only at stop
F03.08	Asynchronous motor stator resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time
F03.09	Asynchronous motor rotor resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time
F03.10	Asynchronous motor stator leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F03.11	Asynchronous motor rotor leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F03.12	Asynchronous motor mutual inductance	0.000mH-90000.000mH	Model dependent	Changeable at any time
F03.13	Asynchronous motor no-load current	0.00A-30000.00A	Model dependent	Changeable at any time
F03.14	Asynchronous motor core magnetic saturation coefficient 1	100.00%-300.00%	Model dependent	Changeable at any time
F03.15	Asynchronous motor core magnetic saturation coefficient 2	100.00%-300.00%	Model dependent	Changeable at any time
F03.16	Asynchronous motor core magnetic saturation coefficient 3	100.00%-300.00%	Model dependent	Changeable at any time
F03.17	Asynchronous motor core magnetic saturation coefficient 4	100.00%-300.00%	Model dependent	Changeable at any time
F03.18	Asynchronous motor core magnetic saturation coefficient 5	90.00%-110.00%	Model dependent	Changeable at any time
F03.19	Asynchronous motor core magnetic saturation coefficient 6	50.00%-100.00%	Model dependent	Changeable at any time
F03.20	Asynchronous motor core magnetic saturation coefficient 7	40.00%-100.00%	Model dependent	Changeable at any time
F03.33	Motor rotation inertia	0.000s-30.000s	Model dependent	Changeable at any time
F03.39	Maximum output voltage limit	50.0%-150.0%	150.0%	Changeable at any time
F03.40	Motor demagnetization time	0.0%-1000.0%	200.0%	Changeable at any time
F03.41	Motor overload protection	0: No protection 1: General motor (with low-speed compensation) 2: Variable frequency motor (without low-speed	2	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		compensation)		
F03.42	Motor overload protection current (continuous working)	50%-F03.43	110%	Changeable only at stop
F03.43	Motor overload protection current (working for 1 minute)	F03.42-200%	150%	Changeable only at stop
F03.44	Reserved			
F03.45	Motor overload pre-alarm coefficient	50.0%-100.0%	80.0%	Changeable at any time
F03.46	Motor temperature detection mode (reserved)		0	Changeable at any time
F03.47	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000 3: KTY84	0	Changeable at any time
F03.48	Motor overtemperature protection threshold	0.0℃-200.0℃	110.0℃	Changeable at any time
F03.49	Motor overtemperature pre-alarm threshold	0.0℃-200.0℃	90.0℃	Changeable at any time
F03.50	Encoder type (reserved)	0: Incremental encoder 1: Absolute value encoder 2: Resolver 3: Sine-cosine encoder	0	Changeable only at stop
F03.51	Encoder power supply	0: 5V 1: 24V 2: 12V 3: 15V	0	Changeable only at stop
F03.52	Encoder direction	0: A ahead of B 1: B ahead of A	0	Changeable only at stop
F03.53	Encoder pulse correction	0: Disabled 1: Enabled	1	Changeable only at stop
F03.54	Encoder PPR (pulses generated per revolution of the encoder disk)	0-32000	1024	Changeable only at stop
F03.55	Number of resolver pole pairs	1-65535	1	Changeable only at stop
F03.57	Encoder signal filter time	0.00us-20.00us	0.00us	Changeable only at stop
F03.60	Numerator of encoder inverter ratio	1-65535	1	Changeable at any time
F03.61	Denominator of encoder inverter ratio	1-65535	1	Changeable at any time
F03.62	Encoder output frequency division coefficient	0-255	1	Changeable at any time
F03.70	Motor parameter auto-tuning mode	0: Disabled 1: Static auto-tuning 2: Static auto-tuning + rotating auto-tuning 3: Rotating auto-tuning 4: Inertia auto-tuning	0	Changeable only at stop

6.2.4 F04 Group: Group 1 Motor Vector Control Parameters

Parameter ID	Name	Reference	Default value	Change
F04.01	Speed loop proportional gain 1	0.00-100.00	3.00	Changeable at any time
F04.02	Speed loop integral time 1	0.00s-100.00s	0.30s	Changeable at any time
F04.03	Speed loop switchover low-point frequency	0.00Hz-F04.07	5.00 Hz	Changeable at any time
F04.04	Speed loop output filter time 1	0.000s-0.100s	0.000s	Changeable at any time
F04.05	Speed loop proportional gain 2	0.00-100.00	3.00	Changeable at any time
F04.06	Speed loop integral time 2	0.00s-100.00s	0.30s	Changeable at any time
F04.07	Speed loop switchover high-point frequency	F04.03-600.00Hz	10.00 Hz	Changeable at any time
F04.08	Speed loop output filter time 2	0.000s-0.100s	0.000s	Changeable at any time
F04.10	Speed loop automatic performance coefficient	0-100	0	Changeable at any time
F04.11	Excitation current loop (d axis) proportional gain	0.00-100.00	0.5	Changeable at any time
F04.12	Excitation current loop (d axis) integral time	0.000s-10.000s	0.010s	Changeable at any time
F04.13	Torque current loop (q axis) proportional gain	0.00-100.00	0.50	Changeable at any time
F04.14	Torque current loop (q axis) integral time	0.000s-10.000s	0.010s	Changeable at any time
F04.15	Current loop performance coefficient	0-100	0	Changeable at any time
F04.18	Motoring slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time
F04.19	Braking slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time
F04.20	Low-speed open loop mode	0: Disabled 1: Enabled	1	Changeable at any time
F04.21	Percentage of low-speed open loop switchover frequency	0.00%-300.00%	5.0%	Changeable at any time
F04.22	Low-speed open loop constant speed current set value	0.0%-200.0%	50.0%	Changeable at any time
F04.23	Low-speed open loop acceleration and deceleration current set value	0.0%-200.0%	20.0%	Changeable at any time
F04.24	Feedforward gain coefficient of acceleration and deceleration torque	0.0%-300.0%	0.0%	Changeable at any time
F04.25	Feedforward filter coefficient of acceleration and deceleration torque	1: Filter time 6ms 2: Filter time 19ms 3: Filter time 44ms 4: Filter time 94ms 5: Filter time 195ms 6: Filter time 395ms 7: Filter time 797ms 8: Filter time 1,601ms 9: Filter time 3,209ms 1: Filter time 6,424ms	3	Changeable at any time
F04.27	Maximum output current limit	0.0%- Model dependent	150.0%	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F04.44	Motoring torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.45	Motoring torque upper limit	0.0%-300.0%	150.0%	Changeable at any time
F04.46	Power generation torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.47	Power generation torque upper limit	0.0%-300.0%	150.0%	Changeable at any time
F04.48	Electric power upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.49	Electric power upper limit	0.0%-200.0%	150.0%	Changeable at any time
F04.50	Generating power limiting	0: Disabled 1: Enabled in the whole process 2: Enabled at constant speed 3: Enabled during deceleration	1	Changeable at any time
F04.51	Generating power upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.52	Generating power upper limit	0.0%-200.0%	150.0%	Changeable at any time

6.2.5 F05 Group: V/F Control Parameters

Parameter ID	Name	Reference	Default value	Change
F05.01	V/F curve	0: Straight-line V/F curve 1: 1.2 power of V/F curve 2: 1.4 power V/F curve 3: 1.6 power V/F curve 4: 1.8 power V/F curve 5: 2.0 power V/F curve 6: Custom V/F curve 7: Reserved 8: V/F half separation mode 9: V/F complete separation mode	0	Changeable only at stop
F05.02	Custom V/F curve _ frequency 1	0.00Hz-F05.04	0.00Hz	Changeable only at stop
F05.03	Custom V/F curve _ voltage 1	0.0%-100.0%	0.0%	Changeable only at stop
F05.04	Custom V/F curve _ frequency 2	F05.02-F05.06	0.00Hz	Changeable only at stop
F05.05	Custom V/F curve _ voltage 2	0.0%-100.0%	0.0%	Changeable only at stop
F05.06	Custom V/F curve _frequency 3	F05.04-F05.08	0.00Hz	Changeable only at stop
F05.07	Custom V/F curve _ voltage 3	0.0%-100.0%	0.0%	Changeable only at stop
F05.08	Custom V/F curve _ frequency 4	F05.06-F03.05	0.00Hz	Changeable only at stop
F05.09	Custom V/F curve _ voltage 4	0.0%-100.0%	0.0%	Changeable only at stop
F05.10	V/F separation voltage reference channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID 8: Communication 9: Expansion card (reserved)	0	Changeable at any time
F05.11	V/F separation voltage	0.0%-300.0%	0.0%	Changeable at any time
F05.12	V/F separation voltage acceleration time	0.0s-3200.0s	6.0s	Changeable at any time
F05.13	V/F separation voltage deceleration time	0.0s-3200.0s	6.0s	Changeable at any time
F05.14	Stop mode for V/F separation	0: Frequency and voltage decline to 0 independently 1: Frequency declines to 0 after voltage declines to 0	0	Changeable at any time
F05.15	Torque boost	0.0%-30.0%	0.0%	Changeable only at stop
F05.16	Cut-off frequency of torque boost	0.00Hz-600.00Hz	10.00Hz	Changeable only at stop
F05.17	V/F slip compensation gain	0.0%-200.0%	0.0%	Changeable at any time
F05.18	V/F oscillation suppression gain	0-100	20	Changeable at any time
F05.19	V/F overcurrent suppression enable	0: Disabled 1: Enabled	1	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F05.20	V/F overcurrent suppression action current	0.0%- Model dependent	Model dependent	Changeable only at stop
F05.21	V/F overcurrent suppression gain	0-100	20	Changeable at any time

6.2.6 F06 Group: Input Terminal Parameters

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F06.01</td><td>DI1 input function</td><td rowspan="6">0: No function
1: Forward run
2: Reverse run
3: Three-Wire control
4: Forward Jog (FJOG)
5: Reverse Jog (RJOG)
6: Running enable
7: Coast to stop
8: Emergency stop
9: External stop
10: Running pause
11: DC braking at stop
12: Immediate DC braking
13: Pre-excitation
14: Switchover between two-wire and three-wire control
15: Command source switched to keypad
16: Command source switched to terminal
17: Command source switched to communication
18: Command source switched to expansion card
19: Frequency source switched to main frequency source
20: Frequency source switched to auxiliary frequency source
21: Frequency source switched to frequency source superposition result
22: Terminal UP
23: Terminal DOWN
24: UP/DOWN setting clear
25: Frequency modification enable
26: Running inhibited
27: Forward run inhibited
28: Reverse run inhibited
29: Torque control inhibited
30: Running mode switched to speed control
31: Running mode switched to torque control
32: Running mode switched to position</td><td>1</td><td>Changeable only at stop</td></tr>
<tr><td>F06.02</td><td>DI2 input function</td><td>4</td><td>Changeable only at stop</td></tr>
<tr><td>F06.03</td><td>DI3 input function</td><td>33</td><td>Changeable only at stop</td></tr>
<tr><td>F06.04</td><td>DI4 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.05</td><td>DI5 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.06</td><td>DI6 input function</td><td>0</td><td>Changeable only at stop</td></tr>
</table>

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F06.07</td><td>DI7 input function</td><td rowspan="4">control
33: Fault Reset
34: User-defined fault 1
35: User-defined fault 2
36: NO input of external fault
37: NC input of external fault
38: Multi-speed reference terminal 1
39: Multi -speed reference terminal 2
40: Multi -speed reference terminal 3
41: Multi -speed reference terminal 4
42: Motor parameter group terminal 1
43: Motor parameter group terminal 2
44: Acceleration and deceleration time terminal 1
45: Acceleration and deceleration time terminal 2
46: Acceleration and deceleration inhibited
47: Simple PLC reset
48: Simple PLC pause
49: Wobble reset
50: Wobble pause
51: Regular clearing
52: Counter input
53: Counter reset
54: Length count input
55: Length reset
56: Pulse input
57: PID pause
58: PID parameter switchover
59: PID action direction reversal
60: PID integral clearing
61: PID integral pause
62: Current running duration clear
63: Position lock
64: Forced brake release
65: Forced brake
66: Brake feedback
67-99: Reserved</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.08</td><td>DI8 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.09</td><td>DI9 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.10</td><td>DI10 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F06.11</td><td>DI filter time</td><td>0.000s-1.000s</td><td>0.010s</td><td>Changeable at any time</td></tr>
<tr><td>F06.12</td><td>DI active mode selection 1</td><td>[0000]-[1111]
Ones: DI1
0: Enabled upon closing
1: Enabled upon opening
Tens: DI2
0: Enabled upon closing
1: Enabled upon opening
Hundreds: DI3
0: Enabled upon closing
1: Enabled upon opening
Thousands: DI4
0: Enabled upon closing
1: Enabled upon opening</td><td>[0000]</td><td>Changeable at any time</td></tr>
<tr><td>F06.13</td><td>DI active mode selection 2</td><td>[0000]-[1111]
Ones: DI5
0: Enabled upon closing
1: Enabled upon opening
Tens: DI6</td><td>[0000]</td><td>Changeable at any time</td></tr>
</table>

Parameter ID	Name	Reference	Default value	Change
		0: Enabled upon closing 1: Enabled upon opening Hundreds: DI7 0: Enabled upon closing 1: Enabled upon opening Thousands: DI8 0: Enabled upon closing 1: Enabled upon opening		
F06.14	DI active mode selection 3	[0000]-[0011] Ones: DI9 0: Enabled upon closing 1: Enabled upon opening Tens: DI10 0: Enabled upon closing 1: Enabled upon opening Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time
F06.15	DI1 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.16	DI1 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.17	DI2 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.18	DI2 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.19	DI3 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.20	DI3 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.21	DI4 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.22	DI4 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.23	DI5 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.24	DI5 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.25	DI6 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.26	DI6 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.27	DI7 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.28	DI7 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.29	DI8 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.30	DI8 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.31	DI9 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.32	DI9 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.33	DI10 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.34	DI10 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.35	Terminal control mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	Changeable only at stop
F06.36	Terminal UP/DOWN control	[0000]-[0021] Ones: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Tens: Running limit 0: Changeable at any time 1: Changeable when running, maintaining at stop 2: Changeable when running, clearing at stop Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time
F06.37	Terminal UP change rate	0.00Hz/s-600.00Hz/s	0.50Hz/s	Changeable at any time
F06.38	Terminal DOWN change rate	0.00Hz/s-600.00Hz/s	0.50Hz/s	Changeable at any time
F06.39	Reserved			
F06.40	Minimum pulse input	0.00kHz-F06.42	0.00kHz	Changeable at any time
F06.41	Percentage corresponding to minimum pulse input	-100.0%-100.0%	0.0%	Changeable at any time
F06.42	Maximum pulse input	F06.40-100.00kHz	50.00kHz	Changeable at any time
F06.43	Percentage corresponding to maximum pulse input	-100.0%-100.0%	100.0%	Changeable at any time
F06.44	Pulse input filter time	0.000s-10.000s	0.050s	Changeable at any time
F06.45	Cut-off frequency of pulse input (reserved)	0.00kHz-1.00kHz	0.10kHz	Changeable at any time
F06.46	AI1 filter time	0.00s-10.00s	0.10s	Changeable at any time
F06.47	AI2 filter time	0.00s-10.00s	0.10s	Changeable at any time
F06.48	AI3 filter time	0.00s-10.00s	0.10s	Changeable at any time
F06.49	AI input type	[0000]-[0011] Ones: AI1 0: Voltage input 1: Current input Tens: AI2 0: Voltage input 1: Current input Hundreds: AI3 (reserved) 0: Voltage input 1: Current input Thousands: Reserved	[0000]	Changeable only at stop
F06.50	Percentage corresponding to AI input overlimit	[0000]-[0222] Ones: AI1 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below	[0111]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		lower limit, or corresponding settings when above the upper limit Tens: AI2 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below lower limit, or corresponding settings when above the upper limit Hundreds: AI3 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below lower limit, or corresponding settings when above the upper limit Thousands: Reserved		
F06.51	AI1 curve	[0000]-[0444] Ones: AI1 0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Tens: AI2 0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Hundreds: AI3 0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Thousands: Reserved	[0210]	Changeable at any time
F06.52	AI curve 1 minimum input	-10.00V-F06.54	0.00V	Changeable at any time
F06.53	Percentage corresponding to AI curve 1 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.54	AI curve 1 maximum input	F06.52-10.00V	10.00V	Changeable at any time
F06.55	Percentage corresponding to AI curve 1 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.56	AI curve 2 minimum input	-10.00V-F06.58	0.00V	Changeable at any time
F06.57	Percentage corresponding to AI curve 2 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.58	AI curve 2 maximum input	F06.56-10.00V	10.00V	Changeable at any time
F06.59	Percentage corresponding to AI curve 2 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.60	AI curve 3 minimum input	-10.00V-F06.62	0.00V	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.61	Percentage corresponding to AI curve 3 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.62	AI curve 3 maximum input	F06.60-10.00V	10.00V	Changeable at any time
F06.63	Percentage corresponding to AI curve 3 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.64	AI curve 4 minimum input	-10.00V-F06.66	0.00V	Changeable at any time
F06.65	Percentage corresponding to AI curve 4 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.66	Inflexion 1 input of AI curve 4	F06.64-F06.68	3.00V	Changeable at any time
F06.67	Percentage corresponding to inflection 1 input of AI curve 4	-100.0%-100.0%	30.0%	Changeable at any time
F06.68	Inflexion 2 input of AI curve 4	F06.66-F06.70	6.00V	Changeable at any time
F06.69	Percentage corresponding to inflection 2 input of AI curve 4	-100.0%-100.0%	60.0%	Changeable at any time
F06.70	AI curve 4 maximum input	F06.68-10.00V	10.00V	Changeable at any time
F06.71	Percentage corresponding to AI curve 4 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.72	AI curve 5 minimum input	-10.00V-F06.74	0.00V	Changeable at any time
F06.73	Percentage corresponding to AI curve 5 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.74	Inflexion 1 input of AI curve 5	F06.72-F06.76	3.00V	Changeable at any time
F06.75	Percentage corresponding to inflection 1 input of AI curve 5	-100.0%-100.0%	30.0%	Changeable at any time
F06.76	Inflexion 2 input of AI curve 5	F06.74-F06.78	6.00V	Changeable at any time
F06.77	Percentage corresponding to inflection 2 input of AI curve 5	-100.0%-100.0%	60.0%	Changeable at any time
F06.78	AI curve 5 maximum input	F06.76-10.00V	10.00V	Changeable at any time
F06.79	Percentage corresponding to AI curve 5 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.80	AI1 skip point	-100.0%-100.0%	0.0%	Changeable at any time
F06.81	AI1 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time
F06.82	AI2 skip point	-100.0%-100.0%	0.0%	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.83	AI2 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time
F06.84	AI3 skip point	-100.0%-100.0%	0.0%	Changeable at any time
F06.85	AI3 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time

6.2.7 F07 Group: Output Terminal Parameters

Parameter ID	Name	Reference	Default value	Change
F07.01	HDO terminal output mode	0: Digital output (DO1) 1: Pulse output (HDO)	1	Changeable at any time
F07.02	DO1 output function	0: No function 1: Inverter in running 2: Inverter in forward running 3: Inverter in reverse running 4: Inverter in jog 5: Inverter in forward jog 6: Inverter in reverse jog 7: Fault 8: Alarm 9: Inverter in undervoltage state 10: Ready to run 11: Braking with energy consumption (reversed) 12: Designated count value reach 13: Reference count value reach 14: Length reach 15: Simple PLC stage completion 16: simple PLC cycle completion 17: Timing reach 18: Current running duration reach 19: Accumulative running duration reach 20: Accumulative power-on duration reach 21: AI1 input overlimit 22: AI2 input overlimit 23: AI3 input overlimit 24: Frequency limit reach 25: Torque limit reach 26: Frequency upper limit reach 27: Frequency lower limit reach (no output at stop) 28: Frequency lower limit reach (output at stop) 29: Zero-speed running 1 (no output at stop) 30: Zero-speed running 2 (output at stop)	0	Changeable at any time
F07.03	DO2 output function		1	Changeable at any time
F07.04	DO3 output function		0	Changeable at any time
F07.05	DO4 output function		0	Changeable at any time
F07.06	DO5 output function		0	Changeable at any time
F07.07	RO1 output function		7	Changeable at any time

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F07.08</td><td>RO2 output function</td><td rowspan="2">31: Frequency detection FDT1 reach
32: Frequency detection FDT2 reach
33: Frequency reference reach
34: Any frequency 1 reach
35: Any frequency 2 reach
36: Any current 1 reach
37: Any current 2 reach
38: Zero current state
39: Output overcurrent
40: Inverter overtemperature pre-alarm
41: Inverter overload pre-alarm
42: Motor overtemperature pre-alarm
43: Motor overload pre-alarm
44: Inverter in load protection 1
45: Inverter in load protection 2 (Reserved)
46: Position lock succeeds
47: Brake output
48: Communication
49-99: Reserved</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.09</td><td>RO3 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.10</td><td>HDO output function</td><td rowspan="4">0: No function
1: Running frequency
2: Frequency reference
3: Ramp frequency
4: Motor speed
5: Bus voltage
6: Output voltage
7: Output voltage (100.0% for 1,000.0V)
8: Output current
9: Output current (100.0% for 1,000.0A)
10: Torque current
11: Excitation current
12: Output power
13: Output torque (absolute value)
14: Output torque (actual value)
15: AI1
16: AI2
17: AI3
18: Pulse input
19: Count value
20: Length value
21: PID reference
22: PID feedback
23: Communication</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.11</td><td>AO1 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.12</td><td>AO2 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.13</td><td>AO3 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.14</td><td>DO1 switch-on delay</td><td>0.0s-6500.0s</td><td>0.0s</td><td>Changeable at any time</td></tr>
<tr><td>F07.15</td><td>DO1 switch-off delay</td><td>0.0s-6500.0s</td><td>0.0s</td><td>Changeable at any time</td></tr>
<tr><td>F07.16</td><td>DO2 switch-on delay</td><td>0.0s-6500.0s</td><td>0.0s</td><td>Changeable at any time</td></tr>
<tr><td>F07.17</td><td>DO2 switch-off delay</td><td>0.0s-6500.0s</td><td>0.0s</td><td>Changeable at any time</td></tr>
</table>

Parameter ID	Name	Reference	Default value	Change
F07.18	DO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.19	DO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.20	DO4 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.21	DO4 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.22	DO5 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.23	DO5 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.24	RO1 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.25	RO1 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.26	RO2 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.27	DO2 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.28	RO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.29	RO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.30	DO active mode 1	[0000]-[1111] Ones: DO1 0: Positive logic active 1: Negative logic active Tens: DO2 0: Positive logic active 1: Negative logic active Hundreds: DO3 0: Positive logic active 1: Negative logic active Thousands: DO4 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time
F07.31	DO active mode 2	[0000]-[1111] Ones: DO5 0: Positive logic active 1: Negative logic active Tens: RO1 0: Positive logic active 1: Negative logic active Hundreds: RO2 0: Positive logic active 1: Negative logic active Thousands: RO3 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time
F07.32	HDO minimum output	-100.0%-F07.34	0.0%	Changeable at any time
F07.33	Pulse output corresponding to HDO minimum output	0.00kHz-100.00kHz	0.0kHz	Changeable at any time
F07.34	HDO maximum output	F07.32-100.00%	100.0%	Changeable at any time
F07.35	Pulse output corresponding to HDO maximum output	0.00kHz-100.00kHz	50.0kHz	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F07.36	HDO output filter time	0.000s-10.000s	0.050s	Changeable at any time
F07.37	AO output type	[0000]-[0111] Ones: AO1 0: Voltage output 1: Current output Tens: AO2 0: Voltage output 1: Current output Hundreds: AO3 0: Voltage output 1: Current output Thousands: Reserved	[0000]	Changeable at any time
F07.38	AO1 minimum output	-100.0%- F07.40	0.0%	Changeable at any time
F07.39	Analog output corresponding to AO1 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.40	AO1 maximum output	F07.38-100.0%	100.0%	Changeable at any time
F07.41	Analog output corresponding to AO1 maximum output	-10.00V-10.00V	10.00V	Changeable at any time
F07.42	AO2 minimum output	-100.0%-F07.44	0.0%	Changeable at any time
F07.43	Analog output corresponding to AO2 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.44	AO2 maximum output	F07.42-100.0%	100.0%	Changeable at any time
F07.45	Analog output corresponding to AO2 maximum output	-10.00V-10.00V	10.00V	Changeable at any time
F07.46	AO3 maximum output	-100.0%-F07.48	0.0%	Changeable at any time
F07.47	Analog output corresponding to AO3 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.48	AO3 maximum output	F07.46-100.0%	100.0%	Changeable at any time
F07.49	Analog output corresponding to AO3 maximum output	-10.00V-10.00V	10.00V	Changeable at any time

6.2.8 F08 Group: System Parameters

Parameter ID	Name	Reference	Default value	Change
F08.01	User password	0-65535	0	Changeable at any time
F08.02	Parameter and key lock	0: No locking 1: Parameters locked 2: Parameters and some keys locked 3: Parameters and all keys locked	0	Changeable at any time
F08.03	Parameter initialization	0: No operation 1: Restore default settings (excluding motor parameters) 2: Restore all factory parameters 3: Clear records	0	Changeable only at stop
F08.04	Parameter writing protection	0: Disabled 1: Enabled	0	Changeable at any time
F08.05	Parameter copy	0: No operation 1: Back up current user parameters	0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
		2: Restore user parameters from backup		
F08.06	Keypad display self-inspection	[0000]-[0011] Ones: Built-in keypad 0: Disabled 1: Enabled Tens: External keypad 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved	0	Changeable only at stop
F08.07	Keypad special function	0000]-[0012] Ones: Keypad priority 0: Both built-in and external keypads enabled, shutdown/reset command preferred 1: Built-in keypad enabled, external keypad disabled 2: External keypad enabled, built-in keypad disabled Tens: Automatic jump to home page enable 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time
F08.08	Keypad MF.K key function	0: Disabled 1: Command channel switchover 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog 5: Menu mode switchover	5	Changeable only at stop
F08.09	Keypad STOP/RESET key function	0: The STOP/RESET key is enabled only in keypad control mode. 1: The STOP/RESET key is enabled in any control mode.	1	Changeable at any time
F08.10	Keypad UP/DOWN key function	[[0000]-[0214] Ones: Reset parameters 0: Disabled 1: Digital setting 2: Terminal UP/DOWN 3: PID reference 4: F08.11 reference Tens: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Hundreds: Reserved Thousands: Reserved	[0001]	Changeable at any time
F08.11	Keypad UP/DOWN key parameter resetting	0.00-99.99	1.11	Changeable at any time
F08.12	Display parameter 1 in running state	B00: Running frequency B01: Frequency reference B02: Bus voltage B03: Output voltage B04: Output current B05: Output power B06: Output torque B07: Torque reference	31	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		B08: PID reference B09: PID feedback B10: DI input terminal state 1 B11: DI input terminal state 2 B12: DO output terminal state B13: AI1 input value B14: AI2 input value B15: AI3 input value		
F08.13	Display parameter 2 in running state	B00: Pulse input frequency B01: Count value B02: Length value B03: Current stage B04: Remaining running duration during timed running B05: Current running time B06: Current power-on time B07: Motor speed B08: Estimated motor frequency B09: Measured motor frequency B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved	0	Changeable at any time
F08.14	Display parameter 1 in shutdown state	B00: Frequency reference B01: Bus voltage B02: Torque reference B03: PID reference B04: PID feedback B05: DI input terminal state 1 B06: DI input terminal state 2 B07: DO output terminal state B08: AI1 input value B09: AI2 input value B10: AI3 input value B11: Pulse input frequency B12: Count value B13: Length value B14: Current stage B15: Reserved	3	Changeable at any time
F08.17	Frequency converter rated power			Read only
F08.18	Rated voltage of frequency converter			Read only
F08.19	Rated current of frequency converter			Read only
F08.20	Product model			Read only
F08.21	Control software version			Read only

6.2.9 F09 Group: Auxiliary Function Parameters

Parameter ID	Name	Reference	Default value	Change
F09.01	Jog frequency reference	0.00Hz- F01.12	5.00 Hz	Changeable at any time
F09.02	Jog acceleration time	0.0s-3200.0s	20.0s	Changeable at any time
F09.03	Jog deceleration time	0.0s-3200.0s	20.0s	Changeable at any time
F09.04	Jog interval time	0.0s-3200.0s	0.0s	Changeable at any time
F09.06	Acceleration time 2	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.07	Deceleration time 2	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.08	Acceleration time 3	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.09	Deceleration time 3	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.10	Acceleration time 4	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.11	Deceleration time 4	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.12	Emergency stop deceleration time	0.0s-3200.0s	Model dependent	Changeable at any time
F09.13	Switchover frequency point of acceleration time 1 and acceleration time 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.14	Switchover frequency point of deceleration time 1 and deceleration time 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.16	Skip frequency point 1	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.17	Skip frequency band 1	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.18	Skip frequency point 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.19	Skip frequency band 2	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.20	Skip frequency point 3	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.21	Skip frequency band 3	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.22	Skip frequency point 4	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.23	Skip frequency band 4	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.24	Droop control gain	0.0%-50.0%	0.0%	Changeable at any time
F09.26	Energy conservation running coefficient	0%-100%	0%	Changeable at any time
F09.27	Minimum speed in energy conversation running	0.0%-100.0%	15.0%	Changeable at any time
F09.30	Frequency detection value 1	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.31	Frequency detection hysteresis rate 1	0.0%-100.0%	5.0%	Changeable at any time
F09.32	Frequency detection value 2	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F09.33	Frequency detection hysteresis rate 2	0.0%-100.0%	5.0%	Changeable at any time
F09.34	Detection value 1 for frequency reach	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.35	Detection width 1 for frequency reach	0.0%-100.0%	0.0%	Changeable at any time
F09.36	Detection value 2 for frequency reach	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.37	Detection width 2 for frequency reach	0.0%-100.0%	0.0%	Changeable at any time
F09.38	Detection width for frequency reference reach	0.0%-100.0%	0.0%	Changeable at any time
F09.39	Current 1 reach	0.0%-300.0%	100.0%	Changeable at any time
F09.40	Detection width of current 1 reach	0.0%-300.0%	0.0%	Changeable at any time
F09.41	Current 2 reach	0.0%-300.0%	100.0%	Changeable at any time
F09.42	Detection width of current 2 reach	0.0%-300.0%	0.0%	Changeable at any time
F09.43	Zero current detection level	0.0%-300.0%	5.0%	Changeable at any time
F09.44	Zero current detection delay	0.00s-650.00s	0.10s	Changeable at any time
F09.45	Output overcurrent threshold	0.0%-300.0%	200.0%	Changeable at any time
F09.46	Output overcurrent detection delay	0.00s-650.00s	0.00s	Changeable at any time
F09.47	AI1 input lower limit	-10.00V-F09.48	3.20V	Changeable at any time
F09.48	AI1 input upper limit	F09.47-10.00V	6.80V	Changeable at any time
F09.49	AI2 input lower limit	-10.00V-F09.50	3.20V	Changeable at any time
F09.50	AI2 input upper limit	F09.49-10.00V	6.80V	Changeable at any time
F09.51	AI3 input lower limit	-10.00V-F09.52	-6.80V	Changeable at any time
F09.52	AI3 input upper limit	F09.51-10.00V	6.80V	Changeable at any time
F09.53	AI input detection delay	0.00s-650.00s	0.01s	Changeable at any time
F09.54	Current running reach time	0.0min-6500.0min	0.0min	Changeable at any time
F09.55	Accumulative running reach time	0h-65000h	0h	Changeable at any time
F09.56	Accumulative power-on reach time	0h-65000h	0h	Changeable at any time
F09.57	Timing function	0: Disabled 1: Enabled	0	Changeable at any time
F09.58	Timing source	0: Fixed time 1: AI1 2: AI2 3: AI3	0	Changeable only at stop
F09.59	Timing duration	0s/m/h-65000s/m/h	0 s/m/h	Changeable only at stop
F09.60	Timing duration unit	0: s (second) 1: m (minute)	0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
		2: h (hour)		
F09.61	Hibernation and wakeup functions	0: Disabled 1: Enabled	0	Changeable at any time
F09.62	Hibernation frequency	0.00Hz-F09.64	0.00 Hz	Changeable at any time
F09.63	Hibernation delay	0.0s-6500.0s	0.0s	Changeable at any time
F09.64	Wakeup frequency	F09.62- F01.12	0.00 Hz	Changeable at any time
F09.65	Wakeup delay	0.0s-6500.0s	0.0s	Changeable at any time
F09.66	Output power correction coefficient	0.0%-999.9%	100.0%	Changeable at any time
F09.67	Linear speed correction coefficient	0.0%-999.9%	100.0%	Changeable at any time

6.2.10 F10 Group: Fault and Protection Parameters

Parameter ID	Name	Reference	Default value	Change
F10.01	Fault auto reset times	0-10	0	Changeable at any time
F10.02	Fault auto reset duration	0.0s-120.0s	1.0s	Changeable at any time
F10.03	Restart after fault auto reset	0: Disabled 1: Enabled	0	Changeable at any time
F10.04	Waiting time of restart after auto reset	0.01s~320.00s	1.00s	Changeable at any time
F10.05	Undervoltage fault action	0: Disabled 1: Enabled	0	Changeable at any time
F10.06	Fault output terminal action	[0000]-[0011] Ones: During fault auto reset 0: Disabled 1: Enabled Tens: In undervoltage fault 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved	[0011]	Changeable at any time
F10.07	Overvoltage suppression enable	0: Disabled 1: Enabled	1	Changeable only at stop
F10.08	Overvoltage suppression action voltage	Model dependent	Model dependent	Changeable only at stop
F10.09	Overvoltage suppression gain	1-300	100	Changeable at any time
F10.10	Undervoltage suppression function	0: Disabled 1: Enabled	0	Changeable only at stop
F10.11	Undervoltage suppression action voltage	330V-540V	440V	Changeable only at stop
F10.12	Undervoltage suppression gain	1-300	100	Changeable at any time
F10.14	Bus undervoltage point	Model dependent	Model dependent	Changeable at any time
F10.15	Bus overvoltage point	Model dependent	Model dependent	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F10.16	Shorted-to-ground protection	0: Disabled 1: Detected upon power-on 2: Detected upon running 3: Detected upon power-on and each running	1	Changeable at any time
F10.17	Soft start fault protection	0: Disabled 1: Enabled	1	Changeable at any time
F10.18	Phase loss protection	[0000]-[0031] Ones: Input phase loss protection 0: Disabled 1: Enabled Tens: Output phase loss protection 0: Disabled 1: Enabled Hundreds: Output phase loss protection before running 0: Disabled 1: Enabled Thousands: Reserved	[0111]	Changeable at any time
F10.19	Input phase loss detection level	0.0%-100.0%	13.0%	Changeable at any time
F10.20	Load protection function	[0000]-[0044] Ones: Load protection 1 0: No test 1: Check for too small motor load 2: Check for too small motor load only at constant speed 3: Check for too large motor load 4: Check for too large motor load only at constant speed Tens: Reserved Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time
F10.21	Load protection 1 detection level	0.0%-300.0%	30.0%	Changeable at any time
F10.22	Load protection 1 detection time	0.0s-3200.0s	5.0s	Changeable at any time
F10.25	Overspeed detection level	0.0%-150.0%	120.0%	Changeable at any time
F10.26	Overspeed detection time	0.0s-3200.0s	1.0s	Changeable at any time
F10.27	Detection level of excessive speed deviation	0.0%-100.0%	20.0%	Changeable at any time
F10.28	Detection time of excessive speed deviation	0.0s-3200.0s	0.0s	Changeable at any time
F10.29	Inverter overload pre-alarm coefficient	50.0%-100.0%	90.0%	Changeable at any time
F10.30	Inverter overtemperature pre-alarm threshold	0.0℃-200.0℃	75.0℃	Changeable at any time
F10.31	Open loop stall detection value	0-8000	0	Changeable at any time
F10.33	Temperature abnormality detection enable	0: Disabled 1: Enabled	1	Changeable at any time
F10.42	Frequency for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Alternative frequency upon exception	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F10.43	Alternative frequency upon exception	0.0%-100.0%	100.0%	Changeable at any time
F10.44	Fault protection action selection 1	[0000]-[2222] Ones: Input phase loss 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Output phase loss 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.45	Fault protection action selection 2	[0000]-[2222] Ones: Inverter overload 0: Coast to stop 1: Reserved 2: Running with derating Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.46	Fault protection action selection 3	[0000]-[2222] Ones: Motor overload 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Motor overtemperature 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.47	Fault protection action selection 4	[0000]-[2222] Ones: Motor parameters auto-tuning fault (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		Tens: Initial position auto-tuning fault (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Motor encoder fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run		
F10.48	Fault protection action selection 5	[0000]-[2222] Ones: Motor overspeed 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Excessive position deviation 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.49	Fault protection action selection 6	[0000]-[2222] Ones: Load protection 1 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Load protection 2 (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Accumulative running time reach 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Accumulative power-on time reach 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.50	Fault protection action selection 7	[0000]-[2222] Ones: User-defined fault 1 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: User-defined fault 2 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: User-defined fault 3	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: External fault (NO) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run		
F10.51	Fault protection action selection 8	[[0000]-[2222] Ones: External fault (NC) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: PID feedback loss 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands digit: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.52	Fault protection action selection 9	[0000]-[2222] Ones: IO fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Parameter storage fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Communication overtime fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.53	Fault protection action selection 10	[0000]-[2222] Ones: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time

6.2.11 F11 Group: PID Parameters

Parameter ID	Name	Reference	Default value	Change
F11.01	PID reference source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: Multi-reference	0	Changeable at any time
F11.02	PID reference	-100.00%-100.0%	50.00%	Changeable at any time
F11.03	PID ramp time	0.00s-320.00s	0.00s	Changeable at any time
F11.04	PID feedback source	0: AI1 1: AI2 2: AI3 3: Pulse reference 4: Communication 5: AI1+AI2 6: AI1-AI2 7: MAX (|AI1|, |AI2|) 8: MIN (|AI1|, |AI2|)	0	Changeable at any time
F11.05	PID feedback gain	0.00-10.00	1.00	Changeable at any time
F11.06	PID feedback filter time	0.000s-32.000s	0.000s	Changeable at any time
F11.07	PID sampling period	0.001s-32.000s	0.002s	Changeable at any time
F11.09	PID action direction	0: Forward 1: Reverse	0	Changeable at any time
F11.10	Proportional gain Kp1	0.000-30.000	0.200	Changeable at any time
F11.11	Integral time Ti1	0.00s-320.00s	1.00s	Changeable at any time
F11.12	Derivative time Td1	0.000s-10.000s	0.000s	Changeable at any time
F11.13	Proportional gain Kp2	0.000-30.000	0.200	Changeable at any time
F11.14	Integral time Ti2	0.00s-320.00s	1.00s	Changeable at any time
F11.15	Derivative time Td2	0.000s-10.000s	0.000s	Changeable at any time
F11.16	PID parameter switchover condition	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Automatic switchover based on running	0	Changeable at any time
F11.17	PID parameter switchover deviation 1	0.00%-F11.18	20.00%	Changeable at any time
F11.18	PID parameter switchover deviation 2	F11.17-100.0%	80.00%	Changeable at any time
F11.19	PID deviation limit	0.00%-100.0%	0.00%	Changeable at any time
F11.20	PID output lower limit	-100.00%-F11.21	-100.00%	Changeable at any time
F11.21	PID output upper limit	F11.20-100.0%	100.00%	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F11.22	PID output filter time	0.000s-32.000s	0.000s	Changeable at any time
F11.23	PID derivative limit	0.00%-100.00%	5.00%	Changeable at any time
F11.24	PID integral tuning	Ones: Integration clear Tens: Integration pause Hundreds: Whether to stop integration at output upper/lower limit Thousands: Whether to stop integration at frequency upper/lower limit (reversed)	0	Changeable at any time
F11.25	PID derivative tuning	0: Derivative of deviation 1: Derivative of feedback	1	Changeable at any time
F11.26	PID initial value	0.00%-100.0%	0.00%	Changeable at any time
F11.27	Hold time of PID initial value	0.00s-320.00s	0.00s	Changeable at any time
F11.28	PID feedback loss detection level	0.00%-100.00%	0.00	Changeable at any time
F11.29	PID feedback loss detection time	0.0s-120.0s	0.0s	Changeable at any time
F11.30	PID operation at stop	0: Disabled 1: Enabled	1	Changeable at any time

6.2.12 F12 Group: Wobble, Fixed Length and Count Value Parameters

Parameter ID	Name	Reference	Default value	Change
F12.01	Wobble amplitude control mode	0: Relative to frequency reference 1: Relative to maximum frequency	0	Changeable at any time
F12.02	Wobble amplitude	0.0%-100.0%	0.0%	Changeable at any time
F12.03	Wobble step	0.0%-50.0%	0.0%	Changeable at any time
F12.04	Wobble rise time	0.0s-6500.0s	0.0s	Changeable at any time
F12.05	Wobble falling time	0.0s-6500.0s	0.0s	Changeable at any time
F12.06	Reference length	0m-65535m	1000m	Changeable at any time
F12.07	Number of pulses per meter	0.0-6553.5	100.0	Changeable at any time
F12.08	Designated count value	0-F12.09	1000	Changeable at any time
F12.09	Reference count value	0-65535	1000	Changeable at any time
F12.10	Count input frequency division	1-65535	1	Changeable at any time

6.2.13 F13 Group: Multi-Speed and Simple PLC Parameters

Parameter ID	Name	Reference	Default value	Change
F13.01	Multi-speed segment 1	-100.00%-100.00%	0.00%	Changeable at any time
F13.02	Multi-speed segment 2	-100.00%-100.00%	0.00%	Changeable at any time
F13.03	Multi-speed segment 3	-100.00%-100.00%	0.00%	Changeable at any time
F13.04	Multi-speed segment 4	-100.00%-100.00%	0.00%	Changeable at any time
F13.05	Multi-speed segment 5	-100.00%-100.00%	0.00%	Changeable at any time
F13.06	Multi-speed segment 6	-100.00%-100.00%	0.00%	Changeable at any time
F13.07	Multi-speed segment 7	-100.00%-100.00%	0.00%	Changeable at any time
F13.08	Multi-speed segment 8	-100.00%-100.00%	0.00%	Changeable at any time
F13.09	Multi-speed segment 9	-100.00%-100.00%	0.00%	Changeable at any time
F13.10	Multi-speed segment 10	-100.00%-100.00%	0.00%	Changeable at any time
F13.11	Multi-speed segment 11	-100.00%-100.00%	0.00%	Changeable at any time
F13.12	Multi-speed segment 12	-100.00%-100.00%	0.00%	Changeable at any time
F13.13	Multi-speed segment 13	-100.00%-100.00%	0.00%	Changeable at any time
F13.14	Multi-speed segment 14	-100.00%-100.00%	0.00%	Changeable at any time
F13.15	Multi-speed segment 15	-100.00%-100.00%	0.00%	Changeable at any time
F13.16	Multi-speed segment 16	-100.00%-100.00%	0.00%	Changeable at any time
F13.17	Simple PLC running mode	0: Stop after running for one cycle 1: Keep final values after running for one cycle 2: Repeat after running for one cycle	0	Changeable at any time
F13.18	Simple PLC start mode	0: Re-run from the first stage 1: Continue running with the stage frequency at the moment of interruption 2: Continue running with the operating frequency at the moment of interruption	0	Changeable at any time
F13.19	Simple PLC memory retention upon power failure	0: Non-retentive upon power failure 1: Retentive upon power failure	0	Changeable at any time
F13.20	Simple PLC running time unit	0: s (second) 1: m (minute) 2: h (hour)	0	Changeable at any time
F13.21	Running time of PLC reference 1	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.22	Acceleration/Deceleration time of PLC reference 1	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F13.23	Running time of PLC reference 2	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.24	Acceleration/Deceleration time of PLC reference 2	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.25	Running time of PLC reference 3	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.26	Acceleration/Deceleration time of PLC reference 3	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.27	Running time of PLC reference 4	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.28	Acceleration/Deceleration time of PLC reference 4	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.29	Running time of PLC reference 5	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.30	Acceleration/Deceleration time of PLC reference 5	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.31	Running time of PLC reference 6	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.32	Acceleration/Deceleration time of PLC reference 6	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.33	Running time of PLC reference 7	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.34	Acceleration/Deceleration time of PLC reference 7	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/ deceleration time 4	0	Changeable at any time
F13.35	Running time of PLC reference 8	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.36	Acceleration/Deceleration time of PLC reference 8	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.37	Running time of PLC reference 9	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.38	Acceleration/Deceleration time of PLC reference 9	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/ deceleration time 4	0	Changeable at any time
F13.39	Running time of PLC reference 10	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.40	Acceleration/Deceleration time of PLC reference 10	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.41	Running time of PLC reference 11	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.42	Acceleration/Deceleration time of PLC reference 11	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		3: Acceleration/deceleration time 4		
F13.43	Running time of PLC reference 12	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.44	Acceleration/Deceleration time of PLC reference 12	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.45	Running time of PLC reference 13	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.46	Acceleration/Deceleration time of PLC reference 13	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.47	Running time of PLC reference 14	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.48	Acceleration/Deceleration time of PLC reference 14	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.49	Running time of PLC reference 15	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.50	Acceleration/Deceleration time of PLC reference 15	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.51	Running time of PLC reference 16	0.0s/m/h-6500.0s/m/h	0.0s/m/h	Changeable at any time
F13.52	Acceleration/Deceleration time of PLC reference 16	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time
F13.53	Multi-speed segment 1 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.54	Multi-speed segment 2 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.55	Multi-speed segment 3 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.56	Multi-speed segment 4 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		6: Digital frequency reference		
F13.57	Multi-speed segment 5 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.58	Multi-speed segment 6 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.59	Multi-speed segment 7 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.60	Multi-speed segment 8 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.61	Multi-speed segment 9 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.62	Multi-speed segment 10 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.63	Multi-speed segment 11 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.64	Multi-speed segment 12 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F13.65	Multi-speed segment 13 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.66	Multi-speed segment 14 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.67	Multi-speed segment 15 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time
F13.68	Multi-speed segment 16 source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: PID 6: Digital frequency reference	0	Changeable at any time

6.2.14 F14 Group: User-Defined Parameters

Parameter ID	Name	Reference	Default value	Change
F14.01	User-defined parameter 1	00.00-99.99	0.00	Changeable at any time
F14.02	User-defined parameter 2	00.00-99.99	0.00	Changeable at any time
F14.03	User-defined parameter 3	00.00-99.99	0.00	Changeable at any time
F14.04	User-defined parameter 4	00.00-99.99	0.00	Changeable at any time
F14.05	User-defined parameter 5	00.00-99.99	0.00	Changeable at any time
F14.06	User-defined parameter 6	00.00-99.99	0.00	Changeable at any time
F14.07	User-defined parameter 7	00.00-99.99	0.00	Changeable at any time
F14.08	User-defined parameter 8	00.00-99.99	0.00	Changeable at any time
F14.09	User-defined parameter 8	00.00-99.99	0.00	Changeable at any time
F14.10	User-defined parameter 10	00.00-99.99	0.00	Changeable at any time
F14.11	User-defined parameter 11	00.00-99.99	0.00	Changeable at any time
F14.12	User-defined parameter 12	00.00-99.99	0.00	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F14.13	User-defined parameter 13	00.00-99.99	0.00	Changeable at any time
F14.14	User-defined parameter 14	00.00-99.99	0.00	Changeable at any time
F14.15	User-defined parameter 15	00.00-99.99	0.00	Changeable at any time
F14.16	User-defined parameter 16	00.00-99.99	0.00	Changeable at any time
F14.17	User-defined parameter 17	00.00-99.99	0.00	Changeable at any time
F14.18	User-defined parameter 18	00.00-99.99	0.00	Changeable at any time
F14.19	User-defined parameter 19	00.00-99.99	0.00	Changeable at any time
F14.20	User-defined parameter 20	00.00-99.99	0.00	Changeable at any time
F14.21	User-defined parameter 21	00.00-99.99	0.00	Changeable at any time
F14.22	User-defined parameter 22	00.00-99.99	0.00	Changeable at any time
F14.23	User-defined parameter 23	00.00-99.99	0.00	Changeable at any time
F14.24	User-defined parameter 24	00.00-99.99	0.00	Changeable at any time
F14.25	User-defined parameter 25	00.00-99.99	0.00	Changeable at any time
F14.26	User-defined parameter 26	00.00-99.99	0.00	Changeable at any time
F14.27	User-defined parameter 27	00.00-99.99	0.00	Changeable at any time
F14.28	User-defined parameter 28	00.00-99.99	0.00	Changeable at any time
F14.29	User-defined parameter 29	00.00-99.99	0.00	Changeable at any time
F14.30	User-defined parameter 30	00.00-99.99	0.00	Changeable at any time
F14.31	User-defined parameter 31	00.00-99.99	0.00	Changeable at any time
F14.32	User-defined parameter 32	00.00-99.99	0.00	Changeable at any time
F14.33	User-defined parameter 33	00.00-99.99	0.00	Changeable at any time
F14.34	User-defined parameter 34	00.00-99.99	0.00	Changeable at any time
F14.35	User-defined parameter 35	00.00-99.99	0.00	Changeable at any time
F14.36	User-defined parameter 36	00.00-99.99	0.00	Changeable at any time

6.2.15 F15 Group: Torque Control Parameters

Parameter ID	Name	Reference	Default value	Change
F15.01	Switchover between speed control and torque control	0: Speed control 1: Torque control	0	Changeable only at stop
F15.02	Torque reference channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop
F15.03	Torque digital setting	-300.0%-300.0%	0.0%	Changeable at any time
F15.04	Torque rising time	0.00s-320.00s	0.00s	Changeable at any time
F15.05	Torque falling time	0.00s-320.00s	0.00s	Changeable at any time
F15.06	Torque control forward speed limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop
F15.07	Torque control forward maximum speed limit	0.00%-100.00%	100.00%	Changeable at any time
F15.08	Torque control reverse speed limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop
F15.09	Torque control reverse maximum speed limit	0.00%-100.00%	100.00%	Changeable at any time

6.2.16 F16 Group: Brake Control Parameters

Parameter ID	Name	Reference	Default value	Change
F16.01	Brake function	0: Disabled 1: Enabled	0	Changeable only at stop
F16.06	Brake opening time	0.000s-32.000s	0.000s	Changeable only at stop
F16.07	Brake closing time	0.000s-32.000s	0.000s	Changeable only at stop

6.2.17 F17 Group: Group 2 Motor Parameters

Parameter ID	Name	Reference	Default value	Change
F17.01	Motor type	0: Asynchronous motor	0	Changeable only at stop
F17.02	Rated motor power	0.00kW-30000.00kW	Model dependent	Changeable only at stop
F17.03	Rated motor voltage	0V-30000V	Model dependent	Changeable only at stop
F17.04	Rated motor current	0.00A -30000.00A	Model dependent	Changeable only at stop
F17.05	Rated motor frequency	0.00Hz-600.00Hz	Model dependent	Changeable only at stop
F17.06	Rated motor speed	0.0RPM~90000.0RPM	Model dependent	Changeable only at stop
F17.08	Asynchronous motor stator resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time
F17.09	Asynchronous motor rotor resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time
F17.10	Asynchronous motor stator leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F17.11	Asynchronous motor rotor leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F17.12	Asynchronous motor mutual inductance	0.000mH-90000.000mH	Model dependent	Changeable at any time
F17.13	Asynchronous motor no-load current	0.00A-30000.00A	Model dependent	Changeable at any time
F17.14	Asynchronous motor core magnetic saturation coefficient 1	100.00%-300.00%	Model dependent	Changeable at any time
F17.15	Asynchronous motor core magnetic saturation coefficient 2	100.00%-300.00%	Model dependent	Changeable at any time
F17.16	Asynchronous motor core magnetic saturation coefficient 3	100.00%-300.00%	Model dependent	Changeable at any time
F17.17	Asynchronous motor core magnetic saturation coefficient 4	100.00%-300.00%	Model dependent	Changeable at any time
F17.18	Asynchronous motor core magnetic saturation coefficient 5	90.00%-110.00%	Model dependent	Changeable at any time
F17.19	Asynchronous motor core magnetic saturation coefficient 6	50.00%-100.00%	Model dependent	Changeable at any time
F17.20	Asynchronous motor core magnetic saturation coefficient 7	40.00%-100.00%	Model dependent	Changeable at any time
F17.33	Motor rotation inertia	0.000s-30.000s	Model dependent	Changeable at any time
F17.39	Maximum output voltage limit	50.0%-150.0%	150.0%	Changeable at any time
F17.40	Motor demagnetization time	0.0%-1000.0%	200.0%	Changeable at any time
F17.41	Motor overload protection	0: No protection 1: General motor (with low-speed compensation) 2: Variable frequency motor (without low-speed compensation)	2	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F17.42	Motor overload protection current (continuous working)	50%-F17.43	110%	Changeable only at stop
F17.43	Motor overload protection current (working for 1 minute)	F17.42-200%	150%	Changeable only at stop
F17.45	Motor overload pre-alarm coefficient	50.0%-100.0%	80.0%	Changeable at any time
F17.47	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000 3: KTY84	0	Changeable at any time
F17.48	Motor overtemperature protection threshold	0.0℃-200.0℃	110.0℃	Changeable at any time
F17.49	Motor overtemperature pre-alarm threshold	0.0℃-200.0℃	90.0℃	Changeable at any time
F17.50	Encoder type (reserved)	0: Incremental encoder 1: Absolute value encoder 2: Resolver 3: Sine-cosine encoder	0	Changeable only at stop
F17.51	Encoder power supply	0: 5V 1: 24V 2: 12V 3: 15V	0	Changeable only at stop
F17.52	Encoder direction	0: A ahead of B 1: B ahead of A	0	Changeable only at stop
F17.53	Encoder pulse correction	0: Disabled 1: Enabled	0	Changeable only at stop
F17.54	Encoder PPR	0-32000	1024	Changeable at any time
F17.55	Number of resolver pole pairs	1-65535	1	Changeable only at stop
F17.57	Encoder signal filter time	0.00us-20.00us	0.00us	Changeable at any time
F17.60	Numerator of encoder inverter ratio	1-65535	1	Changeable at any time
F17.61	Denominator of encoder inverter ratio	1-65535	1	Changeable at any time
F17.62	Encoder output frequency division coefficient	0-255	1	Changeable at any time
F17.70	Motor parameter auto-tuning mode	0: Disabled 1: Static auto-tuning 2: Static auto-tuning + rotating auto-tuning 3: Rotating auto-tuning 4: Inertia auto-tuning	0	Changeable only at stop
F17.71	Motor group 2 control mode	0: V/F control 1: Open-loop vector control (OLVC) 2: Closed-loop vector control (CLVC)	0	Changeable only at stop
F17.72	Motor group 2 acceleration/deceleration time	0: The same as Group 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	Changeable at any time

6.2.18 F18 Group: Group 2 Motor Vector Control Parameters

Parameter ID	Name	Reference	Default value	Change
F18.01	Speed loop proportional gain 1	0.00-100.00	3.00	Changeable at any time
F18.02	Speed loop integral time 1	0.00s-100.00s	0.30s	Changeable at any time
F18.03	Speed loop switchover low-point frequency	0.00Hz-F18.07	5.00 Hz	Changeable at any time
F18.04	Speed loop output filter time 1	0.000s-0.100s	0.000s	Changeable at any time
F18.05	Speed loop proportional gain 2	0.01-100.00	3.00	Changeable at any time
F18.06	Speed loop integral time 2	0.00s-100.00s	0.30s	Changeable at any time
F18.07	Speed loop switchover high-point frequency	F18.03-600.00Hz	10.00 Hz	Changeable at any time
F18.08	Speed loop output filter time 2	0.000s-0.100s	0.000s	Changeable at any time
F18.10	Speed loop automatic performance coefficient	0-100	0	Changeable at any time
F18.11	Excitation current loop (d axis) proportional gain	0.00-100.00	0.5	Changeable at any time
F18.12	Excitation current loop (d axis) integral time	0.000s-10.000s	0.010s	Changeable at any time
F18.13	Torque current loop (q axis) proportional gain	0.00-100.00	0.50	Changeable at any time
F18.14	Torque current loop (q axis) integral time	0.000s-10.000s	0.010s	Changeable at any time
F18.15	Current loop performance coefficient	0-100	0	Changeable at any time
F18.18	Motoring slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time
F18.19	Braking slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time
F18.20	Low-speed open loop mode	0: Disabled 1: Enabled	1	Changeable at any time
F18.21	Percentage of low-speed open loop switchover frequency	0.00%-300.00%	5.0%	Changeable at any time
F18.22	Low-speed open loop constant speed current	0.0%-200.0%	50.0%	Changeable at any time
F18.23	Low-speed open loop acceleration and deceleration current	0.0%-200.0%	20.0%	Changeable at any time
F18.24	Feedforward gain coefficient of acceleration and deceleration torque	0.0%-300.0%	0.0%	Changeable at any time
F18.25	Feedforward filter coefficient of acceleration and deceleration torque	1: filter time 6ms 2: filter time 19ms 3: filter time 44ms 4: filter time 94ms 5: filter time 195ms 6: filter time 395ms 7: filter time 797ms 8: filter time 1,601ms 9: filter time 3,209ms 1: filter time 6,424ms	3	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F18.27	Maximum output current limit	0.0%- Model dependent	150.0%	Changeable at any time
F18.44	Electric torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F18.45	Electric torque upper limit	0.0%-300.0%	150.0%	Changeable at any time
F18.46	Power generation torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F18.47	Power generation torque upper limit	0.0%~300.0%	150.0%	Changeable at any time
F18.48	Electric power limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F18.49	Electric power limit	0.0%-200.0%	150.0%	Changeable at any time
F18.50	Generating power limiting	0: Disabled 1: Enabled in the whole process 2: Enabled at constant speed 3: Enabled during deceleration	1	Changeable at any time
F18.51	Power generation power upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F18.52	Power generation upper limit	0.0%-200.0%	150.0%	Changeable at any time

6.2.19 F26 Group: Optimizing Parameters

Parameter ID	Name	Reference	Default value	Change
F26.04	Overmodulation mode	0: Disabled 1: Mild overmodulatioin 2: Reserved	0	Changeable at any time
F26.05	Random PWM depth	0: Random PWM disabled 1: PWM carrier frequency random depth 1 2: PWM carrier frequency random depth 2 3: PWM carrier frequency random depth 3 4: PWM carrier frequency random depth 4 5: PWM carrier frequency random depth 5 6: PWM carrier frequency random depth 6 7: PWM carrier frequency random depth 7 8: PWM carrier frequency random depth 8 9: PWM carrier frequency random depth 9 10: PWM carrier frequency random depth 10	0	Changeable at any time
F26.11	Speed loop integral separation mode	0: Disabled 1: Integral separation at acceleration/deceleration (according to the feedforward torque) 2: Integral separation at torque saturation	0	Changeable at any time
F26.12	Speed loop integral separation coefficient	0%-300%	20%	Changeable at any time
F26.21	Asynchronous motor flux linkage regulator cut-off frequency	0.1Hz-10.0Hz	0.8Hz	Changeable at any time
F26.22	Filter coefficient of asynchronous motor flux linkage regulator set value	1-15	6	Changeable at any time
F26.23	Asynchronous motor field weakening regulator gain	10-5000	400	Changeable at any time
F26.24	Asynchronous motor field weakening regulator corner frequency	0.10Hz-10.00Hz	1.00Hz	Changeable at any time
F26.25	Asynchronous motor OLVC observer cut-off frequency	1.0Hz-100.0Hz	20.0Hz	Changeable at any time
F26.26	Asynchronous motor OLVC observer corner frequency	1.0Hz-100.0Hz	4.0Hz	Changeable at any time
F26.41	Initial position pulse input voltage amplitude auto-tuning	0-1024	128	Changeable only at stop
F26.42	HFI maximum value of high frequency current amplitude	0-2000	300	Changeable only at stop
F26.43	HFI frequency division coefficient	0-6	1	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F26.45	Deadzone compensation mode	0: Disabled 1: Enabled (compensation mode 1)	1	Changeable at any time
F26.46	Motor 1 deadzone compensation time	0.0-20.0us	Model dependent	Changeable at any time
F26.47	Motor 2 deadzone compensation time	0.0-20.0us	Model dependent	Changeable at any time

6.2.20 F40 Group: Virtual I/O Parameters

Parameter ID	Name	Reference	Default value	Change
F40.01	VDI1 input function	0: No function 1: Forward run 2: Reverse run 3: Three-wire control 4: Forward jog 5: Reverse jog 6: Operation enable 7: Coast to stop 8: Emergency stop 9: External stop 10: Operation pause 11: shutdown DC braking 12: Immediate DC braking 13: Pre-excitation 14: Two-wire/three-wire switchover 15: Command source switched to keypad 16: Command source switched to terminal 17: Command source switched to communication 18: Command source switched to expansion card 19: Frequency source switched to main frequency source 20: Frequency source switched to auxiliary frequency source 21: Frequency source switched to frequency source superposition result 22: Terminal UP 23: Terminal DOWN 24: UP/DOWN setting clear 25: Frequency modification enable 26: Running inhibited 27: Forward run inhibited 28: Reverse run inhibited 29: Torque control inhibited 30: Running mode switched to speed control 31: Running mode switched to torque control 32: Running mode switched to position control	0	Changeable only at stop
F40.02	VDI2 input function		0	Changeable only at stop
F40.03	VDI3 input function		0	Changeable only at stop
F40.04	VDI4 input function		0	Changeable only at stop
F40.05	VDI5 input function		0	Changeable only at stop
F40.06	VDI6 input function		0	Changeable only at stop

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F40.07</td><td>VDI7 input function</td><td rowspan="5">33: Fault Reset
34: User-defined fault 1
35: User-defined fault 2
36: NO input of external fault
37: NC input of external fault
38: Multi -speed reference terminal 1
39: Multi -speed reference terminal 2
40: Multi -speed reference terminal 3
41: Multi -speed reference terminal 4
42: Motor parameter group terminal 1
43: Motor parameter group terminal 2
44: Acceleration and deceleration time terminal 1
45: Acceleration and deceleration time terminal 2
46: Acceleration and deceleration inhibited
47: Simple PLC reset
48: Simple PLC pause
49: Wobble reset
50: Wobble pause
51: Regular clearing
52: Counter input
53: Counter reset
54: Length count input
55: Length reset
56: Pulse input
57: PID pause
58: PID parameter switchover
59: PID action direction reversal
60: PID integral clearing
61: PID integral pause
62: Current running duration clear
63: Position lock
64: Forced brake release
65: Forced brake
66: Brake feedback
67-99: Reserved</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.08</td><td>VDI8 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.09</td><td>ADI1 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.10</td><td>ADI2 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.11</td><td>ADI3 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.12</td><td>VDI active state source 1</td><td>[0000]-[2222]
Ones: VDI1 active state source
0: VDOx
1: Parameter setting
2: DIx
3: Communication setpoint
Tens: VDI2 active state source
0: VDOx
1: Parameter setting
2: DIx
3: Communication setpoint
Hundreds: VDI3 active state source
0: VDOx
1: Parameter setting
2: DIx
3: Communication setpoint
Thousands: VDI4 active state source
0: VDOx
1: Parameter setting
2: DIx
3: Communication setpoint</td><td>[0000]</td><td>Changeable at any time</td></tr>
</table>

Parameter ID	Name	Reference	Default value	Change
F40.13	VDI active state source 2	[0000]-[2222] Ones: VDI5 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Tens: VDI6 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Hundreds: VDI7 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Thousands: VDI8 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint	[0000]	Changeable at any time
F40.14	VDI state digital setting 1	[0000]-[1111] Ones: VDI1 0: Inactive 1: Active Tens: VDI2 0: Inactive 1: Active Hundreds: VDI3 0: Inactive 1: Active Thousands: VDI4 0: Inactive 1: Active	[0000]	Changeable at any time
F40.15	VDI state digital setting 2	[0000]-[1111] Ones: VDI5 0: Inactive 1: Active Tens: VDI6 0: Inactive 1: Active Hundreds: VDI7 0: Inactive 1: Active Thousands: VDI8 0: Inactive 1: Active	[0000]	Changeable at any time
F40.16	ADI active mode	[0000]-[0111] Ones: AI1 0: Active high 1: Active low Tens: AI2 0: Active high 1: Active low Hundreds: AI3 0: Active high 1: Active low Thousands: Reserved	[0000]	Changeable only at stop

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F40.17</td><td>ADI low level threshold</td><td>-10.00V-F40.18</td><td>3.00V</td><td>Changeable at any time</td></tr>
<tr><td>F40.18</td><td>ADI high level threshold</td><td>F40.17-10.00V</td><td>7.00V</td><td>Changeable at any time</td></tr>
<tr><td>F40.19</td><td>VDO1 output function</td><td rowspan="7">0: No function
1: Inverter running
2: Inverter in forward running
3: Inverter in reverse running
4: Inverter in jog
5: Inverter in forward jog
6: Inverter in reverse jog
7: Fault
8: Alarm
9: Inverter in undervoltage state
10: Ready to run
11: Braking with energy consumption (Reversed)
12: Designated count value reach
13: Reference count value reach
14: Length reach
15: Simple PLC stage completion
16: Simple PLC cycle completion
17: Timing reach
18: Current running duration reach
19: Accumulative running duration reach
20: Accumulative power-on duration reach
21: AI1 input overlimit
22: AI2 input overlimit
23: AI3 input overlimit
24: Frequency limited
25: Torque limited
26: Frequency upper limit reach
27: Frequency lower limit reach (no output at stop)
28: Frequency lower limit reach (output at stop)
29: Zero-speed running 1 (no output at stop)
30: Zero-speed running 2 (output at stop)
31: Frequency detection FDT1 reach
32: Frequency detection FDT2 reach
33: Frequency reference reach
34: Any frequency 1 reach
35: Any frequency 2 reach
36: Any current 1 reach
37: Any current 2 reach
38: Zero current state
39: Output overcurrent
40: Inverter overtemperature pre-alarm
41: Inverter overload pre-alarm</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.20</td><td>VDO2 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.21</td><td>VDO3 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.22</td><td>VDO4 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.23</td><td>VDO5 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.24</td><td>VDO6 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.25</td><td>VDO7 output function</td><td>0</td><td>Changeable at any time</td></tr>
</table>

Parameter ID	Name	Reference	Default value	Change
F40.26	VDO8 output function	42: Motor overtemperature pre-alarm 43: Motor overload pre-alarm 44: Inverter in load protection 1 45: Inverter in load protection 2 (Reserved) 46: Position lock succeeds 47: Brake output 48: Communication 49-99: Reserved	0	Changeable at any time
F40.27	VDO1 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.28	VDO1 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.29	VDO2 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.30	VDO2 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.31	VDO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.32	VDO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.33	VDO4 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.34	VDO4 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.35	VDO5 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.36	VDO5 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.37	VDO6 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.38	VDO6 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.39	VDO7 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.40	VDO7 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.41	VDO8 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.42	VDO8 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.43	VDO active mode selection 1	[0000]-[1111] Ones: VDO1 0: Positive logic active 1: Negative logic active Tens: VDO2 0: Positive logic active 1: Negative logic active Hundreds: VDO3 0: Positive logic active 1: Negative logic active Thousands: VDO4 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time
F40.44	VDO active mode selection 2	[0000]-[1111] Ones: VDO5 0: Positive logic active 1: Negative logic active Tens: VDO6	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		0: Positive logic active 1: Negative logic active Hundreds: VDO7 0: Positive logic active 1: Negative logic active Thousands: VDO8 0: Positive logic active 1: Negative logic active		

6.2.21 F41 Group: AI/AO Correction Parameters

Parameter ID	Name	Reference	Default value	Change
F41.01	AI1 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.02	AI1 displayed voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.03	AI1 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.04	AI1 displayed voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.05	AI2 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.06	AI2 displayed voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.07	AI2 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.08	AI2 displayed voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.09	AI3 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.10	AI3 displayed voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.11	AI3 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.12	AI3 displayed voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.13	AO1 target voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.14	AO1 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.15	AO1 target voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.16	AO1 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.17	AO2 target voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.18	AO2 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.19	AO2 target voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.20	AO2 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.21	AO3 target voltage 1	-10.000V-10.000V	2.000V	Changeable at any time
F41.22	AO3 measured voltage 1	-10.000V-10.000V	2.000V	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F41.23	AO3 target voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.24	AO3 measured voltage 2	-10.000V-10.000V	8.000V	Changeable at any time
F41.25	AI1 measured current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.26	AI1 displayed current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.27	AI1 measured current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.28	AI1 displayed current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.29	AI2 measured current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.30	AI2 displayed current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.31	AI2 measured current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.32	AI2 displayed current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.33	AI3 measured current 1 (reserved)	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.34	AI3 displayed current 1 (reserved)	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.35	AI3 measured current 2 (reserved)	0.000mA-20.000mA	16.000mA	Changeable at any time
FF1.36	AI3 displayed current 2 (reserved)	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.37	AO1 target current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.38	AO1 measured current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.39	AO1 target current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.40	AO1 measured current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.41	AO2 target current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.42	AO2 measured current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.43	AO2 target current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.44	AO2 measured current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.45	AO3 target current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.46	AO3 measured current 1	0.000mA-20.000mA	4.000mA	Changeable at any time
F41.47	AO3 target current 2	0.000mA-20.000mA	16.000mA	Changeable at any time
F41.48	AO3 measured current 2	0.000mA-20.000mA	16.000mA	Changeable at any time

6.2.22 F60 Group: Modbus Communication Parameters

Parameter ID	Name	Reference	Default value	Change
F60.01	Modbus communication baud rate	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 115200bps	3	Changeable at any time
F60.02	Modbus communication data format	0: No check (8-N-1) 1: Even check (8-E-1) 2: Odd check (8-O-1) 3: No check (8-N-2)	0	Changeable at any time
F60.03	Modbus communication address	1-247	1	Changeable at any time
F60.04	Modbus response relay	0ms-1000ms	2ms	Changeable at any time
F60.05	Modbus communication timeout time	0.0s-120.0s	0.0s	Changeable at any time
F60.06	Modbus communication proportion setting (reserved)	0.00-5.00	1.00	Changeable at any time

6.2.23 F61 Group: Master-Slave Communication Parameters

Parameter ID	Name	Reference	Default value	Change
F61.01	Master-slave communication enable	0: Disabled 1: Enabled	0	Changeable only at stop
F61.02	Master-slave communication interface	0: CAN 1: RS485	0	Changeable only at stop
F61.03	Master-slave communication baud rate	0: 1Mbps 1: 500Kbps 2: 125Kbps	0	Changeable at any time
F61.04	Master-slave communication address	1-F61.05	1	Changeable at any time
F61.05	Master-slave communication node number	2-12	2	Changeable at any time
F61.06	Master-slave communication selection	0: Slave 1: Master	0	Changeable at any time
F61.07	Master-slave communication mode	0: Polling 1: Broadcast	0	Changeable at any time
F61.08	Slave following master's command	[0000]-[0011] Ones: Whether the slave follows the operation command of the master 0: No 1: Yes Tens: Whether the slave fault information is transmitted 0: No 1: Yes Hundreds: Reserved Thousands: Reserved	[0011]	Changeable at any time
F61.09	Master-slave communication application	0: Rigid connection 1: Flexible connection	0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
	mode			
F61.12	Master data Tx cycle in master-slave communication	1ms-1000ms	4ms	Changeable at any time
F61.14	Master-slave communication timeout time	0.000s-32.000s	0.000s	Changeable at any time
F61.15	Speed window threshold	0: Disabled 1: Enabled	0	Changeable at any time
F61.16	Forward frequency window threshold	0.00Hz-600.00Hz	5.00Hz	Changeable at any time
F61.17	Reverse frequency window threshold	0.00Hz-600.00Hz	5.00Hz	Changeable at any time

6.2.24 F63 Group: Fieldbus Communication Module Configuration Parameters

The communication expansion cards supported by HV350 series inverters are: CANopen card, Profibus-DP card, Profinet card, EtherCAT card, EtherNet/IP card and Modbus-TCP card.

6.2.25 F64 Group: Fieldbus Communication Data Configuration Parameters

The communication expansion cards supported by HV350 series inverters are: CANopen card, Profibus-DP card, Profinet card, EtherCAT card, EtherNet/IP card and Modbus-TCP card.

6.2.26 F80 Group: Fault Record Parameters

Parameter ID	Name	Reference	Default value	Change
F80.01	Active fault code			Read only
F80.02	Active fault subcode (reserved)			Read only
F80.03	Previous fault code			Read only
F80.04	Previous fault subcode (reserved)			Read only
F80.05	Latest two fault codes			Read only
F80.06	Latest two fault subcodes (reserved)			Read only
F80.07	Running frequency upon the active fault			Read only
F80.08	Output voltage upon the active fault			Read only
F80.09	Output current upon the active fault			Read only
F80.10	Bus voltage upon the active fault			Read only
F80.11	Radiator temperature upon the active fault			Read only
F80.12	Inverter running state upon the active fault	B00: Total running B01: Common running B02: Jog		Read only

Parameter ID	Name	Reference	Default value	Change
		B03: Motor parameter auto-tuning B04: Reserved B05: Operation enable B06: Total running command B07: Common running and auto-tuning command B08: Jog command B09: MotorDrive running command B10: Acceleration and deceleration status bit 1 B11: Acceleration and deceleration status bit 2 B12: Frequency reference direction B13: Motor rotation direction B14: Inverter in forward and reverse running switchover B15: Reserved		
F80.13	Input terminal state 1 upon the active fault	B00: DI1 B01: DI2 B02: DI3 B03: DI4 B04: DI5 B05: DI6 B06: DI7 B07: DI8 B08: DI9 B09: DI10 B10: VDI1 B11: VDI2 B12: VDI3 B13: VDI4 B14: VDI5 B15: VDI6		Read only
F80.14	Input terminal state 2 upon the active fault	B00: VDI7 B01: VDI8 B02: ADI1 B03: ADI2 B04: ADI3 B05: Reserved B06: Reserved B07: Reserved B08: Reserved B09: Reserved B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved		Read only
F80.15	Output terminal state upon the active fault	B00: DO1 B01: DO2 B02: DO3 B03: DO4 B04: DO5 B05: RO1 B06: RO2		Read only

Parameter ID	Name	Reference	Default value	Change
		B07: RO3 B08: VDO1 B09: VDO2 B10: VDO3 B11: VDO4 B12: VDO5 B13: VDO6 B14: VDO7 B15: VDO8		
F80.16	Running frequency upon the previous fault			Read only
F80.17	Output voltage upon the previous fault			Read only
F80.18	Output current upon the previous fault			Read only
F80.19	Bus voltage upon the previous fault			Read only
F80.20	Radiator temperature upon the previous fault			Read only
F80.21	Inverter running state upon the previous fault	B00: Total running B01: Common running B02: Jog B03: Motor parameter auto-tuning B04: Reserved B05: Operation enable B06: Total running command B07: Common running and auto-tuning command B08: Jog command B09: MotorDrive running command B10: Acceleration and deceleration status bit 1 B11: Acceleration and deceleration status bit 2 B12: Frequency reference direction B13: Motor rotation direction B14: Inverter in forward and reverse running switchover B15: Reserved		Read only
F80.22	Input terminal state 1 upon the previous fault	B00: DI1 B01: DI2 B02: DI3 B03: DI4 B04: DI5 B05: DI6 B06: DI7 B07: DI8 B08: DI9 B09: DI10 B10: VDI1 B11: VDI2 B12: VDI3 B13: VDI4 B14: VDI5 B15: VDI6		Read only

Parameter ID	Name	Reference	Default value	Change
F80.23	Input terminal state 2 upon the previous fault	B00: VDI7 B01: VDI8 B02: ADI1 B03: ADI2 B04: ADI3 B05: Reserved B06: Reserved B07: Reserved B08: Reserved B09: Reserved B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved		Read only
F80.24	Output terminal state upon the previous fault	B00: DO1 B01: DO2 B02: DO3 B03: DO4 B04: DO5 B05: RO1 B06: RO2 B07: RO3 B08: VDO1 B09: VDO2 B10: VDO3 B11: VDO4 B12: VDO5 B13: VDO6 B14: VDO7 B15: VDO8		Read only
F80.25	Running frequency upon the latest two faults			Read only
F80.26	Output voltage upon the latest two faults			Read only
F80.27	Output current upon the latest two faults			Read only
F80.28	Bus voltage upon the latest two faults			Read only
F80.29	Radiator temperature upon the latest two faults			Read only
F80.30	Inverter running state upon the latest two faults	B00: Total running B01: Common running B02: Jog B03: Motor parameter auto-tuning B04: Reserved B05: Operation enable B06: Total running command B07: Common running and auto-tuning command B08: Jog command B09: MotorDrive running command B10: Acceleration and deceleration status bit 1 B11: Acceleration and deceleration status bit 2		Read only

Parameter ID	Name	Reference	Default value	Change
		B12: Frequency reference direction B13: Motor rotation direction B14: Inverter in forward and reverse running switchover B15: Reserved		
F80.31	Input terminal state 1 upon the latest two faults	B00: DI1 B01: DI2 B02: DI3 B03: DI4 B04: DI5 B05: DI6 B06: DI7 B07: DI8 B08: DI9 B09: DI10 B10: VDI1 B11: VDI2 B12: VDI3 B13: VDI4 B14: VDI5 B15: VDI6		Read only
F80.32	Input terminal state 2 upon the latest two faults	B00: VDI7 B01: VDI8 B02: ADI1 B03: ADI2 B04: ADI3 B05: Reserved B06: Reserved B07: Reserved B08: Reserved B09: Reserved B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved		Read only
F80.33	Output terminal state upon the latest two faults	B00: DO1 B01: DO2 B02: DO3 B03: DO4 B04: DO5 B05: RO1 B06: RO2 B07: RO3 B08: VDO1 B09: VDO2 B10: VDO3 B11: VDO4 B12: VDO5 B13: VDO6 B14: VDO7 B15: VDO8		Read only

6.2.27 F82 Group: Basic Monitoring Parameters

Parameter ID	Name	Reference	Default value	Change
F82.01	Running frequency		0.01Hz	Read only
F82.02	Frequency reference		0.01Hz	Read only
F82.03	Ramp frequency		0.01Hz	Read only
F82.04	Bus voltage		1V	Read only
F82.05	Output voltage		1V	Read only
F82.06	Output current		0.1A	Read only
F82.07	Output power		0.1kW	Read only
F82.08	Output torque		0.01%	Read only
F82.09	Heatsink 1 temperature		0.1℃	Read only
F82.10	Heatsink 2 temperature (reserved)		0.1℃	Read only
F82.11	DI input terminal status 1	B00: DI1 B01: DI2 B02: DI3 B03: DI4 B04: DI5 B05: DI6 B06: DI7 B07: DI8 B08: DI9 B09: DI10 B10: VDI1 B11: VDI2 B12: VDI3 B13: VDI4 B14: VDI5 B15: VDI6	1	Read only
F82.12	DI input terminal status 2	B00: VDI7 B01: VDI8 B02: ADI1 B03: ADI2 B04: ADI3 B05: Reserved B06: Reserved B07: Reserved B08: Reserved B09: Reserved B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved	1	Read only
F82.13	DO output terminal status	B00: DO1 B01: DO2 B02: DO3 B03: DO4 B04: DO5	1	Read only

Parameter ID	Name	Reference	Default value	Change
		B05: RO1 B06: RO2 B07: RO3 B08: VDO1 B09: VDO2 B10: VDO3 B11: VDO4 B12: VDO5 B13: VDO6 B14: VDO7 B15: VDO8		
F82.14	AI1 input value		0.01V/mA	Read only
F82.15	AI2 input value		0.01V/mA	Read only
F82.16	AI3 input value		0.01V	Read only
F82.17	AO1 output value		0.01V/mA	Read only
F82.18	AO2 output value		0.01V/mA	Read only
F82.19	AO3 output value		0.01V/mA	Read only
F82.20	Pulse input frequency		0.01kHz	Read only
F82.21	Pulse output frequency		0.01kHz	Read only
F82.22	PID setting		0.01%	Read only
F82.23	PID feedback		0.01%	Read only
F82.24	PID deviation		0.01%	Read only
F82.25	PID output		0.01%	Read only
F82.26	Simple PLC current stage		1	Read only
F82.27	Count Value		1	Read only
F82.28	Length value		1m	Read only
F82.29	Linear speed		0.01m/s	Read only
F82.30	Inverter overload usage		0.1%	Read only
F82.31	Motor overload usage		0.1%	Read only
F82.32	Motor temperature		0.1℃	Read only
F82.33	Estimated motor frequency		0.01Hz	Read only
F82.34	Measured motor frequency		0.01Hz	Read only
F82.35	Motor speed		0.1RPM	Read only
F82.36	Remaining running duration during timed running		1s/m/h	Read only
F82.37	Current running time		0.1min	Read only

Parameter ID	Name	Reference	Default value	Change
F82.38	Current power-on time		1min	Read only
F82.39	Accumulative running time		1h	Read only
F82.40	Accumulative power-on time		1h	Read only
F82.41	Accumulative fan running time		1h	Read only
F82.42	Accumulative power consumption (low-order bits)		0.1kW/h	Read only
F82.43	Accumulative power consumption (high-order bits)		10000kW/h	Read only
F82.44	Current command source	0: Keypad/background 1: Terminal 2: Communication 3: Expansion card	1	Read only
F82.45	Current frequency source	0: Main frequency source 1: Auxiliary frequency source 2: Frequency source superposition	1	Read only
F82.46	Current running mode	0: Speed control 1: Torque control	1	Read only
F82.47	Current motor parameter group	0: Motor parameter group 1 1: Motor parameter group 2	1	Read only
F82.48	Current motor control mode	0: V/F control 1: Open-loop vector control (OLVC) 2: Closed-loop vector control (CLVC)	1	Read only
F82.49	Current acceleration/deceleration time	0: Acceleration and deceleration time 1 1: Acceleration and deceleration time 2 2: Acceleration and deceleration time 3 3: Acceleration and deceleration time 4	1	Read only
F82.50	Inverter state 1	B00: Total running B01: Common running B02: Jog B03: Motor parameter auto-tuning B04: Reserved B05: Acceleration and deceleration status bit 1 B06: Acceleration and deceleration status bit 2 B07: Frequency reference direction B08: Motor rotation direction B09: Ready to run B10: Fault B11: Alarm B12: Power failure B13: Reserved B14: Reserved B15: Reserved	1	Read only

Parameter ID	Name	Reference	Default value	Change
F82.51	Inverter state 2	B00: Overvoltage suppression B01: Undervoltage suppression B02: V/F overcurrent suppression B03: Position lock B04: Low-speed open loop B05: Torque limit B06: Speed limit (unrelated to running) B07: Encoder running in redundancy mode B08: Overexcitation B09: Ramp maintaining B10: Running waiting B11: Direction inhibition B12: Reserved B13: Reserved B14: Reserved B15: Heartbeat	1	Read only
F82.52	Active fault code		1	Read only
F82.53	Active fault subcode (reserved)		1	Read only
F82.54	Active alarm code		1	Read only
F82.55	Active alarm subcode (reserved)		1	Read only
F82.56	Main frequency source reference value		0.01Hz	Read only
F82.57	Auxiliary frequency source reference value		0.01Hz	Read only
F82.58	Additional frequency reference value		0.01Hz	Read only
F82.59	Communication frequency reference value		0.01Hz	Read only
F82.60	Terminal UP/DOWN frequency reference value		0.01Hz	Read only
F82.61	Torque reference value		0.01%	Read only
F82.62	Torque current reference value		0.1%	Read only
F82.63	Torque current		0.1%	Read only
F82.64	Excitation current reference value		0.1%	Read only
F82.65	Excitation current		0.1%	Read only
F82.66	Target voltage upon V/F separation		1V	Read only
F82.67	Output voltage upon V/F separation		1V	Read only
F82.68	Encoder angle		0.1°	Read only
F82.69	Encoder type	0: Disabled 1: Incremental encoder 2: Absolute value encoder 3: Resolver	0	Read only

Parameter ID	Name	Reference	Default value	Change
		4: Sine-cosine encoder		
F82.70	Expansion card 1 type	0: Disabled 1: Resolver card 2: PLC card 3: IO1 card 4: IO2 card 5: Reserved 6: Incremental encoder card 7: Voltage detection card 8: Reserved 9: Reserved 10: CANopen communication card 11: Reserved 12: Profibus-DP communication card 13: Profinet communication card 14: EtherCAT communication card 15: Ethernet/IP communication card 16: Modbus-TCP communication card	1	Read only
F82.71	Expansion card 1 version		1	Read only
F82.72	Expansion card 2 type	0: Disabled 1: Resolver card 2: PLC card 3: IO1 card 4: IO2 card 5: Reserved 6: Incremental encoder card 7: Voltage detection card 8: Reserved 9: Reserved 10: CANopen communication card 11: Reserved 12: Profibus-DP communication card 13: Profinet communication card 14: EtherCAT communication card 15: Ethernet/IP communication card 16: Modbus-TCP communication card	1	Read only
F82.73	Expansion card 2 version		1	Read only
F82.81	MAC address 1		1	Read only
F82.82	MAC address 2		1	Read only
F82.83	MAC address 3		1	Read only

Parameter ID	Name	Reference	Default value	Change
F82.84	MAC address 4		1	Read only
F82.85	MAC address 5		1	Read only
F82.86	MAC address 6		1	Read only
F82.87	IP address 1		1	Read only
F82.88	IP address 2		1	Read only
F82.89	IP address 3		1	Read only
F82.90	IP address 4		1	Read only

--End of the chapter--

7.1 F01 Group: Standard Function Parameters

Parameter ID	Name	Reference	Default value	Change
F01.01	Type G/P	0: Type G 1: Type P	0	Changeable only at stop

0: Type G
Load type at constant torque

1: Type P
Load type of fans, pumps, etc.

Note:
1) Whether G/P type setting is supported depends on the inverter model.
2) When the G/P type is changed, the reference value for the following parameters will be changed automatically:
   F01.18 Carrier frequency, F04.27 Maximum output current limit, F18.27 maximum output current limit, F05.20 V/F overcurrent suppression action current
3) Function parameters of the inverter are restored to factory defaults (using F08.03 Parameter initialization) except for Type G/P (F01.01).

Parameter ID	Name	Reference	Default value	Change
F01.02	Group 1 motor control mode	0: V/F control 1: Open-loop vector control (OLVC) 2: Closed-loop vector control (CLVC)	0	Changeable only at stop

0: V/F control
Controlled by the voltage/frequency ratio

1: Open-loop vector control (OLVC)
Sensorless vector control (SVC) is a type of open-loop vector control which is applicable to all speed control scenarios. Set this mode when high precision speed control is required.
In this control mode, the torque can respond quickly even without the feedback signal of the motor, and large torque can be obtained even when the motor is running at a low speed.

2: Closed-loop vector control (CLVC)
Feedback vector control (FVC) is a type of closed-loop vector control which is applicable to all speed control scenarios requiring fast torque response and high performance torque control. This mode can realize high-precision speed control up to zero speed. To receive the speed feedback signal of the motor, it is necessary to use the PG purchase card.
This mode is mainly used for high-precision speed control, torque control, simple servo control and other scenarios with strict requirements for control performance.
To enable CLVC, make sure the encoder has the right number of lines and direction. For the rotary transformer, it is also necessary to ensure that the number of poles is correct.

Parameter ID	Name	Reference	Default value	Change
F01.03	Command source	0: Keypad/background 1: Terminal 2: Communication 3: Expansion card (reserved)	0	Changeable at any time

This parameter defines the source of inverter control commands, including start, stop, forward run, reverse run and jog.
0: Keypad/background
Control commands are input using the keys on the keypad or the background.

1: Terminal

Control commands are input using the FWD, REV, FJOG, RJOG and other multi-function input terminals of the inverter.

2: Communication

Control commands are input through Modbus or other communication modes, and the communication mode is determined by F01.27.

3: Expansion card (reserved)

Parameter ID	Name	Reference	Default value	Change
F01.04	Main frequency source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID 8: Communication 9: Terminal UP/DOWN 10: Expansion card (reserved)	0	Changeable only at stop
F01.05	Auxiliary frequency source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi- reference 6: Simple PLC 7: PID 8: Communication 9: Terminal UP/DOWN 10: Expansion card (reserved)	0	Changeable at any time

0: Digital setting

The initial frequency reference is the preset frequency (F01.11). The value can be changed through “F08.10 Keypad UP/DOWN key function”. For details about parameter retention at power failure and keypad operation scopes, please refer to F08.10.

1: AI1

2: AI2

3: AI3

The frequency reference is set and modified by using the analog inputs through AI1, AI2 and AI3. The frequency is calculated according to the preset AI curve with 100% corresponding to the maximum frequency. For details, please refer to “F06 Group: Input Terminal Parameters”.

4: Pulse reference

The frequency reference is set and modified by using the pulse frequency input through DI5. The frequency is calculated according to the curve that maps pulse frequencies to running frequencies. For details, please refer to parameters F06.40-F06.45.

5: Multi-reference

The frequency reference is selected by the multi-reference terminals. When all the multi-reference terminals are disabled, the multi-reference value will zero. For details, please refer to “F13 Group: Multi-speed and Simple PLC Parameters”.

6: Simple PLC

Simple PLC is a multi-reference used to control the frequency reference and inverter running direction. Up to 16 references can be set. For details, please refer to “F13 Group: Multi-speed and Simple PLC Parameters”.

7: PID

When the main or auxiliary frequency source selects this source, the inverter is in PID control mode. The frequency reference will then be the output after PID. For details about PID reference and PID feedback, please refer to “F11 Group: PID Parameters.”

The current set value of the parameter F11.02 can be changed through F08.10 Keypad UP/DOWN key function. For details about parameter retention at power failure and keypad operation scopes, please refer to F08.10.

The status and characteristics of the PID control can be changed by the input terminal, and details can be viewed by referring to parameters F06.01-F06.10.

8: Communication

The frequency reference is set through communication.

When the Modbus communication is enabled, the frequency reference can be set and modified through addresses 0x2000/0x3000. For details, please refer to **Appendix V: Modbus-RTU Communication Protocol**.

When master-slave communication is enabled, the slave selects the frequency reference or output frequency transmitted by the master as the frequency reference. For details, please refer to “F61 Group: Master-slave Communication Parameters”.

When the Profibus-DP communication is enabled, the frequency reference can be set and modified through corresponding address. For details, please refer to the operating instructions of the optional Profibus-DP card.

When the CANopen communication is enabled, the frequency reference can be set and modified through corresponding address. For details, please refer to the operating instructions of the optional CANopen card.

9: Terminal UP/DOWN

The frequency reference is increased and decreased linearly through terminal UP/DOWN and controlled via the on-off of terminal UP, DOWN and DGND set by the multi-function terminals (DI1-DI10). For details, please refer to F06.01-F06.10 for terminal function.

The frequency reference set through terminal UP/DOWN can be changed by through F08.10 Keypad UP/DOWN key function. For details about parameter retention at power failure and keypad operation scopes, please refer to F08.10.

10: Expansion card (reserved)

Parameter ID	Name	Reference	Default value	Change
F01.06	Base value of range of auxiliary frequency source for superposition	0: Relative to maximum frequency 1: Relative to main frequency source	0	Changeable only at stop
F01.07	Range of auxiliary frequency source for superposition	0%-150%	100%	Changeable at any time

When F01.09 Frequency source superposition is set to 2-5, the auxiliary frequency will be limited with the limit =F01.07*F01.06.

Parameter ID	Name	Reference	Default value	Change
F01.08	Offset frequency at superposition	0.00Hz-F01.12	0.00Hz	Changeable at any time

When F01.09 Frequency source superposition is set to 2-5, the offset frequency will be superposed to the calculation result.

Parameter ID	Name	Reference	Default value	Change
F01.09	Frequency source superposition	0: Main 1: Auxiliary 2: Main + Auxiliary 3: Main - Auxiliary 4: Max (|main|, |auxiliary|) 5: Min (|main|, |auxiliary|)	0	Changeable at any time

This parameter is used to select the combination mode of the main and auxiliary frequency sources.

0: Main
Only F01.04 Main frequency source is enabled.

1: Auxiliary
Only F01.05 Auxiliary frequency source is enabled.

2: Main + Auxiliary
The frequency reference of the inverter is superposed by “F01.04 Main frequency source” and “F01.05 Auxiliary frequency source”.

3: Main – Auxiliary
The frequency reference of the inverter is obtained through “F01.04 Main frequency source” minus “F01.05 Auxiliary frequency source”, which may be negative.

4: Max (|main|, |auxiliary|)
The maximum absolute value of “F01.04 Main frequency source” and “F01.05 Auxiliary frequency source” is the frequency reference of the inverter.

5: Min (|main|, |auxiliary|)
The minimum absolute value of “F01.04 Main frequency source” and “F01.05 Auxiliary frequency source” is the frequency reference of the inverter.

Parameter ID	Name	Scope	Default value	Change
F01.10	Frequency source bound to command source	[0000]-[AAAA] Ones: Frequency source bound to keypad control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN 11: Expansion card (reserved) Tens: Frequency source bound to terminal control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN 11: Expansion card (reserved) Hundreds: Frequency source bound to communication control 0: No binding 1: Digital setting 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference	[0000]	Changeable at any time

Parameter ID	Name	Scope	Default value	Change
		7: simple PLC 8: PID 9: Communication 10: Terminal UP/DOWN 11: Expansion card (reserved) Thousands: Reserved		

This parameter is used to set the frequency source bound to each command source. When the command source has a bound frequency source, the frequency set by F01.04 to F01.09 will be invalid when the command source is enabled.

Ones: Frequency source bound to keypad control

Tens: Frequency source bound to terminal control

Hundreds: Frequency source bound to communication control

Thousands: Reserved
0: No binding
1: Digital setting
2: AI1
3: AI2
4: AI3
5: Pulse reference
6: Multi-reference
7: Simple PLC
8: PID
9: Communication
10: Terminal UP/DOWN
11: Expansion card (reserved)

The setting of this parameter should be consistent with that of F01.04 and F01.05.

Parameter ID	Name	Reference	Default value	Change
F01.11	Frequency of digital setting	0.00Hz-F01.12	50.00Hz	Changeable at any time

This parameter is enabled only when 0: Digital setting is chosen for both F01.04 and F01.05, and it is used to set and modify the frequency of digital setting.

Parameter ID	Name	Reference	Default value	Change
F01.12	Maximum frequency	F01.14-600.00Hz	50.00Hz	Changeable only at stop

When AI, Pulse-reference, Multi-reference are set as frequency source, 100% corresponds to the maximum frequency. If 0: Maximum frequency is enabled through the ones place of F01.20, the maximum frequency is used as acceleration/deceleration time base frequency.

Parameter ID	Name	Reference	Default value	Change
F01.13	Source of frequency upper limit	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: Expansion card (reserved)	0	Changeable only at stop
F01.14	Frequency upper limit	F01.16-F01.12	50.00Hz	Changeable at any time

These two parameters are used to set the frequency upper limit.

Parameter ID	Name	Reference	Default value	Change
F01.15	Frequency upper limit offset	0.00Hz-F01.12	0.00Hz	Changeable at any time

The final frequency upper limit equals to the frequency upper limit reference superposing the frequency upper limit offset.

Parameter ID	Name	Reference	Default value	Change
F01.16	Frequency lower limit	0.00Hz-F01.14	0.00Hz	Changeable at any time

When the frequency reference is lower than the frequency lower limit, whether the inverter takes the frequency lower limit for running, shuts down or runs at zero speed is set by F01.17.

Parameter ID	Name	Reference	Default value	Change
F01.17	Action when set reference below frequency lower limit	0: Run at frequency lower limit 1: Shutdown 2: Run at zero speed	0	Changeable at any time

0: Run at frequency lower limit

When the actual set frequency is lower than the frequency lower limit, the inverter will run at the frequency lower limit.

1: Shutdown

When the actual set frequency is lower than the frequency lower limit, the inverter will stop without output.

2: Run at zero speed

When the actual set frequency is lower than the frequency lower limit, the inverter will run at zero frequency. When the actual set frequency is lower than the frequency lower limit and F01.17 is set to 1: Shutdown, the inverter is in waiting to run state after startup.

The maximum frequency, frequency upper and lower limits should be set carefully according to the running conditions requirements. In addition to frequency upper and lower limits, the output frequency of the inverter during running is also limited by the set start frequency, shutdown detection frequency, start frequency of DC braking at stop, jump frequency and other parameters. The relationship between the maximum frequency, frequency upper limit and frequency lower limit are shown in the figure below.

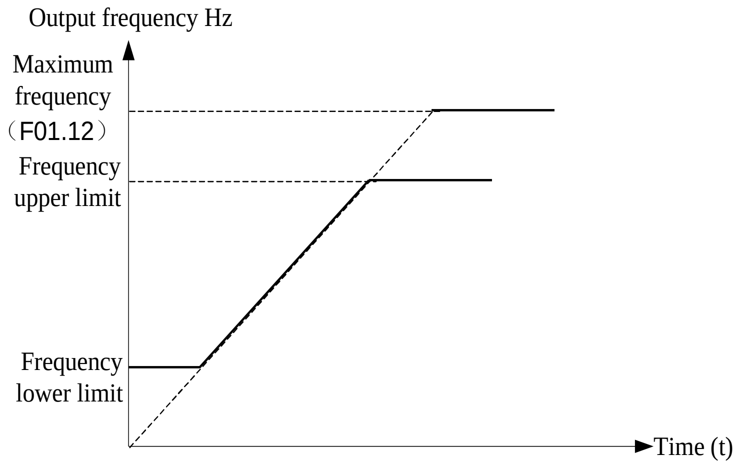


Figure 7-1 Relationship between the maximum frequency, frequency upper limit and frequency lower limit

Parameter ID	Name	Scope	Default value	Change
F01.18	Carrier frequency	Model dependent	Model dependent	Changeable at any time

This parameter is used to set the switching frequency for the inverter IGBT. Please set this parameter when adjusting magnetic noise or reducing leakage current. This function is mainly used to tackle loud noise and intense vibration in the operation of the inverter. It is highly applicable to scenarios requiring silence as a high carrier frequency leads to more stable current waveform and lower noise. However, an increase in the carrier frequency will also result in an increase in switching loss, whole machine temperature and radio interference as well as a decrease in efficiency and output power. Meanwhile, the capacitive leakage current will also increase, which may cause leakage protector malfunction or overcurrent. As for running at a low carrier frequency, the opposite principle is true.

Different motors also respond differently to the carrier frequency. The optimal carrier frequency can only be obtained via actual adjustment. However, with the increase of motor capacity, the carrier frequency should be smaller.

Hopewind reserves the right to limit the maximum carrier frequency.

Parameter ID	Name	Reference	Default value	Change
F01.19	Carrier frequency adjusted with temperature	0: Disabled 1: Enabled	1	Changeable at any time

The carrier frequency will decrease automatically if the temperature is too high. If enabling this parameter, the switching loss of the power device will be decreased, thus preventing frequent inverter overtemperature alarms.

Parameter ID	Name	Scope	Default value	Change
F01.20	Acceleration/Deceleration time base frequency	0: Maximum frequency 1: Frequency reference 2: 100.00Hz	0	Changeable only at stop
F01.21	Acceleration/Deceleration time unit	0: s (second) 1: m (minute)	0	Changeable only at stop
F01.22	Acceleration time 1	0.0sec/min-3200.0sec/min	Model dependent	Changeable only at stop
F01.23	Deceleration time 1	0.0sec/min-3200.0sec/min	Model dependent	Changeable only at stop

Acceleration time refers to the time required for the output frequency to accelerate from 0.00Hz to the acceleration/deceleration time base frequency. The maximum frequency, frequency reference and fixed frequency 100.00Hz can be set as the acceleration/deceleration time base frequency through F01.20. Note that if the frequency reference changes frequently, the acceleration of the motor will be variable.

Similarly, deceleration time refers to the time required for the output frequency to slow down from the acceleration/deceleration time base frequency to 0.00Hz.

The unit of acceleration and deceleration time can be s (second) or m (minute).

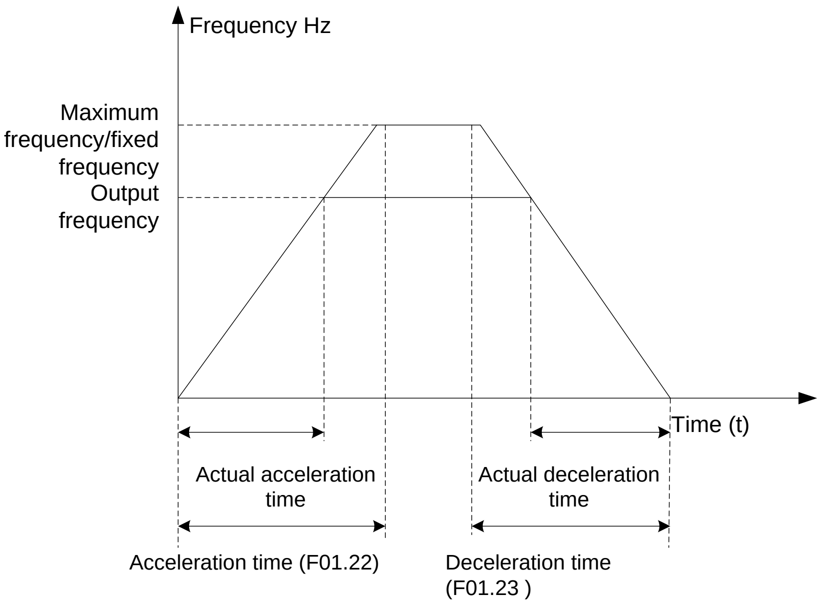


Figure 7-2 Acceleration/deceleration time

Parameter ID	Name	Scope	Default value	Change
F01.24	Running direction	[0000]-[1121] Ones: Running direction (Keypad) 0: Forward run 1: Reverse run Tens: Direction inhibition 0: Disabled 1: Reverse run inhibited 2. Forward run inhibited Hundreds: Reserved Thousands digit: Reserved	[0000]	Changeable at any time

Ones: Running direction (keypad)

0: Forward run

When the command source is the keypad, adjust the frequency reference to the forward direction.

1: Reverse run

When the command source is the keypad, adjust the frequency reference to the reverse direction.

Tens: Direction inhibition

0: Reverse run inhibited

The inverter supports forward/reverse run commands to control the motor.

1: REV disabled

The inverter only supports the forward run command to control the motor. If the reverse run control command is given, the inverter will run at zero speed.

2. Forward run inhibited

The inverter only supports the reverse run command to control the motor. If the forward run control command is given, the inverter will run at zero speed.

Hundreds: Reserved

Thousands: Reserved

Parameter ID	Name	Reference	Default value	Change
F01.25	Output phase sequence reverse	0: Disabled 1: Enabled	0	Changeable only at stop

If this parameter is enabled, switchover between forward run and reverse run can be achieved without reversing motor wiring.

Parameter ID	Name	Reference	Default value	Change
F01.26	Motor parameter group	0: Group 1 1: Group 2	0	Changeable only at stop

This parameter is used for motor parameter group switchover. The vector control mode supports two groups of control parameters, and V/F control mode supports one group of control parameters.

Parameter ID	Name	Reference	Default value	Change
F01.27	Communication control	[0000]-[0011] Ones: Communication protocol 0: Modbus communication protocol (RTU/ASCII) 1: Fieldbus communication protocol Tens: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Hundreds: Reserved Thousands: Reserved	[0000]	Changeable only at stop

Ones: Communication protocol

0: Modbus communication protocol (RTU/ASCII)

This parameter is used to set control parameters for Modbus communication protocol (RTU/ASCII).

1: Fieldbus communication protocol

This parameter is used to set control parameters for fieldbus communication which includes other communication protocols except for Modbus communication protocol (RTU/ASCII) and master-slave communication.

Tens: Retention at power failure
0: Non-retentive at power failure
The communication frequency reference is non-retentive in case of power failure.
1: Retentive at power failure
The communication frequency reference is retentive in case of power failure.

Hundreds: Reserved

Thousands: Reserved

Note:
When the communication protocol is set to 0: Modbus, the fieldbus communication timeout will not be detected.
When the communication protocol is set to 1: Fieldbus communication protocol, the Modbus communication timeout will not be detected.

7.2 F02 Group: Start/Stop Control Parameters

Parameter ID	Name	Reference	Default value	Change
F02.01	Startup mode	0: Direct start 1: DC braking start 2: Speed tracking start	0	Changeable at any time

0: Direct start
The startup of the inverter is controlled by parameters “F02.05 Start frequency” and “F02.06 Startup frequency hold time”. This mode is applicable to scenarios requiring large static friction torque and small load inertia, or to those with external mechanical braking equipment which enables the motor shaft to remain stationary before restarting after the motor has stopped.

1: DC braking start
In this mode, the load motor obtains a certain DC braking energy (i.e. electromagnetic brake) through parameters “F02.07 DC braking current at startup” and “F02.08 DC braking time at startup” and starts with the start frequency. This mode is applicable to scenarios with small inertia loads, that is, with forward or reverse running in shutdown state.

2: Speed tracking start
The inverter first detects the speed and direction of the motor and then start running at the detected speed to reach the frequency reference according to the acceleration/deceleration time.

Parameter ID	Name	Reference	Default value	Change
F02.02	Speed tracking mode	0: From the stop frequency 1: From the power frequency 2: From the maximum frequency	2	Changeable only at stop
F02.03	Speed tracking current settings	10.0%-200.0%	100.0%	Changeable at any time
F02.04	Speed tracking search coefficient	10.0%-1000.0%	100.0%	Changeable at any time

F02.02-F02.04 are only valid for asynchronous motors.

Table 7-1 Description of speed tracking modes

F02.02=0	Speed tracking starts the search from the frequency at the previous motor shutdown. If an external force is applied to accelerate the motor beyond the previous shutdown frequency, the speed tracking will fail.
F02.02=1	Speed tracking starts search from the power frequency.

F02.02=2	Speed tracking starts the search from the maximum frequency set by F01.12.

F02.03 is used to set motor input current during asynchronous motor speed tracking. Too large input current can easily lead to motor overtemperature while too small current can lead to inaccurate speed search results. It is recommended to maintain the default settings.

F02.04 is used to set speed tracking search coefficient. The larger the search coefficient, the more detailed the search and the longer the search time, and vice versa. It is recommended to maintain the default settings.

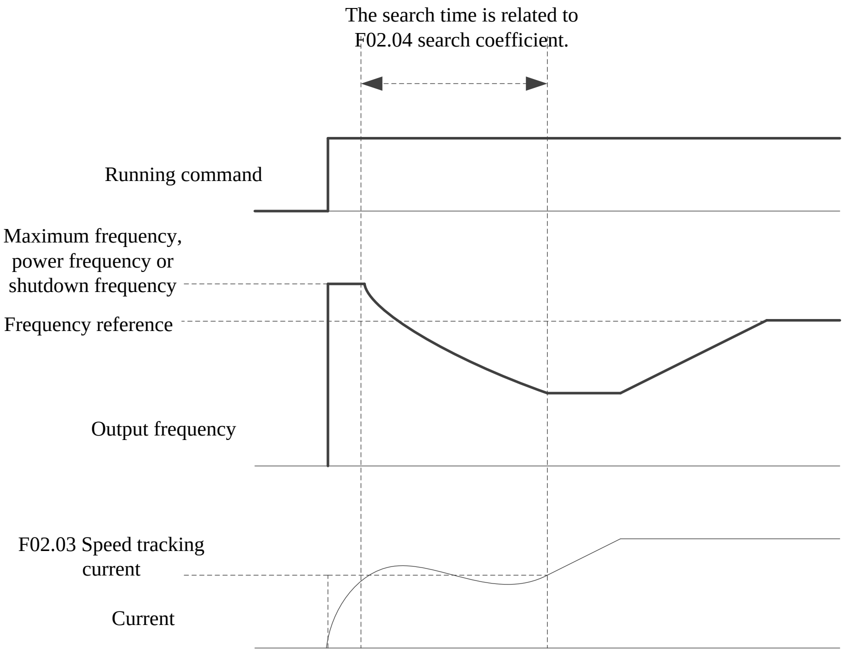


Figure 7-3 Asynchronous motor speed tracking search

Parameter ID	Name	Reference	Default value	Change
F02.05	Start frequency	0.00Hz-10.00Hz	0.00Hz	Changeable at any time
F02.06	Start frequency hold time	0.0s-320.0s	0.0s	Changeable only at stop

Start frequency refers to the initial output frequency of the inverter. A proper start frequency leads to high start torque and some momentum at the start moment for some loads with large static friction under static state. However, if it is set too large, acceleration overcurrent and other faults will occur.

Start frequency hold time refers to the time the inverter keeps at the start frequency, after which the inverter enters normal acceleration and deceleration.

Note:

The start frequency is not limited by “F01.16 Frequency lower limit” or the jump frequency. When the start frequency hold time is not 0, it will be set as the upper limit for F16.06 Brake opening time to ensure that the start frequency hold function is still enabled after brake open.

Parameter ID	Name	Reference	Default value	Change
F02.07	DC braking current at startup	0.0%-300.0%	50.0%	Changeable only at stop
F02.08	DC braking time at startup	0.0s-3200.0s	0.0s	Changeable only at stop

DC braking current at startup refers to the amount of braking current sent by the inverter to the motor during DC braking with 100% corresponding to the motor rated current. The larger the DC braking current, the larger the braking torque, but the more serious the inverter overtemperature. Therefore, please set the braking current as needed. Inside the inverter, the DC braking current should not exceed 80% of the rated current.

DC braking time at startup refers to the duration of the DC braking current during startup. Only when F02.01 is set to 1: DC braking start will the DC braking at startup function be enabled. There is no DC braking when the braking time is set to 0.0 second.

When both DC braking and short-circuit braking are enabled, the inverter will first carry out short-circuit braking and then DC braking.

The percentage reference of F02.07 is the rated current of the motor.

Parameter ID	Name	Reference	Default value	Change
F02.09	Pre-excitation current	0.0%-100.0%	50.0%	Changeable only at stop
F02.10	Pre-excitation time	0.0s-100.0s	0.0s	Changeable only at stop

When the external DI terminal outputs an "active" signal, the inverter excites the motor according to the current set in F02.09. F02.10 sets the minimum pre-excitation time. If the duration of the effective level of the external DI signal is less than "F02.10 Pre-excitation time", the inverter will excite the motor according to F02.10 Pre-excitation time; if it is greater than F02.10, the inverter will excite the motor according to the duration of the of the effective level of the external DI signal.

The pre-excitation function can be enabled through DI1-DI10.

Even if the pre-excitation time is not set, the synchronous motor vector mode will force the motor to excite as needed.

The percentage reference of F02.09 is the rated current of the motor.

Parameter ID	Name	Reference	Default value	Change
F02.11	Stop mode	0: Decelerate to stop 1: Coast to stop	0	Changeable at any time

0: Decelerate to stop

In this mode, the inverter decelerates according to the set time and mode and stops output when it reaches the stop speed. During deceleration to stop, when the output frequency is less than "F02.12 Start frequency of DC braking at stop", the inverter output frequency will jump to zero and stops working after carrying out DC braking. Otherwise, the inverter will stop working after decelerating to the minimum output frequency.

During deceleration to stop, for machines with built-in braking unit, an external braking resistor (optional) can be connected. When the DC bus voltage exceeds "F02.32 Braking unit action voltage", the inverter starts braking with energy consumption.

Machines without a built-in braking unit can be equipped with an optional external braking unit and braking resistor. This mode is mainly used when quick braking is required during shutdown.

1: Coast to stop

The inverter stops output once it receives the stop command and the motor coasts to stop. This mode is mainly used together with an external mechanical brake to realize quick stop.

Note:

In the jog mode, only deceleration to stop can be applied.

Parameter ID	Name	Reference	Default value	Change
F02.12	Start frequency of DC braking at stop	0.00Hz-600.00Hz	0.00 Hz	Changeable at any time
F02.13	DC braking delay at stop	0.0s-3200.0s	0.0s	Changeable at any time
F02.14	DC braking current at stop	0.0%-300.0%	50.0%	Changeable at any time
F02.15	DC braking time at stop	0.0s-3200.0s	0.0s	Changeable at any time

When the inverter decelerates to the start frequency of DC braking at stop, it will stop output and starts DC braking. During shutdown, when the output frequency is less than start frequency of DC braking at stop, the DC braking function is enabled.

During the deceleration to stop, when the frequency reference is less than the start frequency of DC braking at stop, DC braking is enabled and the inverter output frequency jumps to zero. If the operating conditions do not have strict requirements for braking at stop, the start frequency of DC braking at stop should be set as low as possible.

DC braking delay at stop refers to the delay between the inverter stops output and starts DC braking. This time is used for the motor to demagnetize to prevent overcurrent caused by high speeds during DC braking.

DC braking current at stop refers to the amount of braking current sent by the inverter to the motor during DC braking with 100% corresponding to motor rated current. Inside the inverter, the DC braking current should not exceed 80% of the rated current.

DC braking provides zero speed torque. It is normally used to improve shutdown accuracy and speed. However, it cannot be used for deceleration braking during normal operation. That is, the inverter stops output once DC braking starts. If the DC braking current is set too large, the inverter is prone to overcurrent when shutting down. If this parameter is set to 0, DC braking is disabled.

DC braking time at stop refers to the duration of the DC braking current during shutting down. There is no DC braking when the braking time is 0.0 second, that is, DC braking is disabled.

When both DC braking and short-circuit braking are enabled, the inverter will first carry out short-circuit braking and then DC braking.

Parameter ID	Name	Reference	Default value	Change
F02.16	Acceleration/Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration	0	Changeable only at stop

This series of inverter provides two acceleration and deceleration modes, both of which are supported during normal start, stop, forward and reverse run, acceleration and deceleration.

0: Linear acceleration/deceleration

This mode is generally applicable for general loads.

1: S-curve acceleration/deceleration

The S-type acceleration and deceleration curves are mainly used to smoothen the start and stop of the machine and to alleviate noise and vibration during acceleration and deceleration.

Parameter ID	Name	Reference	Default value	Change
F02.17	Time proportion of S-curve at start of acceleration	1.0%~100.0%	30.0%	Changeable only at stop
F02.18	Time proportion of S-curve at end of acceleration	1.0%~100.0%	30.0%	Changeable only at stop
F02.19	Time proportion of S-curve at start of deceleration	1.0%~100.0%	30.0%	Changeable only at stop
F02.20	Time proportion of S-curve at end of deceleration	1.0%~100.0%	30.0%	Changeable only at stop

The S-curve characteristics during forward and reverse run are as shown in the following figure:

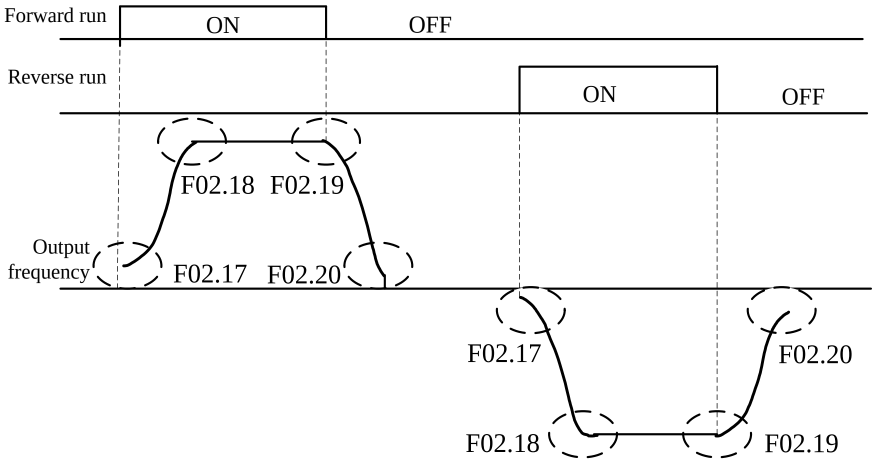


Figure 7-4 S-Curve characteristics

Note:

The parameter settings for F02.17-F02.20 have the following restrictions:

F02.17 + F02.18 <= 100.0%

F02.19 + F02.20 <= 100.0%

Parameter ID	Name	Reference	Default value	Change
F02.21	Switchover between forward and reverse run	0: Switch over zero frequency 1: Switch over startup frequency	0	Changeable only at stop

0: Switch over zero frequency

Switchover between forward and reverse run is enabled when the speed decreases to zero.

1: Switch over startup frequency

Switchover between forward and reverse run is enabled when the speed decreases to the start frequency.

Parameter ID	Name	Reference	Default value	Change
F02.22	Forward and reverse deadzone time	0.0s-3200.0s	0.0s	Changeable at any time

Forward and reverse deadzone time refers to the transition time at zero frequency or start frequency during the inverter's switching from forward run to reverse run or vice versa. This time is mainly set for the equipment with large inertial load and mechanical deadzone when changing the direction.

Parameter ID	Name	Reference	Default value	Change
F02.23	Stop speed	0.00Hz-600.00Hz	0.50 Hz	Changeable only at stop
F02.24	Stop speed detection mode	0: Detect by the speed set value or the speed feedback value 1: Detect by the speed feedback value	0	Changeable only at stop
F02.25	Detect time by speed set value	0.00s-320.00s	0.05s	Changeable only at stop
F02.26	Detect time by speed feedback value	0.00s-320.00s	0.50s	Changeable only at stop

During deceleration to stop, when the inverter output frequency is less than the stop speed, the inverter enters the shutdown state.

There are two stop speed detection modes, that is, detecting by the speed set value or the speed feedback value and detecting by the speed feedback value. In the V/F control mode, please choose to detect by the speed set value.

Parameter ID	Name	Reference	Default value	Change
F02.27	Fan control mode	0: Working always 1: Working automatically 2: Working during inverter running	2	Changeable at any time
F02.30	Fan stop delay time	0.0s-3200.0s	60.0s	Changeable at any time

0: Working always

Regardless of the temperature of the module, the fan will operate once the inverter is powered on. When the inverter stops, the fan will stop running after the fan stop delay time.

1: Working automatically

Whether the fan is running when the inverter is running is related to the module temperature.

2: Working during inverter running

Regardless of the module temperature, the fan will operate once the inverter starts to run. When the inverter stops, the fan will stop running after the fan stop delay time.

Parameter ID	Name	Reference	Default value	Change
F02.31	Braking unit enable	Model dependent	0	Changeable only at stop
F02.32	Braking unit action voltage	Model dependent	Model dependent	Changeable only at stop
F02.33	Braking usage	0.0%-100.0%	50.0%	Changeable at any time

When the braking unit is enabled, the inverter performs braking with energy consumption for the motor once the bus voltage exceeds the action voltage of braking with energy consumption. When the braking unit is disabled, the inverter will not perform braking with energy consumption for the motor regardless of the bus voltage.

When the DC bus voltage increases to exceed "F02.32 Braking unit action voltage", the braking unit is enabled.

Tip:

When braking with energy consumption is enabled, please disable the overvoltage suppression function by setting "F10.07 Overvoltage suppression enable" to 0: Disabled. Otherwise, under the overvoltage suppression mode, the increase of the bus voltage may be hindered, thus braking with energy consumption cannot be activated.

When the usage is set to 0, the braking transistor is switched off; when it is set to 100%, the braking transistor is switched on; when it is set to other value, the braking unit works in the chopping mode. This parameter is used to define the duty ratio of the braking unit switch signal. The greater the duty ratio, the better the braking effect. However, its setting should also take into account the resistance and power of the braking resistor.

Parameter ID	Name	Reference	Default value	Change
F02.35	Overexcitation enable	0: Disabled 1: Enabled during deceleration 2: Enabled always	0	Changeable at any time
F02.36	Overexcitation suppression current	0%-300.0%	100.0%	Changeable at any time
F02.37	Overexcitation gain	100%-300.0%	125.0%	Changeable at any time

When the motor is working in the generating mode, the output current increases by increasing the motor excitation, and the feedback energy is consumed in the motor stator winding to curb the rise of the bus voltage.

For F02.36, the percentage base is the rated current of the motor. If the motor current exceeds the value set by F02.36, reduce the overexcitation to reduce the motor current.

For F02.37, the greater the excitation gain, the better the effect of curbing the bus voltage rise. Please set the excitation gain according to the actual bus voltage rise.

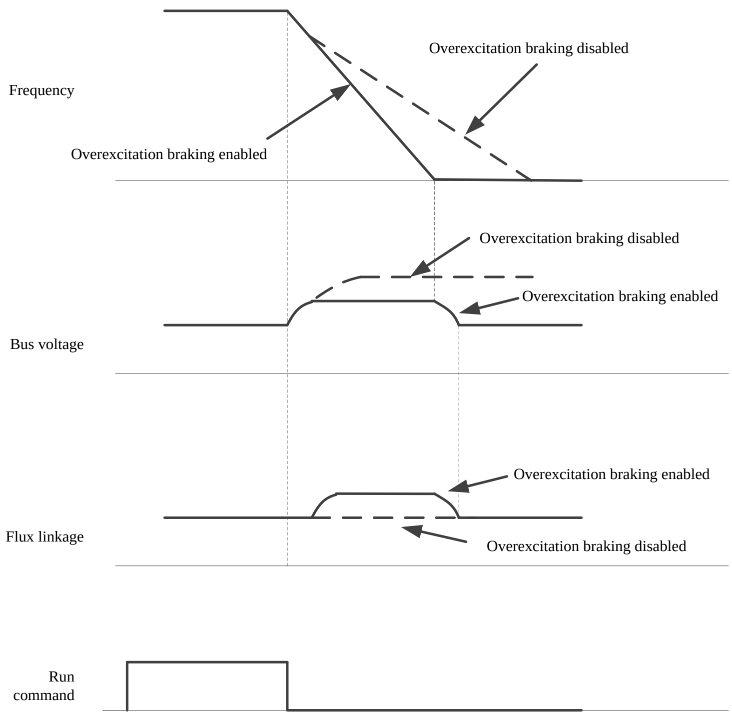


Figure 7-5 Overexcitation braking effect

Parameter ID	Name	Reference	Default value	Change
F02.38	Position lock start frequency	0.01Hz-600.00Hz	0.10Hz	Changeable at any time
F02.39	Position lock gain	0.0-100.0	25.0	Changeable at any time
F02.40	Position lock end amplitude	0-30000	600	Changeable at any time

After motor deceleration, the inverter records the motor position at zero speed and keeps the motor rotor at this position during zero speed. Thereafter, if the motor rotates due to external force, the inverter will adjust the motor back to the set position.

Note:

The position lock function is only enabled in the CLVC mode.

F02.38 is used to set the position lock start frequency. When the motor speed decreases to this value, the inverter records the motor position and takes it as the target position of the position lock function. The parameter should not be set too large.

F02.39 is used to set the position lock gain. The larger the gain, the greater the control torque, and the faster the return to the target position after the motor deviates from the shutdown position. But a too large gain may cause the rotor position to oscillate. Therefore, please set the gain based on the control of the actual position.

F02.40 is used to set the position lock end amplitude. When the error between the current position of the motor rotor and the shutdown position recorded by the inverter is lower than this value, the position lock succeeds and the DO terminal displays that position lock is realized.

Parameter ID	Name	Reference	Default value	Change
F02.41	Startup protection	[0000]-[0011] Ones: Power-On protection 0: Disabled 1: Enabled Tens: Command channel switching protection	[0011]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		0: Disabled 1: Enabled Hundreds: Reserved 0: Disabled 1: Enabled Thousands: Reserved		

Ones: Power-On protection

If the run command is valid when the inverter is powered on (for example, the run command source is terminal and it is closed before power-on), the inverter will not respond to the run command. In this case, the run command should be removed. Only when it is valid again will the inverter responds.

Tens: Command channel switching

In the running state, this mode is used to prevent switchover between common running and jog during switching of command channels.

Note:

When restart upon power failure is enabled, power-on protection is disabled.

Parameter ID	Name	Reference	Default value	Change
F02.42	Restart upon power failure	0: Invalid 1: Valid	0	Changeable at any time
F02.43	Restart time upon power failure	0.0s-3200.0s	1.0s	Changeable at any time

If the inverter is running when the power failure occurs, it will automatically perform speed tracking start after F02.43 Restart time upon power failure when power supply resumes. During this time, the inverter will not respond to run command. But if shutdown command is issued during this time, the inverter will give up restart. Please take the operation resumption preparation time of other equipment related to the inverter after power supply restoration as basis when setting this parameter.

7.3 F03 Group: Group 1 Motor Parameters

Parameter ID	Name	Reference	Default value	Change
F03.01	Motor type	0: Asynchronous motor	0	Changeable only at stop
F03.02	Rated motor power	0.00kW-30000.00kW	Model dependent	Changeable only at stop
F03.03	Rated motor voltage	0V-30000V	Model dependent	Changeable only at stop
F03.04	Rated motor current	0.00A -30000.00A	Model dependent	Changeable only at stop
F03.05	Rated motor frequency	0.00Hz-600.00Hz	Model dependent	Changeable only at stop
F03.06	Rated motor speed	0.0RPM-90000.0RPM	Model dependent	Changeable only at stop

F03.01-F03.06 are motor parameters which should be set according to the motor nameplate.

The incorrect setting of the rated power and rated current of the motor will lead to incorrect calculation of the motor protection points.

The incorrect setting of the rated voltage, rated frequency and rated speed will cause the motor auto-tuning to fail.

Parameter ID	Name	Reference	Default value	Change
F03.08	Asynchronous motor stator resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time
F03.09	Asynchronous motor rotor resistance	0.0mOhm-30000.0mOhm	Model dependent	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F03.10	Asynchronous motor stator leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F03.11	Asynchronous motor rotor leakage inductance	0.000mH-30000.000mH	Model dependent	Changeable at any time
F03.12	Asynchronous motor mutual inductance	0.000mH-90000.000mH	Model dependent	Changeable at any time
F03.13	Asynchronous motor no-load current	0.00A-30000.00A	Model dependent	Changeable at any time

F03.08-F03.13 are equivalent circuit parameters of the asynchronous motor, which should be ensured correct under the vector control mode.

After static auto-tuning of the asynchronous motor, the equivalent circuit parameters will be automatically updated.

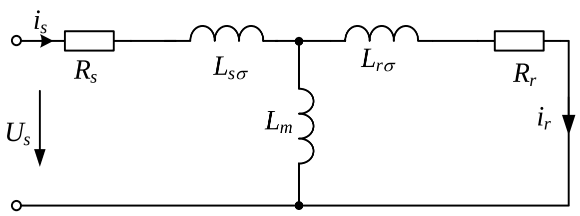


Figure 7-6 Asynchronous motor equivalent circuit parameters

Table 7-2 Asynchronous motor equivalent circuit parameters and parameters

	Parameter	Name	Unit
R_s	F03.08	Stator resistance	mΩ
R_r	F03.09	Rotor resistance	mΩ
$L_{s\sigma}$	F03.10	Stator leakage inductance	mH
$L_{r\sigma}$	F03.11	Rotor leakage inductance	mH
L_m	F03.12	Mutual inductance	mH

Parameter ID	Name	Reference	Default value	Change
F03.14	Asynchronous motor core magnetic saturation coefficient 1	100.00%-300.00%	Model dependent	Changeable at any time
F03.15	Asynchronous motor core magnetic saturation coefficient 2	100.00%-300.00%	Model dependent	Changeable at any time
F03.16	Asynchronous motor core magnetic saturation coefficient 3	100.00%-300.00%	Model dependent	Changeable at any time
F03.17	Asynchronous motor core magnetic saturation coefficient 4	100.00%-300.00%	Model dependent	Changeable at any time
F03.18	Asynchronous motor core magnetic saturation coefficient 5	90.00%-110.00%	Model dependent	Changeable at any time
F03.19	Asynchronous motor core magnetic saturation coefficient 6	50.00%-100.00%	Model dependent	Changeable at any time
F03.20	Asynchronous motor core magnetic saturation coefficient 7	40.00%-100.00%	Model dependent	Changeable at any time

F03.14-F03.20 are saturation coefficients of the asynchronous motor magnetic circuit which are used to describe the excitation curve of the motor.

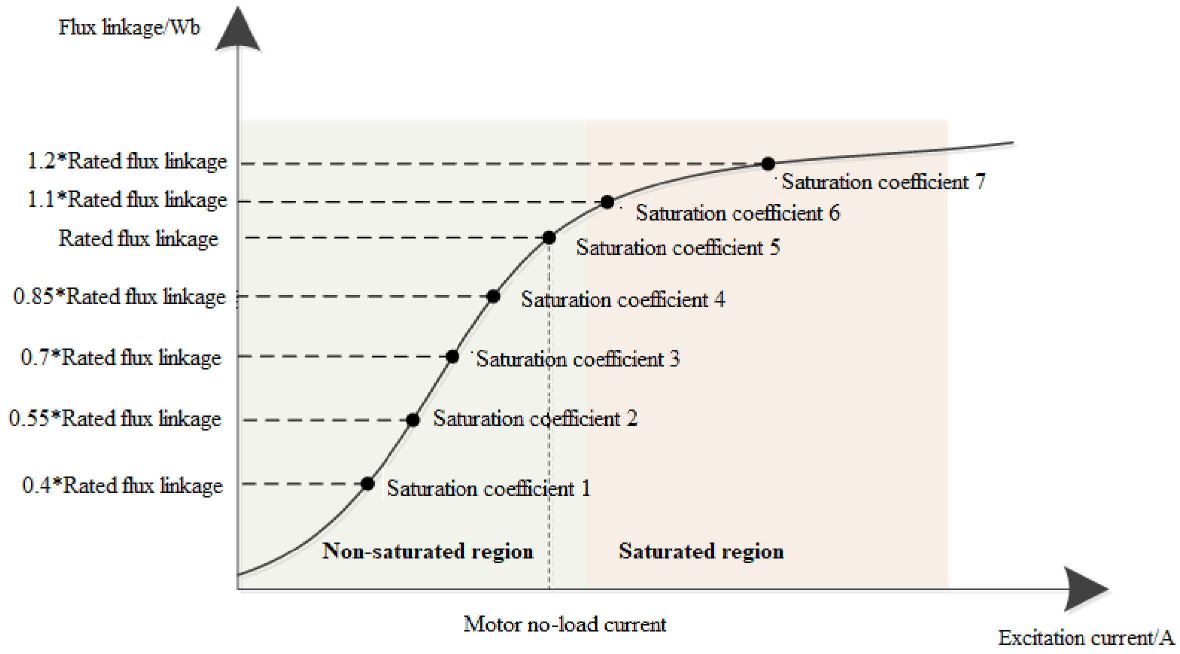


Figure 7-7 Synchronous motor excitation curve

Parameter ID	Name	Reference	Default value	Change
F03.33	Motor rotation inertia	0.000s-30.000s	Model dependent	Changeable at any time

The motor with larger rotation inertia will require larger acceleration torque and vice versa.

After motor auto-tuning, this parameter will be changed.

The unit of motor rotation inertia (s) refers to the time required for the motor to accelerate to the rated speed with the rated torque.

Parameter ID	Name	Reference	Default value	Change
F03.39	Maximum output voltage limit	50.0%-150.0%	100.0%	Changeable at any time

This parameter is used to limit the maximum output voltage for the inverter with the percentage benchmark being the rated voltage of the motor. The higher the maximum voltage, the stronger the load capacity of the field weakening region and the smaller the current. But the output current will also fluctuate if the DC bus fluctuates since the braking unit is enabled.

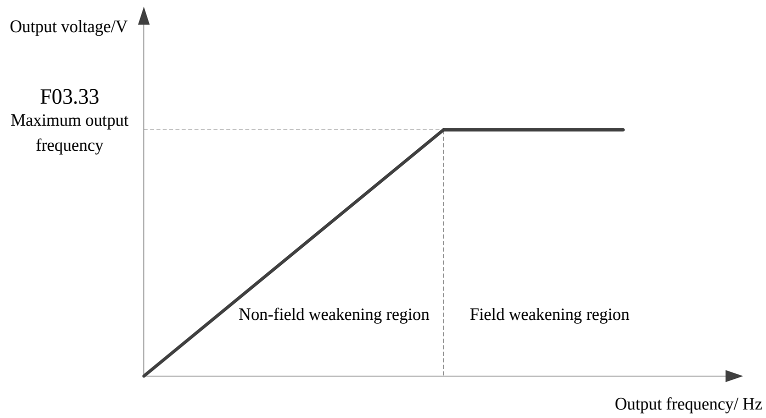


Figure 7-8 Maximum Output Voltage

Parameter ID	Name	Reference	Default value	Change
F03.40	Motor demagnetization time	0.0%-1000.0%	200.0%	Changeable at any time

The time of motor demagnetization after coast to stop is based on the rotor time constant. If the motor coasts to stop, the inverter will not respond to the start-up demand within the demagnetization time.

This parameter is effective only for asynchronous motors.

Parameter ID	Name	Reference	Default value	Change
F03.41	Motor overload protection	0: No protection 1: General motor (with low-speed compensation) 2: Variable frequency motor (without low-speed compensation)	2	Changeable at any time

For variable frequency motors, overload curves set through F03.42 and F03.43 are adopted for motor I2t.

For normal motors, the I2t overload curve is that set through F03.42 and F03.43 multiplied by a derating factor, which is related to the run frequency of the motor.

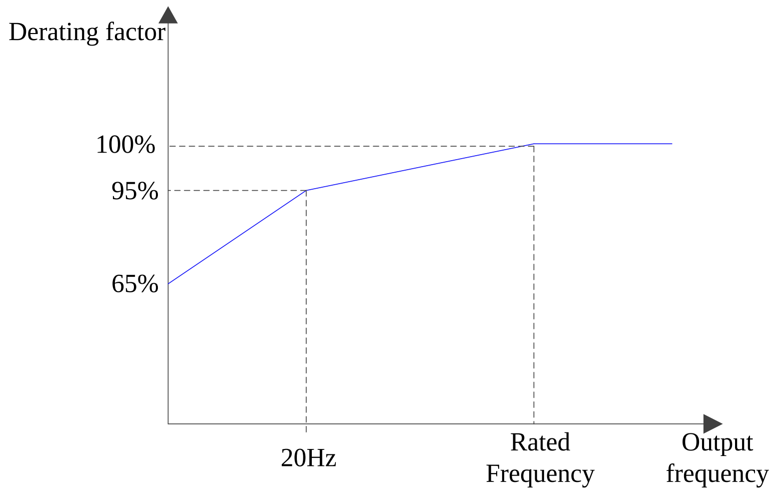


Figure 7-9 Motor Derating Factor

Parameter ID	Name	Reference	Default value	Change
F03.42	Motor overload protection current (continuous working)	50%-F03.43	110%	Changeable only at stop
F03.43	Motor overload protection current (working for 1 minute)	F03.42-200%	150%	Changeable only at stop

F03.42-F03.43 set the overload curve for the motor.

F03.42 sets the detected motor overload protection current (the motor continues to work). If the motor output current is less than or equal to F03.42, the motor overload usage will not be accumulated. If the output current is larger than F03.42, the motor overload usage will be accumulated without being cleared. The larger the current, the faster the accumulation. When the accumulation reaches 100%, the inverter will report a fault.

F03.43 sets the detected motor overload protection current (the motor works for a minute). If the motor output current is equal to F03.43, the motor runs for 1 minute at this current with the motor overload usage accumulating to 100% (which will be cleared each time). When the accumulation reaches 100%, the inverter will report a fault.

The overload characteristic curve of the motor is an inverse time-lag protection curve determined by F03.42 and F03.43.

The motor overload usage is displayed in F82.31.

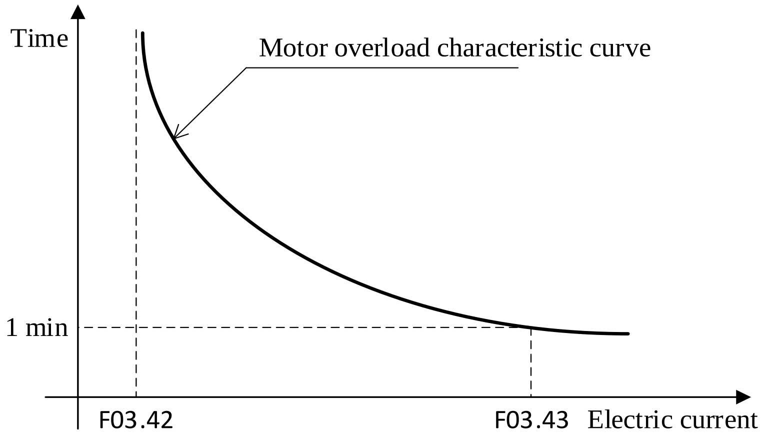


Figure 7-10 Motor overload characteristic curve

Parameter ID	Name	Reference	Default value	Change
F03.45	Motor overload pre-alarm coefficient	50.0%-100.0%	80.0%	Changeable at any time

When the motor overload usage (motor overload accumulation value) exceeds the value set in F03.45, the inverter will send an alarm to remind the user that the motor is about to enter overload protection. F03.45 sets the pre-alarm coefficient of the inverter before the motor enters overload protection. The larger the coefficient is, the smaller the advance value and vice versa.

Parameter ID	Name	Reference	Default value	Change
F03.47	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000 3: KTY84	0	Changeable at any time
F03.48	Motor overtemperature protection threshold	0.0℃-200.0℃	110.0℃	Changeable at any time
F03.49	Motor overtemperature pre-alarm threshold	0.0℃-200.0℃	90.0℃	Changeable at any time

When the motor temperature exceeds F03.49, the inverter will send an alarm and it will report a fault when the temperature exceeds F03.48.

Parameter ID	Name	Reference	Default value	Change
F03.50	Encoder type (reserved)	0: Incremental encoder 1: Absolute value encoder 2: Resolver 3: Sine-cosine encoder	0	Changeable only at stop

Please set the encoder type according to the *Encoder Manual*.

Parameter ID	Name	Reference	Default value	Change
F03.51	Encoder power supply	0: 5V 1: 24V 2: 12V 3: 15V	0	Changeable only at stop

Please set the power supply according to the *Encoder Manual*.

Parameter ID	Name	Reference	Default value	Change
F03.52	Encoder direction	0: A ahead of B 1: B ahead of A	0	Changeable only at stop

This parameter is used to set the encoder direction, that is, whether it is the same as that of motor rotation or not.

In the same direction means that when the motor stator is wired in the UVW positive order and the encoder is wired in the normal order, the rotation direction marked on the encoder should be consistent with the rotation direction marked on the motor housing (either clockwise or counterclockwise).

If the resolver is rewired, the encoder direction should be recalibrated; otherwise, the motor may fail to run normally.

Parameter ID	Name	Reference	Default value	Change
F03.53	Encoder pulse correction	0: Disabled 1: Enabled	1	Changeable only at stop

This parameter is only applicable to incremental encoders.

If F03.53 is set to 0, the inverter will not detect the Z-pulse of the encoder signal.

If F03.53 is set to 1, the inverter will detect the Z-pulse of the encoder signal. The encoder Z-pulse is mainly used to detect the encoder PPR. When the Z signal of the encoder is not detected, the inverter will not detect such faults as encoder code loss, code excess and PPR configuration error.

Please set the PPR according to the *Encoder Manual.*

Parameter ID	Name	Reference	Default value	Change
F03.55	Number of resolver pole pairs	1-65535	1	Changeable only at stop

Please set the number of pole pairs by referring to the *Resolver Manual*. Incorrect setting of this parameter will lead to incorrect speed measurement, thereby causing the CLVC mode to fail to work normally.

The number of resolver pole pairs must be integer multiplied by that of motor pole pairs which is calculated by the following equation.

$$n_p = \frac{60 * f_N}{\omega_m}$$

$$n_p - Number\ of\ motor\ pole\ pairs$$

$$f_N - Rated\ frequency\ of\ motor$$

$$\omega_m - Rated\ rotation\ speed\ of\ motor$$

If the result of the above formula is not an integer, take the nearest integer.

Note:

When a resolver is used to measure speed, the PE terminal of the resolver expansion card must be grounded reliably, the resolver cable must be shielded, and the shielding layer of the resolver cable must also be grounded reliably. Otherwise, the quality of the feedback voltage will be affected, thus compromising the accuracy of the velocity measurement.

Parameter ID	Name	Reference	Default value	Change
F03.57	Encoder signal filter time	0.00us-20.00us	0.00us	Changeable only at stop

F03.57 sets the encoder signal filter time The larger the filter time, the smaller the maximum rotation speed that can be sampled. The calculation formula is as follows:

$$\text{Maximum measured rotation speed} = \frac{15}{\text{Encoder PPR} * \text{Encoder signal filter time}}$$

If F03.55 is set to 0, the inverter will calculate a most appropriate filter time according to the actual circuit of the encoder to filter the encoder signal.

Parameter ID	Name	Reference	Default value	Change
F03.60	Numerator of encoder inverter ratio	1-65535	1	Changeable at any time
F03.61	Denominator of encoder inverter ratio	1-65535	1	Changeable at any time

These tow parameters are used when the encoder is not mounted on the motor shaft.

After the inverter ratio is set, the actual motor speed is:

$$\text{Motor speed} = \frac{\text{Numerator of inverter ratio}}{\text{Denominator of inverter ratio}} * \text{Encoder original speed}$$

Note:

The ratio of the molecule to the denominator in the above formula should not be greater than 65.00, and should not be less than 0.001.

Parameter ID	Name	Reference	Default value	Change
F03.62	Encoder output frequency division coefficient	0-255	1	Changeable at any time

If this parameter is set to 0, the encoder stops output; if it is set to 1-225, the encoder outputs with frequency division.

Parameter ID	Name	Reference	Default value	Change
F03.70	Motor parameter auto-tuning mode	0: Disabled 1: Static auto-tuning 2: Static auto-tuning + rotating auto-tuning 3: Rotating auto-tuning 4: Inertia auto-tuning	0	Changeable only at stop

In 1: Static auto-tuning mode, the inverter will inject AC or DC with different frequencies into the motor to identify the equivalent circuit parameters of the motor. For these parameters, please refer to F03.08 -F03.13. After static auto-tuning, the inverter will automatically calculate the most suitable current loop PI.

In 3: Rotating auto-tuning mode, the inverter will accelerate the motor to 0.4 times of the rated speed, and identifies the excitation curve and motor rotation inertia at this speed. For description of motor excitation curve, please refer to F03.14-F03.20; for that of motor rotation inertia, please refer to F03.33. After rotating auto-tuning, the inverter will automatically calculate the most appropriate speed loop PI.

In 4: Inertia auto-tuning mode, the identification principle is the same as rotating auto-tuning. The difference is that this mode only identifies the motor rotation inertia. For description of motor rotation inertia, please refer to F03.33.

To set this parameter to 3: Rotating auto-tuning or 4: Inertia auto-tuning, please ensure that the motor has experienced 1: Static auto-tuning. It is also necessary to ensure that the motor is off-shaft or that it is in a free rotation state, and that the torque, power and current limits set in F04.27-F04.52 are cancelled so as to obtain the best identification effect.

Table 7-3 Motor auto-tuning identification parameters

Static auto-tuning	Stator resistance, rotor resistance, stator leakage inductance, rotor leakage inductance, excitation inductance, deadzone voltage, no-load current, low-speed open loop current.
Rotating auto-tuning	Excitation inductance, excitation curve, rotation inertia, no-load current, low-speed open loop current
Inertia auto-tuning	Rotation inertia

7.4 F04 group: Group 1 Motor Vector Control Parameters

Table 7-4 Definitions of VF/VC control

VF control	The inverter determines the stator voltage amplitude corresponding to the current speed of the motor according to the set voltage frequency ratio (VF curve), and outputs the three-phase alternating current to the stator end of the motor. The mechanical characteristics of the motor are entirely the characteristics of the motor itself. V- Motor stator voltage F- Motor stator frequency The relations of the stator frequency and motor speed: $\mathrm{n}=\frac{60*f}{p}(1-s)$ n-Motor speed

	f-Motor stator frequency s-Motor slip rate p-Number of motor pole pairs
VC control	The inverter divides the motor current into excitation component and torque component according to the Field Oriented Control (FOC) theory. It controls the magnetic field of the motor through the excitation current and controls the output torque of the motor through the torque current. By doing so, the motor is able to work in the constant speed mode or constant torque mode. The mechanical characteristics of the motor are set through the control parameters of the inverter. The stronger the control parameters, the stronger the mechanical characteristics.

Table 7-5 Definitions of OLVC/CLVC

OLVC	The speed of the motor is observed by the adaptive observer based on known physical quantities such as the voltage and current of the motor according to the equivalent circuit of the motor. To enable the OLVC mode, parameters F03.08-F03.13 should be ensured correct. Before using OLVC, it is recommended that the motor experience a static auto-tuning and a rotary auto-tuning.
CLVC	The speed of the motor is measured according to the external speed sensor (encoder or resolver). The speed can be controlled to be accurate, but motor equivalent circuit parameters still need to be correct as incorrect parameters will affect the flux orientation, thus compromising the decoupling of the excitation component and the torque component, making the control effect worse. (1) Before using OLVC, it is recommended that the motor experience a static auto-tuning and a rotary auto-tuning. (2) To enable CLVC, make sure the encoder has the right number of lines and direction. For the rotary transformer, it is also necessary to ensure that the number of poles is correct.

Parameter ID	Name	Reference	Default value	Change
F04.01	Speed loop proportional gain 1	0.00-100.00	3.00	Changeable at any time
F04.02	Speed loop integral time 1	0.00s-100.00s	0.30s	Changeable at any time
F04.03	Speed loop switchover low-point frequency	0.00Hz-F04.07	5.00 Hz	Changeable at any time
F04.04	Speed loop output filter time 1	0.000s-0.100s	0.000s	Changeable at any time
F04.05	Speed loop proportional gain 2	0.00-100.00	3.00	Changeable at any time
F04.06	Speed loop integral time 2	0.00s-100.00s	0.30s	Changeable at any time
F04.07	Speed loop switchover high-point frequency	F04.03-600.00Hz	10.00 Hz	Changeable at any time
F04.08	Speed loop output filter time 2	0.000s-0.100s	0.000s	Changeable at any time

The adjustment rule between speed loop PI parameters and filter coefficient are as follows:

Table 7-6 Speed loop PI self-adaption rule

Motor rotation speed f	**f<F04.03**	The speed loop PI is the value set by F04.01 and F04.02. The speed loop output filter time is the value set by F04.04.
	F04.07>f>F04.03	The speed loop PI is between F04.01, F04.02 and F04.05, F04.06, and changes linearly with the increase of output frequency. The speed loop output filter time is between F04.04 and F04.08, and changes linearly with the increase

		of output frequency.
	f>F04.07	The speed loop PI is the value set by F04.05 and F04.06. The speed loop output filter time is the value set by F04.08.

When the speed loop integral time is set to 0, integration will not be enabled, and the speed loop will be pure P control.

It is generally recommended to set the speed loop PI curve as shown in the following figure. Use large Kp and large *τi* (small Ki, $K_i = \frac{K_p}{\tau_i}$) at low speed, and small Kp and small τi (large Ki) at high speed.

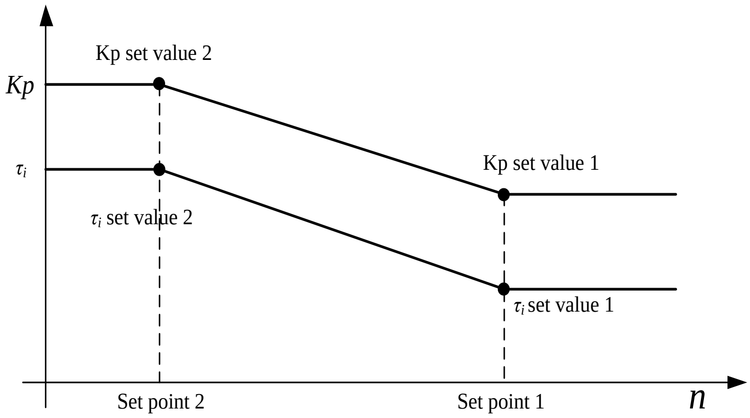


Figure 7-11 Speed loop PI self-adaption curve

Parameter ID	Name	Reference	Default value	Change
F04.10	Speed loop automatic performance coefficient	0-100	0	Changeable at any time

After setting the speed loop performance coefficient, the inverter will automatically calculate the speed loop PI and write that PI to F04.01-F04.02 and F04.05-F04.06. The larger the performance coefficient, the faster the speed loop response, the better the disturbance resistance to the load change, but the less the motor stability, and vice versa.

To enable this parameter, please ensure that F03.33 Motor rotation inertia is accurate.

If motor rotation auto-tuning has been performed, it is recommended to use the speed loop PI automatically calculated by the inverter. Since this PI is generally the most appropriate one taking into account the dynamic performance and stability of speed response, it is not recommended to adjust the speed loop performance coefficient unless there is a particularly high requirement for either dynamic performance or stability.

Parameter ID	Name	Reference	Default value	Change
F04.11	Excitation current loop (d axis) proportional gain	0.00-100.00	0.5	Changeable at any time
F04.12	Excitation current loop (d axis) integral time	0.000s-10.000s	0.010s	Changeable at any time
F04.13	Torque current loop (q axis) proportional gain	0.00-100.00	0.50	Changeable at any time
F04.14	Torque current loop (q axis) integral time	0.000s-10.000s	0.010s	Changeable at any time

The current loop PI parameters are set through F04.11-F04.14.

When the current loop integral time is set to 0, the integration link will not be enabled and the current loop takes pure P control.

Parameter ID	Name	Reference	Default value	Change
F04.15	Current loop performance coefficient	0-100	0	Changeable at any time

After setting the current loop performance coefficient, the inverter will automatically calculate the current loop PI and write that PI to F04.11-F04.14. The larger the performance coefficient, the faster the current loop response, the better the disturbance resistance to the load change, but the less the current loop stability, and vice versa.

To enable this parameter, please ensure that F03.10 and F03.11 motor leakage inductance are correct.

If motor static auto-tuning has been performed, it is recommended to use the current loop PI automatically calculated by the inverter. Since this PI is generally the most appropriate one taking into account the dynamic performance and stability of speed response, it is not recommended to adjust the current loop performance coefficient unless there is a particularly high requirement for either dynamic performance or stability.

Parameter ID	Name	Reference	Default value	Change
F04.18	Motoring slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time
F04.19	Braking slip compensation coefficient	50.0%-200.0%	100.0%	Changeable at any time

If F04.18 and F04.19 are set to above 100%, the inverter will appropriately increase the output frequency to compensate the impact of the asynchronous motor slip frequency on the rotation speed.

Parameter ID	Name	Reference	Default value	Change
F04.20	Low-speed open loop mode	0: Disabled 1: Enabled	1	Changeable at any time
F04.21	Percentage of low-speed open loop switchover frequency	0.00%-300.00%	5.0%	Changeable at any time
F04.22	Low-speed open loop constant speed current set value	0.0%-200.0%	50.0%	Changeable at any time
F04.23	Low-speed open loop acceleration and deceleration current set value	0.0%-200.0%	20.0%	Changeable at any time

In the OLVC mode, the rotation speed observation result is not accurate due to non-linear factors at low speed. If this mode is still used, it is difficult to produce sound rotation speed control effect, which can be tackled through injecting constant AC into the motor so that it maintains a constant magnetic field and torque.

F04.20-F04.23 are only applicable to the OLVC mode.

F04.21 is used to set the switching point for the low-speed open loop working section.

F04.22 is used to set the current for the motor when it works in low-speed open loop constant speed.

F04.23 is used to set the current for the motor when it works in low-speed open loop acceleration or deceleration state.

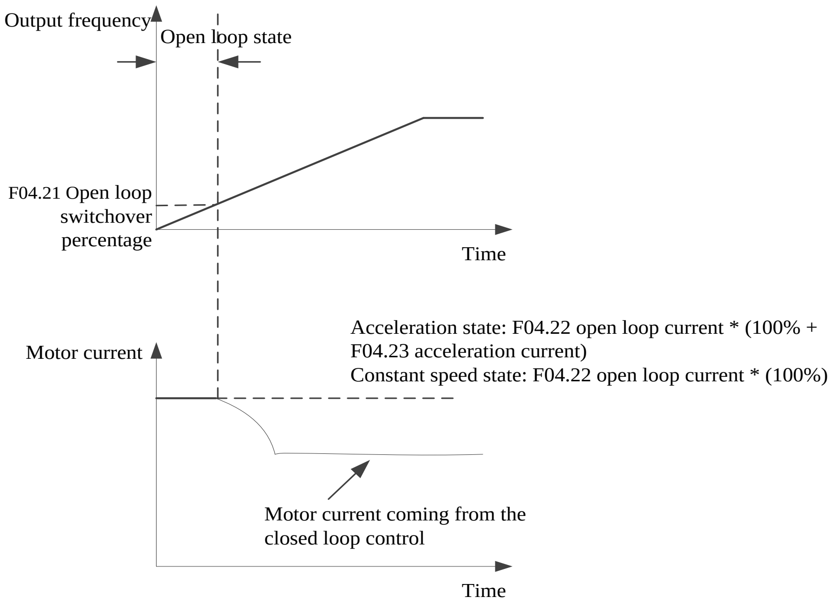


Figure 7-12 Low speed open loop

Parameter ID	Name	Reference	Default value	Change
F04.24	Feedforward gain coefficient of acceleration and deceleration torque	0.0%-300.0%	0.0%	Changeable at any time
F04.25	Feedforward filter coefficient of acceleration and deceleration torque	1: Filter time 6ms 2: Filter time 19ms 3: Filter time 44ms 4: Filter time 94ms 5: Filter time 195ms 6: Filter time 395ms 7: Filter time 797ms 8: Filter time 1,601ms 9: Filter time 3,209ms 1: Filter time 6,424ms	3	Changeable at any time

F04.24 and F04.25 are only applicable to the OLVC mode.

F04.24 is used to set the feedforward gain of acceleration and deceleration torque. The greater the gain, the greater the torque during acceleration and deceleration. This parameter is recommended not to be set greater than 100%.

F04.25 is used to set the feedforward filter coefficient of acceleration and deceleration torque. The greater the filter coefficient, the smoother the engagement and disengagement of the acceleration and deceleration torque will be.

Parameter ID	Name	Reference	Default value	Change
F04.27	Maximum output current	Model dependent	150.0%	Changeable at any time

F04.27 is used to set the maximum output current of the inverter during vector control, and the percentage benchmark is the inverter rated current.

Note:

If F04.27 is set so small that motor does not run normally (e.g., it is lower than the minimum no-load current of the motor), this parameter will not be enabled and the inverter will automatically set a reasonable value as the limit.

Parameter ID	Name	Reference	Default value	Change
F04.44	Motoring torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.45	Motoring torque upper limit	0.0%-300.0%	150.0%	Changeable at any time

F04.44-F04.45 are only applicable to the vector control mode.

F04.44-F04.45 are used to set the motoring torque upper limit. In the motoring mode, the inverter converts electric energy into mechanical energy by taking energy from the DC bus and controls the output torque of the motor to resist the disturbance of the load. And in the generating mode, the motor converts mechanical energy into electric energy by taking energy from the mechanical shaft and feeds it back to the DC bus.

The difference between the motoring mode and the generating mode is listed in the following table and the figure below.

Table 7-7 Interpretation of the motoring and generating modes

	Basis for judgment	Energy use mode
Motoring	Rotation speed * torque>0	Energy consumed
Generating	Rotation speed * torque <0	Feedback energy

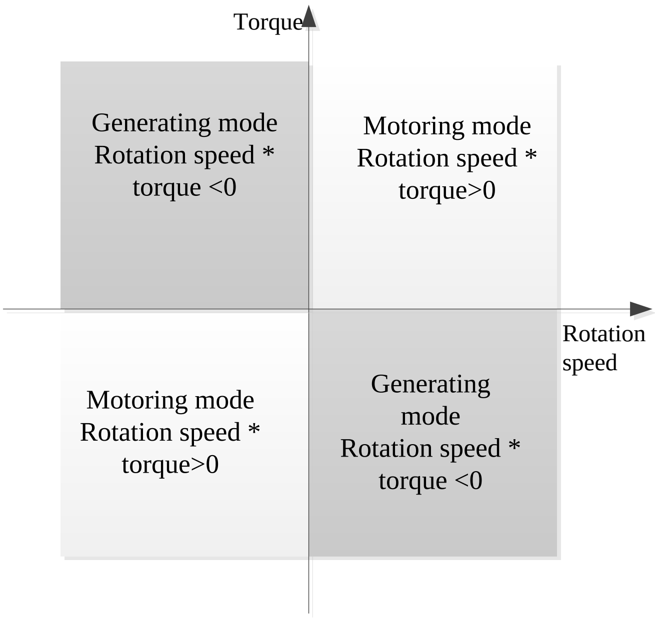


Figure 7-13 Four-quadrant diagram of motor operation

If F04.44 is set to 0: Digital setting, the motoring torque limit of the inverter is "F04.45 Motoring torque upper limit".

If F04.44 is set to 1-3 or 6-7, the motoring torque limit of the inverter is AI input value (by percentage) * F04.45.

If F04.44 is set to 4: Pulse, the motoring torque limit of the inverter is HDI input pulse frequency (by percentage) * F04.45.

If F04.44 is set to 5: Communication, the motoring torque limit of the inverter is set the initial value given by communication.

Parameter ID	Name	Reference	Default value	Change
F04.46	Power generation torque upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.47	Power generation torque upper limit	0.0%~300.0%	150.0%	Changeable at any time

F04.46-F04.47 are used to set the motor torque limit in the generating mode. For difference between the motoring mode and generating mode, and the finally enabled power generation torque when different limit sources are chosen, please refer to description of F04.44-F04.45.

Parameter ID	Name	Reference	Default value	Change
F04.48	Electric power upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.49	Electric power upper limit	0.0%-200.0%	150.0%	Changeable at any time

F04.48-F04.49 are only applicable to the vector control mode.

Parameter ID	Name	Reference	Default value	Change
F04.50	Generating power limiting	0: Disabled 1: Enabled in the whole process 2: Enabled at constant speed 3: Enabled during deceleration	1	Changeable at any time
F04.51	Generating power upper limit channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable at any time
F04.52	Generating power upper limit	0.0%-200.0%	150.0%	Changeable at any time

F04.50-F04.52 are only applicable to the vector control mode.

F04.50 is used to set the power generation limiting mode. It is defined as follows.

Table 7-8 Motor power limiting mode

F04.50	0: Disabled	The motor does not limit the genera power.
	1: Enabled in the whole process	The motor always limits generating power.
	2: Enabled at constant speed	When the motor is not accelerating or decelerating, it will limit the generating power.
	3: Enabled during deceleration	When the motor is in a deceleration state, it will limit the generating power.

The limiting mode set by F04.50 is only applicable to speed mode. For torque mode, generating power limit is enabled in the whole process unless 0: Disabled is chosen.

When the generating power upper limit is not enabled, it does not mean there is no generating power limit, but the motor limits the generating power to its maximum power.

7.5 F05 Group: V/F Control Parameters

Table 7-9 Definitions of VF/VC control

VF control	The inverter determines the stator voltage amplitude corresponding to the current speed of the motor according to the set voltage frequency ratio (VF curve), and outputs the three-phase alternating current to the stator end of the motor. The mechanical characteristics of the motor are entirely the characteristics of the motor itself. V- Motor stator voltage F- Motor stator frequency The relations of the stator frequency and motor speed: $\mathrm{n}=\frac{60*f}{p}(1-s)$ n-Motor speed f-Motor stator frequency s-Motor slip rate p-Number of motor pole pairs
VC control	The inverter divides the motor current into excitation component and torque component according to the Field Oriented Control (FOC) theory. It controls the magnetic field of the motor through the excitation current and controls the output torque of the motor through the torque current. By doing so, the motor is able to work in the constant speed mode or constant torque mode. The mechanical characteristics of the motor are set through the control parameters of the inverter. The stronger the control parameters, the stronger the mechanical characteristics.

Only asynchronous motor can enable V/F control mode.

Parameter ID	Name	Reference	Default value	Change
F05.01	V/F curve	0: Straight-line V/F curve 1: 1.2 power of V/F curve 2: 1.4 power V/F curve 3: 1.6 power V/F curve 4: 1.8 power V/F curve 5: 2.0 power V/F curve 6: Custom V/F curve 7: Reserved 8: V/F half separation mode 9: V/F complete separation mode	0	Changeable only at stop

The above VF curves can be divided into four categories which are described as follows:

Table 7-10 VF curves

Straight-line V/F curve	The inverter takes the rated voltage and rated frequency of the motor as the V/F curve, and adjusts the motor voltage in proportion to the current motor stator frequency. When the motor works at the rated speed (the stator frequency is the rated one), the stator voltage will be the rated one.
1.2-2.0 power of V/F curve	The stator voltage of the motor and the stator frequency show a power curve relationship, and the stator voltage is 1.2-2.0 power of the stator frequency. The power curve takes effect only when the stator frequency is above a certain value.

Custom V/F curve	The user sets 4 V/F points, which determine the V/F curve.
V/F separation mode	Both the stator voltage and the stator frequency are set by parameters. The voltage is set by F05.10 and the frequency is set by F01.04. In the half separation mode, the voltage and frequency share the acceleration time. In the complete separation mode, the voltage and frequency do not share the acceleration time.

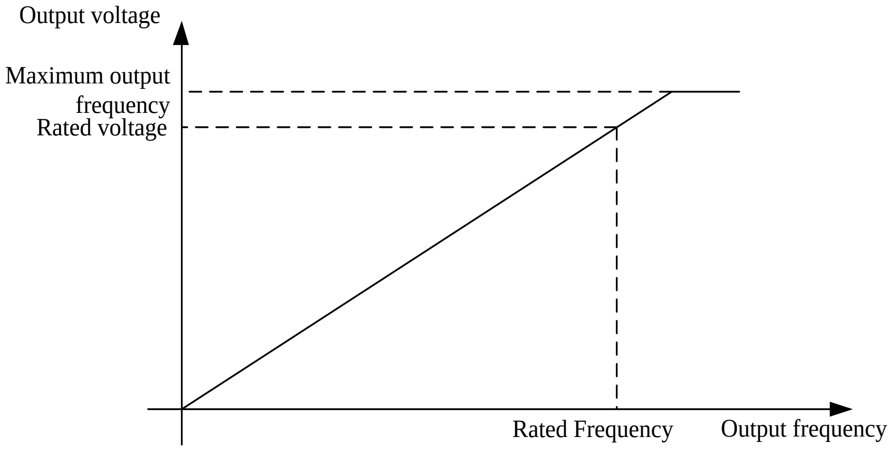


Figure 7-14 Straight-line V/F curve

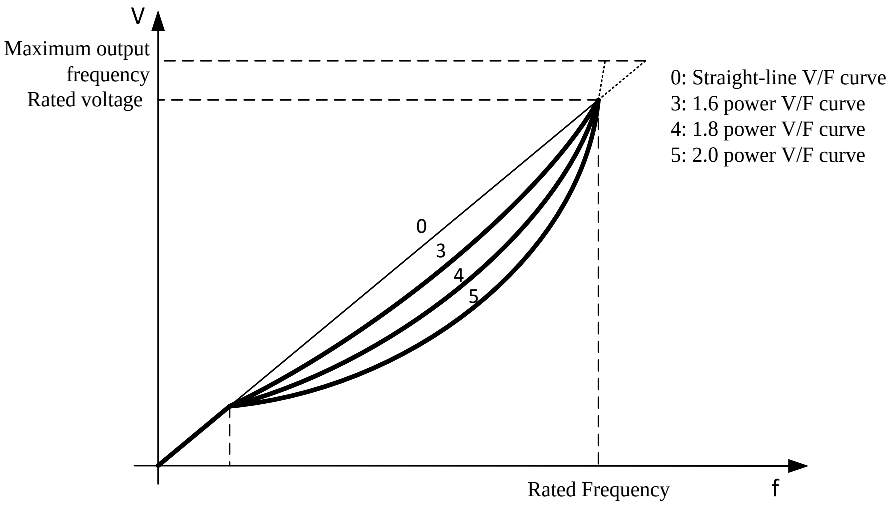


Figure 7-15 Power V/F curve

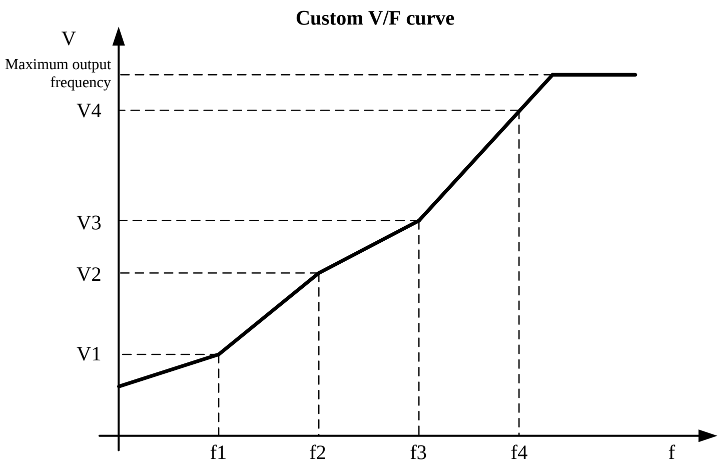


Figure 7-16 Custom V/F Curve

Parameter ID	Name	Reference	Default value	Change
F05.02	Custom V/F curve _ frequency 1	0.00Hz-F05.04	0.00Hz	Changeable only at stop
F05.03	Custom V/F curve _ voltage 1	0.0%-100.0%	0.0%	Changeable only at stop
F05.04	Custom V/F curve _ frequency 2	F05.02-F05.06	0.00Hz	Changeable only at stop
F05.05	Custom V/F curve _ voltage 2	0.0%-100.0%	0.0%	Changeable only at stop
F05.06	Custom V/F curve _frequency 3	F05.04-F05.08	0.00Hz	Changeable only at stop
F05.07	Custom V/F curve_voltage 3	0.0%-100.0%	0.0%	Changeable only at stop
F05.08	Custom V/F curve_frequency 4	F05.06-F03.05	0.00Hz	Changeable only at stop
F05.09	Custom V/F curve_voltage 4	0.0%-100.0%	0.0%	Changeable only at stop

F05.02-F05.09 are used to set the custom V/F curve. For the definition of the custom V/F curve, please refer to description of F05.01.

Please ensure that the voltage-frequency ratio set in F05.02-F05.09 does not deviate too far from the linear VF.

Parameter ID	Name	Reference	Default value	Change
F05.10	V/F separation voltage reference channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Multi-reference 6: Simple PLC 7: PID 8: Communication 9: Expansion card (reserved)	0	Changeable at any time
F05.11	V/F separation voltage	0.0%-300.0%	0.0%	Changeable at any time

F05.10-F05.11 are used to set the voltage reference channel under the V/F separation mode. If the load is an asynchronous motor, the voltage of VF separation is not recommended to be set too high, preferably near the normal voltage-frequency ratio range of the motor. If the load is RLC type load, the voltage reference is recommended to be set according to the actual load requirements.

Parameter ID	Name	Reference	Default value	Change
F05.12	V/F separation voltage acceleration time	0.0s-3200.0s	6.0s	Changeable at any time
F05.13	V/F separation voltage deceleration time	0.0s-3200.0s	6.0s	Changeable at any time

These two parameters are used to set the acceleration and deceleration time in the V/F complete separation mode, that is, the time for the motor voltage to increase from 0 to the rated voltage.

In the half separation mode, the acceleration and deceleration time is determined by F01.22 and F01.23.

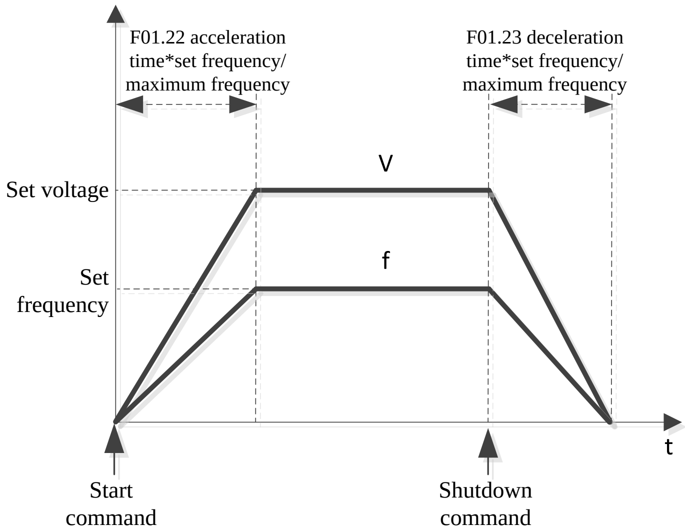


Figure 7-17 Acceleration and deceleration process in the half separation mode

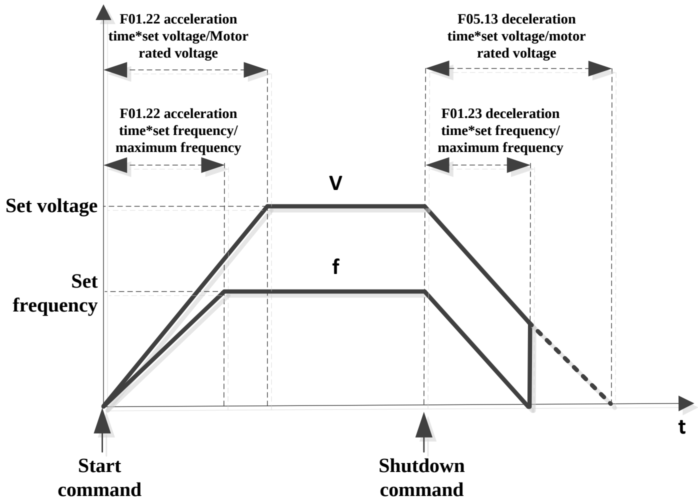


Figure 7-18 Acceleration and deceleration process in complete separation mode

Parameter ID	Name	Reference	Default value	Change
F05.14	Stop mode for V/F separation	0: Frequency and voltage decline to 0 independently 1: Frequency declines to 0 after voltage declines to 0	0	Changeable at any time

F05.14 is used to set the deceleration to stop mode in the V/F separation mode.

The shutdown mode of voltage and frequency independently reduced to 0 are shown in Figure 7-19, and that of voltage first reduced to 0 and frequency then reduced to 0 is shown in Figure 7-20.

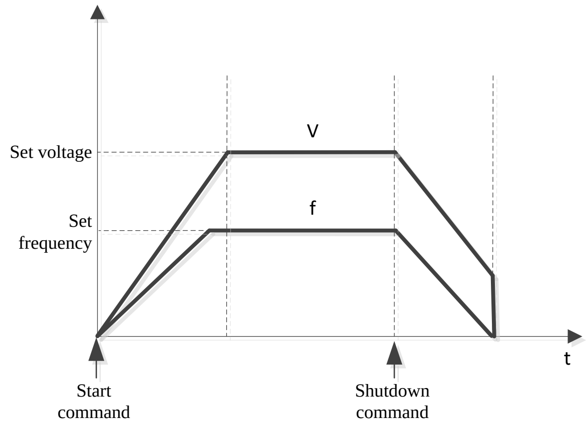


Figure 7-19 Voltage and frequency independently reduced to 0 respectively

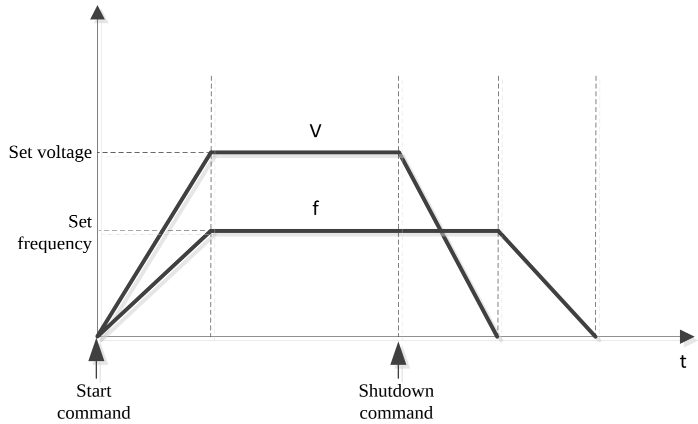


Figure 7-20 Voltage firstly reduced to 0 and then frequency to 0

Parameter ID	Name	Reference	Default value	Change
F05.15	Torque boost	0.0%-30.0%	0.0%	Changeable only at stop
F05.16	Cut-off frequency of torque boost	0.00Hz-600.00Hz	10.00Hz	Changeable only at stop

In the V/F control mode, the load capacity of the motor is increased by increasing the output voltage at low speed.

F05.15 is used to set the torque boost at low speed. If F05.15 is set to 0, the inverter will automatically calculate a torque boost according to the motor parameters.

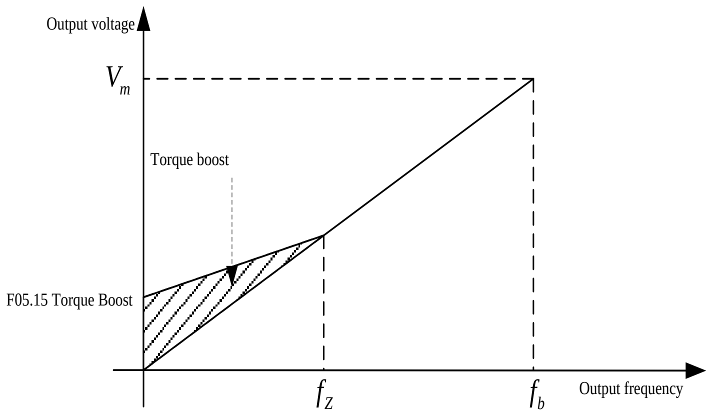


Figure 7-21 V/F torque boost

Parameter ID	Name	Reference	Default value	Change
F05.17	V/F slip compensation gain	0.0%-200.0%	0.0%	Changeable at any time

In the V/F control mode, there is slight difference between the rotation speed of the motor under closed loop control and the set frequency, namely, the slip ratio. By setting the compensation coefficient in F05.17, the inverter will appropriately increase the stator frequency of the motor to compensate the slip. The greater the value set in F05.17, the greater the frequency compensated Setting this parameter to 100% means that compensation will be performed based on the slip rate on the motor nameplate.

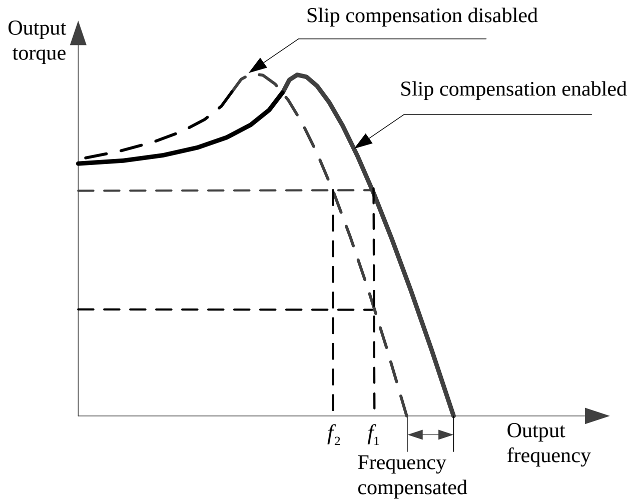


Figure 7-22 Slip compensation

Parameter ID	Name	Reference	Default value	Change
F05.18	V/F oscillation suppression gain	0-100	20	Changeable at any time

At low speed, current or rotational speed oscillation may occur in the asynchronous motor due to magnetic field saturation, parasitic inductance, etc., which can be tackled by setting F05.18. The greater the gain, the better the damping effect will be. However, the too large gain will lead to instability of the control of the large-inertia motor, so the gain should be adjusted according to the actual suppression effect.

Parameter ID	Name	Reference	Default value	Change
F05.19	V/F overcurrent suppression enable	0: Disabled 1: Enabled	1	Changeable only at stop
F05.20	V/F overcurrent suppression action current	0.0%- Model dependent	Model dependent	Changeable only at stop
F05.21	V/F overcurrent suppression gain	0-100	20	Changeable at any time

Since the V/F control mode only controls the three-phase voltage amplitude and frequency of the stator end of the motor, overcurrent may occur in the motor due to sudden loading, leading to motor overtemperature or inverter overcurrent, which can be suppressed through setting F05.19-F05.21.

When the motor current is too large, the inverter will adjust the motor frequency appropriately until the motor current returns to the normal value (reducing the motor frequency in the motoring mode and increasing it in the generating mode).

Setting F05.19 to 1 can enable overcurrent suppression.

F05.20 is used to set the overcurrent suppression action current with the percentage basis being the motor rated current. If there is overcurrent in the field application, it is recommended that the action current should be set to about 100%.

F05.21 is used to set the overcurrent suppression gain. The greater the gain, the better the suppression effect, but too large gain will cause oscillation. Please set the gain according to the actual overcurrent suppression effect.

7.6 F06 Group: Input Terminal Parameters

Parameter ID	Name	Reference	Default value	Change
F06.01	DI1 input function	0: No function 1: Forward run 2: Reverse run 3: Three-Wire control 4: Forward Jog (FJOG) 5: Reverse Jog (RJOG) 6: Running enable 7: Coast to stop 8: Emergency stop 9: External stop 10: Running pause 11: DC braking at stop 12: Immediate DC braking 13: Pre-excitation 14: Switchover between two-wire and three-wire control 15: Command source switched to keypad 16: Command source switched to terminal 17: Command source switched to communication 18: Command source switched to expansion card 19: Frequency source switched to main frequency source 20: Frequency source switched to auxiliary frequency source 21: Frequency source switched to frequency source superposition result 22: Terminal UP 23: Terminal DOWN 24: UP/DOWN setting clear 25: Frequency modification enable 26: Running inhibited 27: Forward run inhibited 28: Reverse run inhibited 29: Torque control inhibited 30: Running mode switched to speed control 31: Running mode switched to torque control 32: Running mode switched to position control 33: Fault Reset 34: User-defined fault 1 35: User-defined fault 2 36: NO input of external fault 37: NC input of external fault 38: Multi-speed reference terminal 1 39: Multi -speed reference terminal 2	1	Changeable only at stop
F06.02	DI2 input function		4	Changeable only at stop
F06.03	DI3 input function		33	Changeable only at stop
F06.04	DI4 input function		0	Changeable only at stop
F06.05	DI5 input function		0	Changeable only at stop
F06.06	DI6 input function		0	Changeable only at stop
F06.07	DI7 input function		0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F06.08	DI8 input function	40: Multi -speed reference terminal 3 41: Multi -speed reference terminal 4 42: Motor parameter group terminal 1 43: Motor parameter group terminal 2 44: Acceleration and deceleration time terminal 1 45: Acceleration and deceleration time terminal 2 46: Acceleration and deceleration inhibited 47: Simple PLC reset 48: Simple PLC pause 49: Wobble reset 50: Wobble pause 51: Regular clearing 52: Counter input 53: Counter reset 54: Length count input 55: Length reset 56: Pulse input 57: PID pause 58: PID parameter switchover 59: PID action direction reversal 60: PID integral clearing 61: PID integral pause 62: Current running duration clear 63: Position lock 64: Forced brake release 65: Forced brake 66: Brake feedback 67-99: Reserved	0	Changeable only at stop
F06.09	DI9 input function		0	Changeable only at stop
F06.10	DI10 input function		0	Changeable only at stop

For details about DI input functions, please refer to “7.27 DI Terminal Function Description”.

Parameter ID	Name	Reference	Default value	Change
F06.11	DI filter time	0.000s-1.000s	0.010s	Changeable at any time

This parameter is defined as the time to filter the DI signal to prevent signal interference. The longer the filter time, the stronger the anti-interference effect, but the slower the reaction speed will be; and vice versa.

If the first terminal filtering is not completed, the DI terminal is disabled.

Parameter ID	Name	Reference	Default value	Change
F06.12	DI active mode selection 1	[0000]-[1111] Ones: DI1 0: Enabled upon closing 1: Enabled upon opening Tens: DI2 0: Enabled upon closing 1: Enabled upon opening Hundreds: DI3 0: Enabled upon closing 1: Enabled upon opening Thousands: DI4 0: Enabled upon closing 1: Enabled upon opening	[0000]	Changeable at any time
F06.13	DI active mode selection 2	[0000]-[1111] Ones: DI5 0: Enabled upon closing	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		1: Enabled upon opening Tens: DI6 0: Enabled upon closing 1: Enabled upon opening Hundreds: DI7 0: Enabled upon closing 1: Enabled upon opening Thousands: DI8 0: Enabled upon closing 1: Enabled upon opening		
F06.14	DI active mode selection 3	[0000]-[0011] Ones: DI9 0: Enabled upon closing 1: Enabled upon opening Tens: DI10 0: Enabled upon closing 1: Enabled upon opening Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.15	DI1 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.16	DI1 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.17	DI2 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.18	DI2 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.19	DI3 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.20	DI3 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.21	DI4 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.22	DI4 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.23	DI5 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.24	DI5 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.25	DI6 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.26	DI6 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.27	DI7 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.28	DI7 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.29	DI8 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.30	DI8 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.31	DI9 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.32	DI9 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.33	DI10 active detection time	0.0s-6500.0s	0.0s	Changeable at any time
F06.34	DI10 inactive detection time	0.0s-6500.0s	0.0s	Changeable at any time

The active detection time refers to the delay time for the DI terminal to change from active state to inactive state.

The inactive detection time refers to the delay time for the DI terminal to change from inactive state to active state.

Parameter ID	Name	Reference	Default value	Change
F06.35	Terminal control mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	Changeable only at stop

This parameter defines four ways of controlling the inverter through external terminals. Take DI1 (forward run), DI2 (reverse run) and DI3 (three-wire control) as an example.

0: Two-wire mode 1

Whether the motor runs or not and the running direction are bound. This is the most frequently used two-wire control mode. The running direction is determined command from DI1 (forward run) and DI2 (reverse run) (see the figure below).

K1	K2	Run command
0	0	Stop
1	0	Forward run
0	1	Reverse run
1	1	Stop

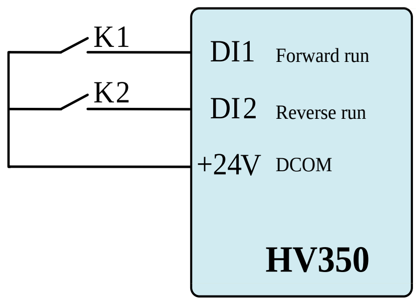


Figure 7-23 Two-wire control 1

1: Two-wire mode 2

Whether the motor runs or not and the running direction are independent. Under this mode, DI1 (forward run) is used to enable running and the running direction is controlled by the status of DI2 (reverse run) (see the figure below).

K1	K2	Run command
0	0	Stop
1	0	Forward run
1	1	Reverse run
0	1	Stop

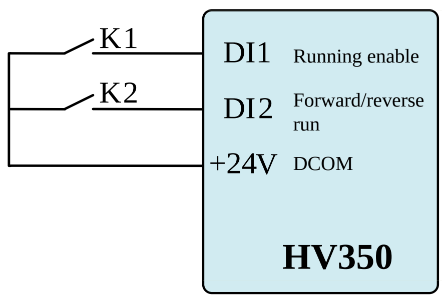


Figure 7-24 Two-wire control 2

2: Three-wire mode 1

Under this mode, DI3 (three-wire control) is used to enable running and the running direction is controlled by DI1 (forward run) and DI2 (reverse run).

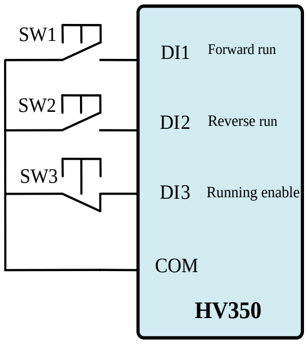


Figure 7-25 Three-wire control 1

3: Three-wire mode 2

Under this mode, DI3 (three-wire control) is used to disable running, DI1 (forward run) is used to enable running and the running direction is controlled by the status of DI2 (reverse run) (see the figure below).

K	Run direction
0	Forward
1	Reverse

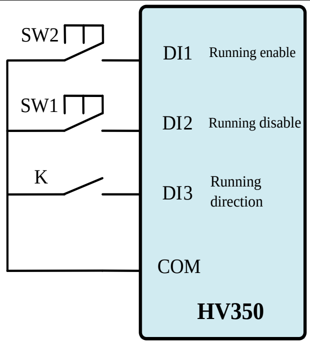


Figure 7-26 Three-wire control 2

Parameter ID	Name	Reference	Default value	Change
F06.36	Terminal UP/DOWN control	[0000]-[0021] Ones: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Tens: Running limit 0: Changeable at any time 1: Changeable when running, maintaining at stop 2: Changeable when running, clearing at stop Hundreds: Reserved Thousands: Reserved	[0000]	Changeable at any time

Ones: Retention at power failure

0: Non-retentive at power failure

In this mode, frequency changes made by using keys △ and ▽ or terminal UP/DOWN are not retained in case of power failure. Upon repowering on, the frequency reference is restored to the preset frequency (F01.11).

1: Retentive at power failure

In this mode, frequency changes made by using keys △ and ▽ or terminal UP/DOWN are retained in case of power failure. Upon repowering on, the frequency reference is restored to the same value as that used at the moment of the power failure.

Tens: Running limit

0: Changeable at any time

Terminal UP/DOWN can be adjusted when the inverter is running or when it shuts down.

1: Changeable when running, maintaining at stop

Terminal UP/DOWN can be adjusted only when the inverter is running, and the frequency records are retained in case of power failure. Upon repowering on, the frequency reference is restored to the same value as that used at the moment of the power failure.

2: Changeable when running, clearing at stop

Terminal UP/DOWN can be adjusted only when the inverter is running, and the frequency records are cleared in case of power failure. Upon repowering on, the frequency reference is restored to 0.00Hz.

Hundreds: Reserved

Thousands: Reserved

Parameter ID	Name	Reference	Default value	Change
F06.37	Terminal UP change rate	0.00Hz/s-600.00Hz/s	0.50Hz/s	Changeable at any time
F06.38	Terminal DOWN change rate	0.00Hz/s-600.00Hz/s	0.50Hz/s	Changeable at any time
F06.39	Reserved			

F06.37-F06.39 are used to change the change rate of the frequency reference when it is adjusted by terminal UP/DOWN.

Parameter ID	Name	Reference	Default value	Change
F06.40	Minimum pulse input	0.00kHz-F06.42	0.00kHz	Changeable at any time
F06.41	Percentage corresponding to minimum pulse input	-100.0%-100.0%	0.0%	Changeable at any time
F06.42	Maximum pulse input	F06.40-100.00kHz	50.00kHz	Changeable at any time
F06.43	Percentage corresponding to maximum pulse input	-100.0%-100.0%	100.0%	Changeable at any time

Minimum pulse input: This parameter stipulates the minimum frequency accepted by the pulse input terminal (DI5). Frequency below this value will be processed by the inverter as the minimum input frequency.

Percentage corresponding to minimum pulse input: This parameter is used to set the percentage corresponding to minimum pulse input.

Maximum pulse input: This parameter stipulates the maximum frequency accepted by the pulse input terminal (DI5). Frequency above this value will be processed by the inverter as the maximum input frequency.

Percentage corresponding to maximum pulse input: This parameter is used to set the percentage corresponding to maximum pulse input.

Parameter ID	Name	Reference	Default value	Change
F06.44	Pulse input filter time	0.000s-10.000s	0.050s	Changeable at any time
F06.45	Cut-off frequency of pulse input (reserved)	0.00kHz-1.00kHz	0.10kHz	Changeable at any time

Pulse input filter time is defined as the time to filter the input pulse signal to prevent signal interference. The longer the filter time, the stronger the anti-interference effect, but the slower the response will be; and vice versa.

Cut-off frequency of pulse input is defined as the minimum pulse frequency identified by the pulse input port. Pulse frequency below this value will be identified as 0.00kHz. The smaller this value, the lower level the pulse frequency that can be identified by the pulse input port. However, when the pulse frequency at the pulse input port disappears, the inverter continues to treat it as 0.00kHz.

Parameter ID	Name	Reference	Default value	Change
F06.46	AI1 filter time	0.00s-10.00s	0.10s	Changeable at any time
F06.47	AI2 filter time	0.00s-10.00s	0.10s	Changeable at any time
F06.48	AI3 filter time	0.00s-10.00s	0.10s	Changeable at any time

This parameter is defined as the time to filter the AI signal to prevent signal interference. The longer the filter time, the stronger the anti-interference effect, but the slower the response will be; and vice versa.

Parameter ID	Name	Reference	Default value	Change
F06.49	AI input type	[0000]-[0011] Ones: AI1 0: Voltage input 1: Current input Tens: AI2 0: Voltage input 1: Current input Hundreds: AI3 (reserved) 0: Voltage input 1: Current input Thousands: Reserved	[0000]	Changeable only at stop

This parameter is used to select AI input signal type, that is, whether it is voltage or current.

Parameter ID	Name	Reference	Default value	Change
F06.50	Percentage corresponding to AI input overlimit	[0000]-[0222] Ones: AI1 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below lower limit, or corresponding settings when above the upper limit Tens: AI2 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below lower limit, or corresponding settings when above the upper limit Hundreds: AI3 0: No limit 1: corresponding settings at limit and exceeding time limit 2: 0 when there is a limit and it is below lower limit, or corresponding settings when above the upper limit Thousands: Reserved	[0111]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F06.51	AI1 curve	[0000]-[0444] Ones: AI1 0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Tens: AI2	[0210]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Hundreds: AI3 0: AI curve 1 1: AI curve 2 2: AI curve 3 3: AI curve 4 4: AI curve 5 Thousands: Reserved		

0: AI curve 1
1: AI curve 2
2: AI curve 3
For descriptions of curves in the form of two-point straight line, please refer to F06.52-F06.63.
3: AI curve 4
4: AI curve 5
For descriptions of curves in the form of multi-inflexion broken line, please refer to F06.64-F06.79.

Parameter ID	Name	Reference	Default value	Change
F06.52	AI curve 1 minimum input	-10.00V-F06.54	0.00V	Changeable at any time
F06.53	Percentage corresponding to AI curve 1 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.54	AI curve 1 maximum input	F06.52-10.00V	10.00V	Changeable at any time
F06.55	Percentage corresponding to AI curve 1 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.56	AI curve 2 minimum input	-10.00V-F06.58	0.00V	Changeable at any time
F06.57	Percentage corresponding to AI curve 2 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.58	AI curve 2 maximum input	F06.56-10.00V	10.00V	Changeable at any time
F06.59	Percentage corresponding to AI curve 2 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.60	AI curve 3 minimum input	-10.00V-F06.62	0.00V	Changeable at any time
F06.61	Percentage corresponding to AI curve 3 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.62	AI curve 3 maximum input	F06.60-10.00V	10.00V	Changeable at any time
F06.63	Percentage corresponding to AI curve 3 maximum input	-100.0%-100.0%	100.0%	Changeable at any time

AI curve minimum input: This parameter defines the signal accepted by the AI terminal. Voltage signals below this value will be processed by the inverter as the AI lower limit.

Percentage corresponding to AI curve minimum input: This parameter is used to set the percentage corresponding to the AI lower limit.

AI curve maximum input: This parameter defines the signal accepted by the AI terminal. Voltage signals exceeding this value will be processed by the inverter as the AI upper limit.

Percentage corresponding to AI curve maximum input: This parameter is used to set the percentage corresponding to the AI upper limit.

When the AI is current, 1mA current corresponds to 0.5V voltage.

Parameter ID	Name	Reference	Default value	Change
F06.64	AI curve 4 minimum input	-10.00V-F06.66	0.00V	Changeable at any time
F06.65	Percentage corresponding to AI curve 4 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.66	Inflexion 1 input of AI curve 4	F06.64-F06.68	3.00V	Changeable at any time
F06.67	Percentage corresponding to inflection 1 input of AI curve 4	-100.0%-100.0%	30.0%	Changeable at any time
F06.68	Inflexion 2 input of AI curve 4	F06.66-F06.70	6.00V	Changeable at any time
F06.69	Percentage corresponding to inflection 2 input of AI curve 4	-100.0%-100.0%	60.0%	Changeable at any time
F06.70	AI curve 4 maximum input	F06.68-10.00V	10.00V	Changeable at any time
F06.71	Percentage corresponding to AI curve 4 maximum input	-100.0%-100.0%	100.0%	Changeable at any time
F06.72	AI curve 5 minimum input	-10.00V-F06.74	0.00V	Changeable at any time
F06.73	Percentage corresponding to AI curve 5 minimum input	-100.0%-100.0%	0.0%	Changeable at any time
F06.74	Inflexion 1 input of AI curve 5	F06.72-F06.76	3.00V	Changeable at any time
F06.75	Percentage corresponding to inflection 1 input of AI curve 5	-100.0%-100.0%	30.0%	Changeable at any time
F06.76	Inflexion 2 input of AI curve 5	F06.74-F06.78	6.00V	Changeable at any time
F06.77	Percentage corresponding to inflection 2 input of AI curve 5	-100.0%-100.0%	60.0%	Changeable at any time
F06.78	AI curve 5 maximum input	F06.76-10.00V	10.00V	Changeable at any time
F06.79	Percentage corresponding to AI curve 5 maximum input	-100.0%-100.0%	100.0%	Changeable at any time

AI curve 4 and AI curve 5 can be set with two inflexions and divided into three straight lines. With the slope of each line varying, the correspondence relationship can be more flexible. See the figure below for details:

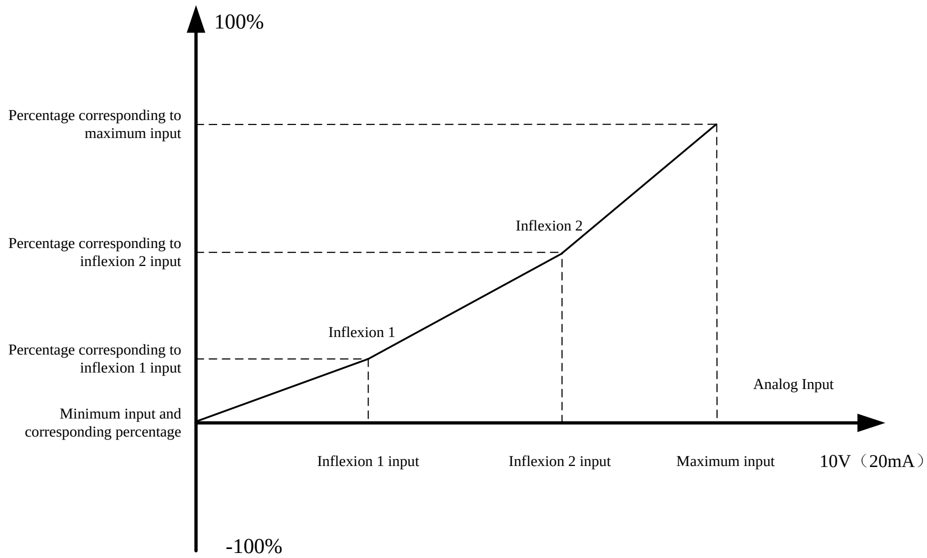


Figure 7-27 Multi-inflexion Curve

If AI curve 4 or AI curve 5 are chosen for AI1 and AI2, the input should be voltage with the current twice the voltage (4mA-2V).

Parameter ID	Name	Reference	Default value	Change
F06.80	AI1 skip point	-100.0%-100.0%	0.0%	Changeable at any time
F06.81	AI1 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time
F06.82	AI2 skip point	-100.0%-100.0%	0.0%	Changeable at any time
F06.83	AI2 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time
F06.84	AI3 skip point	-100.0%-100.0%	0.0%	Changeable at any time
F06.85	AI3 skip amplitude	0.0%-100.0%	0.5%	Changeable at any time

When the AI is within the AI skip amplitude, it is treated as the AI skip point.

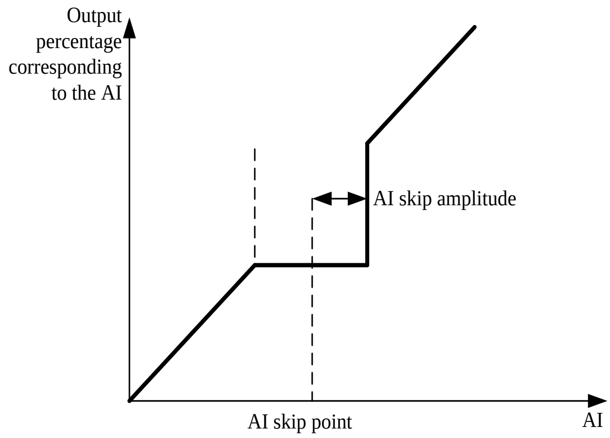


Figure 7-28 AI Skip point/skip amplitude

7.7 F07 Group: Output Terminal Parameters

Parameter ID	Name	Reference	Default value	Change
F07.01	HDO terminal output mode	0: Digital output (DO1) 1: Pulse output (HDO)	1	Changeable at any time

0: Digital output (DO1)
For details about this parameter, please refer to F07.02.

1: Pulse output (HDO)
The maximum pulse frequency is 100.0kHz. For details about this parameter, please refer to F07.10.

Parameter ID	Name	Reference	Default value	Change
F07.02	DO1 output function	0: No function 1: Inverter in running 2: Inverter in forward running 3: Inverter in reverse running 4: Inverter in jog 5: Inverter in forward jog 6: Inverter in reverse jog	0	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F07.03	DO2 output function	7: Fault 8: Alarm 9: Inverter in undervoltage state 10: Ready to run 11: Braking with energy consumption (reversed) 12: Designated count value reach 13: Reference count value reach 14: Length reach 15: Simple PLC stage completion 16: simple PLC cycle completion 17: Timing reach 18: Current running duration reach 19: Accumulative running duration reach 20: Accumulative power-on duration reach 21: AI1 input overlimit 22: AI2 input overlimit 23: AI3 input overlimit 24: Frequency limit reach 25: Torque limit reach 26: Frequency upper limit reach 27: Frequency lower limit reach (no output at stop) 28: Frequency lower limit reach (output at stop) 29: Zero-speed running 1 (no output at stop) 30: Zero-speed running 2 (output at stop) 31: Frequency detection FDT1 reach 32: Frequency detection FDT2 reach 33: Frequency reference reach 34: Any frequency 1 reach 35: Any frequency 2 reach 36: Any current 1 reach 37: Any current 2 reach 38: Zero current state 39: Output overcurrent 40: Inverter overtemperature pre-alarm 41: Inverter overload pre-alarm 42: Motor overtemperature pre-alarm 43: Motor overload pre-alarm 44: Inverter in load protection 1 45: Inverter in load protection 2 (Reserved) 46: Position lock succeeds 47: Brake output 48: Communication 49-99: Reserved	1	Changeable at any time
F07.04	DO3 output function		0	Changeable at any time
F07.05	DO4 output function		0	Changeable at any time
F07.06	DO5 output function		0	Changeable at any time
F07.07	RO1 output function		7	Changeable at any time
F07.08	RO2 output function		0	Changeable at any time
F07.09	RO3 output function		0	Changeable at any time

For details about F07.02-F07.09, please refer to “7.28 DO Terminal Function Description”.

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F07.10</td><td>HDO output function</td><td rowspan="4">0: No function
1: Running frequency
2: Frequency reference
3: Ramp frequency
4: Motor speed
5: Bus voltage
6: Output voltage
7: Output voltage (100.0% for 1,000.0V)
8: Output current
9: Output current (100.0% for 1,000.0A)
10: Torque current
11: Excitation current
12: Output power
13: Output torque (absolute value)
14: Output torque (actual value)
15: AI1
16: AI2
17: AI3
18: Pulse input
19: Count value
20: Length value
21: PID reference
22: PID feedback
23: Communication</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.11</td><td>AO1 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.12</td><td>AO2 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F07.13</td><td>AO3 output function</td><td>0</td><td>Changeable at any time</td></tr>
</table>

For details about F07.02-F07.09, please refer to “7.29 AO/HDO Terminal Function Description”.

Parameter ID	Name	Reference	Default value	Change
F07.14	DO1 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.15	DO1 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.16	DO2 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.17	DO2 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.18	DO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.19	DO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.20	DO4 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.21	DO4 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.22	DO5 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.23	DO5 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.24	RO1 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.25	RO1 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F07.26	RO2 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.27	DO2 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.28	RO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F07.29	RO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time

The above parameters define the delay time when the programmable output terminals are switched on/off.

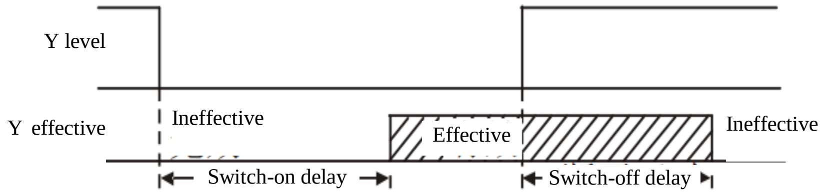


Figure 7-29 Switch-on/off delay

Parameter ID	Name	Reference	Default value	Change
F07.30	DO active mode 1	[0000]-[1111] Ones: DO1 0: Positive logic active 1: Negative logic active Tens: DO2 0: Positive logic active 1: Negative logic active Hundreds: DO3 0: Positive logic active 1: Negative logic active Thousands: DO4 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time
F07.31	DO active mode 2	[0000]-[1111] Ones: DO5 0: Positive logic active 1: Negative logic active Tens: RO1 0: Positive logic active 1: Negative logic active Hundreds: RO2 0: Positive logic active 1: Negative logic active Thousands: RO3 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F07.32	HDO minimum output	-100.0%-F07.34	0.0%	Changeable at any time
F07.33	Pulse output corresponding to HDO minimum output	0.00kHz-100.00kHz	0.0kHz	Changeable at any time
F07.34	HDO maximum output	F07.32-100.00%	100.0%	Changeable at any time
F07.35	Pulse output corresponding to HDO maximum output	0.00kHz-100.00kHz	50.0kHz	Changeable at any time

The above parameters define the correspondence between the output percentage and the pulse output. When the output percentage exceeds the set maximum output or minimum output, it is treated as the minimum/maximum output accordingly.

Parameter ID	Name	Reference	Default value	Change
F07.36	HDO output filter time	0.000s-10.000s	0.050s	Changeable at any time

The longer the filter tine, the slower the pulse output frequency changes.

Parameter ID	Name	Reference	Default value	Change
F07.37	AO output type	[0000]-[0111] Ones: AO1 0: Voltage output 1: Current output Tens: AO2 0: Voltage output 1: Current output Hundreds: AO3 0: Voltage output 1: Current output Thousands: Reserved	[0000]	Changeable at any time

This parameter is used to select AO output signal type, that is, whether it is voltage or current.

Parameter ID	Name	Reference	Default value	Change
F07.38	AO1 minimum output	-100.0%-F07.40	0.0%	Changeable at any time
F07.39	Analog output corresponding to AO1 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.40	AO1 maximum output	F07.38-100.0%	100.0%	Changeable at any time
F07.41	Analog output corresponding to AO1 maximum output	-10.00V-10.00V	10.00V	Changeable at any time
F07.42	AO2 minimum output	-100.0%-F07.44	0.0%	Changeable at any time
F07.43	Analog output corresponding to AO2 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.44	AO2 maximum output	F07.42-100.0%	100.0%	Changeable at any time
F07.45	Analog output corresponding to AO2 maximum output	-10.00V-10.00V	10.00V	Changeable at any time
F07.46	AO3 maximum output	-100.0%-F07.48	0.0%	Changeable at any time
F07.47	Analog output corresponding to AO3 minimum output	-10.00V-10.00V	0.00V	Changeable at any time
F07.48	AO3 maximum output	F07.46-100.0%	100.0%	Changeable at any time
F07.49	Analog output corresponding to AO3 maximum output	-10.00V-10.00V	10.00V	Changeable at any time

The above parameters define the correspondence between the output percentage and AO. When the output percentage exceeds the minimum/maximum output, it will be treated as the minimum/maximum output accordingly.

When the AO is current, 1mA current corresponds to 0.5V voltage. In different applications, the AO corresponding to 100% of the output is different. Please refer to the description of each application for details.

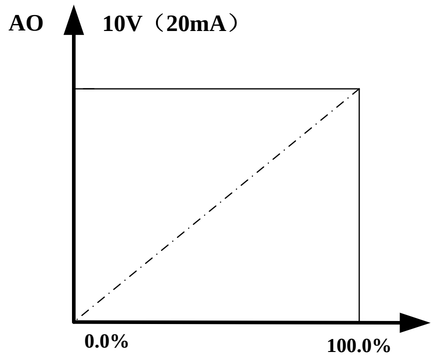


Figure 7-30 AO Relation curve

7.8 F08 Group: System Parameters

Parameter ID	Name	Reference	Default value	Change
F08.01	User password	0-65535	0	Changeable at any time

This parameter is used to set the user password. When 1-3 is selected in F08.02, this password must be entered to unlock. The factory default password is 0. Please keep the reset one properly.

Parameter ID	Name	Reference	Default value	Change
F08.02	Parameter and key lock	0: No locking 1: Parameters locked 2: Parameters and some keys locked 3: Parameters and all keys locked	0	Changeable at any time

0: No locking

All the parameters are changeable and all the keys can be used.

1: Parameters locked

All the parameter are unchangeable (except for the initial frequency reference which can be changed by pressing the ▲/▼ keys). Users cannot enter the parameter changing interface through the keypad, but the number of “Read only” parameters can be selected through the “**>>**” key. All the keys on the keypad can be used.

2: Parameters and some keys locked

All the parameters are unchangeable. Users can neither enter the parameter changing interface through the keypad nor choose the number of “Read only” parameters. Also, all keys on the keypad are locked except for MENU/RUN/STOP.

3: Parameters and all keys locked

All parameters are locked, and no parameters can be modified. All keys on the keypad except MENU are also locked.

Unlocking instructions:

If 0 is not set for F08.01, press the “MENU” key to display “-----”, then press the “>>/▲/▼/ENT” key, and a digital tube blinks. Next, enter the password through the △/▽ keys and press the “ENT” key. If the password is correct, unlocking can be achieved.

After unlocking, the lock function will be enabled again once returning to the main interface or upon restarting after power failure.

Parameter ID	Name	Reference	Default value	Change
F08.03	Parameter initialization	0: No operation 1: Restore default settings (excluding motor parameters) 2: Restore all factory parameters 3: Clear records	0	Changeable only at stop

0: No operation

1: Restore default settings (excluding motor parameters)

When this parameter is set to 1, most of the functional parameters of the inverter will be restored to factory parameters, except for the motor parameters, fault record, accumulative running time, accumulative power-on time, accumulative fan running time and accumulative power consumption.

2: Restore all factory parameters

On the basis of 1, motor parameters are restored.

3: Clear records

Clear the inverter fault record information, accumulative running time, accumulative power-on time, accumulative fan running time, and accumulative power consumption.

Parameter ID	Name	Reference	Default value	Change
F08.04	Parameter writing protection	0: Disabled 1: Enabled	0	Changeable at any time

This parameter is used to set the changing properties for parameters. If 1 is selected, all the parameters, except for this one, will be read-only.

Parameter ID	Name	Reference	Default value	Change
F08.05	Parameter copy	0: No operation 1: Back up current user parameters 2: Restore user parameters from backup	0	Changeable only at stop

When the built-in digital tube keypad controls this parameter, user parameters are backed up to the inverter ROM, or user backup parameters are restored from the ROM.

When the external digital tube keypad controls this parameter, user parameters are backed up to the external keypad, or user backup parameters are restored from the external keypad.

Parameter ID	Name	Reference	Default value	Change
F08.06	Keypad display self-inspection	[0000]-[0011] Ones: Built-in keypad 0: Disabled 1: Enabled Tens: External keypad 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved	0	Changeable only at stop

The digital tube keypad displays self-inspection.

Parameter ID	Name	Reference	Default value	Change
F08.07	Keypad special function	0000]-[0012] Ones: Keypad priority 0: Both built-in and external keypads enabled, shutdown/reset command preferred 1: Built-in keypad enabled, external keypad disabled 2: External keypad enabled, built-in	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		keypad disabled Tens: Automatic jump to home page enable 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved		

Ones: Keypad priority
0: Both built-in and external keypads enabled, shutdown/reset command preferred
1: Built-in keypad enabled, external keypad disabled
2: External keypad enabled, built-in keypad disabled

Tens: Automatic jump to home page enable
0: Disabled
The digital tube keypad does not automatically jump to the home page.
1: Enabled
The digital tube keypad, if not on the home page and is not operated within 5 minutes, will automatically jump to the home page.

Parameter ID	Name	Reference	Default value	Change
F08.08	Keypad MF.K key function	0: Disabled 1: Command channel switchover 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog 5: Menu mode switchover	5	Changeable only at stop

0: Disabled
The MF.K key is disabled.

1: Command channel switchover
When “F01.03 Command source” is set to 0: Keypad, command sources cannot be switched.
When F01.03 is set to 1: Terminal, command sources can be switched over between terminal and keypad.
When F01.03 is set to 2: Communication, command sources can be switched over between communication and keypad.
The command channel switchover priority is as follows: communication> terminal>Keypad MF.K. That is to say, setting to 2: Communication and 1: Terminal can clear the command from the keypad MF.K key.

2: Switchover between forward and reverse run
This parameter is used to switch the direction of the frequency command. It is enabled only when the command source is the keypad.

3: Forward jog
This parameter is only enabled when the command source is the keypad.

4: Reverse jog
This parameter is only enabled when the command source is the keypad.

5: Menu mode switchover
This parameter is used for switchover among three menu modes, namely, the basic menu mode, user-defined menu mode and user-modified menu mode.

Except jog, other functions of the MF.K key are edge-triggered.

Parameter ID	Name	Reference	Default value	Change
F08.09	Keypad STOP/RESET key function	0: The STOP/RESET key is enabled only in keypad control mode. 1: The STOP/RESET key is enabled in any control mode.	1	Changeable at any time

0: The STOP/RESET key is enabled only in keypad operating mode.

When the running signal is not controlled by the keypad, the STOP key cannot act as the shutdown command source.

1: The STOP/RESET key is enabled in any control mode.

The STOP key can act as the shutdown command source no matter the running signal is controlled by which source.

Parameter ID	Name	Reference	Default value	Change
F08.10	Keypad UP/DOWN key function	[[0000]-[0214] Ones: Reset parameters 0: Disabled 1: Digital setting 2: Terminal UP/DOWN 3: PID reference 4: F08.11 reference Tens: Retention at power failure 0: Non-retentive at power failure 1: Retentive at power failure Hundreds: Reserved Thousands: Reserved	[0001]	Changeable at any time
F08.11	Keypad UP/DOWN key parameter resetting	0.00-99.99	1.11	Changeable at any time

Ones: Reset parameters

0: Disabled

The function to quickly modify parameters with the keypad UP/DOWN key is disabled.

1: Digital setting

The initial frequency reference (F01.11) can be quickly modified through the UP/DOWN key.

2: 2: Terminal UP/DOWN

The frequency reference set through terminal UP/DOWN can be quickly modified through the UP/DOWN key.

3: PID reference

Parameter F11.02 can be quickly modified through the UP/DOWN key.

4: F08.11 reference

Parameter F08.11 mapping address can be quickly modified through the UP/DOWN key.

Tens: Retention at power failure

0: Non-retentive at power failure

1: Retentive at power failure

The tens place is used to set whether parameter changes made by using the UP/DOWN key can be retained in case of power failure.

Hundreds: Reserved

Thousands: Reserved

Parameter ID	Name	Reference	Default value	Change
F08.12	Display parameter 1 in running state	B00: Running frequency B01: Frequency reference B02: Bus voltage B03: Output voltage B04: Output current B05: Output power B06: Output torque B07: Torque reference B08: PID reference B09: PID feedback B10: DI input terminal state 1 B11: DI input terminal state 2 B12: DO output terminal state B13: AI1 input value B14: AI2 input value B15: AI3 input value	31	Changeable at any time
F08.13	Display parameter 2 in running state	B00: Pulse input frequency B01: Count value B02: Length value B03: Current stage B04: Remaining running duration during timed running B05: Current running time B06: Current power-on time B07: Motor speed B08: Estimated motor frequency B09: Measured motor frequency B10: Reserved B11: Reserved B12: Reserved B13: Reserved B14: Reserved B15: Reserved	0	Changeable at any time
F08.14	Display parameter 1 in shutdown state	B00: Frequency reference B01: Bus voltage B02: Torque reference B03: PID reference B04: PID feedback B05: DI input terminal state 1 B06: DI input terminal state 2 B07: DO output terminal state B08: AI1 input value B09: AI2 input value B10: AI3 input value B11: Pulse input frequency B12: Count value B13: Length value B14: Current stage B15: Reserved	3	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F08.17	Frequency converter rated power			Read only
F08.18	Rated voltage of frequency converter			Read only
F08.19	Rated current of frequency converter			Read only

F08.17-F08.19 are used to set inverter parameters.

Parameter ID	Name	Reference	Default value	Change
F08.20	Product model			Read only
F08.21	Control software version			Read only

The product model can be 350, 510, etc.
The software version can be switched among V/B/D through the “**>>**” key.

7.9 F09 Group: Auxiliary Function Parameters

Parameter ID	Name	Reference	Default value	Change
F09.01	Jog frequency reference	0.00Hz- F01.12	5.00 Hz	Changeable at any time

This parameter is used to set frequency reference for the inverter in jog.

Note:
When the frequency reference is greater than the upper limit set in F01.14, the actual jog output frequency will be limited by the upper limit.

Parameter ID	Name	Reference	Default value	Change
F09.02	Jog acceleration time	0.0s-3200.0s	20.0s	Changeable at any time
F09.03	Jog deceleration time	0.0s-3200.0s	20.0s	Changeable at any time

Jog acceleration times refers to the time for the inverter to accelerate from 0.00Hz to “F01.20 Acceleration/Deceleration time base frequency”.
Jog deceleration time refers to the time for the inverter to decelerate from “F01.20 Acceleration/Deceleration time base frequency” to 0.00Hz.

Parameter ID	Name	Reference	Default value	Change
F09.04	Jog interval time	0.0s-3200.0s	0.0s	Changeable at any time

This parameter is used to set the interval time that must be waited for from the cancellation of the previous jog command to the taking effect of the next jog command.
The jog command issued during the interval time will not cause the inverter to run, which is still in standby mode. If the command continues to exist, it will be executed immediately after the interval time.

Parameter ID	Name	Reference	Default value	Change properties
F09.06	Acceleration time 2	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.07	Deceleration time 2	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.08	Acceleration time 3	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.09	Deceleration time 3	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.10	Acceleration time 4	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time
F09.11	Deceleration time 4	0.0sec/min-3200.0sec/min	Model dependent	Changeable at any time

Acceleration time 2/3/4 refers to the time for the inverter to accelerate from 0.00Hz to F01.20 Acceleration/Deceleration time base frequency.

Deceleration time 2/3/4 refers to the time for the inverter to decelerate from F01.20 Acceleration/Deceleration time base frequency to 0.00Hz.

Switchover among acceleration/deceleration time 2/3/4 can only be achieved through the acceleration and deceleration time terminal 1 and 2 and the on-off of DGND (except for acceleration and deceleration of Simple PLC).

If no acceleration and deceleration time terminal is set, acceleration and deceleration time 1 is enabled by default, and the inverter will perform acceleration and deceleration according to this time.

For the definition of the acceleration and deceleration time of the simple PLC, please refer to “F13 Group: Multi-speed and Simple PLC Parameters”.

The jog acceleration and deceleration time is not within this range. It is set separately through F09.02 and F09.03.

Table 7-11 Table of Acceleration and Deceleration Time Selection

Terminal 2	Terminal 1	Acceleration/Deceleration time
OFF	OFF	Acceleration time 1/deceleration time 1
OFF	ON	Acceleration time 2/deceleration time 2
ON	OFF	Acceleration time 3/deceleration time 3
ON	ON	Acceleration time 4/deceleration time 4

Parameter ID	Name	Reference	Default value	Change
F09.12	Emergency stop deceleration time	0.0s-3200.0s	Model dependent	Changeable at any time

This parameter is used to set the deceleration time during emergency stop. The definition of emergency stop deceleration time is the same as that of acceleration/deceleration time.

Parameter ID	Name	Reference	Default value	Change
F09.13	Switchover frequency point of acceleration time 1 and acceleration time 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.14	Switchover frequency point of deceleration time 1 and deceleration time 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time

It is used to select different acceleration and deceleration time according to the run frequency range during the run of the frequency converter. This function can be enabled only when the DI terminal function is not set to 44 (acceleration and deceleration time terminal 1) or 45 (acceleration and deceleration time terminal 2).

As shown in the figure below, in the process of acceleration, acceleration time 2 will be selected if the run frequency is less than F09.13 and acceleration time 1 will be selected if the run frequency is greater than F09.13. In the process of deceleration, deceleration time 1 will be selected if the run frequency is greater than F09.14, and deceleration time 2 will be selected if the run frequency is less than F09.14.

These tow parameters are used to select different acceleration and deceleration time according to the running frequency range.

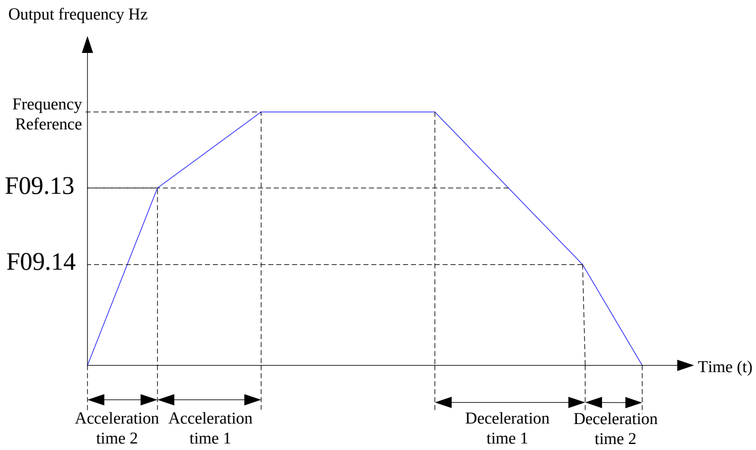


Figure 7-31 Acceleration and deceleration time switchover

Parameter ID	Name	Reference	Default value	Change
F09.16	Skip frequency point 1	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.17	Skip frequency band 1	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.18	Skip frequency point 2	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.19	Skip frequency band 2	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.20	Skip frequency point 3	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.21	Skip frequency band 3	0.00Hz-30.00Hz	0.00Hz	Changeable at any time
F09.22	Skip frequency point 4	0.00Hz-600.00Hz	0.00Hz	Changeable at any time
F09.23	Skip frequency band 4	0.00Hz-30.00Hz	0.00Hz	Changeable at any time

These parameters are used to set the skip frequency to prevent the motor from running with load at an output frequency that causes mechanical resonance. Four skip frequency points can be set. After setting these parameters, even if the frequency reference is with the mechanical load resonance frequency, the inverter output frequency will be automatically adjusted to be out of the resonance frequency. If all the four skip frequencies are set to 0, the skip frequency parameters are disabled.

Parameter ID	Name	Reference	Default value	Change
F09.24	Droop control gain	0.0%-50.0%	0.0%	Changeable at any time
F09.26	Energy conservation running coefficient	0%-100%	0%	Changeable at any time
F09.27	Minimum speed in energy conversation running	0.0%-100.0%	15.0%	Changeable at any time

In case of multiple motors driving the same load, the speed drop of the motor can be adjusted under the same load through droop control to balance the load on different motors.

F09.24 droop control gain is as shown in the figure below.

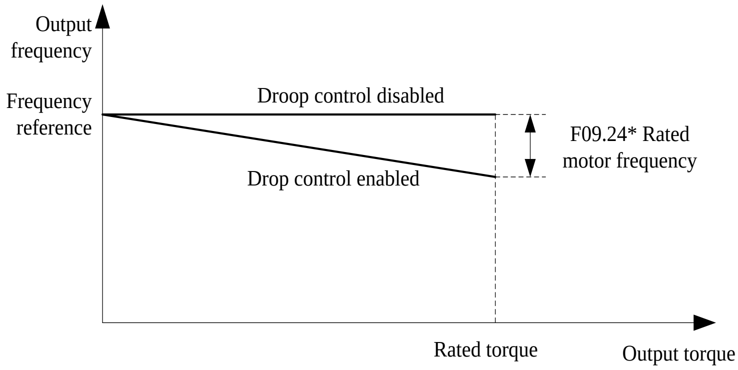


Figure 7-32 Droop Control

Energy conservation running means that when the motor runs at light load/no load, reducing the motor flux can reduce the motor loss and the noise generated by the motor. This parameter is recommended for scenarios with low dynamic response requirements, such as fans and water pumps.

This parameter can be enabled in both VF mode and VC mode.

F09.26 is used to set the energy conservation running coefficient.

F09.27 is used to set the minimum rotation speed for energy conservation running, and energy conservation will be disabled when the motor speed is lower than this value.

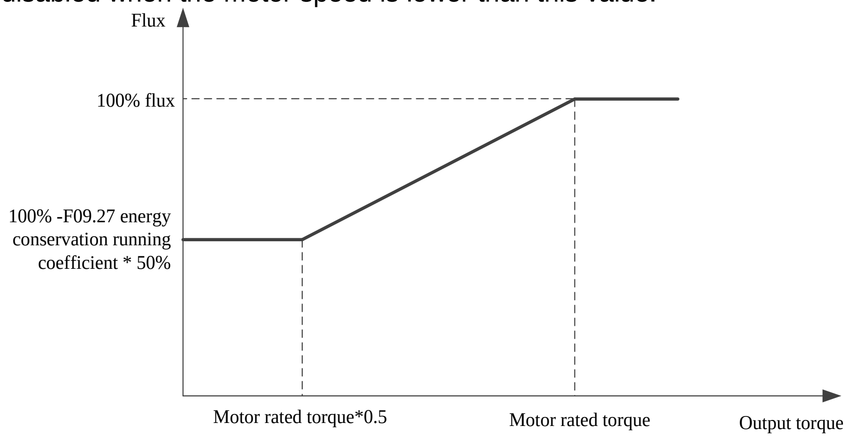


Figure 7-33 Energy conservation running

Parameter ID	Name	Reference	Default value	Change
F09.30	Frequency detection value 1	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.31	Frequency detection hysteresis rate 1	0.0%-100.0%	5.0%	Changeable at any time
F09.32	Frequency detection value 2	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.33	Frequency detection hysteresis rate 2	0.0%-100.0%	5.0%	Changeable at any time

These parameters are used to set frequency detection value and the hysteresis value after output. The hysteresis is only enabled during deceleration.

When the inverter frequency superposed by the additionally set frequency value (absolute value) is higher than the frequency detection value, the DO terminal outputs an “active” signal. When it is lower than the frequency detection value minus the frequency detection hysteresis value, the DO terminal outputs an “inactive” signal. The following figure shows how the frequency detection function works.

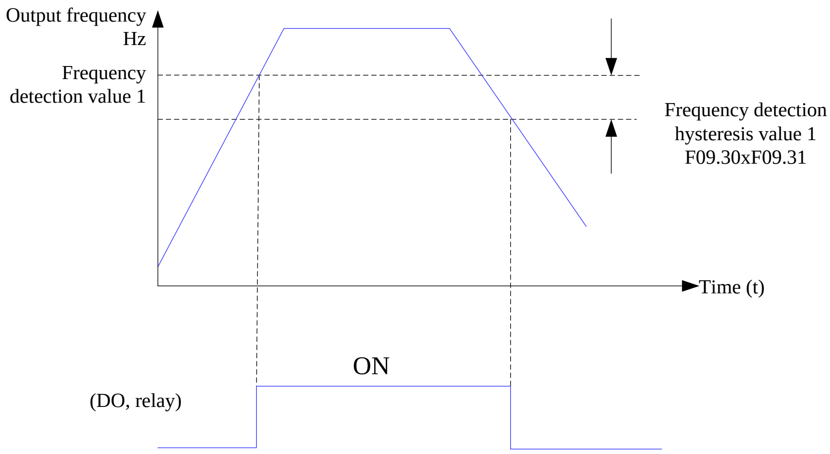


Figure 7-34 Frequency detection function working principle

Parameter ID	Name	Reference	Default value	Change
F09.34	Detection value 1 for frequency reach	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.35	Detection width 1 for frequency reach	0.0%-100.0%	0.0%	Changeable at any time
F09.36	Detection value 2 for frequency reach	0.00Hz-600.00Hz	50.00 Hz	Changeable at any time
F09.37	Detection width 2 for frequency reach	0.0%-100.0%	0.0%	Changeable at any time

When the inverter frequency superposed by the additionally set frequency value (absolute value) is within the range of detection value for frequency reach ± detection width for frequency reach, the DO terminal outputs an “active” signal.

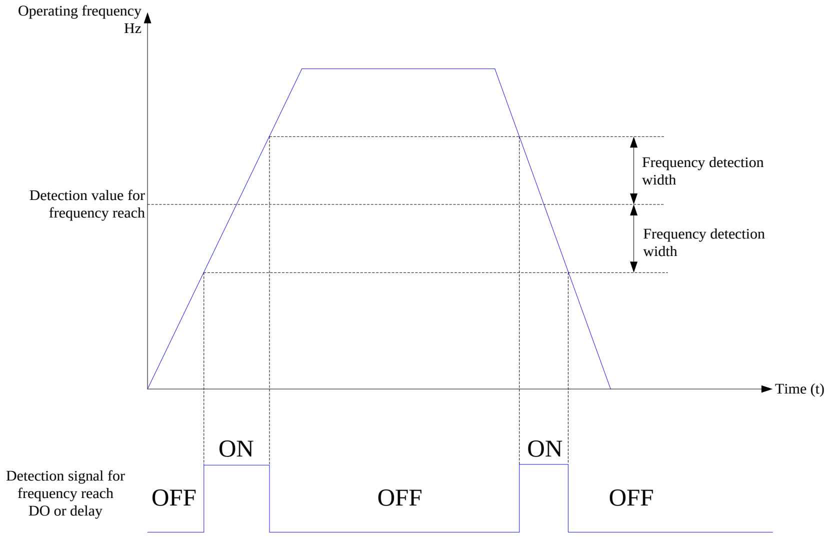


Figure 7-35 Detection for frequency reach

Parameter ID	Name	Reference	Default value	Change
F09.38	Detection width for frequency reference reach	0.0%-100.0%	0.0%	Changeable at any time

The percentage base is the maximum frequency. When the inverter frequency superposed by the additionally set frequency value (absolute value) is within the range of the frequency reference ± maximum frequency * F09.38 Detection width for frequency reference reach, the DO terminal outputs an “active” signal.

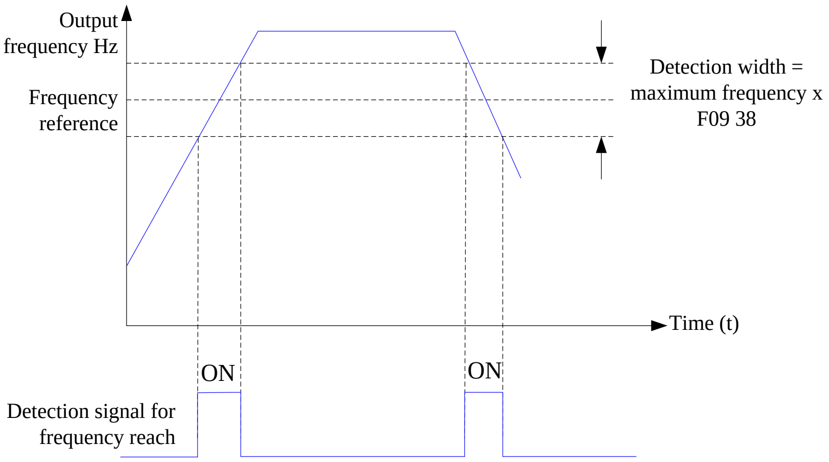


Figure 7-36 Detection width for frequency reference reach

Parameter ID	Name	Reference	Default value	Change
F09.39	Current 1 reach	0.0%-300.0%	100.0%	Changeable at any time
F09.40	Detection width of current 1 reach	0.0%-300.0%	0.0%	Changeable at any time
F09.41	Current 2 reach	0.0%-300.0%	100.0%	Changeable at any time
F09.42	Detection width of current 2 reach	0.0%-300.0%	0.0%	Changeable at any time

The DO terminal outputs an “active” signal when the output current is within the range of (current 1 reach ± detection width of current 1 reach) * motor rated current.

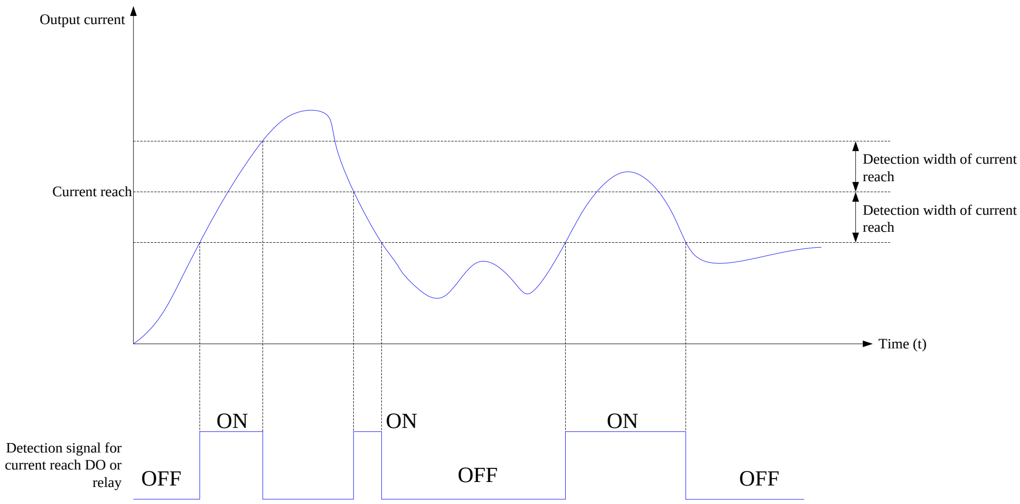


Figure 7-37 Current reach

Parameter ID	Name	Reference	Default value	Change
F09.43	Zero current detection level	0.0%-300.0%	5.0%	Changeable at any time
F09.44	Zero current detection delay	0.00s-650.00s	0.10s	Changeable at any time

The DO terminal outputs an “active” signal when the output current is less than or equal to “F09.43 Zero current detection” for a period longer than “F09.44 Zero current detection delay”.

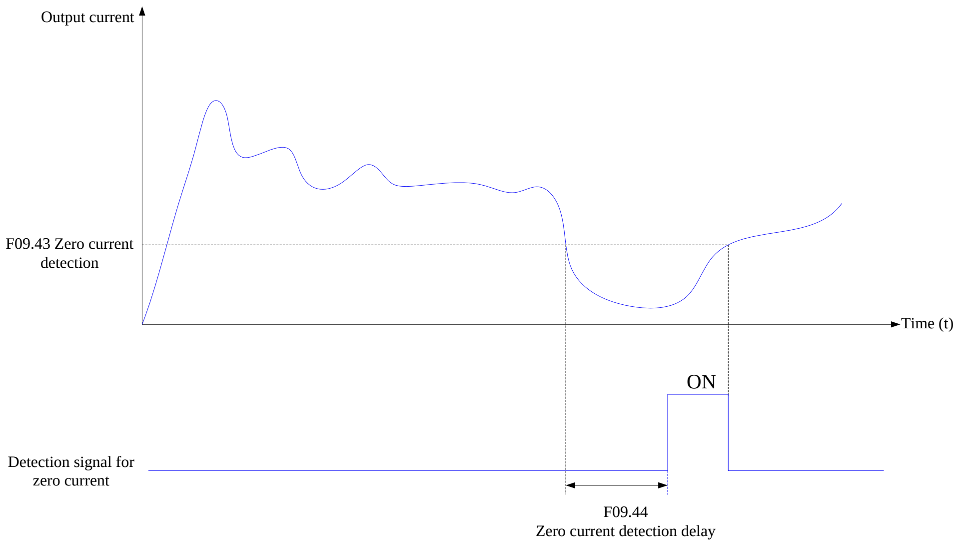


Figure 7-38 Zero current detection

Parameter ID	Name	Reference	Default value	Change
F09.45	Output overcurrent threshold	0.0%-300.0%	200.0%	Changeable at any time
F09.46	Output overcurrent detection delay	0.00s-650.00s	0.00s	Changeable at any time

The DO terminal outputs an "active" signal when the output current exceeds "F09.45 Output overcurrent threshold" for a period longer than "F09.46 Output overcurrent detection delay".

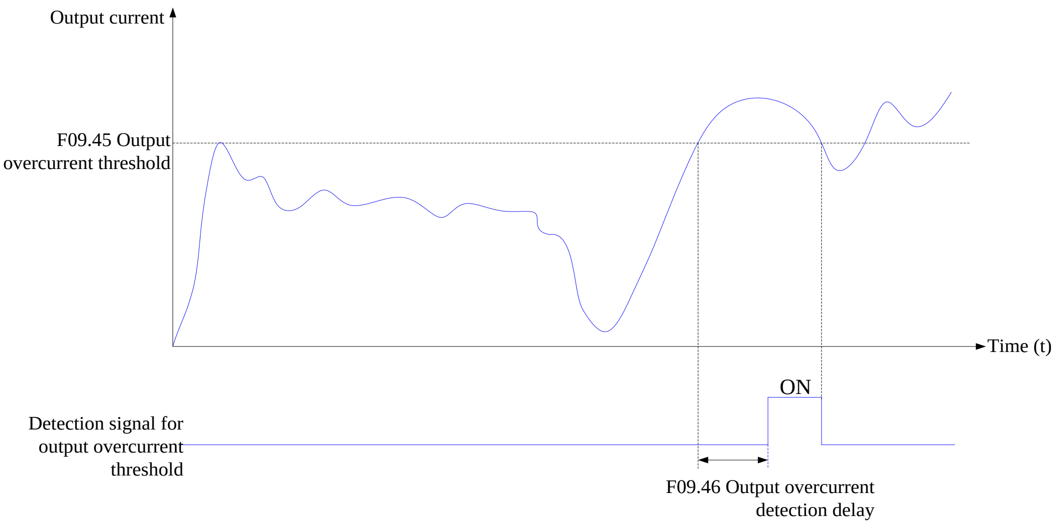


Figure 7-39 Output overcurrent detection

Parameter ID	Name	Reference	Default value	Change
F09.47	AI1 input lower limit	-10.00V-F09.48	3.20V	Changeable at any time
F09.48	AI1 input upper limit	F09.47-10.00V	6.80V	Changeable at any time
F09.49	AI2 input lower limit	-10.00V-F09.50	3.20V	Changeable at any time
F09.50	AI2 input upper limit	F09.49-10.00V	6.80V	Changeable at any time
F09.51	AI3 input lower limit	-10.00V-F09.52	-6.80V	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F09.52	AI3 input upper limit	F09.51-10.00V	6.80V	Changeable at any time

When AI1 is greater than F09.48, or when AI1 is less than F09.47, the DO terminal outputs the “active” signal of “AI1 input overlimit” to indicate whether the AI1 input voltage is within the set range. The same is true for AI2 and AI3.

Parameter ID	Name	Reference	Default value	Change
F09.53	AI input detection delay	0.00s-650.00s	0.01s	Changeable at any time

This parameter is enabled only when the AI input overlimit duration is greater than or equal to this value.

Parameter ID	Name	Reference	Default value	Change
F09.54	Current running reach time	0.0min-6500.0min	0.0min	Changeable at any time
F09.55	Accumulative running reach time	0h-65000h	0h	Changeable at any time
F09.56	Accumulative power-on reach time	0h-65000h	0h	Changeable at any time

Current running reach time means that the DO terminal outputs an “active” signal when the current running time during startup reaches this value.

Accumulative running reach time means that the DO terminal outputs an “active” signal when the accumulative running time reaches this value.

Accumulative power-on reach time means that the DO terminal outputs an “active” signal when the accumulative power-on time reaches this value.

Parameter ID	Name	Reference	Default value	Change
F09.57	Timing function	0: Disabled 1: Enabled	0	Changeable at any time
F09.58	Timing source	0: Fixed time 1: AI1 2: AI2 3: AI3	0	Changeable only at stop
F09.59	Timing duration	0s/m/h-65000s/m/h	0 s/m/h	Changeable only at stop
F09.60	Timing duration unit	0: s (second) 1: m (minute) 2: h (hour)	0	Changeable only at stop

When the timing function is enabled, the inverter starts timing from 0 each time it starts up and the remaining running duration during timed running can be viewed through F82.36.

When F09.57 is set to 1: Enabled, the inverter begins timing since it starts up and it shuts down automatically when the time reaches F09.59. At the same time, the DO terminal outputs an “active” signal. If the inverter has already started up, the timing begins when the timing function is enabled.

When F09.58 is set to 1: AI1, the duration of timed running = AI1 given * F09.59 and the result will be limited.

The timing duration depends on F09.58 and F09.59.

There are three timing duration units, namely, s, m and h.

Parameter ID	Name	Reference	Default value	Change
F09.61	Hibernation and wakeup functions	0: Disabled 1: Enabled	0	Changeable at any time
F09.62	Hibernation frequency	0.00Hz-F09.64	0.00 Hz	Changeable at any time
F09.63	Hibernation delay	0.0s-6500.0s	0.0s	Changeable at any time
F09.64	Wakeup frequency	F09.62-600.00Hz	0.00 Hz	Changeable at any time
F09.65	Wakeup delay	0.0s-6500.0s	0.0s	Changeable at any time

Hibernation and wakeup functions are used in water supply scenarios. Generally, F09.61 should be set not less than F09.62. If both of them are set into 0.00Hz, both functions are disabled.

If the hibernation function is enabled when the PID is calculating but users want the PID calculation continues, set “F11.30 PID operation at stop” to 1: Enabled. If users want the PID calculation not to continue, set F11.30 to 0: Disabled.

Parameter ID	Name	Reference	Default value	Change
F09.66	Output power correction coefficient	0.0%-999.9%	100.0%	Changeable at any time

When “F82.07 Output Power” does not meet expectation, the output power can be linearly corrected through this parameter.

Parameter ID	Name	Reference	Default value	Change
F09.67	Linear speed correction coefficient	0.0%-999.9%	100.0%	Changeable at any time

When “F82.29 Linear Speed” does not meet expectation, the linear speed can be linearly corrected through this parameter.

7.10 F10 Group: Fault and Protection Parameters

Parameter ID	Name	Reference	Default value	Change
F10.01	Fault auto reset times	0-10	0	Changeable at any time
F10.02	Fault auto reset duration	0.0s-120.0s	1.0s	Changeable at any time
F10.03	Restart after fault auto reset	0: Disabled 1: Enabled	0	Changeable at any time
F10.04	Waiting time of restart after auto reset	0.01s~320.00s	1.00s	Changeable at any time

When F10.01 is set to 0, the auto reset function is disabled and only manual reset is available. Setting this parameter to 1-10 defines the maximum auto reset times after each fault. Due to load fluctuation, grid voltage fluctuation and other accidental factors, the inverter is prone to fault or shutdown during running. To ensure the continuity of the working of the system, auto reset is allowed for such faults as overload, overcurrent, system abnormality, overvoltage and undervoltage during running. And after auto reset, the inverter will resume working automatically using speed tracking start. If the fault cannot be eliminated within set times, output will be stopped and the times counted will be cleared. It is recommended that the reset times be set to 1 as continuous fault reset and restart will cause harm to the inverter.

Fault auto reset duration defines the waiting time from the fault occurs to fault reset.
Running after fault auto reset stipulates whether the inverter resumes running after reset.
Waiting time of restart after auto reset defines the waiting time from fault reset to restart.

Attention:

1. The auto reset function is only effective for such faults as overload, overcurrent, system abnormality, overvoltage and undervoltage during running.

2. When the fault is not removed, the inverter cannot be reset.

Note:

The starting characteristic of the mechanical equipment must be carefully considered when using this parameter. It is inapplicable to scenarios or inverters unable to start with load and having to report alarm once output stops.

Parameter ID	Name	Reference	Default value	Change
F10.05	Undervoltage fault action	0: Disabled 1: Enabled	0	Changeable at any time

It defines whether the undervoltage fault is reported. If not, P. oFF prompt will appear.

Parameter ID	Name	Reference	Default value	Change
F10.06	Fault output terminal action	[0000]-[0011] Ones: During fault auto reset 0: Disabled 1: Enabled Tens: In undervoltage fault 0: Disabled 1: Enabled Hundreds: Reserved Thousands: Reserved	[0011]	Changeable at any time

Ones: During fault auto reset
0: Disabled
1: Enabled
It defines whether the DO terminal fault output function is enabled during auto fault reset.

Tens: In undervoltage fault
0: Disabled
1: Enabled
It defines whether the DO terminal fault output function is enabled in case of undervoltage fault.

Hundreds: Reserved

Thousands: Reserved

Parameter ID	Name	Reference	Default value	Change
F10.07	Overvoltage suppression enable	0: Disabled 1: Enabled	1	Changeable only at stop
F10.08	Overvoltage suppression action voltage	Model dependent	Model dependent	Changeable only at stop
F10.09	Overvoltage suppression gain	1-300	100	Changeable at any time

Overvoltage suppression:

In the VF control mode, the bus voltage is kept not higher than the overvoltage suppression action voltage by adjusting the output frequency.

In the vector control (VC) mode, the bus voltage is kept not higher than the overvoltage suppression action voltage by adjusting the output torque.

The overvoltage suppression function is enabled in a forced manner when the inverter is in the emergency stop or motor parameters auto-tuning state. In other conditions, whether the function is enabled is determined by F10.07.

The overvoltage suppression gain should be set according to the actual deceleration. If the bus voltage cannot be suppressed in the normal deceleration process, the overvoltage suppression can be set larger accordingly.

The overvoltage suppression function is as shown in the figure below.

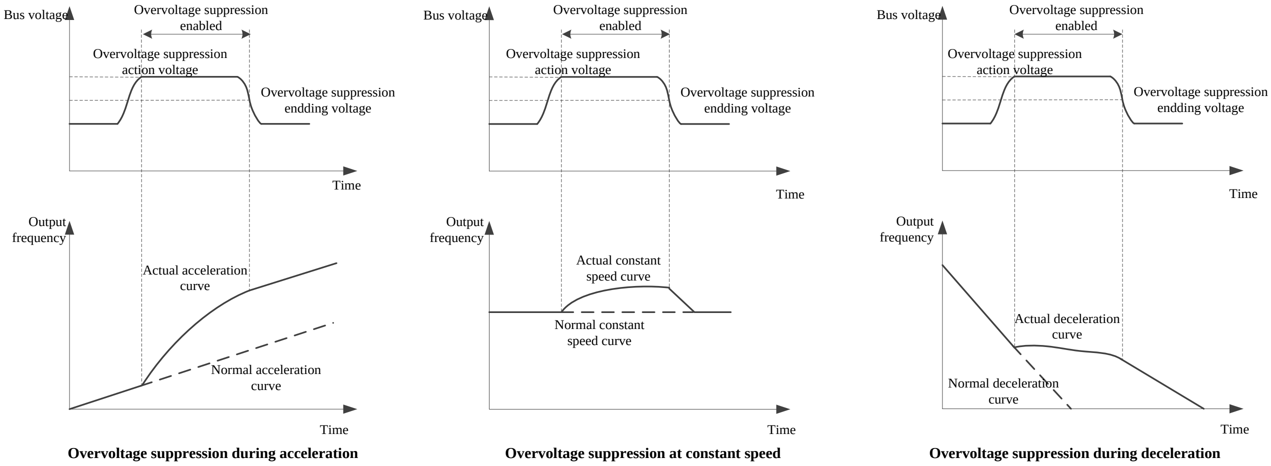


Figure 7-40 Overvoltage suppression

Parameter ID	Name	Reference	Default value	Change
F10.10	Undervoltage suppression function	0: Disabled 1: Enabled	0	Changeable only at stop
F10.11	Undervoltage suppression action voltage	330V-540V	440V	Changeable only at stop
F10.12	Undervoltage suppression gain	1-300	100	Changeable at any time

Undervoltage suppression:

In case of power failure, the bus voltage is maintained though motor deceleration and feeding back energy to the bus until power resumption. If the voltage remains unrestored, the motor will shut down when it decelerates to a speed of 0.

F10.11 is used to set undervoltage suppression action voltage. The suppression is enabled when the bus voltage is lower than this value. During the suppression, the inverter feeds back energy to the bus, maintaining the bus voltage not less than the value set in F10.11.

The undervoltage suppression gain should be set according to the actual undervoltage condition. The setting should be evaluated at the most serious grid fluctuation. If the inverter fails to maintain the bus voltage, the undervoltage suppression gain can be set larger accordingly.

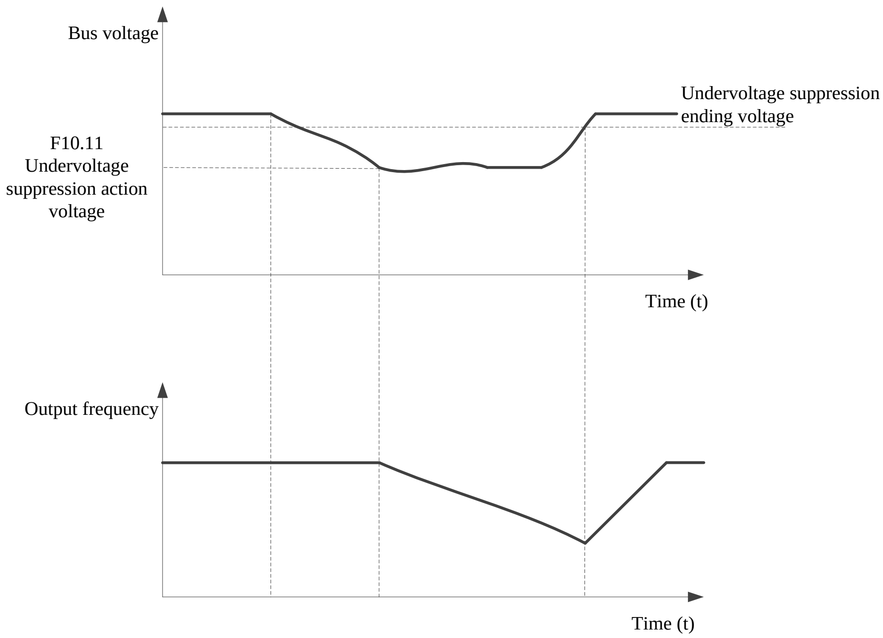


Figure 7-41 Undervoltage Suppression

Parameter ID	Name	Reference	Default value	Change
F10.14	Bus undervoltage point	Model dependent	Model dependent	Changeable at any time
F10.15	Bus overvoltage point	Model dependent	Model dependent	Changeable only at stop

When the bus voltage is lower than the value set in F10.14, the inverter will detect bus undervoltage. If "F10.05 Undervoltage fault action" is set to 1: Enabled, the inverter will stop and report the fault. If it is set to 0: Disabled, the inverter only stops without reporting the fault.

When the bus voltage is higher than the value set in F10.15, the inverter will detect bus overvoltage. It will shut down and report the fault.

Parameter ID	Name	Reference	Default value	Change
F10.16	Shorted-to-ground protection	0: Disabled 1: Detected upon power-on 2: Detected upon running 3: Detected upon power-on and each running	1	Changeable at any time

This parameter sets the detection mode for to-ground short circuit of the inverter. The detection function is inapplicable to scenarios with long grounding cable of the motor (meaning large the grounding impedance).

Parameter ID	Name	Reference	Default value	Change
F10.17	Soft start fault protection	0: Disabled 1: Enabled	1	Changeable at any time

This parameter sets the detection mode of the soft start fault of the inverter rectification circuit.

Parameter ID	Name	Reference	Default value	Change
F10.18	Phase loss protection	[0000]-[0031] Ones: Input phase loss protection 0: Disabled 1: Enabled Tens: Output phase loss protection 0: Disabled 1: Enabled Hundreds: Output phase loss protection before running 0: Disabled 1: Enabled Thousands: Reserved	[0111]	Changeable at any time
F10.19	Input phase loss detection level	0.0%-100.0%	13.0%	Changeable at any time

F10.18 sets phase loss protection. The ones place sets the input phase loss protection function with 0 disabled and 1 enabled.

The Tens place sets the output phase loss protection function with 0 disabled and 1 enabled.

The hundreds place sets the output phase loss protection before running with 0 disabled and 1 enabled.

F10.19 sets the input phase loss detection level with the percentage basis being the rated bus voltage.

The input phase loss detection condition is that the output power ripple is less than 25% and the bus voltage ripple is greater than the value set in F10.19 for 2s.

Parameter ID	Name	Reference	Default value	Change
F10.20	Load protection function	[0000]-[0044] Ones: Load protection 1 0: No test 1: Check for too small motor load 2: Check for too small motor load only at constant speed 3: Check for too large motor load	[0000]	Changeable at any time

		4: Check for too large motor load only at constant speed Tens: Reserved Hundreds: Reserved Thousands: Reserved		
F10.21	Load protection 1 detection level	0.0%-300.0%	30.0%	Changeable at any time
F10.22	Load protection 1 detection time	0.0s-3200.0s	5.0s	Changeable at any time

In the V/F control mode, the judgment basis for load protection is the motor output current with 100% corresponding to the motor rated current. In the vector control mode, the judgment basis is the motor output torque with 100% corresponding to the motor rated torque. During the detection time set in F10.22, the judgement basis for load protection is compared with “F10.21 Load protection detection level” and the inverter acts according to F10.20. When alarm is set for load protection, the alarm can be made through the DO terminal output. For details, please refer to the DO terminal functions.

When the load protection time is 0, load protection is enabled immediately.

During DC braking, load protection is not detected.

Parameter ID	Name	Reference	Default value	Change
F10.25	Overspeed detection level	0.0%-150.0%	120.0%	Changeable at any time
F10.26	Overspeed detection time	0.0s-3200.0s	1.0s	Changeable at any time

When the motor speed exceeds the value set in F10.25 and the duration exceeds the time set in F10.26, the motor overspeed fault will be detected.

The inverter only detects the excessive speed deviation fault in the vector control (VC) mode.

When F10.26 is set to 0, the overspeed fault will not be detected.

The percentage basis of this parameter is “F01.12 Maximum frequency”.

Parameter ID	Name	Reference	Default value	Change
F10.27	Detection level of excessive speed deviation	0.0%-100.0%	20.0%	Changeable at any time
F10.28	Detection time of excessive speed deviation	0.0s-3200.0s	0.0s	Changeable at any time

When the difference (absolute value) between the motor speed reference and the actual speed exceeds the value set in F10.27, and the duration exceeds the time set in F10.28, the excessive speed deviation fault will be detected.

The inverter only detects the excessive speed deviation fault in the vector control (VC) mode.

When F10.28 is set to 0, the excessive speed deviation fault will not be detected.

The percentage basis of this parameter is “F01.12 Maximum frequency”.

Parameter ID	Name	Reference	Default value	Change
F10.29	inverter overload pre-alarm coefficient	50.0%-100.0%	90.0%	Changeable at any time

When F82.30 Inverter overload usage exceeds F10.29, the DO terminal outputs an “active” signal.

Parameter ID	Name	Reference	Default value	Change
F10.30	Inverter overtemperature pre-alarm threshold	0.0℃-200.0℃	75.0℃	Changeable at any time

When the temperature of the inverter radiator 1 reaches the value set in F10.30, the DO terminal will output an “active” signal.

Parameter ID	Name	Reference	Default value	Change
F10.31	Open loop stall detection value	0-8000	0	Changeable at any time

This parameter is used to set open loop stall detection with “0” meaning no detection.

Parameter ID	Name	Reference	Default value	Change
F10.33	Temperature abnormality detection enable	0: Disabled 1: Enabled	1	Changeable at any time

This parameter is used to enable temperature abnormality detection.

Parameter ID	Name	Reference	Default value	Change
F10.42	Frequency for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Alternative frequency upon exception	0	Changeable at any time
F10.43	Alternative frequency upon exception	0.0%-100.0%	100.0%	Changeable at any time

When the fault occurs during the running of the inverter and the handling mode of the fault is set to continue to run, the inverter will display AXX.XX and operate at the frequency determined by F10.42.

Parameter ID	Name	Reference	Default value	Change
F10.44	Fault protection action selection 1	[0000]-[2222] Ones: Input phase loss 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Output phase loss	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run		
F10.45	Fault protection action selection 2	[0000]-[2222] Ones: inverter overload 0: Coast to stop 1: Reserved 2: Running with derating Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.46	Fault protection action selection 3	[0000]-[2222] Ones: Motor overload 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Motor overtemperature 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.47	Fault protection action selection 4	[0000]-[2222] Ones: Motor parameters auto-tuning fault (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Initial position auto-tuning fault (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		Thousands: Motor encoder fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run		
F10.48	Fault protection action selection 5	[0000]-[2222] Ones: Motor overspeed 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Excessive position deviation 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.49	Fault protection action selection 6	[0000]-[2222] Ones: Load protection 1 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Load protection 2 (reserved) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Accumulative running time reach 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Accumulative power-on time reach 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.50	Fault protection action selection 7	[0000]-[2222] Ones: User-defined fault 1 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: User-defined fault 2 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: User-defined fault 3 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: External fault (NO) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.51	Fault protection action selection 8	[[0000]-[2222] Ones: External fault (NC) 0: Coast to stop	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		1: Stop according to the stop mode 2: Continue to run Tens: PID feedback loss 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands digit: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run		
F10.52	Fault protection action selection 9	[0000]-[2222] Ones: IO fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Parameter storage fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Communication overtime fault 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time
F10.53	Fault protection action selection 10	[0000]-[2222] Ones: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Reserved 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	[0000]	Changeable at any time

If fault occurs in the inverter and the fault protection action is set to 0, the inverter will report the fault and stops output, namely, it coasts to stop. If it is set to 1, the inverter will stop according to the stop mode. If it is set to 2, the inverter will continue to run with the running frequency determined by F10.30.

If the fault protection action is set to 1 and the fault occurs during jog, the inverter decelerates to stop; if the fault occurs during auto-tuning, the inverter coasts to stop.

IO fault includes AI/AO overcurrent and communication overtime fault includes Modbus communication overtime, master-slave communication overtime and fieldbus communication overtime.

7.11 F11 Group: PID Parameters

PID control is a general process control method. PID control is used to form a closed-loop system in which each controlled variable is stabilized at the target level through proportional, integral and differential operation on the difference between the feedback signal and the target signal of the controlled variable. PID control is typically applied in closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

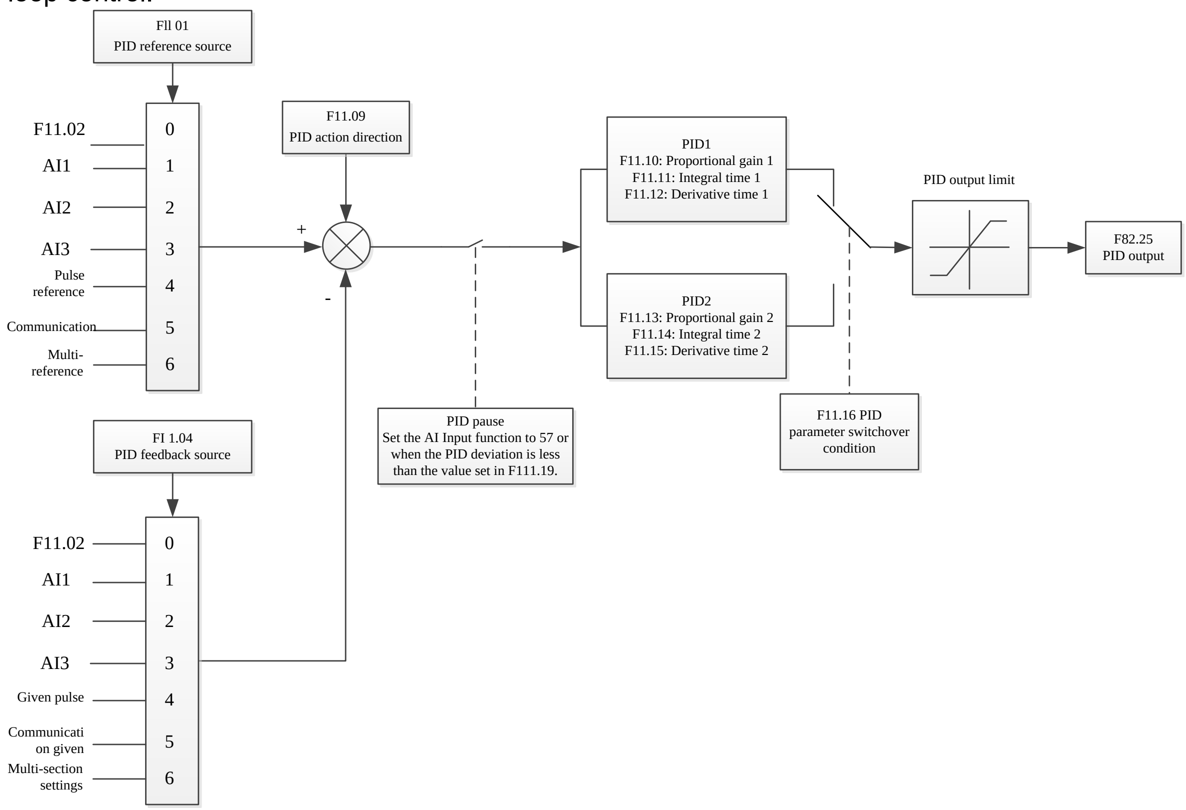


Figure 7-42 Process PID function

Parameter ID	Name	Reference	Default value	Change
F11.01	PID reference source	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: Multi-reference	0	Changeable at any time

The PID reference source is used to select the PID reference source. The PID reference is a relative value with 100% corresponding to 100% of the feedback signal of the controlled system.

Note:

When the PID reference source is set to 6, the multi-speed segment source cannot be set to 5: PID.

Parameter ID	Name	Reference	Default value	Change
F11.02	PID reference	-100.00%-100.0%	50.00%	Changeable at any time

When F11.01 is set to 0, the PID reference is set by F11.02 with 100% corresponding to the maximum feedback amount.

Parameter ID	Name	Reference	Default value	Change
F11.03	PID ramp time	0.00s-320.00s	0.00s	Changeable at any time

PID ramp time refers to the time for the PID reference to increase from 0 to 100 or to decrease from 100 to 0.

Parameter ID	Name	Reference	Default value	Change
F11.05	PID feedback gain	0.00-10.00	1.00	Changeable at any time

PID feedback gain refers to the magnification of PID feedback, which is 1 by default.

Parameter ID	Name	Reference	Default value	Change
F11.06	PID feedback filter time	0.000s-32.000s	0.000s	Changeable at any time

When the PID feedback filter time is not 0, the PID feedback filter will be enabled. PID feedback filter can reduce the interference of the feedback, but the PID closed-loop system response will be slower.

Parameter ID	Name	Reference	Default value	Change
F11.07	PID sampling period	0.001s-32.000s	0.002s	Changeable at any time

The PID sampling period determines the PID closed-loop adjustment calculation period. The larger the sampling period, the slower the PID regulator response will be.

Parameter ID	Name	Reference	Default value	Change
F11.09	PID action direction	0: Forward 1: Reverse	0	Changeable at any time

In the forward mode, the PID feedback is less than the PID reference, and the PID output increases.

In the reverse mode, the PID feedback is less than the PID, and the PID output decreases.

Parameter ID	Name	Reference	Default value	Change
F11.10	Proportional gain Kp1	0.000-30.000	0.200	Changeable at any time
F11.11	Integral time Ti1	0.00s-320.00s	1.00s	Changeable at any time
F11.12	Derivative time Td1	0.000s-10.000s	0.000s	Changeable at any time

The larger the Kp, the faster the deviation decreases, but it is easy to cause PID regulator oscillation; and vice versa. When the proportional gain Kp is 1.000 and the PID deviation is 100%, the PID output is 100%. If the PID output is the frequency reference, the corresponding frequency is the maximum frequency.

The integral time Ti determines the strength of the integral tuning of the PID regulator. The smaller the Ti, the greater the integral tuning intensity will be. The integral time means that when the PID deviation is 100%, the integral regulator will tune continuously through this time, and the integral tuning amount will reach 100%.

The derivative time Td determines the strength of the change rate of the PID regulator on the action object. The longer the derivative time, the greater the tuning intensity will be. If the derivative tuning object is the feedback signal, then the derivative time will mean that, when the feedback signal changes by 100% within the time, the derivative tuning will be100%.

Parameter ID	Name	Reference	Default value	Change
F11.13	Proportional gain Kp2	0.000-30.000	0.200	Changeable at any time
F11.14	Integral time Ti2	0.00s-320.00s	1.00s	Changeable at any time
F11.15	Derivative time Td2	0.000s-10.000s	0.000s	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F11.16	PID parameter switchover condition	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Automatic switchover based on running	0	Changeable at any time

This parameter is used for switchover between two groups of PID parameters.

0: No switchover

By default, there is no switchover and group 1 of PID parameters is used.

1: Switchover by DI

The DI input function should be set to 58: PID parameter switchover. When the terminal is disabled, group 1 of PID parameters is used (F11.10-F11.12); when it is enabled, group 2 of PID parameters is used (F11.13-F11.15).

2: Automatic switchover based on deviation

When the absolute value of the PID deviation is less than or equal to “F11.17 PID parameter switchover deviation 1”, group 1 of PID parameters is used; when the absolute value is more than or equal to “F11.18 PID parameter switchover deviation 2”, group 2 of PID parameters is used; when the absolute value is between switchover deviations 1 and 2, the linear interpolation of the two groups of PID parameters is used (see the figure below).

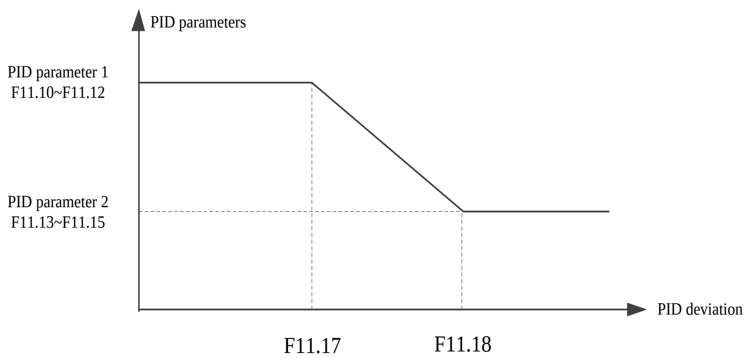


Figure 7-43 PID parameters automatic switchover based on deviation

3: Automatic switchover based on running

When the running frequency of the inverter is between 0 and the maximum frequency, linear interpolation of the two groups of PID parameters is used (see the figure below)

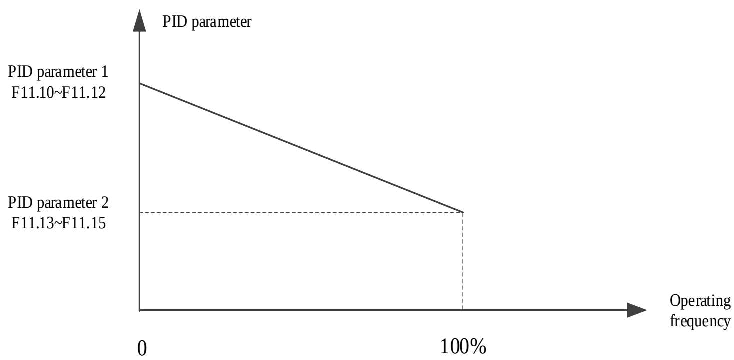


Figure 7-44 PID parameters automatic switchover based on running

Parameter ID	Name	Reference	Default value	Change
F11.19	PID deviation limit	0.00%-100.0%	0.00%	Changeable at any time

When the absolute value of the PID deviation is less than this parameter, PID tuning will pause to maintain the current output value. This parameter helps to balance the accuracy and stability of the system output.

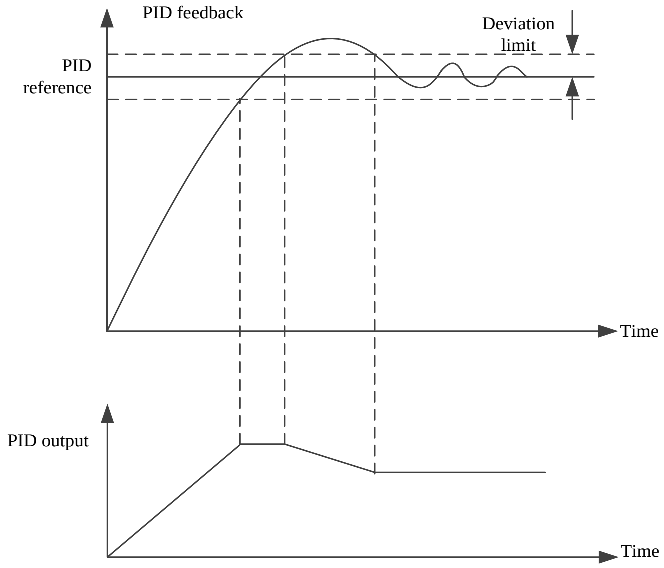


Figure 7-45 Deviation limit

Parameter ID	Name	Reference	Default value	Change
F11.20	PID output lower limit	-100.00%-F11.21	-100.00%	Changeable at any time
F11.21	PID output upper limit	F11.20-100.0%	100.00%	Changeable at any time

These two parameters are used to set the PID regulator output limit.

If F11.24 PID integral tuning is set to stop integration at output upper/lower limit, then the PID regulator will pause integration when the PID output reaches the output limit.

Parameter ID	Name	Reference	Default value	Change
F11.22	PID output filter time	0.000s-32.000s	0.000s	Changeable at any time

The PID output filter function is enabled when this parameter is set to non-0. When the PID output is the frequency reference, PID output filter can reduce the sudden change of the frequency reference, but it will affect the response performance of the process closed-loop system.

Parameter ID	Name	Reference	Default value	Change
F11.23	PID derivative limit	0.00%-100.00%	5.00%	Changeable at any time

This parameter is used to limit the derivative output range to limit the derivative action to a small range as the PID regulator is prone to oscillation during derivative.

Parameter ID	Name	Reference	Default value	Change
F11.24	PID integral tuning	Ones: Integration clear Tens: Integration pause Hundreds: whether to stop integration at output upper/lower limit Thousands: whether to stop integration at frequency upper/lower limit (reversed)	0	Changeable at any time

Ones: Integration clear

When this parameter is disabled, no matter whether 60: PID integral clearing in the DI input function is enabled, integral clearing will be disabled. It will be enabled only when this parameter is enabled and 60: PID integral clearing in the DI input function is enabled.

Tens: Integration pause

When this parameter is disabled, no matter whether 61: PID integral pause in the DI input function is enabled, integral pause will be disabled. It will be enabled only when this parameter is enabled and 61: PID integral pause in the DI input function is enabled.

Hundreds: whether to stop integration at output upper/lower limit

When this parameter is enabled, when the PID output reaches upper/lower limit, PID integral will pause.

Parameter ID	Name	Reference	Default value	Change
F11.26	PID initial value	0.00%-100.0%	0.00%	Changeable at any time
F11.27	Hold time of PID initial value	0.00s-320.00s	0.00s	Changeable at any time

When the inverter is started, the PID output is the PID initial value. When the hold time of PID initial value is reached, the PID regulator will start to calculate. The PID initial value function is as follows:

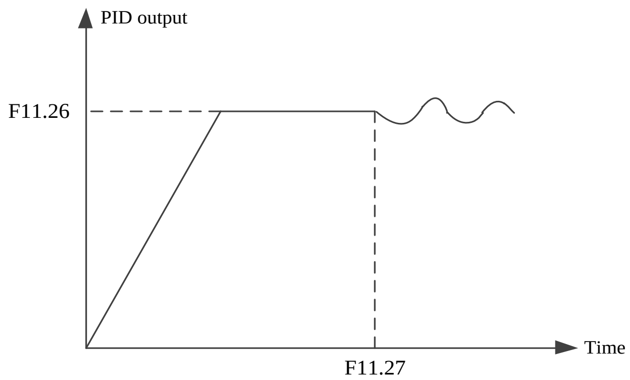


Figure 7-46 PID initial value function

Parameter ID	Name	Reference	Default value	Change
F11.28	PID feedback loss detection level	0.00-100.0%	0.00	Changeable at any time
F11.29	PID feedback loss detection time	0.0s-120.0s	0.0s	Changeable at any time

When F11.28 is set to 0.00%, PID feedback loss detection is disabled.

When F11.29 is set to 0, PID feedback loss takes effect immediately.

When the PID feedback is less than the value set in F11.28, and the duration exceeds the value set in F11.29, the inverter will detect the PID feedback loss fault or alarm.

Note:

The PID feedback loss detection time is the percentage of the base value, and the PID feedback loss detection object is the original value before the PID feedback gain.

Parameter ID	Name	Reference	Default value	Change
F11.30	PID operation at stop	0: Disabled 1: Enabled	1	Changeable at any time

This parameter is used to select whether the PID continues calculation in the shutdown state of the inverter. In general scenarios, PID should stop calculation in the shutdown state.

7.12 F12 Group: Wobble, Fixed Length and Count Value Parameters

The wobble function is applicable to industries such as textile and chemical fiber and scenarios requiring transverse movement and winding. Its typical application is shown in the figure below.

Usually the wobble process is as follows: The inverter first accelerates to the wobble center frequency as per the acceleration time, and then run circularly according to the set wobble amplitude, wobble step, wobble rise time and wobble falling time until a shutdown command is detected. At this time, the inverter decelerates to stop as per the deceleration time.

In the process of wobble control, wobble reset and wobble pause can be realized through the multi-functional DI terminals.

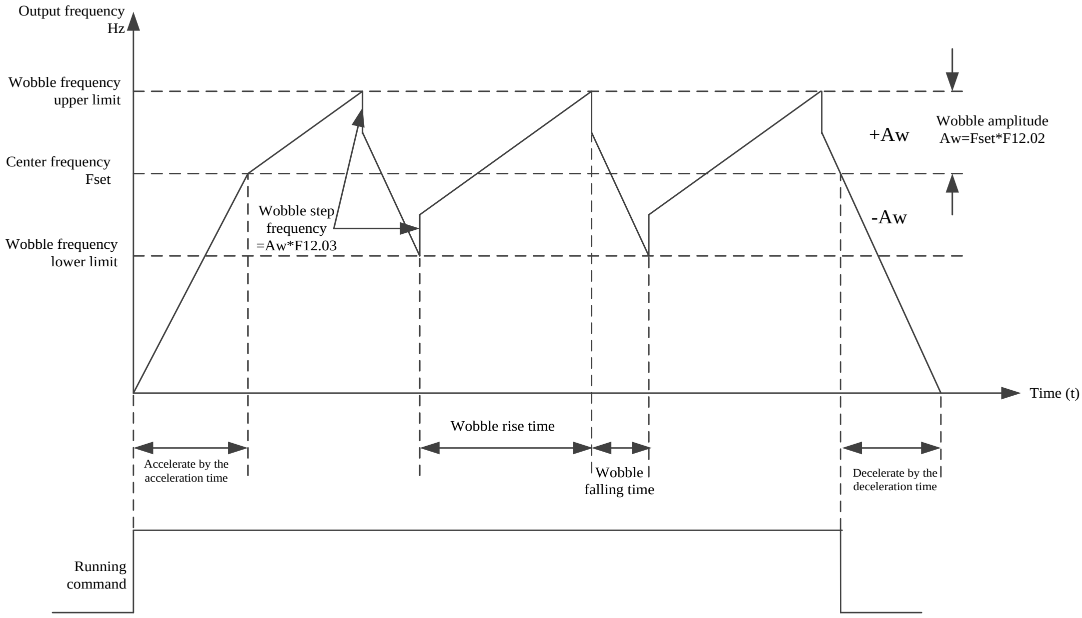


Figure 7-47 Wobble function

The wobble center frequency comes from the frequency reference of common running, multi-speed running and PLC running.

The wobble function is automatically cancelled during jog, parameter auto-tuning and process PID running.

Parameter ID	Name	Reference	Default value	Change
F12.01	Wobble amplitude control mode	0: Relative to frequency reference 1: Relative to maximum frequency	0	Changeable at any time

This parameter can be the benchmark for F12.02. If it is set to 0, wobble amplitude is the percentage relative to the frequency reference, which will be variable; if it is set to 1, wobble amplitude is the percentage relative to the maximum frequency, which will be fixed.

Parameter ID	Name	Reference	Default value	Change
F12.02	Wobble amplitude	0.0%-100.0%	0.0%	Changeable at any time

The wobble frequency is constrained by the frequency upper and lower limit. If the wobble amplitude is set improperly, the wobble cannot work normally.

Parameter ID	Name	Reference	Default value	Change
F12.03	Wobble step	0.0%-50.0%	0.0%	Changeable at any time

The wobble step is the percentage relative to the wobble amplitude. If it is set to 0, there will be no wobble step frequency, as shown in Figure 7-41.

Parameter ID	Name	Reference	Default value	Change
F12.04	Wobble rise time	0.0s-6500.0s	0.0s	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
F12.05	Wobble falling time	0.0s-6500.0s	0.0s	Changeable at any time

It defines the time of the swing frequency rise phase and the time of the swing frequency fall phase.

Wobble rise time refers to the time the wobble frequency lower limit rising to the upper limit; and wobble falling time refers to the time the upper limit falling to the lower limit.

Parameter ID	Name	Reference	Default value	Change
F12.06	Reference length	0m-65535m	1000m	Changeable at any time
F12.07	Number of pulses per meter	0.0-6553.5	100.0	Changeable at any time

These parameters are used for shutdown with fixed length.

The fixed length control mode cannot identify direction but count the length according to the number of pulses.

The pulse count is input from the terminal (set DI5 input function to 54: Length count input) and the length can be calculated according to F12.07.

The calculated length = pulse count/number of pulses per meter. When it is greater than or equal to the reference length, the inverter will detect that the length is reached. This state can be used as an external shutdown command and an automatic shutdown system can be made.

During fixed length control, length reset can be realized through the multi-functional DI terminals.

To apply fixed length control, parameters should be set as follows.

Parameter	Name	Reference	Function description
F06.05	DI5 input function	54	Length count input
F06.01-F06.10 (any one)	DI1-DI10 input function (any one)	55	Length reset
F07.02-F07.09 (any one)	Terminal output function (any one)	14	Length reach

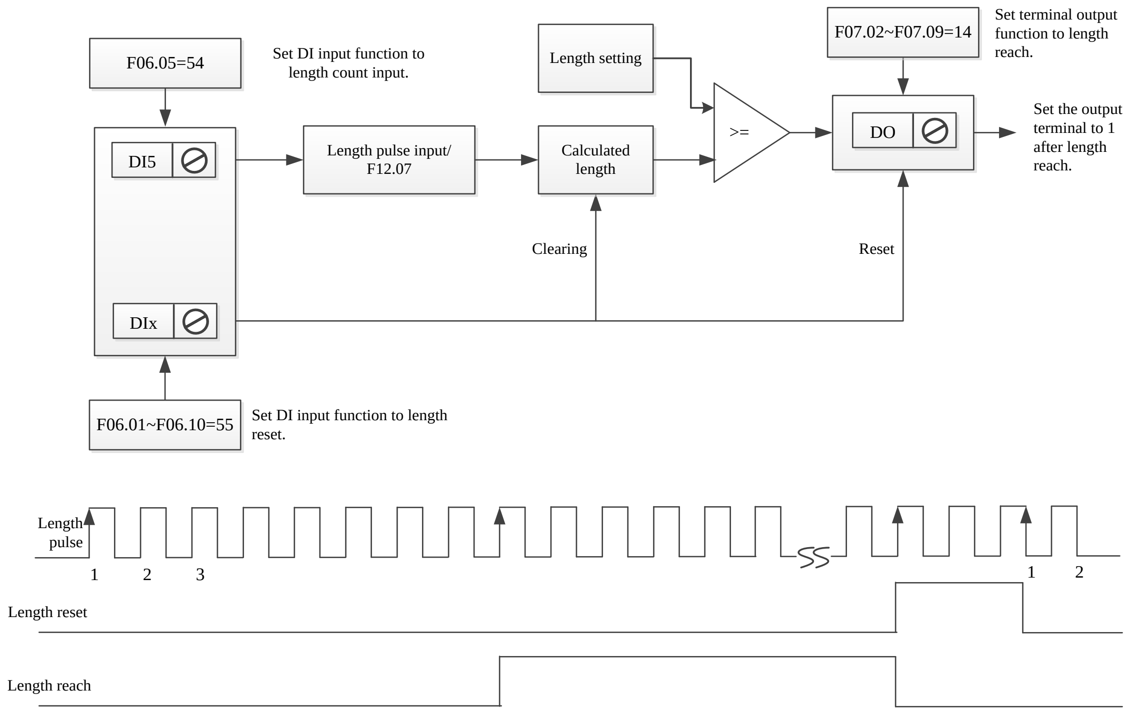


Figure 7-48 Fixed length control

Parameter ID	Name	Reference	Default value	Change
F12.08	Designated count value	0-F12.09	1000	Changeable at any time
F12.09	Reference count value	0-65535	1000	Changeable at any time
F12.10	Count input frequency division	1-65535	1	Changeable at any time

The pulse count should be collected through the DI terminal, and when the pulse frequency is high, it can only be collected through the DI5 terminal. In such case, the DI terminal function should be set to 52: Counter input.

When the count value reaches the reference count value, the reference count value is enabled, and it can be output through output terminal function 13: Reference count value reach. When the count value reaches the designated count value, it can be output through the output terminal function 12: Designated count value reach.

During count value control, counter reset can be realized through the multi-functional DI terminals (set the DI input terminal function to 53). When the counter reset command is enabled, the pulse counter is reset.

To enable the count value function, parameters should be set as follows.

Parameter	Name	Reference	Function description
F06.05	DI5 input function	52	Counter input
F06.01-F06.10 (any one)	DI1-DI10 input function (any one)	53	Counter reset
F07.02-F07.09 (any one)	Terminal output function (any one)	13	Reference count value reach
F07.02-F07.09 (any one)	Terminal output function (any one)	12	Designated count value reach

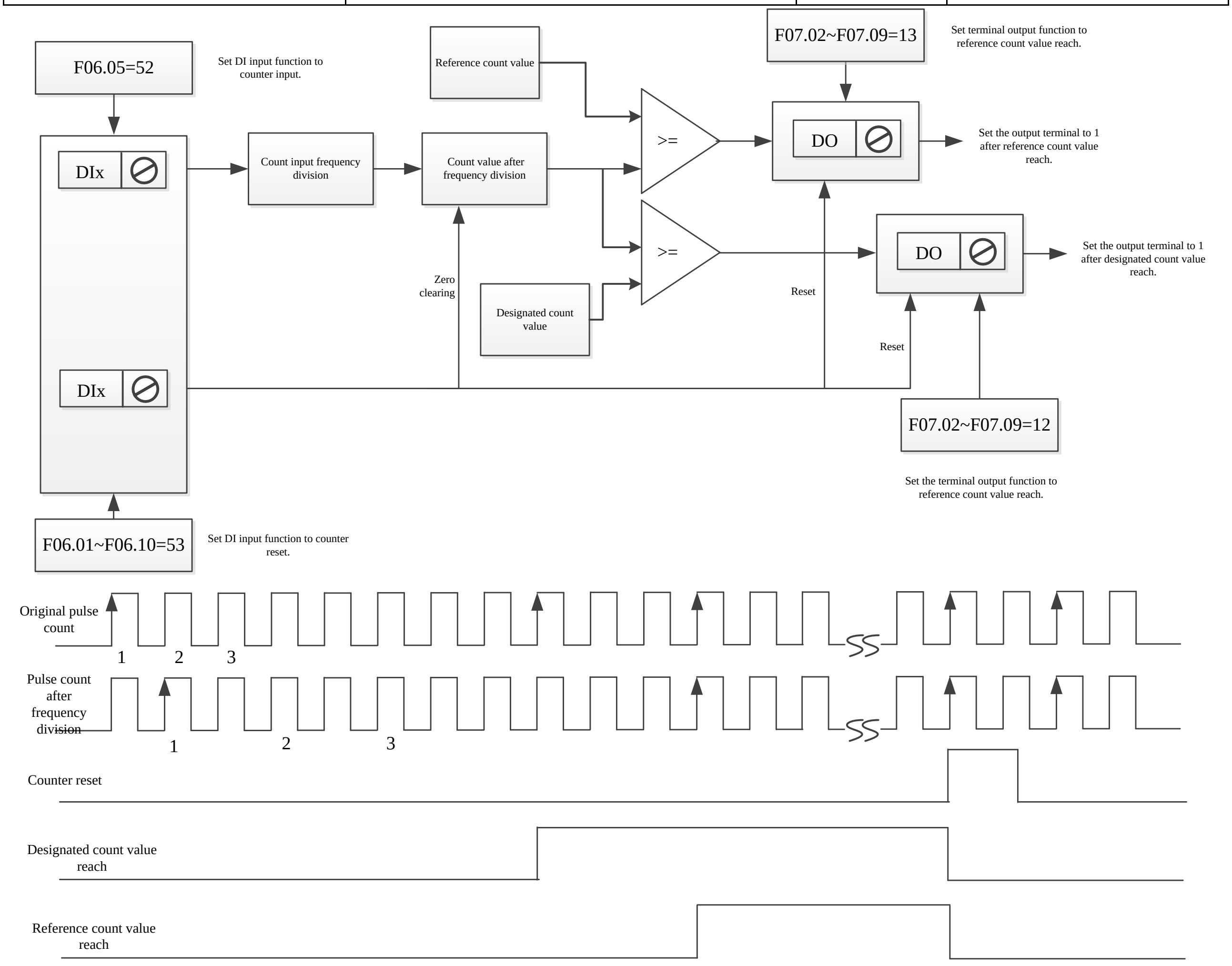


Figure 7-49 Count value control

The DI5 port must be used.
The DO ports for “Reference count value reach” and “Designated count value reach” cannot be reused.
When the inverter is in RUN/STOP state, the counter keeps counting until reference count value reach.
The count value is retentive upon power failure.

Feeding back to the inverter shutdown input terminal that the count value reaches the DO output can realize automatic shutdown.

7.13 F13 Group: Multi-Speed and Simple PLC Parameters

When multi-reference is selected as the main frequency source, the frequency reference is set via the on-off of terminal DI.

Table 7-12 Steps to set multi-reference as main frequency source

Step	Related parameters	Description	
Select multi-reference as the main frequency source.	F01.04	F01.04 = 5	
Determine the number of speed segments required.	NA	At most 16 speed segments can be supported and 4 DI terminals are required. The relations between the number of speed segments and DI terminals are as follows: 2 speed segments: 1 DI terminal 3-4 speed segments: 2 DI terminals 5-8 speed segments: 3 DI terminals 9-16 speed segment: 4 DI terminals	
Set DI input function to Multi -speed reference.	F06.01-F06.10	Multi -speed reference terminal 1	Set to 38
		Multi -speed reference terminal 2	Set to 39
		Multi -speed reference terminal 3	Set to 40
		Multi -speed reference terminal 4	Set to 41
Set the frequency corresponding to each speed segment.	F13.01-F13.16	Set the frequency corresponding to each speed segment with 100% corresponding to the maximum frequency set in F01.12.	
	F13.53-F13.68	The multi-speed segment source is digital setting by default, and the results are shown in F13.01-F13.16.	

The on-off of 4 multi-speed reference terminals can constitute 16 states with 16 frequency references, as shown in the figure below.

Table 7-13 Terminal on-off and multi-speed reference

DI terminal 4	DI terminal 3	DI terminal 2	DI terminal 1	Corresponding speed segment	Corresponding frequency reference
OFF	OFF	OFF	OFF	Multi-speed segment 1	F13.01
OFF	OFF	OFF	ON	Multi-speed segment 2	F13.02
OFF	OFF	ON	OFF	Multi-speed segment 3	F13.03
OFF	OFF	ON	ON	Multi-speed segment 4	F13.04
OFF	ON	OFF	OFF	Multi-speed segment 5	F13.05
OFF	ON	OFF	ON	Multi-speed segment 6	F13.06
OFF	ON	ON	OFF	Multi-speed segment 7	F13.07
OFF	ON	ON	ON	Multi-speed segment 8	F13.08
ON	OFF	OFF	OFF	Multi-speed segment 9	F13.09
ON	OFF	OFF	ON	Multi-speed segment 10	F13.10

DI terminal 4	DI terminal 3	DI terminal 2	DI terminal 1	Corresponding speed segment	Corresponding frequency reference
ON	OFF	ON	OFF	Multi-speed segment 11	F13.11
ON	OFF	ON	ON	Multi-speed segment 12	F13.12
ON	ON	OFF	OFF	Multi-speed segment 13	F13.13
ON	ON	OFF	ON	Multi-speed segment 14	F13.14
ON	ON	ON	OFF	Multi-speed segment 15	F13.15
ON	ON	ON	ON	Multi-speed segment 16	F13.16

Simple PLC is a multi-reference used to automatically change the running frequency and direction according to the running time as shown in the figure below.

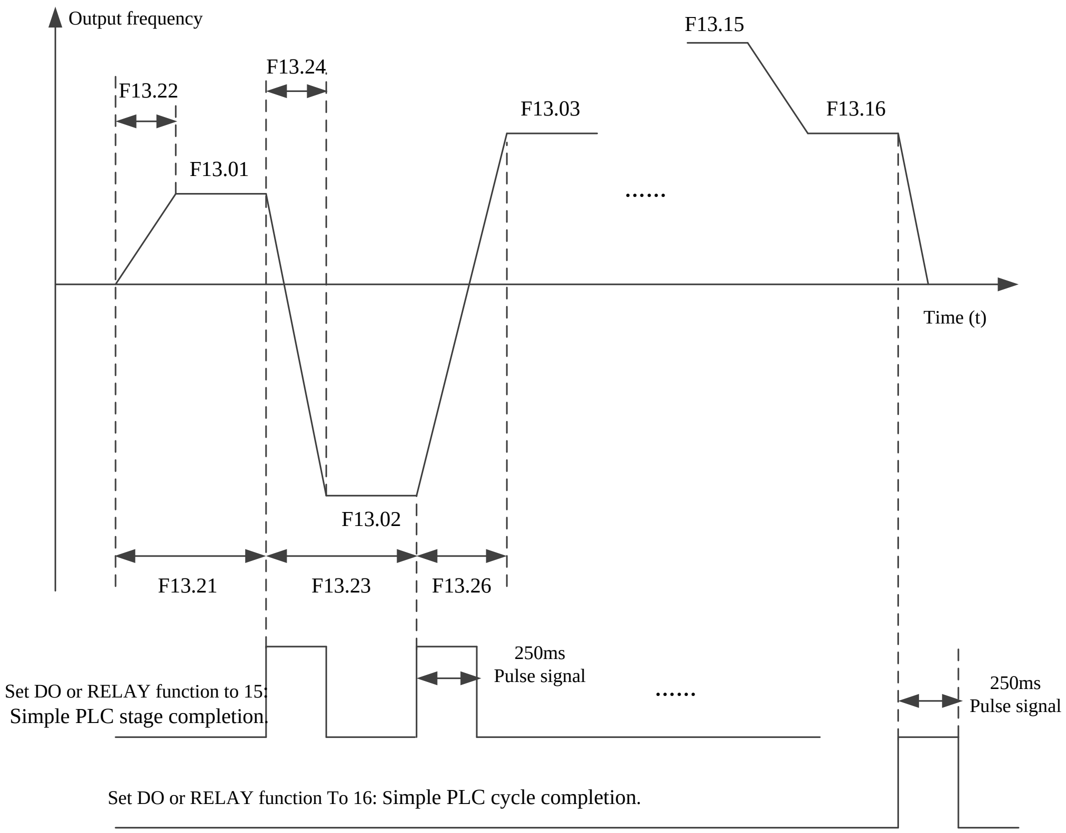


Figure 7-50 Simple PLC Running

In the figure above, F13.22, F13.24 and F13.26 are the acceleration and deceleration time of the stage, F13.01-F13.16 are the frequency reference of the stage, and F13.21 and F13.23 are the running time of the stage.

The terminal outputs a pulse signal with a width of 250 ms when the simple PLC completes one stage/cycle. Please refer to the descriptions of 15: Simple PLC stage completion and 16: simple PLC cycle completion in F07.01-F07.09.

Parameter ID	Name	Scope	Default value	Change properties
F13.17	Simple PLC running mode	0: Stop after running for one cycle 1: Keep final values after running for one cycle 2: Repeat after running for one cycle	0	Changeable at any time

0: Stop after running for one cycle

The inverter shuts down automatically after completing a PLC cycle and it will start when another running command is given.

1: Keep final values after running for one cycle
After completing a PLC cycle, the inverter will automatically keep the final running frequency and running direction.

2: Repeat after running for one cycle
After completing a PLC cycle, the inverter will automatically start the next cycle and will not shut down until receiving a shutdown command.

Parameter ID	Name	Reference	Default value	Change
F13.18	Simple PLC start mode	0: Re-run from the first stage 1: Continue running with the stage frequency at the moment of interruption 2: Continue running with the operating frequency at the moment of interruption	0	Changeable at any time

0: Re-run from the first stage
If the inverter shuts down during running (due to shutdown command received, fault or power failure), PLC re-runs from the first stage after the inverter is repowered on.

1: Continue running with the stage frequency at the moment of interruption
If the inverter shuts down during running (due to shutdown command received, fault or power failure), it will automatically record time PLC running has used at the current stage and the number of the current stage, and PLC continues running with the stage frequency and remaining time at the moment of interruption after the inverter is repowered on as shown in the figure below.

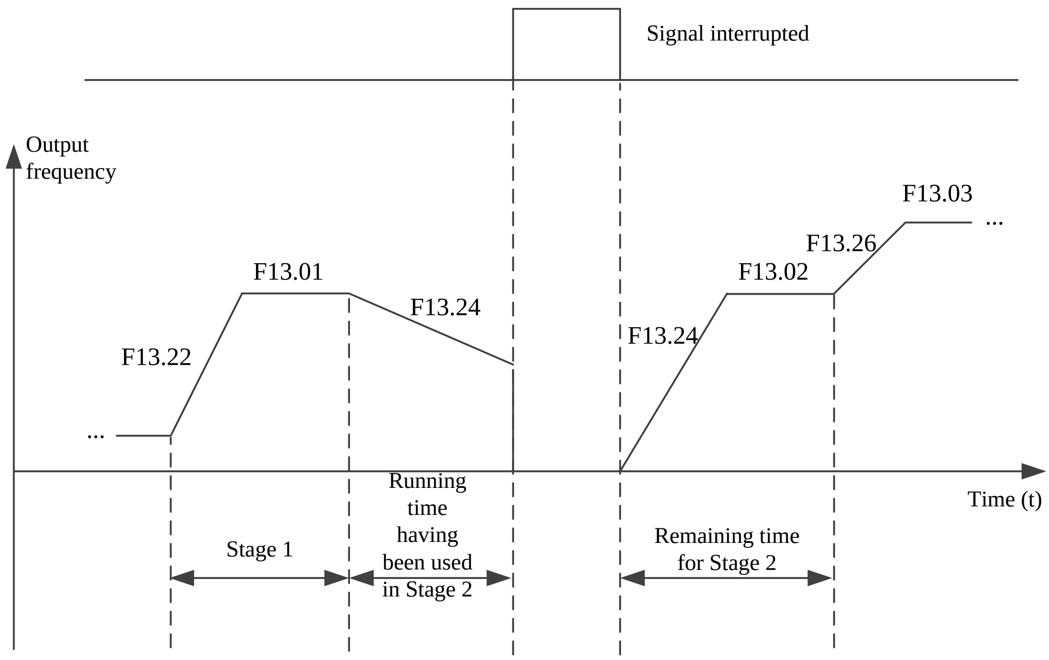


Figure 7-51 PLC start mode 1

2: Continue running with the operating frequency at the moment of interruption
If the inverter shuts down during running (due to shutdown command received, fault or power failure), it will automatically record time PLC running has used at the current stage, the number of the current stage and the operating frequency at the moment of interruption. After the inverter is repowered on, PLC resumes to the operating frequency at the moment of interruption and then finish the interrupted stage as shown in the figure below.

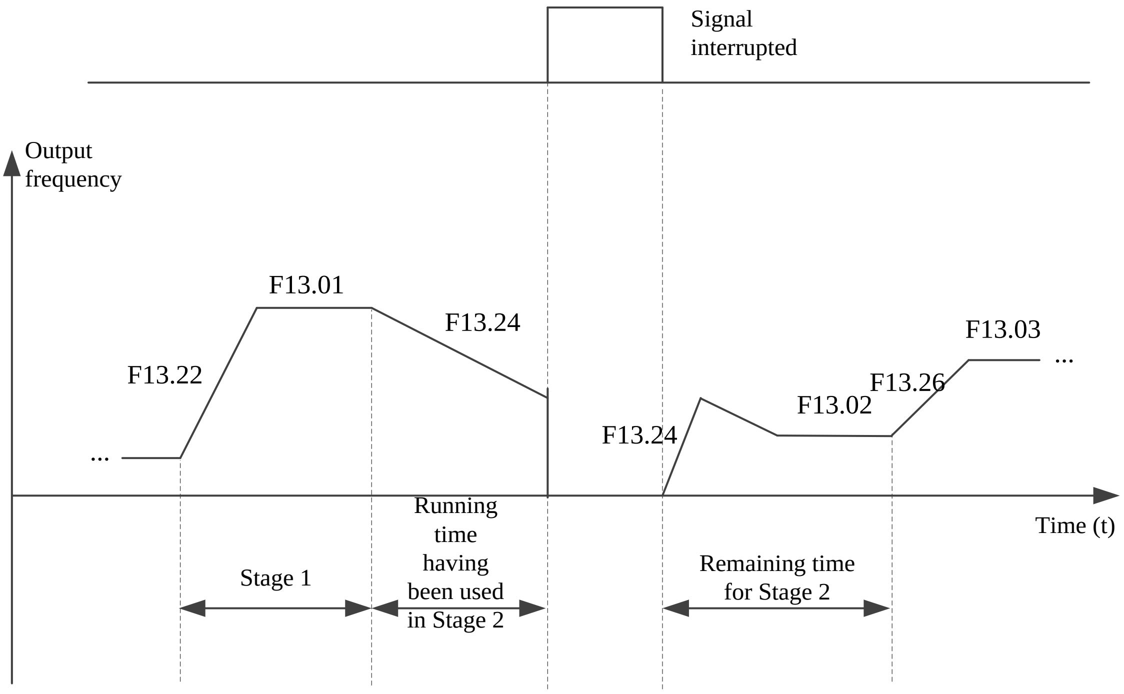


Figure 7-52 PLC start mode 2

Note:

The difference between start mode 1 and start mode 2 is that start mode 2 retains one more operating frequency at the moment of interruption than start mode 1, and under mode 2, PLC re-runs from this frequency.

Parameter ID	Name	Reference	Default value	Change
F13.19	Simple PLC memory retention upon power failure	0: Non-retentive upon power failure 1: Retentive upon power failure	0	Changeable at any time

0: Non-retentive upon power failure

The PLC running status will not be retained upon power failure and after the inverter is repowered on, PLC re-runs from the first stage.

1: Retentive upon power failure

The PLC running status, including the number of running stage, running time that has been used at the current stage and running frequency, will be retained upon power failure. After the inverter is repowered on, PLC re-runs according to descriptions in F13.18.

Parameter ID	Name	Reference	Default value	Change
F13.20	Simple PLC running time unit	0: s (second) 1: m (minute) 2: h (hour)	0	Changeable at any time

0: s (second)

The running time of each stage is counted in seconds.

1: m (minute)

The running time of each stage is counted in minutes.

2: h (hour)

The running time of each stage is counted in hours.

This unit is only effective for the time of PLC running in each stage, and the unit of acceleration and deceleration time during PLC running is determined by F01.21.

Note:

1. If PLC running time of a certain stage is set to 0, this stage is ineffective.
2. PLC pause and reset can be realized through DI terminals. Please refer to F06 group parameters for the

definition of input terminal functions.

3. The simple PLC function is enabled only when the simple PLC is selected as frequency source. For example, when F01.04 Main frequency source is set to 6: Simple PLC, the PLC function is enabled.

7.14 F14 Group: User-Defined Parameters

F14.01-F14.36 are user-defined parameters. Users can select the parameters as needed and summarize them to form F14 group to facilitate viewing and changing.

A maximum of 36 parameters can be set for F14. If a F14 group parameter is displayed as F00.00, this parameter is empty. When the inverter enters the user-defined parameter mode, the definitions of the F14 group parameters will be displayed with the order consistent with that of F14 group parameters and those named F00.00 will be skipped over.

When the communication reads and writes F14 group parameters, the object is the data in the mapping address. Thanks to user-defined parameters, non-continuous addresses can be continuously read and written.

7.15 F15 Group: Torque Control Parameters

ID	Name	Reference	Default value	Change
F15.01	Switchover between speed control and torque control	0: Speed control 1: Torque control	0	Changeable only at stop

0: Speed control

1: Torque control

This parameter can be enabled only under the vector control mode.

Parameter ID	Name	Reference	Default value	Change
F15.02	Torque reference channel	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop

The torque reference is set as a relative value with 100% corresponding to the motor rated torque. If the reference is -300%-300.0%, the maximum torque of the inverter is three times the rated torque.

0: Digital setting

The torque reference is set by F15.03.

1: AI1

The torque reference is set by voltage or current analog quantity through AI1 terminal with 100% corresponding to the motor rated torque.

2: AI2

The torque reference is set by voltage or current analog quantity through AI2 terminal with 100% corresponding to the motor rated torque.

3: AI3

The torque reference is set by voltage or current analog quantity through AI3 terminal with 100% corresponding to the motor rated torque.

4: Pulse reference

The torque reference is set by the input pulse.

5: Communication

The torque reference is set by communication.

6: MAX (AI1, AI2)

The torque reference is set by the maximum between voltage/current analog quantity through AI1 terminal and that through AI2 terminal.

7: MIN (AI1, AI2)

The torque reference is set by the minimum between voltage/current analog quantity through AI1 terminal and that through AI2 terminal.

8: Expansion card (reserved)

Parameter ID	Name	Reference	Default value	Change
F15.03	Torque digital setting	-300.0%-300.0%	0.0%	Changeable at any time

When F15.02 is set to 0, the torque reference is set by this parameter.

Parameter ID	Name	Reference	Default value	Change
F15.04	Torque rising time	0.00s-320.00s	0.00s	Changeable at any time
F15.05	Torque falling time	0.00s-320.00s	0.00s	Changeable at any time

These two parameters are used to set the ramp time, with rising time referring to the time for the torque reference to rise from 0.0% to 100% and falling time referring to the time for the torque reference to fall from 100% to 0%.

Parameter ID	Name	Reference	Default value	Change
F15.06	Channel of maximum forward speed in torque control	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop

This parameter is used to set the maximum forward running frequency source for the inverter in the torque control mode.

Under torque control mode, if the load torque is less than the motor output torque, the motor speed will rise continuously, which may cause overspeed accidents. In response, the maximum motor speed under torque control mode must be limited.

0: Digital setting

The maximum forward speed in torque control is set by F15.07.

1: AI1

The maximum forward speed in torque control is set by voltage or current analog quantity through AI1 terminal with 100% corresponding to the maximum frequency.

2: AI2

The maximum forward speed in torque control is set by voltage or current analog quantity through AI2 terminal with 100% corresponding to the maximum frequency.

3: AI3

The maximum forward speed in torque control is set by voltage or current analog quantity through AI3 terminal with 100% corresponding to the maximum frequency.

4: Pulse reference

The maximum forward speed in torque control is set by input pulse.

5: Communication

The maximum forward speed in torque control is set by communication.

6: MAX (AI1, AI2)

The maximum forward speed in torque control is set by the maximum between voltage/current analog quantity through AI1 terminal and that through AI2 terminal.

7: MIN (AI1, AI2)

The maximum forward speed in torque control is set by the minimum between voltage/current analog quantity through AI1 terminal and that through AI2 terminal.

8: Expansion card (reserved)

Parameter ID	Name	Reference	Default value	Change
F15.07	Maximum forward speed in torque control	0.00%-100.00%	100.00%	Changeable at any time

When F15.06 is set to 0, the maximum forward speed in torque control is set by F15.07.

Parameter ID	Name	Reference	Default value	Change
F15.08	Channel of maximum reverse speed in torque control	0: Digital setting 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication 6: MAX (AI1, AI2) 7: MIN (AI1, AI2) 8: Expansion card (reserved)	0	Changeable only at stop

This parameter is used to set the maximum reverse running frequency source for the inverter in the torque control mode. Please refer to F15.06 for details.

Parameter ID	Name	Reference	Default value	Change
F15.09	Maximum reverse speed in torque control	0.00%-100.00%	100.00%	Changeable at any time

When F15.08 is set to 0, the maximum reverse speed in torque is set by F15.09.

7.16 F16 Group: Brake Control Parameters

Parameter ID	Name	Reference	Default value	Change
F16.01	Brake function	0: Disabled 1: Enabled	0	Changeable only at stop

Parameter ID	Name	Reference	Default value	Change
F16.06	Brake function	0: Disabled 1: Enabled	0	Changeable only at stop

Note:

When this function is enabled, DC braking will not be performed.

Parameter ID	Name	Reference	Default value	Change
F16.06	Brake opening time	0.000s-32.000s	0.000s	Changeable only at stop
F16.07	Brake closing time	0.000s-32.000s	0.000s	Changeable only at stop

Note:

When “F02.06 Startup frequency hold time” is set to 0s, the upper limit for brake opening time is 32s by default. When it is a non-0 value, the upper limit for brake opening time is the startup frequency hold time.

During deceleration to stop, the time sequence of brake control is shown in the figure below.

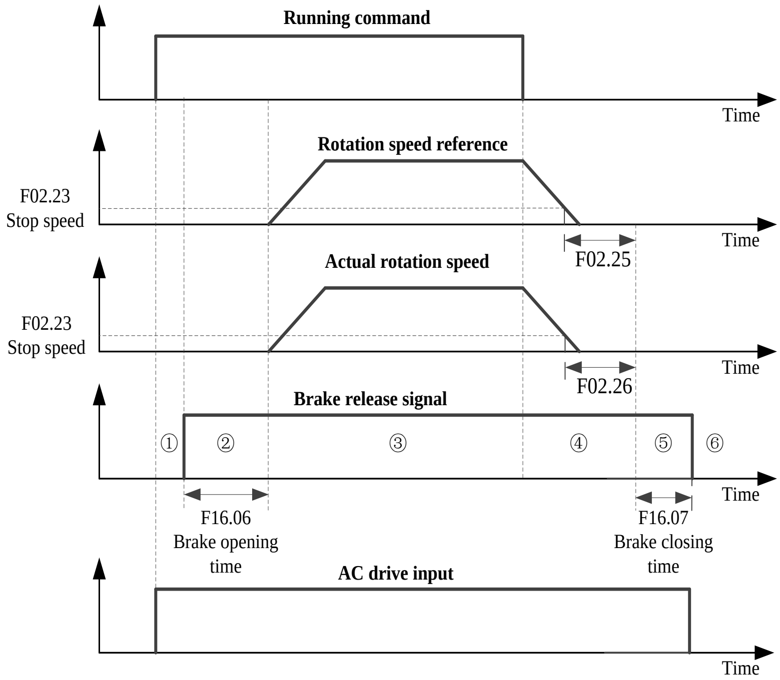


Figure 7-53 Time sequence of brake control (deceleration to stop)

Stage ①: The running command takes effect and the inverter starts to run. The motor is in the pre-excitation stage.

Stage ②: Motor excitation is completed, waiting for the brake to release, and the acceleration and deceleration ramp is disabled.

Stage ③: The motor brake is released and the acceleration and deceleration ramp is enabled. The inverter is in the normal running state.

Stage ④: The running command is cancelled and the inverter is switched to deceleration to stop mode.

Stage ⑤: Deceleration to stop is finished, waiting for the brake to close.

Stage ⑥: After braking, the inverter shuts down.

During coast to stop, the time sequence of brake control is shown in the figure below:

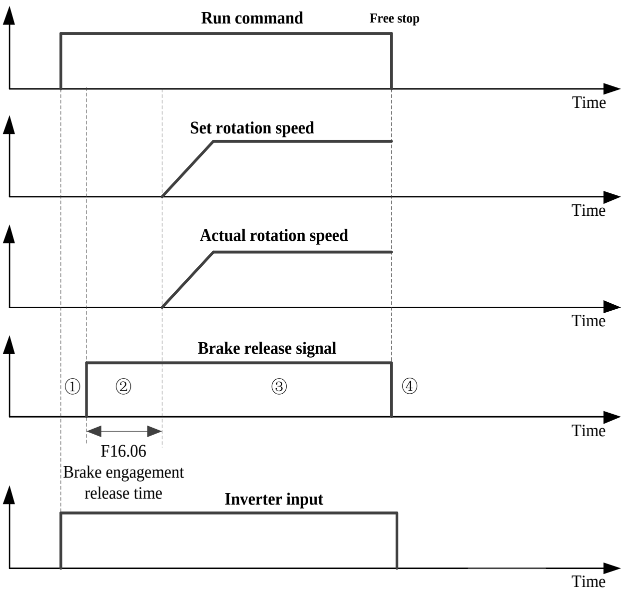


Figure 7-54 Time sequence of brake control (coast to stop)

Stage ①: The running command takes effect and the inverter starts to run. The motor is in the pre-excitation stage.

Stage ②: Motor excitation is completed, waiting for the brake to release, and the acceleration and deceleration ramp is disabled.

Stage ③: The motor brake is released and the acceleration and deceleration ramp is enabled. The inverter is in the normal running state.

Stage ④: Coast to stop is enabled. The brake is closed and the inverter shuts down.

7.17 F17 Group: Group 2 Motor Parameters

Please refer to “F03 Group: Group 1 Motor Parameters”.

7.18 F18 Group: Group 2 Motor Vector Control Parameters

Please refer to “F04 Group: Group 1 Motor Vector Control Parameters”.

7.19 F26 Group: Optimizing Parameters

Parameter ID	Name	Reference	Default value	Change
F26.04	Overmodulation mode	0: Disabled 1: Mild overmodulatioin 2: Reserved	0	Changeable at any time

If the three-phase AC output by the inverter is stipulated to be in sine wave, the maximum line voltage output by the inverter is the bus voltage/1.414. If the output voltage is not limited to be sine wave, the inverter can theoretically output a higher voltage (but the maximum voltage cannot exceed 1.15 times the bus voltage/1.414). Overmodulation technology is to increase the inverter output voltage to above the busbar voltage/1.414.

Through overmodulation, the maximum output voltage of the inverter can be increased and the motor current can be reduced, but the quality of some waveforms will also be affected.

This parameter is used to set the overmodulation function.
When it is set to 0, the output line voltage of the inverter is in sine wave.
When it is set to 1, the output line voltage of the inverter is in trapezoidal wave.

Parameter ID	Name	Reference	Default value	Change
F26.05	Random PWM depth	0: Random PWM disabled 1: PWM carrier frequency random depth 1 2: PWM carrier frequency random depth 2 3: PWM carrier frequency random depth 3 4: PWM carrier frequency random depth 4 5: PWM carrier frequency random depth 5 6: PWM carrier frequency random depth 6 7: PWM carrier frequency random depth 7 8: PWM carrier frequency random depth 8 9: PWM carrier frequency random depth 9 10: PWM carrier frequency random depth 10	0	Changeable at any time

If the switching frequency of the inverter is fixed, the voltage harmonic of the inverter will be distributed at several frequency points in a fixed manner, and the harmonic amplitude at the frequency point will be large, which may cause large interference to the adjacent equipment. If the switching frequency of the inverter fluctuates randomly within a certain range, the harmonic voltage introduced by the inverter will be evenly distributed within a certain range, and the harmonic amplitude at each frequency point in the range will be very small, reducing electromagnetic interference to the adjacent equipment and the noise generated by the inverter.

If this parameter is set to 0, random PWM is disabled.

If it is set to 1-10, random PWM is enabled, with the fluctuation range of the switching frequency the minimum in PWM carrier frequency random depth 1 and that the maximum in PWM carrier frequency random depth 10.

Parameter ID	Name	Reference	Default value	Change
F26.11	Speed loop integral separation mode	0: Disabled 1: Integral separation at acceleration/deceleration (according to the feedforward torque) 2: Integral separation at torque saturation	0	Changeable at any time
F26.12	Speed loop integral separation coefficient	0%-300%	20%	Changeable at any time

During the dynamic adjustment of the speed loop, in case of torque limit due to acceleration and deceleration or sudden changes in load, overshoot of the loop speed can be alleviated through weakening the speed loop Ki accordingly to reduce error accumulation.

Table 7-14 Speed loop integral separation enable mode

F26.11=0	Speed loop integral separation disabled
F26.11=1	When the motor accelerates and decelerates, the speed loop integral separation function will be enabled.
F26.11=2	When the motor reaches the torque limit, the speed loop integral separation function will be enabled.

F26.12 is used to set the speed loop integral separation coefficient. When the integral separation function is enabled, the final effective speed loop K_i =integral separation coefficient * original K_i.

When both DC braking and short-circuit braking are enabled, the inverter will first carry out short-circuit braking and then DC braking.

Parameter ID	Name	Reference	Default value	Change
F26.21	Asynchronous motor flux linkage regulator cut-off frequency	0.1Hz-10.0Hz	0.8Hz	Changeable at any time
F26.22	Filter coefficient of asynchronous motor flux linkage regulator set value	1-15	6	Changeable at any time

These parameters are only valid for the vector control mode.

For general applications, it is recommended to keep F26.21-F26.22 at the default value.

Parameter ID	Name	Reference	Default value	Change
F26.23	Asynchronous motor field weakening regulator gain	10-5000	400	Changeable at any time
F26.24	Asynchronous motor field weakening regulator corner frequency	0.10Hz-10.00Hz	1.00Hz	Changeable at any time

It is recommended to keep these two parameters at their default value.

Parameter ID	Name	Reference	Default value	Change
F26.25	Asynchronous motor OLVC observer cut-off frequency	1.0Hz-100.0Hz	20.0Hz	Changeable at any time
F26.26	Asynchronous motor OLVC observer corner frequency	1.0Hz-100.0Hz	4.0Hz	Changeable at any time

The higher the observer cut-off frequency, the faster the response to sudden change of rotation speed, but the worse the observation result in the steady state.

Generally, it is not recommended to change the default value.

Parameter ID	Name	Reference	Default value	Change
F26.45	Deadzone compensation mode	0: Disabled 1: Enabled (compensation mode 1)	1	Changeable at any time

When the motor works at a low speed, the output voltage of the inverter will be very small, and the proportion of the deadzone voltage in the output voltage is high, causing the voltage injected to the motor stator side to decrease, thus affecting control of the motor. The deadzone compensation function is to increase the inverter output voltage appropriately at medium and low speed to offset voltage loss caused by the deadzone effect.

When this parameter is set to 0, deadzone compensation function is disabled and the control effect of the inverter at low speed will be compromised.

When it is set to 1, deadzone compensation function is disabled to offset voltage loss caused by the deadzone effect, improving the control effect at low speed.

Parameter ID	Name	Reference	Default value	Change
F26.46	Motor 1 deadzone compensation time	0.0-20.0us	Model dependent	Changeable at any time
F26.47	Motor 1 deadzone compensation time	0.0-20.0us	Model dependent	Changeable at any time

The two parameters are used to set the deadzone compensation time when motor 1 and 2 parameters take effect.

After motor static auto-tuning, the value will be automatically updated to that identified during auto-tuning. For more about motor static auto-tuning function, please refer to description in F03.70 and F17.70.

Do not manually change this parameter after static auto-tuning; otherwise, motor control performance will be compromised at low speed.

7.20 F40 Group: Virtual I/O Parameters

Parameter ID	Name	Reference	Default value	Change
F40.01	VDI1 input function	0: No function 1: Forward run 2: Reverse run 3: Three-wire control 4: Forward jog 5: Reverse jog 6: Operation enable 7: Coast to stop 8: Emergency stop 9: External stop 10: Operation pause 11: shutdown DC braking 12: Immediate DC braking 13: Pre-excitation 14: Two-wire/three-wire switchover 15: Command source switched to keypad 16: Command source switched to terminal 17: Command source switched to communication 18: Command source switched to	0	Changeable only at stop
F40.02	VDI2 input function		0	Changeable only at stop
F40.03	VDI3 input function		0	Changeable only at stop

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F40.04</td><td>VDI4 input function</td><td rowspan="8">expansion card
19: Frequency source switched to main frequency source
20: Frequency source switched to auxiliary frequency source
21: Frequency source switched to frequency source superposition result
22: Terminal UP
23: Terminal DOWN
24: UP/DOWN setting clear
25: Frequency modification enable
26: Running inhibited
27: Forward run inhibited
28: Reverse run inhibited
29: Torque control inhibited
30: Running mode switched to speed control
31: Running mode switched to torque control
32: Running mode switched to position control
33: Fault Reset
34: User-defined fault 1
35: User-defined fault 2
36: NO input of external fault
37: NC input of external fault
38: Multi -speed reference terminal 1
39: Multi -speed reference terminal 2
40: Multi -speed reference terminal 3
41: Multi -speed reference terminal 4
42: Motor parameter group terminal 1
43: Motor parameter group terminal 2
44: Acceleration and deceleration time terminal 1
45: Acceleration and deceleration time terminal 2
46: Acceleration and deceleration inhibited
47: Simple PLC reset
48: Simple PLC pause
49: Wobble reset
50: Wobble pause
51: Regular clearing
52: Counter input
53: Counter reset
54: Length count input
55: Length reset
56: Pulse input
57: PID pause
58: PID parameter switchover
59: PID action direction reversal
60: PID integral clearing
61: PID integral pause
62: Current running duration clear
63: Position lock
64: Forced brake release
65: Forced brake
66: Brake feedback
67-99: Reserved</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.05</td><td>VDI5 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.06</td><td>VDI6 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.07</td><td>VDI7 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.08</td><td>VDI8 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.09</td><td>ADI1 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.10</td><td>ADI2 input function</td><td>0</td><td>Changeable only at stop</td></tr>
<tr><td>F40.11</td><td>ADI3 input function</td><td>0</td><td>Changeable only at stop</td></tr>
</table>

For details about AI input function, please refer to “7.27 DI Terminal Function Description”.

Parameter ID	Name	Reference	Default value	Change
F40.12	VDI active state source 1	[0000]-[2222] Ones: VDI1 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Tens: VDI2 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Hundreds: VDI3 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Thousands: VDI4 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint	[0000]	Changeable at any time
F40.13	VDI active state source 2	[0000]-[2222] Ones: VDI5 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Tens: VDI6 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Hundreds: VDI7 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint Thousands: VDI8 active state source 0: VDOx 1: Parameter setting 2: DIx 3: Communication setpoint	[0000]	Changeable at any time

The state of the VDI can be set in three ways via F40.12 and F40.13. If it is set to 0, the state of the VDI depends on whether the VDO is effective and VDIx is uniquely bound to VDOx (x can be 1-8). If it is set to 1, the state of the VDI is set by F40.14 and F40.15. If it is set to 2, the state of the VDI depends on whether the DIx is effective and VDIx is uniquely bound to VDOx (x can be 1-8). If it is set to 3, the state of the VDI is set through communication.

Parameter ID	Name	Reference	Default value	Change
F40.14	VDI state digital setting 1	[0000]-[1111] Ones: VDI1 0: Inactive 1: Active Tens: VDI2 0: Inactive 1: Active Hundreds: VDI3 0: Inactive	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		1: Active Thousands: VDI4 0: Inactive 1: Active		
F40.15	VDI state digital setting 2	[0000]-[1111] Ones: VDI5 0: Inactive 1: Active Tens: VDI6 0: Inactive 1: Active Hundreds: VDI7 0: Inactive 1: Active Thousands: VDI8 0: Inactive 1: Active	[0000]	Changeable at any time

When F40.12/13 is set to 1, the state of corresponding VDI is set through these two parameters.

Parameter ID	Name	Reference	Default value	Change
F40.16	ADI active mode	[0000]-[0111] Ones: AI1 0: Active high 1: Active low Tens: AI2 0: Active high 1: Active low Hundreds: AI3 0: Active high 1: Active low Thousands: Reserved	[0000]	Changeable only at stop

When the AI terminal is of high level, and the value of F40.16 is set to 0, the AI terminal is active, and when F40.16 is set to 1, the AI terminal is inactive.

When the AI terminal is of low level, and the value of F40.16 is set to 0, the AI terminal is inactive, and when F40.16 is set to 1, the AI terminal is active.

Parameter ID	Name	Reference	Default value	Change
F40.17	ADI low level threshold	-10.00V-F40.18	3.00V	Changeable at any time
F40.18	ADI high level threshold	F40.17-10.00V	7.00V	Changeable at any time

The two parameters are used to set AI as DI high/low level threshold. If the level is less than or equal to the DI low level threshold, it is regarded as low level. If the level is more than or equal to the DI high level threshold, it is regarded as high level.

Parameter ID	Name	Reference	Default value	Change
F40.19	VDO1 output function	0: No function 1: Inverter running 2: Inverter in forward running 3: Inverter in reverse running 4: Inverter in jog 5: Inverter in forward jog 6: Inverter in reverse jog	0	Changeable at any time

<table>
<tr><th>Parameter ID</th><th>Name</th><th>Reference</th><th>Default value</th><th>Change</th></tr>
<tr><td>F40.20</td><td>VDO2 output function</td><td rowspan="7">7: Fault
8: Alarm
9: Inverter in undervoltage state
10: Ready to run
11: Braking with energy consumption (Reversed)
12: Designated count value reach
13: Reference count value reach
14: Length reach
15: Simple PLC stage completion
16: Simple PLC cycle completion
17: Timing reach
18: Current running duration reach
19: Accumulative running duration reach
20: Accumulative power-on duration reach
21: AI1 input overlimit
22: AI2 input overlimit
23: AI3 input overlimit
24: Frequency limited
25: Torque limited
26: Frequency upper limit reach
27: Frequency lower limit reach (no output at stop)
28: Frequency lower limit reach (output at stop)
29: Zero-speed running 1 (no output at stop)
30: Zero-speed running 2 (output at stop)
31: Frequency detection FDT1 reach
32: Frequency detection FDT2 reach
33: Frequency reference reach
34: Any frequency 1 reach
35: Any frequency 2 reach
36: Any current 1 reach
37: Any current 2 reach
38: Zero current state
39: Output overcurrent
40: Inverter overtemperature pre-alarm
41: Inverter overload pre-alarm
42: Motor overtemperature pre-alarm
43: Motor overload pre-alarm
44: Inverter in load protection 1
45: Inverter in load protection 2 (Reserved)
46: Position lock succeeds
47: Brake output
48: Communication
49-99: Reserved</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.21</td><td>VDO3 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.22</td><td>VDO4 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.23</td><td>VDO5 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.24</td><td>VDO6 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.25</td><td>VDO7 output function</td><td>0</td><td>Changeable at any time</td></tr>
<tr><td>F40.26</td><td>VDO8 output function</td><td>0</td><td>Changeable at any time</td></tr>
</table>

Parameter ID	Name	Reference	Default value	Change
F40.27	VDO1 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.28	VDO1 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.29	VDO2 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.30	VDO2 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.31	VDO3 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.32	VDO3 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.33	VDO4 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.34	VDO4 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.35	VDO5 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.36	VDO5 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.37	VDO6 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.38	VDO6 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.39	VDO7 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.40	VDO7 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.41	VDO8 switch-on delay	0.0s-6500.0s	0.0s	Changeable at any time
F40.42	VDO8 switch-off delay	0.0s-6500.0s	0.0s	Changeable at any time

The above parameters are used to set the VDOx switch-on/off delay, which is the same as Dox switch-on/off delay.

Parameter ID	Name	Reference	Default value	Change
F40.43	VDO active mode selection 1	[0000]-[1111] Ones: VDO1 0: Positive logic active 1: Negative logic active Tens: VDO2 0: Positive logic active 1: Negative logic active Hundreds: VDO3 0: Positive logic active 1: Negative logic active Thousands: VDO4 0: Positive logic active 1: Negative logic active	[0000]	Changeable at any time
F40.44	VDO active mode selection 2	[0000]-[1111] Ones: VDO5 0: Positive logic active 1: Negative logic active Tens: VDO6 0: Positive logic active 1: Negative logic active Hundreds: VDO7 0: Positive logic active	[0000]	Changeable at any time

Parameter ID	Name	Reference	Default value	Change
		1: Negative logic active Thousands: VDO8 0: Positive logic active 1: Negative logic active		

0: Positive logic active
If the terminal is disabled, “0” is output.
If the terminal is enabled, “1” is output.

1: Negative logic active
If the terminal is disabled, “1” is output.
If the terminal is enabled, “0” is output.

7.21 F41 Group: AI/AO Correction Parameters

AI/AO voltage type correction method:

1) Select the AI/AO type as voltage type.
2) For AI, input two standard voltages for correction, such as 2V and 8V. For measured voltage 1, fill in with 2V; for displayed voltage 1, fill in with the AI displayed value. For measured voltage 2, fill in with 8V; for displayed voltage 2, fill in with the AI displayed value.
3) For AO, output two voltages for correction, such as 2V and 8V. For target voltage 1, fill in with 2V; for measured voltage 1, fill in with the multimeter measured value. For target voltage 2, fill in with 8V, for measured voltage 2, fill in with the multimeter measured value.

AI/AO current type correction method:

1) Select the AI/AO type as current type.
2) For AI, input two standard currents for correction, such as 4 mA and 16 mA with 1mA equivalent to 0.5V. For measured voltage 1, fill in with 2V (4*0.5V); for displayed voltage 1, fill in with the AI displayed value. For measured voltage 2, fill in with 8V (16*0.5V) and for displayed voltage 2, fill in with the AI displayed value.
3) For AO, output two currents for correction, such as 4mA and 16mA with 1mA current equal to 0.5V. For target voltage 1, fill in with 2V (4*0.5V); for measured voltage 1, fill in with the multimeter measured value*0.5V. For target voltage 2, fill in with 8V (16*0.5V); for measured voltage 2, fill in with the multimeter measured value *0.5V.

7.22 F60 Group: Modbus Communication Parameters

Parameter ID	Name	Reference	Default value	Change
F60.01	Modbus communication baud rate	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 115200bps	3	Changeable at any time

This parameter is used to set the baud rate during Modbus communication. If the baud rate is set inconsistent, Modbus communication will fail.

Parameter ID	Name	Reference	Default value	Change
F60.02	Modbus communication data format	0: No check (8-N-1) 1: Even check (8-E-1) 2: Odd check (8-O-1) 3: No check (8-N-2)	0	Changeable at any time

This parameter is used to set the data format during Modbus communication. If the format is set inconsistent, Modbus communication will fail.

Parameter ID	Name	Reference	Default value	Change
F60.03	Modbus communication address	1-247	1	Changeable at any time

This parameter is used to define the communication address when the inverter is used as the slave during Modbus communication.

Parameter ID	Name	Reference	Default value	Change
F60.04	Modbus response relay	0ms-1000ms	2ms	Changeable at any time

This parameter defines the interval for the inverter to send response data to the host computer after data reception when it acts as the Modbus communication slave station. If the response delay is less than the system processing time, the system processing time should prevail. If the response delay is longer than the system processing time, then after the system has completed data processing, it will wait until the response delay time is reached before sending the data to the host computer.

Parameter ID	Name	Reference	Default value	Change
F60.05	Modbus communication timeout time	0.0s-120.0s	0.0s	Changeable at any time

When the serial port communication signal disappears for a period longer than the value set in this parameter, the inverter will report a communication fault.

When this parameter is set to 0s, the inverter will not detect the serial port communication signal and this parameter will be disabled.

Parameter ID	Name	Reference	Default value	Change
F60.06	Modbus communication proportion setting (reserved)	0.00-5.00	1.00	Changeable at any time

The data in the communication address 0x2000 or 0x3000 sent by the host computer is multiplied with this parameter as the communication given value of the inverter. The given frequency of the host computer communication can be modified proportionally.

For details about the Modbus Communication protocol, see **Appendix V: Modbus-RTU Communication Protocol.**

7.23 F61 Group: Master-Slave Communication Parameters

Parameter ID	Name	Reference	Default value	Change
F61.01	Master-slave communication enable	0: Disabled 1: Enabled	0	Changeable only at stop

When this parameter is set to 0, master-slave communication is disabled with the status word and fault word cleared, and vice versa.

Parameter ID	Name	Reference	Default value	Change
F61.02	Master-slave communication interface	0: CAN 1: RS485	0	Changeable only at stop

This parameter is used for selecting master-slave communication interface, which can be CAN or RS485.

When master-slave communication is enabled and the interface is RS485, Modbus communication is disabled.

Note:

When RS485 master-slave communication is enabled, it is recommended that the interrupt frequencies of the master and slave inverters be consistent, that is, the power, carrier frequency, and maximum frequency of them are consistent. If they are inconsistent, please contact Hopewind R&D for confirmation.

Parameter ID	Name	Reference	Default value	Change
F61.03	Master-slave communication baud rate	0:1Mbps 1:500Kbps 2:125Kbps	0	Changeable at any time

During master-slave communication, the baud rate of the master and slave in the network shall be the same. This parameter can only be modified by CAN communication.

The baud rate of the RS485 master-slave communication is fixed at 3Mbps.

Parameter ID	Name	Reference	Default value	Change
F61.04	Master-slave communication address	1-F61.05	1	Changeable at any time
F61.05	Master-slave communication node number	2-12	2	Changeable at any time

The value of F61.04 cannot be set greater than F61.05; otherwise, it will be treated as F61.05. The addresses of nodes in the same master-slave communication network should be set from 1 in sequence, and the addresses should be continuous. Addresses of nodes in the same master-slave communication network cannot share the same address.

The value of F61.05 should be consistent with the total number of nodes to be connected in the actual application. That is to say, the value of this parameter must be the same as the number of nodes in the same master-slave communication network.

Parameter ID	Name	Reference	Default value	Change
F61.06	Master-slave communication selection	0: Slave 1: Master	0	Changeable at any time
F61.07	Master-slave communication mode	0: Polling 1: Broadcast	0	Changeable at any time

F61.06 is used to set the inverter role (master or slave). For nodes in the same master-slave communication network, there is only one master.

F61.07 is used to set the master-slave communication mode. This parameter can only be set for the master.

In the polling mode, the master broadcasts the data and polls the slave by address. All the slaves receive the data, and the corresponding slave needs to reply.

In the broadcast mode, the master broadcasts the data and all the slaves receive the data only with no need to reply.

Parameter ID	Name	Reference	Default value	Change
F61.08	Slave following master's command	[0000]-[0011] Ones: Whether the slave follows the operation command of the master 0: No 1: Yes Tens: Whether the slave fault information is transmitted 0: No 1: Yes Hundreds: Reserved Thousands: Reserved	[0011]	Changeable at any time

The ones place is used to set whether the slave following master's command (If yes, the slave command source should be set to communication).

The tens place is used to set whether the slave fault information is transmitted to the master (If yes, the master end will report a slave fault).

Parameter ID	Name	Reference	Default value	Change
F61.09	Master-slave communication application mode	0: Rigid connection 1: Flexible connection	0	Changeable only at stop

0: Rigid connection

When master-slave communication is enabled, the running mode of the master is automatically switched to speed control, that of the slave is automatically switched to torque control, and the speed loop integral is disabled.

To enable rigid connection, “F01.02 Motor group 1 control mode” should be manually set to vector control for both the master and the slave. For the slave, F01.03 Command source should be manually set to 2: Communication; F15.02 Torque reference channel should be manually set to 5: Communication; F61.08 Slave following master’s command should be manually set and F61.15 Speed window threshold should be manually set.

1: Flexible connection

When master-slave communication is enabled, the running mode of the master and slave is automatically switched to speed control, and the speed loop integral is enabled.

To enable flexible connection, “F01.02 Motor group 1 control mode” should be manually set to vector control for both the master and the slave; for the slave, “F01.03 Command source” should be manually set to 2: Communication, “F01.04 Main frequency source” should be manually set to 5: Communication, and “F61.08 Slave following master’s command” should be manually set.

Note: The application mode for the master and slave should be set consistent; otherwise normal work may fail.

Tx/Rx data of rigid connection:

Master-slave communication selection	
Tx: master/Rx: slave	Tx: slave/Rx: master
Status word (F100.06) and fault status, start/stop	Status word (F100.06) and fault status/salve fault
Ramp frequency (0.01Hz)/speed window threshold	
Output torque reference (0.01%)/torque setting	

Tx/Rx data of rigid connection:

Master-slave communication selection	
Tx: master/Rx: slave	Tx: slave/Rx: master
Status word (F100.06) and fault status, start/stop	Status word (F100.06) and fault status/salve fault
Frequency reference (0.01Hz)/frequency reference	
Speed loop output integral (0.1%)/speed loop integral setting	

Parameter ID	Name	Reference	Default value	Change
F61.12	Master data Tx cycle in master-slave communication	1ms-1000ms	4ms	Changeable at any time

When the baud is changed, this parameter updates automatically. It is effective only for CAN communication interface.

Parameter ID	Name	Reference	Default value	Change
F61.14	Master-slave communication timeout time	0.000s-32.000s	0.000s	Changeable at any time

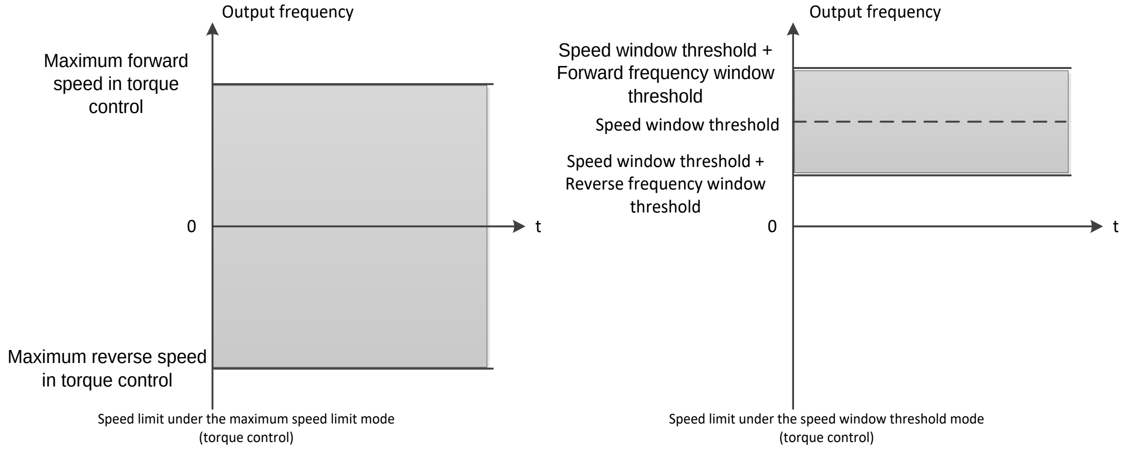
This parameter is used to set the interval between the master-slave communication fault and the fault report. If it is set to 0, master-slave communication timeout is not detected.

The value of this parameter cannot be smaller than “F61.12 Master data Tx cycle” in master-slave communication.

Parameter ID	Name	Reference	Default value	Change
F61.15	Speed window threshold	0: Disabled 1: Enabled	0	Changeable at any time
F61.16	Forward frequency window threshold	0.00Hz-600.00Hz	5.00Hz	Changeable at any time
F61.17	Reverse frequency window threshold	0.00Hz-600.00Hz	5.00Hz	Changeable at any time

Speed window threshold is enabled only when master-slave communication is enabled and torque control mode is selected.

In the figure below, the left shows the maximum speed threshold control, and the right shows the speed window threshold control.



7.24 F63 Group: Fieldbus Communication Module Configuration Parameters

For details about parameters of fieldbus communication module configuration, please refer to the corresponding optional expansion card manual.

7.25 F64 Group: Fieldbus Communication Data Configuration Parameters

For details about parameters of fieldbus communication data configuration, please refer to the corresponding optional expansion card manual.

7.26 F80 Group: Fault Record Parameters

This group of parameters are used to record the last three faults of the inverter. For possible causes and solutions of each fault, please refer to **8 Troubleshooting**.

7.27 F82 Group: Basic Monitoring Parameters

Parameter ID	Name	Description
F82.01	Running frequency	Displayed is the current output frequency of the inverter.
F82.02	Frequency reference	Displayed is the current frequency reference of the inverter.
F82.03	Ramp frequency	Displayed is the current ramp output frequency of the inverter.
F82.04	Bus voltage	Displayed is the current bus voltage of the inverter.
F82.05	Output voltage	Displayed is the current output voltage of the inverter.
F82.06	Output current	Displayed is the current output current of the inverter.
F82.07	Output power	Displayed is the current output power of the inverter.
F82.08	Output torque	Displayed is the current output torque of the inverter.
F82.09	Heatsink 1 temperature	Displayed is the current IGBT heatsink temperature of the inverter.
F82.10	Heatsink 2 temperature (reserved)	Displayed is the current rectifier bridge heatsink temperature of the inverter.

Parameter ID	Name	Description
F82.11	DI input terminal status 1	Displayed is the current status of the inverter DI input terminal.
F82.12	DI input terminal status 2	Displayed is the current status of the inverter DI input terminal.
F82.13	DO output terminal status	Displayed is the current status of the inverter DO output terminal.
F82.14	AI1 input value	Displayed is the current AI1 input value of the inverter.
F82.15	AI2 input value	Displayed is the current AI2 input value of the inverter.
F82.16	AI3 input value	Displayed is the current AI3 input value of the inverter.
F82.17	AO1 output value	Displayed is the current AO1 output value of the inverter.
F82.18	AO2 output value	Displayed is the current AO2 output value of the inverter.
F82.19	AO3 output value	Displayed is the current AO3 output value of the inverter.
F82.20	Pulse input frequency	Displayed is the current pulse input frequency of the inverter.
F82.21	Pulse output frequency	Displayed is the current pulse output frequency of the inverter.
F82.22	PID setting	Displayed is the current PID setting of the inverter.
F82.23	PID feedback	Displayed is the current PID feedback of the inverter.
F82.24	PID deviation	Displayed is the current PID deviation of the inverter.
F82.25	PID output	Displayed is the current PID output of the inverter.
F82.26	Simple PLC current stage	Displayed is the current simple PLC stage.
F82.27	Count Value	Displayed is the current count value of the inverter.
F82.28	Length value	Displayed is the current length value of the inverter.
F82.29	Linear speed	Displayed is the current linear speed of the inverter.
F82.30	Inverter overload usage	Displayed is the current inverter overload usage.
F82.31	Motor overload usage	Displayed is the current inverter motor overload usage.
F82.32	Motor temperature	Displayed is the current inverter motor temperature.
F82.33	Estimated motor frequency	Displayed is the current rotor speed estimated by the vector control.
F82.34	Measured motor frequency	Displayed is the current rotor speed fed back by the encoder.
F82.35	Motor speed	Displayed is the current motor speed.
F82.36	Remaining running duration during timed running	Displayed is the current remaining running duration during timed running.
F82.37	Current running time	Displayed is the current running time of the inverter.
F82.38	Current power-on time	Displayed is the current power-on time of the inverter.
F82.39	Accumulative running time	Displayed is the current accumulative running time of the inverter.
F82.40	Accumulative power-on time	Displayed is the current accumulative power-on time of the inverter.
F82.41	Accumulative fan running time	Displayed is the current accumulative fan running time of the inverter.
F82.42	Accumulative power consumption (low-order bits)	Displayed is the current power consumption. Accumulative power consumption= Accumulative power consumption (low-order bits) * 10000 + Accumulative power consumption (high-order bits) (in 0.1kW/h)
F82.43	Accumulative power consumption (high-order bits)	
F82.44	Current command source	Displayed is the current command source of the inverter.

Parameter ID	Name	Description
F82.45	Current frequency source	Displayed is the current frequency source of the inverter.
F82.46	Current running mode	Displayed is the current running mode of the inverter.
F82.47	Current motor parameter group	Displayed is the current motor parameter group of the inverter.
F82.48	Current motor control mode	Displayed is the current motor control mode of the inverter.
F82.49	Current acceleration/deceleration time	Displayed is the current acceleration/deceleration time of the inverter.
F82.50	Inverter state 1	Displayed is the current inverter state.
F82.51	Inverter state 2	Displayed is the current inverter state.
F82.52	Active fault code	Displayed is the current fault code.
F82.53	Active fault subcode (reserved)	Displayed is the current fault subcode.
F82.54	Active alarm code	Displayed is the active alarm code.
F82.55	Active alarm subcode (reserved)	Displayed is the active alarm subcode.
F82.56	Main frequency source reference value	Displayed is the current main frequency source reference value.
F82.57	Auxiliary frequency source reference value	Displayed is the current auxiliary frequency source reference value.
F82.58	Additional frequency reference value	Displayed is the additional frequency reference value, that is, the wobble frequency.
F82.59	Communication frequency reference value	Displayed is the current communication frequency reference value.
F82.60	Terminal UP/DOWN frequency reference value	Displayed is the current terminal UP/DOWN frequency.
F82.61	Torque reference value	Displayed is the current torque reference value.
F82.62	Torque current reference value	Displayed is the current torque current reference value.
F82.63	Torque current	Displayed is the current torque current.
F82.64	Excitation current reference value	Displayed is the current excitation current reference value.
F82.65	Excitation current	Displayed is the current excitation current.
F82.66	Target voltage upon V/F separation	Displayed is the current target voltage upon V/F separation.
F82.67	Output voltage upon V/F separation	Displayed is the current output voltage upon V/F separation.
F82.68	Encoder angle	Displayed is the current encoder angle, that is, mechanical angle.
F82.69	Encoder type	Displayed is the current encoder type.
F82.70	Expansion card 1 type	Displayed is the current expansion card type and version.
F82.71	Expansion card 1 version	
F82.72	Expansion card 2 type	
F82.73	Expansion card 2 version	
F82.81	MAC address 1	Displayed is the MAC address.
F82.82	MAC address 2	
F82.83	MAC address 3	

Parameter ID	Name	Description
F82.84	MAC address 4	
F82.85	MAC address 5	
F82.86	MAC address 6	
F82.87	IP address 1	Displayed is the IP address.
F82.88	IP address 2	
F82.89	IP address 3	
F82.90	IP address 4	

7.28 DI Terminal Function Description

1: Forward run
2: Reverse run
3: Three-wire control

When the command source is set to terminal, the start and stop of the inverter can be controlled through terminals, with the following four modes supported.

Two-wire mode 1:

F06.35	Terminal control mode	0: Two-wire mode 1
F06.01	DI1 input function	1: Forward run
F06.02	DI2 input function	2: Reverse run

K1	K2	Run command
1	0	Forward run
0	1	Reverse run
1	1	Stop
0	0	Stop

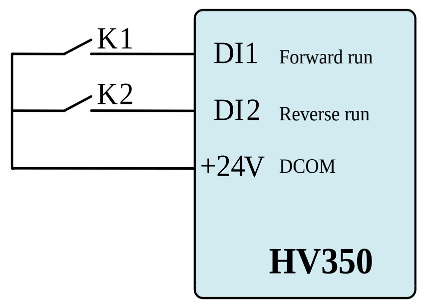
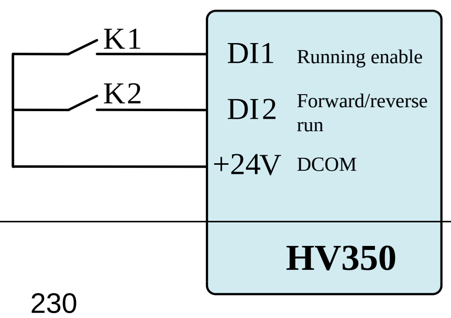


Figure 7-49 Two-wire mode 1

Two-wire mode 2:

F06.35	Terminal control mode	1: Two-wire mode 2
F06.01	DI1 input function	1: Forward run
F06.02	DI2 terminal function selection	2: Reverse run

K1	K2	Run command
1	0	Forward run
1	1	Reverse run



0	0	Stop	
0	1	Stop	

Figure 7-50 Two-wire mode 2

Three-wire mode 1:

F06.35	Terminal control mode	2: Three-wire mode 1
F06.01	DI1 input function	1: Forward run
F06.02	DI2 input function	2: Reverse run
F06.03	DI3 input function	3: Three-wire control

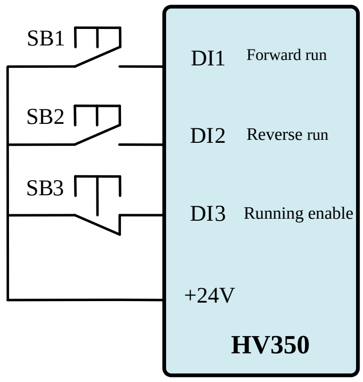


Figure 7-51 Three-wire control mode 1

Three-wire mode 2:

F06.35	Terminal control mode	3: Three-wire mode 2
F06.01	DI1 input function	6: Running enable
F06.02	DI2 input function	1/2: Forward/reverse run
F06.03	DI3 input function	3: Three-wire control

K	Run direction
0	Forward
1	Reverse

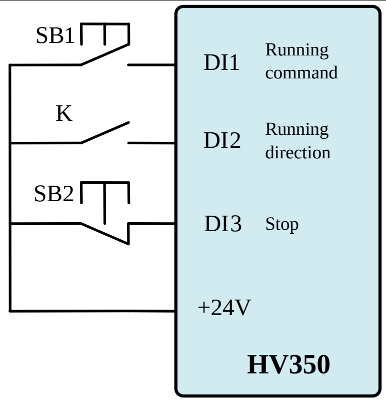


Figure 7-52 Three-wire control mode 2

Precautions:

1) When the inverter is powered on, whether the run command takes effect is related to the setting in F02.41 Startup protection; during the control command channel switchover, whether the run command takes effect is related to the setting in F02.41 Startup protection.
2) During the switchover between the above four terminal control modes, the startup protection function

is disabled.

4: Forward Jog (FJOG)

5: Reverse Jog (RJOG)

When the command source is set to terminal, FJOG and RJOG can be controlled through terminals.

Precautions:

When the inverter is powered on, whether the run command takes effect is related to the setting in F02.41 Startup protection; during the control command channel switchover, whether the run command takes effect is related to the setting in F02.41 Startup protection.

6: Running enable

In the shutdown state, if this parameter is disabled, the inverter will coast to stop (no output).

In the running state, if this parameter is disabled, the inverter will coast to stop (no output). When it is enabled, the inverter resumes normal running.

Note:

1) In the jog mode, this parameter is enabled.
2) In the normal running mode, this parameter is enabled.
3) In the torque control mode, this parameter is enabled.
4) Even if this parameter is disabled, the inverter can still respond to the control command. For example:

In the shutdown state, when the running enable terminal is disabled and the run command takes effect, the inverter will switch to the waiting to run state. After the terminal is enabled, the inverter will switch to the running state.

In the running state, when the running enable terminal is disabled, the inverter will switch from the running state to the waiting to run state, and when the shutdown command takes effect, the inverter will switch to the shutdown state.

7: Coast to stop

When the coast to stop terminal is enabled, the inverter coasts to stop (according to inertia).

When the coast to stop terminal command is invalid, the run command is not restored. It is necessary to re-enter the run command to start the inverter.

No matter which control command channel is chosen, the coast to stop terminal is enabled.

8: Emergency stop

When the coast to stop terminal is enabled, the inverter will be forced to decelerate to stop (even though the stop mode is set to coast to stop) and the deceleration time in emergency stop is determined by F09.12.

If configured with shutdown DC braking, DC braking will take effect during shutdown.

When the emergency stop terminal command is invalid, the run command is not restored. It is necessary to re-enter the run command to start the inverter.

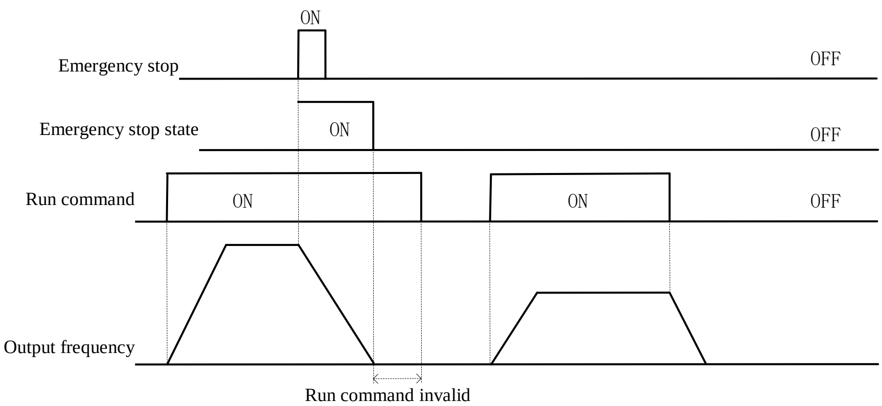


Figure 7-53 Emergency stop

No matter which control command channel is chosen, the emergency stop terminal is enabled.

In the jog mode, the emergency stop terminal is enabled.

During emergency stop, the maximum Vdc control is mandatorily effective.

When the inverter is in the torque control mode, the stop mode will be switched to deceleration to stop.

9: External stop

When external stop is in the active mode, the inverter is forced to stop by the shutdown mode.

The external stop terminal is effective under any control command channel. In speed control mode, the inverter will decelerate to stop according to the deceleration time; in torque control mode, it will coast to stop.

In the jog mode, the external stop terminal is disabled.

10: Running pause

When the terminal is in the active mode, if the inverter is running, it will stop according to the shutdown mode and all operating parameters (such as PLC parameters, wobble frequency, PID parameters) will be retained. When the terminal is inactive, the inverter will restore to the retained state.

Note:

1) In the jog mode, the running pause function is disabled. If the terminal is in the active mode, the inverter shuts down.
2) In the common running mode, when running pause is enabled, the inverter will stop by the shutdown mode and enter the waiting to run mode. When running pause is disabled, it will switch to normal running state automatically.
3) In the torque control mode, when running pause is enabled, the inverter will coast to stop and enter the waiting to run mode. When running pause is disabled, it will switch to the normal running state automatically.

11: Shutdown DC braking

After the inverter receives a shutdown command and when the running frequency is lower than that of the shutdown DC braking, the inverter starts DC braking, with the current set by F02.14, and the braking time is the maximum of terminal function hold time and the F02.15 DC braking time at stop.

12: Immediate DC braking

In the shutdown state, the DC braking function of the inverter can be enabled, with the current set by F02.14. If the run command or jog command is enabled, DC braking is lifted. If demagnetization has not been completed when the DI command is active, the inverter will wait for the motor to complete demagnetization before DC braking. For the asynchronous motor, the demagnetization time is about 2 times the rotor time constant.

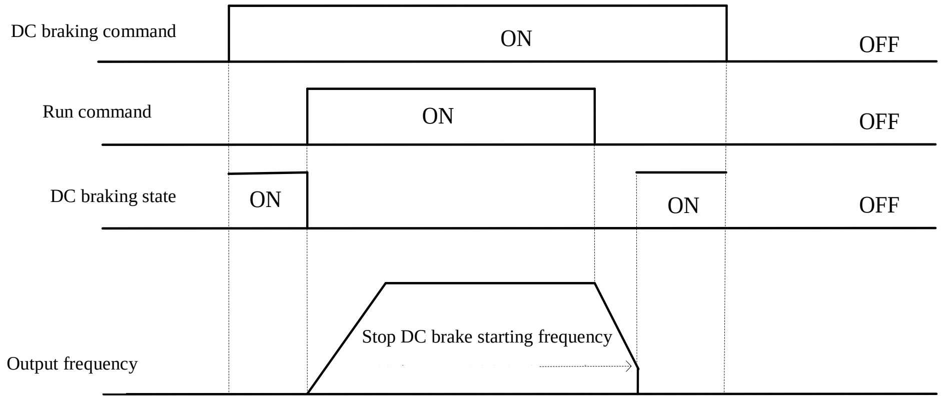


Figure 7-54 Immediate DC Braking

13: Pre-excitation

It is disabled in VF control mode.

In OLVC/CLVC control mode, if the terminal is in the active mode during startup, excitation will be automatically delayed until the terminal is inactive.

14: Two-wire/three-wire switchover

If the terminal is active, the control mode will automatically switch between two-wire mode and the three-wire mode, with the switchover logic as follows:

Before switchover	After switchover
Two-wire mode 1	Three-wire mode 1
Two-wire mode 2	Three-wire mode 2
Three-wire mode 1	Two-wire mode 1
Three-wire mode 2	Two-wire mode 2

Note:

During two-wire/three-wire switchover, the startup protection function is disabled.

15: Command source switched to keypad
16: Command source switched to terminal
17: Command source switched to communication
18: Command source switched to Expansion card (reserved)

The command channel switchover priority is as follows: keypad>terminal>communication.

Note:

In addition to command source switchover through terminal, switchover through the MF.K is also supported, but it ranks lower in the priority when compared with the terminal.

19: Frequency source switched to main frequency source
20: Frequency source switched to auxiliary frequency source
21: Frequency source switched to frequency source superposition result

The frequency source channel can be switched through the terminal.

22: Terminal UP
23: Terminal DOWN
24: UP/DOWN setting clear

These terminals are used to control the increase (UP key) and decease (DOWN key) of the frequency reference. They are enabled only when terminal is selected as the frequency source. The retention and clear of the adjusted frequency can be set by F06.36 (refer to the parameter for details).

25: Frequency modification enable (reserved)
26: Running inhibited
27: Forward run inhibited
28: Reverse run inhibited

When the running inhibited terminal is active, the run command is inactive under shutdown mode and the inverter coasts to stop under running state.

When the forward run inhibited terminal is active, if the frequency reference is forward, the actual frequency reference of the inverter will be limited to 0.

When the reverse run inhibited terminal is active, if the frequency reference is reverse, the actual frequency reference of the inverter will be limited to 0.

Note:

Under the torque mode, both the forward and reverse terminals are disabled.

29: Torque control inhibited (reserved)

Activating the terminal switches the inverter from the torque control mode to the speed control mode. Deactivating the terminal switches the inverter back to the torque control mode.

30: Running mode switched to speed control
31: Running mode switched to torque control
32: Running mode switched to position control (reserved)

The control mode can be switched to speed control/torque control through the terminal with the switching priority: speed control>torque control>position control.

33: Fault reset
34: User-defined fault 1
35: User-defined fault 2

When the terminal is active, the inverter detects user-defined fault 1 (fault code: 39) and user-defined fault 2 (fault code: 40).

36: NO input of external fault

When the terminal is active, the inverter detects the external fault (fault code: 42).

37: NC input of external fault

When the terminal is inactive, the inverter detects the external fault (fault code: 42).

38: Multi-speed reference terminal 1
39: Multi-speed reference terminal 2
40: Multi-speed reference terminal 3
41: Multi-speed reference terminal 4

The multi-speed reference terminals set 16 segments through terminal on-off combination.

42: Motor parameter group terminal 1
43: Motor parameter group terminal 2

Motor parameter group can be switched through the 4 combinations of on-off of the two terminals. HV350 temporarily supports switchover between 2 groups of motor parameters.

Note:

When the inverter is running, switchover between motor parameter groups are not supported.

The switching priority of the switching modes is as follows:

Terminal>parameters

44: Acceleration and deceleration time terminal 1
45: Acceleration and deceleration time terminal 2

4 sets of acceleration and deceleration can be switched through the 4 combinations of on-off of the two terminals.

Note:

In addition to terminals, the following three ways can also be used to adjust the acceleration and deceleration time.

1) By using F09.13 and F09.14, switchover among acceleration time 1, acceleration time 2, deceleration time 1 and deceleration time 2 can be achieved during acceleration and deceleration.
2) When the simple PLC function is enabled, different running stages can be configured with different acceleration and deceleration time.
3) Motor 1/motor 2 supports different acceleration and deceleration time.

The switching priority of the above three switching modes is as follows:

Terminal >simple PLC>motor 1/motor 2 configuration> acceleration time 1/acceleration time 2 switchover

That is to say, acceleration time 1/acceleration time 2 switchover via the running frequency is only applicable to motor 1.

46: Acceleration and deceleration inhibited

The current running frequency of the inverter is not affected by the external input frequency changes (unless shutdown command is received).

47: Simple PLC reset

When the terminal is active, simple PLC returns to the initial state.

48: Simple PLC pause

When the terminal is active, simple PLC pauses and maintains the current output with running timing stopped. When the terminal is inactive, PLC continues to run with timing.

49: Wobble reset

During wobble control, when the terminal is active, the inverter restores running with the center frequency. When the terminal is inactive, wobble running is resumed.

50: Wobble pause

During wobble control, when the terminal is active, the inverter keeps the current output frequency. After the terminal command is cancelled, wobble running is resumed.

51: Regular clearing

In the timing process, the counter will be cleared when the terminal becomes active.

52: Counter input

In the count process, the pulse count is input when the terminal becomes active. Only DI5 supports counter input.

53: Counter reset

In the count process function, the counter is reset when the terminal becomes active.

54: Length count input

In the fixed length process, the length count is input when the terminal becomes active. Only DI5 is supported.

55: Length reset

In the fixed length process, if the terminal is set to length reset, the length will be cleared.

56: Pulse input

It is for HDI high-speed pulse input. Only DI5 is supported.

57: PID pause

The terminal is used to suspend PID control temporarily, so that the inverter keeps the current output frequency with no more PID tuning.

58: PID parameter switchover

When F11.16 PID parameter switchover condition is set to 1: Switchover by DI:

The PID parameters are F11.13-F11.15when the terminal is active.

The PID parameters are F11.10-F11.12 when the terminal is inactive.

59: PID action direction reversal

If the terminal of “PID action direction reversal” is inactive, the final effective PID direction is the same as that set in F11.09. If it is active, the final effective PID direction reverses that set in F11.09.

PID action direction reversal	PID direction set in F11.09	Final effective PID direction
0	0	0
0	1	1
1	0	1
1	1	0

60: PID integral clearing

The terminal is used to clear PID integral, that is, the integral does not work.

61: PID integral pause

The terminal is used to suspend integral tuning of PID without disabling its proportional and derivative tuning.

62: Current running duration clear

The terminal is used to reset the current running time of the inverter.

If the current running time is less than F09.54 (current running reach time which is greater than 0), the current running time is reset when the terminal becomes active.

If the current time is greater than F09.54 (greater than 0), the current running time is not reset even when the terminal is active.

63: Position lock

In the CLVC control mode, the position lock function is enabled when the terminal becomes active.

64: Forced brake release

When F16.01 Brake function is set to 0: Disabled, forced brake release is output when the terminal becomes active.

65: Forced brake

When F16.01 Brake function is set to 1: Enabled, forced brake is output when the terminal becomes active.

66: Brake feedback (reserved)

7.29 DO Terminal Function Description

1: Inverter running

The terminal outputs an “active” signal when the inverter is running with output frequency (which can be 0).

2: Inverter in forward running

The terminal outputs an “active” signal when the inverter is in forward running with output frequency (which can be 0).

3: Inverter in reverse running

The terminal outputs an “active” signal when the inverter is in reverse running with output frequency (which can be 0).

4: Inverter in jog

The terminal outputs an “active” signal when the inverter is in jog with output frequency (which can be 0).

5: Inverter in forward jog

The terminal outputs an “active” signal when the inverter is in forward jog with output frequency (which can be 0).

6: Inverter in reverse jog

The terminal outputs an “active” signal when the inverter is in reverse jog with output frequency (which can be 0).

7: Fault

The terminal outputs an “active” signal when the inverter stops due to a fault.

8: Alarm

The DO terminal outputs an “active” signal when a fault occurs on the inverter and the fault protection action is set to “continue to run”.

9: Inverter in undervoltage state

The terminal outputs an “active” signal when undervoltage occurs on the inverter.

10: Ready to run

The terminal outputs an “active” signal when no exception occurs after the inverter is powered on.

11: Braking with energy consumption (Reversed)

The terminal outputs an “active” signal when the braking unit acts.

12: Designated count value reach

In a counting process, the terminal outputs an “active” signal when the count value reaches the value of F12.09.

13: Reference count value reach

In a counting process, the terminal outputs an “active” signal when the count value reaches the value of F12.08.

14: Length reach

In a fixed length process, the terminal outputs an “active” signal when the detected length exceeds the value of F12.06.

15: Simple PLC stage completion

The terminal outputs a pulse signal with a width of 250 ms when the simple PLC completes one stage.

16: Simple PLC cycle completion

The terminal outputs a pulse signal with a width of 250 ms when the simple PLC completes one cycle.

17: Timing reach

If the timing function (F09.57) is enabled, the terminal outputs an “active” signal when the current running time of the inverter reaches the set timing duration. The timing duration is set using F09.58, F09.59 and F09.60.

18: Current running duration reach

When the initial run time of the frequency converter exceeds the time set by F09.54, the "effective" signal will be output.

The terminal outputs an “active” signal when the current running time of the inverter exceeds the value of F09.54 (current running reach time).

19: Accumulative running duration reach

The terminal outputs an “active” signal when the accumulative running time of the inverter exceeds the value of F09.55 (Accumulative running reach time).

20: Accumulative power-on duration reach

The terminal outputs an “active” signal when the accumulative power-on time of the inverter exceeds the accumulative power-on reach time (F09.56).

21: AI1 input overlimit

The terminal outputs an “active” signal when the value of AI1 is greater than that of F09.48 (AI1 input upper limit) or less than that of F09.47 (AI1 input lower limit).

22: AI2 input overlimit

The terminal outputs an “active” signal when the value of AI1 is greater than that of F09.50 (AI2 input upper limit) or less than that of F09.49 (AI2 input lower limit).

23: AI3 input overlimit

The terminal outputs an “active” signal when the value of AI1 is greater than that of F09.52 (AI3 input upper limit) or less than that of F09.51 (AI3 input lower limit).

24: Frequency limited

The terminal outputs an “active” signal when the frequency reference exceeds the upper or lower limit of frequency and the output frequency of inverter reaches the upper or lower limit of frequency.

25: Torque limited

The terminal outputs an “active” signal when the output torque reaches the torque limit.

26: Frequency upper limit reach

The terminal outputs an “active” signal when the running frequency reaches the upper limit (F01.14).

27: Frequency lower limit reach (no output at stop)

The terminal outputs an “active” signal when the running frequency reaches the lower limit (F01.16). In the shutdown state, it outputs an “inactive” signal.

28: Frequency lower limit reach (output at stop)

The terminal outputs an “active” signal when the running frequency reaches the lower limit (F01.16). In the shutdown state, it also outputs an “inactive” signal.

29: Zero-speed running 1 (no output at stop)

The terminal outputs an “active” signal when the inverter is running with an output frequency of 0.00Hz. When the inverter is in shutdown state, it outputs an “inactive” signal.

30: Zero-speed running 2 (output at stop)

The terminal outputs an “active” signal when the inverter is running with an output frequency of 0.00Hz. When the inverter is in shutdown state, it also outputs an “active” signal.

31: Frequency detection FDT1 reach

The DO terminal outputs an “active” signal when the running frequency is higher than the frequency detection value. It stops outputting the “active” signal when the running frequency falls below the result of the detection value minus the frequency detection hysteresis (which is calculated by multiplying F09.31 by F09.30).

32: Frequency detection FDT2 reach

The DO terminal outputs an “active” signal when the running frequency is higher than the frequency detection value. It stops outputting the “active” signal when the running frequency falls below the result of the detection value minus the frequency detection hysteresis (which is calculated by multiplying F09.33 by F09.32).

33: Frequency reference reach

The DO will output the "effective" signal when the run frequency of the frequency converter is within a certain range of the target frequency (the product of the target frequency ± F09.38 set value, and the maximum frequency).

The DO terminal outputs an “active” signal when the running frequency of the inverter is within a particular range (target frequency ± F09.38 × maximum frequency).

34: Any frequency 1 reach

The DO terminal outputs an “active” signal when the running frequency of the inverter is within the frequency detection range specified by F09.34 (detection value 1 for frequency reach). Frequency detection range: F09.34-F09.35×F01.12 (maximum frequency) - 09.34+ F09.35×F01.12.

35: Any frequency 2 reach

The DO terminal outputs an “active” signal when the running frequency of the inverter is within the frequency detection range specified by F09.36 (detection value 2 for frequency reach). Frequency detection range: F09.36-F09.37×F01.12 (maximum frequency) - 09.36+ F09.37×F01.12.

36: Any current 1 reach

The DO terminal outputs an “active” signal when the output current of the inverter is within the range specified by F09.39 (current 1 reach). Current detection range: F09.39-F09.40×F03.04 (motor rated current) - F09.39+ F09.40×F03.04.

37: Any current 2 reach

The DO terminal outputs an “active” signal when the output current of the inverter is within the range specified by F09.41 (current 2 reach). Current detection range: F09.41- F09.42×F03.04 (motor rated current) - F09.41+ F09.42×F03.04.

38: Zero current state

The DO terminal outputs an “active” signal when the output current of the inverter remains in the zero current range for a period longer than the duration set through F09.44 (Zero current detection delay). Zero current detection range: 0- F09.43×F03.04.

39: Output overcurrent

The DO terminal outputs an “active” signal when the output current of the inverter remains higher than the value of F09.45 (output overcurrent threshold) for a period longer than the duration set through F09.46 (output overcurrent detection delay).

40: Inverter overtemperature pre-alarm

The terminal outputs an “active” signal when the Heatsink 1 temperature (F82.09) reaches the value of F10.30 (Inverter overtemperature pre-alarm threshold).

41: Inverter overload pre-alarm

Before overload protection, the terminal outputs an “active” signal when the pre-alarm threshold is exceeded after judging the value of F10.29 inverter overload pre-alarm coefficient.

42: Motor overtemperature pre-alarm

The terminal outputs an “active” signal when F82.32 Motor temperature reaches F03.49 Motor overtemperature pre-alarm threshold.

43: Motor overload pre-alarm

Before overload protection, the terminal outputs an “active” signal when the pre-alarm threshold is exceeded after judging the value of F03.45 Motor overload pre-alarm coefficient.

44: Inverter in load protection 1

The terminal outputs an “active” signal when the load is too small or too large.

45: Inverter in load protection 2 (Reserved)

The terminal outputs an “active” signal when the load is too small or too large.

46: Position lock succeeds

The terminal outputs an “active” signal when the position lock succeeds.

47: Brake output

The terminal outputs an “active” signal when the brake opening command is enabled and outputs an “inactive” signal when the brake closing command is enabled. The brake is closed by default.

48: Communication

Whether the terminal outputs an “active” or “inactive” signal is set by the value of the communication address 0x200B.

7.30 AO/HDO Terminal Function Description

Function code	Definition of Functions	Function scope
1	Running frequency	0- maximum output frequency
2	Frequency reference	0- maximum output frequency
3	Ramp frequency	0- maximum output frequency
4	Motor speed	0-rated motor speed
5	Bus voltage	0.0-1000.0V
6	Output voltage	0-1.2 times of motor rated voltage
7	Output voltage (100.0% for 1,000.0V)	0.0-1000.0V
8	Output current	0-2 times of motor rated current
9	Output current (100.0% for 1,000.0A)	0.0-1000.0A
10	Torque current	0-3 times of motor rated voltage
11	Excitation current	0-3 times of motor rated voltage
12	Output power	0-2 times of motor rated power
13	Output torque (absolute value)	0-2 times of motor rated torque
14	Output torque (actual value)	-2 times of motor rated torque-2 times of motor rated torque
15	AI1	0-10V
16	AI2	0-10V
17	AI3	0-10V
18	Pulse input	0.01-100.00kHz
19	Count Value	0-reference count value
20	Length value	0-referernce length
21	PID setting	0.00-100.00%
22	PID feedback	0.00-100.00%
23	Communication settings	0H-7FFFH

--End of the chapter--

Fault code	Fault name	Fault cause	Troubleshooting
E01	IGBT fault	The IGBT inside the inverter is damaged.	Power off the inverter first and then power on. If the fault still exists, please contact the service for maintenance.
		The AC output of the inverter is short-circuited.	Check whether the output cable or motor is short-circuited.
E04	Overcurrent during acceleration	The output circuit is grounded or shorted.	Eliminate peripheral faults and detect if there is short or open circuit in the motor.
		CLVC or OLVC is adopted without parameter identification	Set motor parameters according to the nameplate and identify them.
		The rapid deceleration time is set too short	Increase the deceleration time.
		Inappropriate overcurrent suppression parameters	1. Confirm that overcurrent suppression is enabled through “F05.19: Overcurrent suppression enable”. 2. Adjust the action current between 120% and 150% through “F05.20: Overcurrent suppression action current”. 3. Adjust the overcurrent suppression gain between 20 and 40 through “F05.21: Overcurrent suppression gain”.
		The value of torque boost or V/F curve in “F05 Group: V/F Control Parameters” is set inappropriate.	Adjust the value of torque boost or V/F curve.
		The rotating motor is started up.	Select the speed tracking start mode or wait for the motor to stop before starting up.
		External interference	Based on historical faults, if the current value is far below the overcurrent threshold, locate the interference source. Otherwise, inspect the drive board or Hall component.
E05	Overcurrent during deceleration	The output circuit is grounded or shorted.	Eliminate peripheral faults and detect if there is short or open circuit in the motor.
		CLVC or OLVC is adopted without motor parameters auto-tuning.	Set motor parameters according to the nameplate and perform parameters auto-tuning.
		The rapid deceleration time is set too short.	Increase the deceleration time.
		Inappropriate overcurrent suppression parameters	1. Confirm that overcurrent suppression is enabled through “F05.19: Overcurrent suppression enable”. 2. Adjust the action current between 120% and 150% through “F05.20: Overcurrent suppression action current”. 3. Adjust the overcurrent suppression gain between 20 and

Fault code	Fault name	Fault cause	Troubleshooting
			40 through “F05.21: Overcurrent suppression gain”.
		No brake unit and brake resistor	Install brake unit and brake resistor.
		Affected by external interference	Based on historical faults, if the current value is far below the overcurrent threshold, locate the interference source. Otherwise, inspect the driver board or Hall component.
E06	Overcurrent during operation at constant speed	The output circuit grounded is or shorted	Eliminate peripheral faults and detect if there is short or open circuit in the motor.
		No parameter auto-tuning in CLVC or OLVC mode	Set motor parameters according to the nameplate and identify them.
		Inappropriate overcurrent suppression parameters setting	1. Confirm that overcurrent suppression is enabled through “F05.19: Overcurrent suppression enable”. 2. Adjust the action current between 120% and 150% through “F05.20: Overcurrent suppression action current”. 3. Adjust the overcurrent suppression gain between 20 and 40 through “F05.21: Overcurrent suppression gain”.
		Inadequate power rating of the inverter	In stable operation, if the operating current has exceeded the rated current of the motor or the rated output current of the inverter, replace the inverter with higher power rating.
		External interference	Based on historical faults, if the current value is far below the overcurrent threshold, locate the interference source. Otherwise, inspect the drive board or Hall component.
E07	Overvoltage during acceleration	Inappropriate overvoltage suppression parameters setting	1. Confirm that overvoltage suppression is enabled through “F10.07: Overvoltage suppression enable”. 2. Adjust the action voltage between 650V and 770V through “F10.08: Overvoltage suppression action voltage”. 3. Adjust the overvoltage suppression gain between 50 and 150 through “F10.09: Overcurrent suppression gain”.
		High input voltage	Adjust the voltage to the normal range.
		The motor is driven by an external force during acceleration.	Eliminate the external force or install a brake resistor.
		Short acceleration time	Increase the acceleration time.
		Brake unit and brake resistor not installed	Install a brake unit and brake resistor.

Fault code	Fault name	Fault cause	Troubleshooting
E08	Overvoltage during deceleration	Inappropriate overvoltage suppression parameters setting	1. Confirm that overvoltage suppression is enabled through "F10.07: Overvoltage suppression enable". 2. Adjust the action voltage between 650V and 770V through "F10.08: Overvoltage suppression action voltage". 3. Adjust the overvoltage suppression gain between 50 and 150 through "F10.09: Overcurrent suppression gain".
		High input voltage	Adjust the voltage to the normal range.
		The motor is driven by an external force during deceleration.	Eliminate the external force or install a brake resistor.
		Short deceleration time	Increase the deceleration time.
		Brake unit and brake resistor not installed	Install a brake unit and brake resistor.
E09	Overvoltage during operation at constant speed	Inappropriate overvoltage suppression parameters setting	1. Confirm that overvoltage suppression is enabled through "F10.07: Overvoltage suppression enable". 2. Adjust the action voltage between 650V and 770V through "F10.08: Overvoltage suppression action voltage". 3. Adjust the overvoltage suppression gain between 50 and 150 through "F10.09: Overcurrent suppression gain".
		The motor is driven by an external force during operation.	Eliminate the external force or install a brake resistor.
E10	Bus undervoltage	Instantaneous power outage	Enable undervoltage suppression through "F10.10: Undervoltage suppression function" to avoid instantaneous power outage.
		Input voltage of the inverter not in the specified range	Adjust the voltage to the normal range.
		Abnormal bus voltage	Seek technical support.
		Rectifier bridge, buffer resistor, drive board or control board exception	Seek technical support.
E11	Inverter overload	Excessive load or locked-rotor	Reduce the load, and check the motor and mechanical condition.
		Inadequate power rating of the inverter	Replace the inverter with one of higher power rating.
E12	Motor overload	Inappropriate overload protection parameter	Set correct overload protection parameter.
		Excessive load or locked-rotor	Reduce the load, and check the motor and the mechanical condition.
E13	Reversed		
E14	Input phase loss	Abnormal three-phase input power supply	Check and eliminate the problems in the peripheral circuit.
		Drive board, surging protection board, main control board or	Seek technical support.

Fault code	Fault name	Fault cause	Troubleshooting
		rectifier bridge exception	
E15	Output phase loss	Motor fault	Check whether open circuit occurs on the motor.
		Abnormal lead from the inverter to the motor	Eliminate peripheral faults.
		Unbalanced three-phase output of the inverter during motor operation	Check if the three-phase winding of the motor is normal. If not, eliminate the fault
		Drive board and IGBT exception	Seek technical support.
E16	Rectifier module overheating (reserved)	The ambient temperature is too high.	Reduce the ambient temperature.
		The air filter is blocked.	Clean the air filter.
		The fan is damaged.	Replace the fan.
		The thermistor is damaged.	Seek the manufacturer's service.
		The rectifier module is damaged.	Seek the manufacturer's service.
E17	Inverter unit overheating	The ambient temperature is too high.	Reduce the ambient temperature.
		The air filter is blocked.	Clean the air filter.
		The fan is damaged.	Replace the fan.
		The thermistor is damaged.	Seek the manufacturer’s service.
		The inverter module is damaged.	Seek the manufacturer’s service.
E18	Contactor fault	Drive board and power supply exception	Seek the manufacturer’s service.
		Contactor exception	Seek the manufacturer’s service.
E19	Current detection fault	Hall component exception	Seek the manufacturer’s service.
		Drive board exception	Seek the manufacturer’s service.
E20	Brake unit fault	The IGBT of the brake unit is damaged.	Replace the brake unit.
		The external brake resistor port is short-circuited or the impedance is abnormal.	Check whether the braking resistor is correctly wired. Check whether the resistance is normal (the resistance may be smaller than the normal value due to resistor failure or unrecommended resistor model). Connect the resistor to the unit again or replace the resistor.
E21	Reserved		
E22	Short-to-ground fault 1	Motor short-to-ground	Replace the cable or motor.
E23	Short-to-ground fault 2	Motor short-to-ground	Replace the cable or motor.
E24	Excessive speed deviation	Incorrect encoder parameters setting	Set the encoder parameters correctly.
		Parameter auto-tuning not performed	Perform motor parameter auto-tuning.

Fault code	Fault name	Fault cause	Troubleshooting
		Inappropriate setting of F10.27 and F10.28	Set F10.27 and F10.28 according to the actual situation.
E25	Motor overspeed	Incorrect encoder parameters setting	Set the encoder parameter correctly.
		Parameter auto-tuning not performed	Perform motor parameter auto-tuning.
		Inappropriate setting of F10.25 and F10.26	Set F10.25 and F10.26 according to the actual situation.
E26	Motor overtemperature	Loose wiring of temperature sensor	Detect the wiring and eliminate the fault.
		motor temperature too high	Increase the carrier frequency or take other heat dissipation measures.
E27	Locked-rotor (reserved)	The rotor of the motor is locked.	Check whether the motor works normally. Check whether the brake device is faulty. Check whether the motor load is excessive.
		The value of torque boost under VF torque control mode is set too large.	Decrease the value of torque boost percentage under VF torque control mode.
E28	Reserved		
E29	Motor auto-tuning fault	Motor parameters not set as per the nameplate	Set the parameters according to the nameplate.
		Parameter auto-tuning timeout	Check the lead from the inverter to the motor.
		Encoder exception	Check if the encoder PPR is set correctly and if the connection of signal wires is correct and reliable.
E30	Initial position auto-tuning fault	The permanent magnet synchronous motor has been degaussed.	Replace the motor permanent magnet.
E31	Reserved		
E32	Motor encoder fault	Unsuitable encoder model	Set the encoder type correctly according to the actual situation.
		Encoder wiring error	Check the wiring.
		Encoder damage	Replace the encoder.
		Encoder card exception	Replace the encoder card.
E33	Load protection 1	Load too small or too large	Check the load and the load protection detection value.
E34	Load protection 2 (reserved)	Load too small or too large	Check the load and the load protection detection value.
E35	Slave failure in master-slave control	Slave fault	Inspect the slave according to its fault code.
E36	Accumulative running time reach	The accumulative running time reaches the set value.	Clear the fault record through “F08.03: Parameter initialization”.
E37	Accumulative power-on time reach	The accumulated power-on time reaches the set value.	Clear the fault record through “F08.03: Parameter initialization”.
E38	PID feedback loss	PID feedback is less than the value of F11.28	Check the PID feedback signal or set F11.28 properly.
E39	User-defined fault 1	The user-defined fault 1 signal is input through the multifunctional terminal DI.	Reset for operation.

Fault code	Fault name	Fault cause	Troubleshooting
		The user-defined fault 1 signal is input through virtual IO.	
E40	User-defined fault 2	The user-defined fault 2 signal is input through the multifunctional terminal DI.	Reset for operation.
		The user-defined fault 2 signal is input through virtual IO.	
E42	External fault (NO)	The external NO fault signal is input through the multifunctional terminal DI.	Eliminate the external faults, confirm that “F02.41: Restart upon power failure” is enabled and reset for operation.
		The external NO fault signal is input through virtual IO.	
E43	External fault (NC)	The external NC fault signal is input through the multifunctional terminal DI.	Confirm that “F40 group: Virtual IO Parameters” are set correctly and reset for operation.
		The external NC fault signal is input through virtual IO.	
E44	Temperature detection exception	The wiring for temperature detection is disconnected.	Check the temperature sensor wire.
		The temperature is too low (below -40℃).	The temperature is too low for the inverter to operate.
E65	AI fault 1	AI input signal exception (current input, with the value greater than 25mA).	Check the load and replace it if needed.
		Control board damage	Replace the control board.
E69	AO fault 1	Unsuitable load impedance; output current greater than 20mA	Check the load and replace it if needed.
		Control board damage	Replace the control board.
E82	Parameter storage fault	Memory damage	Seek the manufacturer's service.
E85	Modbus communication timeout	The host controller works abnormally.	Check the host controller.
		Communication cable connection exception	Check the communication cable connection.
		Incorrect setting of F01.27	Set the communication protocol correctly.
		Incorrect setting of “F60 Group: Modbus Communication Parameters”	Set the communication parameters correctly.
		If the faults still exist after the above inspection, try to restore the factory settings.	
E86	Master-slave communication timeout	The host controller works abnormally.	Check the host controller.
		Communication cable connection exception	Check the communication cable connection.
		Incorrect setting of F01.27	Set the communication protocol correctly.
		Incorrect setting of “F61 Group: Master-Slave Communication Parameters”	Set the communication parameters correctly.
		If the faults still exist after the above inspection, try to restore the factory settings.	
E87	Fieldbus communication timeout	The host controller works abnormally.	Check the host controller.
		Communication cable connection exception	Check the communication cable connection.

Fault code	Fault name	Fault cause	Troubleshooting
		Incorrect setting of F01.27	Set the communication protocol (F01.27) correctly.
		Incorrect setting of “F63 Group: Fieldbus Communication Module Configuration Parameters”	Set the communication parameters correctly.
		If the faults still exist after the above inspection, try to restore the factory settings.	
E88	Fieldbus expansion card fault	The firmware version is 0.	Replace the fieldbus expansion card.
E90	I/O expansion card fault	I/O expansion card communication fault	Replace the I/O expansion card.

--End of the chapter -

9.1 Daily Maintenance

Component aging, potential fault or service life reduction of the inverter will occur due to the influence of ambient temperature, humidity, dust and vibration, so it is necessary to maintain it.

Daily cleaning:

- Keep the inverter clean.
- Effectively protect the inverter inside from dust, especially metal dust.
- Effectively clean oil stains on the cooling fan.

9.2 Regular Inspection

Users are supposed to inspect the inverter regularly based on the use condition to eliminate faults and safety hazards. Before inspection, please note that the input and output power supplies should be reliably disconnected and wait for the discharging time indicated on the cover plate. The inspection contents are shown as follows:

Table 9-1 Inspection methods

Part		Items	Method	Criteria
Surroundings		Ambient temperature, humidity, vibration, air (whether there is dust, gas, oil mist, water droplet, etc.)	Visual inspection and measuring with relevant instruments	Meet the installation environment requirements.
		Check whether there are such foreign objects as tools.	Visual inspection	No tools and other foreign objects
Voltage		Check whether the voltage of main circuit and control circuit is normal.	Measure with relevant instruments.	Meet technical specifications.
Structural component (check after power-off)		Check whether there is abnormal sound or vibration.	Inspection by eyes and ears	Normal
		Check whether the bolts are loosened.	Tightening	Normal
		Check whether there is deformation or damage.	Observing	Normal
		Check whether discoloration occurs due to overheating.	Observing	Normal
		Check whether there is dirt or dust attached.	Observing	Normal
Main circuit	General (check after power-off)	Check for loosened or dropping bolts.	Tightening	Normal
		Check whether the equipment and insulation are deformed, cracked, damaged, or discolored due to overheating or deterioration.	Visual inspection	Normal
		Check whether the conductor is attached with dirt and dust.	Visual inspection	Normal
	Conductor, wires (check after power-off)	Check whether the conductor is discolored or skewed due to overheating.	Visual inspection	Normal
		Check whether the exterior of the wire is damaged, cracked and discolored.	Visual inspection	Normal
	Terminal board (check after power-off)	Check whether it is damaged.	Visual inspection	Normal
	Braking resistor (check after	Check whether there is strange smell or insulation damage due to overheating.	Inspection by eyes and nose	Normal

Part		Items	Method	Criteria
	power-off)	Check whether it is disconnected.	Visual inspection, or disconnect one side to measure with a tester	Within ± 10% of the nominal resistance value
	Transformer, reactor	Check for abnormal vibration and strange smell.	Inspection by eyes, ears and nose	Normal
	Electromagnetic contactor, relay	Check for crackling sound during operation.	Auditory sensation	Normal
		Check whether the contact is abnormal.	Inspection by ears	Normal
Cooling System	Cooling fan	Check for loosened bolts.	Tightening	Normal
		Check for discoloration due to overheating.	Visual inspection	Normal
		Check for abnormal sound or vibration.	Inspect by eyes and ears and rotate it with hands (the power supply must be turned off).	Rotate smoothly.
	Ventilating duct (check after power-off)	Check whether the radiator and inlet are blocked, and whether there are foreign objects attached.	Visual inspection	Normal

9.3 Replacement of Quick-Wear Parts

Regularly maintain or replace the electronic components inside to keep the inverter normally operating.

Replacement of electrolytic capacitor: Do not replace the electrolytic capacitor without our permission for it is related to the internal components. Please contact Hopewind.

The service life of the inverter is related to its operating environment and operating condition.

The recommended replacing time for quick-wear parts is shown in the table below:

Table 9-2 Replaced parts and replacing cycle

Quick-wear parts	Service life	Causes of damage	Criteria
Fan	2 ~ 3 years	Bearing wear, blade aging	● Whether there are cracks in blades or other parts; ● Whether there is any abnormal vibration sound during startup; ● Whether the fan runs after power-on
Electrolytic capacitor	4 ~ 5 years	Poor input power supply; High ambient temperature; Increasing ripple current caused by frequent load leap; Electrolyte aging	● Whether there is any liquid leakage; ● Whether the safety valve has protruded; ● Measured electrostatic capacitance; ● Measured insulation resistance

9.4 Storage of Inverter

After purchasing an inverter, pay attention to the following points for short-term storage and long-term storage:

- Pack the inverter with Hopewind's package box as original for storage.
- The inverter cannot be exposed to moisture, high temperature or sunlight for a long time.
- Before installation after long-term storage, reprocess the capacitor first. Note that the storage time starts from the ex-work date instead of the purchase date. The requirements for reprocessing are shown in the table below:

Table 9-3 Processing methods

Storage time	Required operations	Preparation time
< 6 months	No need to reprocess	No need to prepare
6 months ~ 2 years	Apply the supply voltage to the inverter for 1 hour before issuing the operation command.	1 hour
> 2 years	Increase the voltage with a voltage regulating power supply to power on the inverter.	2 hours

9.5 Precautions for Inverter Disposal

NOTE

When disposing the inverter, please pay attention to:

- Electrolytic capacitor: The electrolytic capacitor of the main circuit and the capacitor on the printed board may explode during incineration.
  Plastics: The plastic parts will produce toxic gas during incineration.
- Disposal methods: Please dispose it as industrial waste.

--End of the chapter--

10.1 Appendix I: Optional Components

Model	Name	Function
HVLED	External LED keypad	The external keypad, including a mounting base, allows users to set, view, and copy parameters.
HVCOM-USB	Communication adapter	High-speed communication between the background quick-commissioning software hopeInsight and the computer can be achieved with this adapter.
HVIO-01	I/O terminal expansion card	Provide 3 digital inputs, 1 digital output, 1 analog input (-10V~10V), 2 analog outputs (0~10V/0~20mA), 1 temperature sampling (PT100, PT1000, KTY84), and 1 relay output.
HVPG-ABZ-01	Incremental photoelectric encoder expansion card	Support wiring of the ABZ incremental encoder.
HVPG-ROT	Rotary photoelectric encoder expansion card	Support wiring of the resolver encoder.
HVCOM-DP-H	Profibus-DP communication card	Support Profibus-DP bus communication.
HVCOM-PN-H	Profinet communication card	Support Profinet IO bus communication.
HVCOM-CA	CANopen communication card	Support CANopen bus communication.
HVCOM-TP-H	Modbus TCP/IP communication card	Support Modbus TCP/IP communication.
HVCOM-EC-H	EtherCAT communication card	Support EtherCAT communication.
HVCOM-EN-H	EtherNet/IP communication card	Support EtherNet/IP communication.

📖 Note: HV350 series is equipped with Modbus-RTU communication interface as standard.

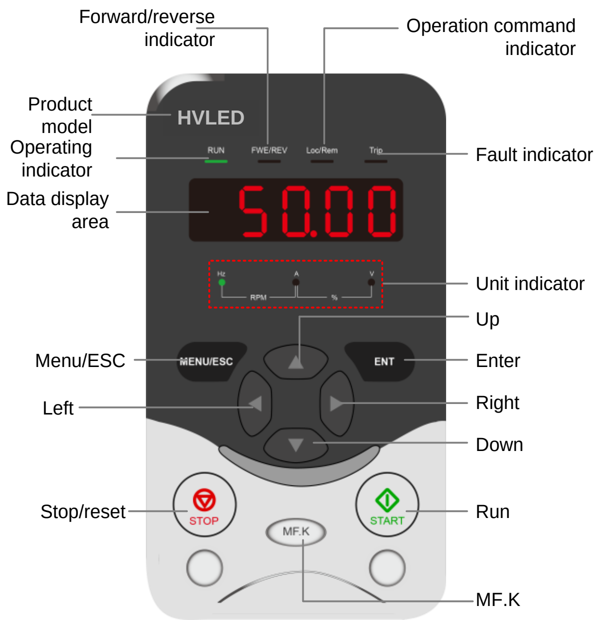
10.2 Appendix II: HVLED Remote Keypad Manual

10.2.1 Product Description

HVLED remote LED keypad can connect HV350 series inverters with a network cable.

This optional component can be connected to the inverter through standard RJ45 communication wire (maximum 50 meters). It can support parameters setting and monitoring, operation status check, fault and alarm check, startup, shutdown and jog of the inverter.

10.2.1.1 Appearance and Key



10.2.1.2 Key Functions

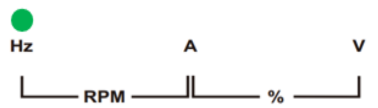
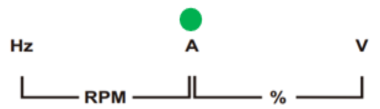
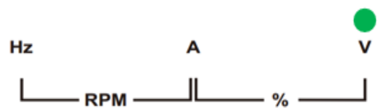
Key	Description
MENU/ESC	To view the menu/to return to the last step
ENTER	To confirm
△	To increase the value progressively
▽	To decrease the value progressively
◁	To move to the left
▷	To move to the right
STOP	To turn off the inverter or reset
START	To operate
MF.K	To set different functions by function codes

10.2.1.3 MF.K

The functions of the MF.K key can be selected via "F08.08 Keypad MF.K key function". It can support the switch between the command channel, operation direction or menu mode of the inverter as well as the forward and reverse jog.

Parameter	Function	Factory value	Setting scope	Description
F08.08	MF.K	5	0: Disabled	This key is disabled
			1: Command channel switchover	1. When F01.03 Command source is set to 0: Keypad, command sources cannot be switched. 2. When F01.03 is set to 1: Terminal, command sources can be switched over between terminal and keypad. 3. When F01.03 is set to 2: Communication, command sources can be switched over between communication and keypad.
			2: Switchover between forward and reverse run	This parameter is used to switch the direction of the frequency command. It is enabled only when the command source is the keypad.
			3: Forward jog	This parameter is only enabled when the command source is the keypad.
			4: Reverse jog	This parameter is only enabled when the command source is the keypad.
			5: Menu mode switchover	This parameter is used for switchover among three menu modes.

10.2.1.4 Indicators

Name	Status	Description
RUN Operating indicator	Off	Shutdown
	On	Operation
	Blinking	Ready for operation
FWD/REV Forward/reverse run indicator	Off	Forward run
	On	Reverse run
	Blinking	1. Switchover between forward and reverse run (speed control) 2. Motor dragged to operate reversely (torque control)
LOC/REM Local/remote indicator	Off	Keypad control
	On	Terminal control
	Blinking	Communication control
TRIP Fault indicator	Off	Normal status
	On	Fault status
	Blinking	Alarm status
		Frequency unit: Hz
		Current unit: A
		Voltage unit: V

	Speed unit: RPM
	Percentage: %

10.2.1.5 LED Display Correspondence Table

The data display area is equipped with a five-digit LED digital tube, which can show such parameters as set frequency, function codes, monitoring data and fault codes.

LED display	Actual value	LED display	Actual value	LED display	Actual value	LED display	Actual value
	0		6		C		N
	1		7		c		P
	2		8		D		R
	3		9		E		T
	4		A		F		U
	5/S		B		L		u/v
	H		W		G		-

10.2.1.6 Special LED Characters

1) Power-on: The digital tube shows -H-W- and the indicators are all on.
2) Fault/alarm: The digital tube displays Exx or Axx. The indicator is always on when there is an alarm. The indicator blinks rapidly when there is a fault. When the alarm and fault occur at the same time, the fault is indicated first. On the home, the fault codes and alarm codes can be displayed by pressing ◁ or ▷.
3) Motor parameters auto-tuning: The digital tube shows TUNE.
4) Power-off: The digital tube shows P.oFF.
5) Version No.: The digital tube shows prefix v, b, d.
6) Hexadecimal: The digital tube shows prefix H.
7) For Level-3 menu, add 0 in the front if the digit of parameter display value is less than 5. However, this rule is not suitable for the read-only parameter group or other menus.

10.2.1.7 LED Blinking

The LED digital tube blinks once per second in the following states:

1) On Level-0 menu (the home page), the digital tube blinks to show shutdown parameters.
2) The digital tube blinks to show the position of the shift key, where the writable parameters of Level-1 menu, Level-2 menu and Level-3 menu are being modified.
3) The digital tube blinks when the tens place of “F08.06: keypad display self-inspection” is set to “1: Enabled”.

10.2.2 Product Installation

10.2.2.1 Installing Base

Main function of the base:

- It can be used to fix the keypad.
- The base is equipped with 3 RJ45 ports as adapters.

The base is usually fixed to the drive product shell. Some drive models are installed with the bases before ex-work. Base size:

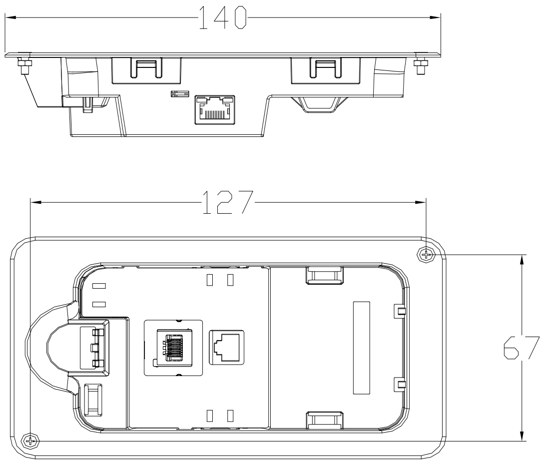


Figure 10-1 Base size (mm)

If the base is to be mounted on the surface of other equipment, please drill holes according to the diagram below to fix the base.

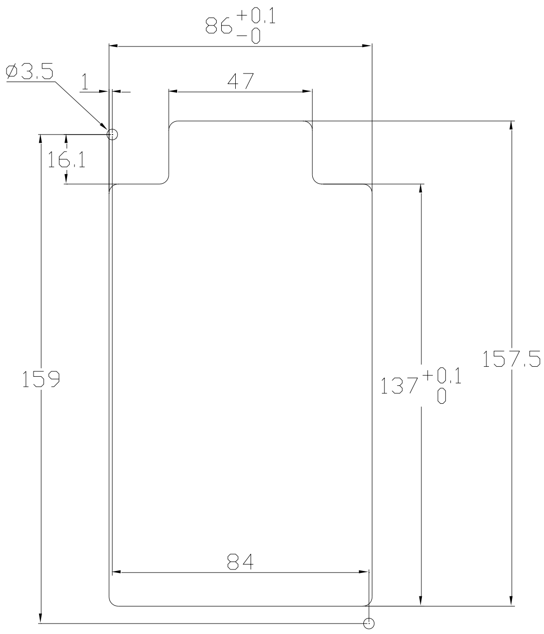


Figure 10-2 Base holes

Fix the base to the product shell with screws, as shown in the figure below.

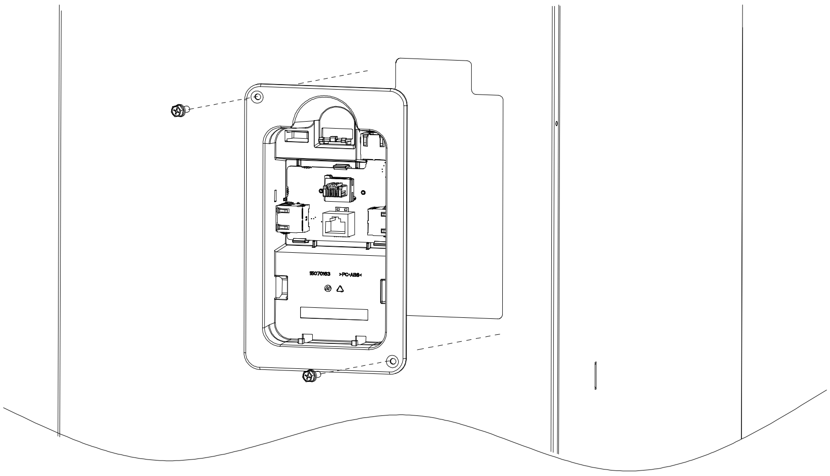


Figure 10-3 Base mounting

10.2.2.2 Installing Remote Keypad

The remote keypad is fixed to the base by the clips on the back. When installing, please ensure that the RJ45 port on the back of the keypad is in the same direction as the RJ45 port on the base.

1) Align the RJ45 port with the RJ45 port. Press the keypad into the base until the keypad is fixed by the clips. The installation diagram is shown below.

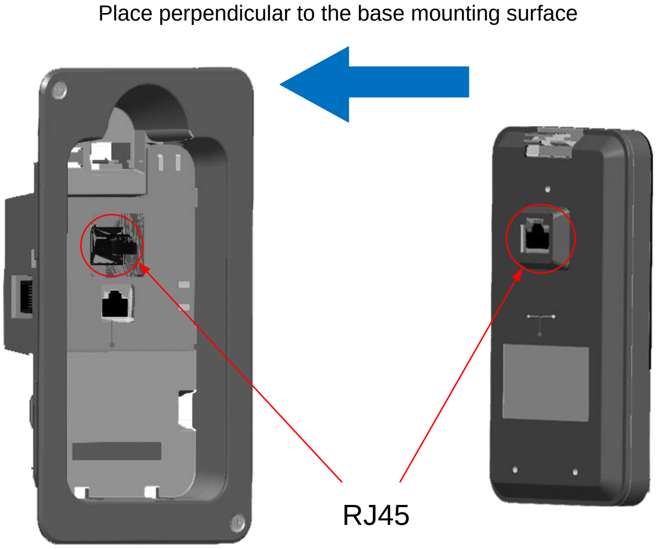


Figure 10-4 Installation

2) The base is configured with 3 RJ45 network ports. After the remote keypad is fixed in the base, connect the RJ45 network port of the inverter control panel to any RJ45 network port of the base through network wire.

10.2.2.3 Removing Remote Keypad

When removing the keypad, press the tabs on the top of the keypad until the keypad comes loose and then remove it horizontally. The position of the tabs is shown in the figure below.

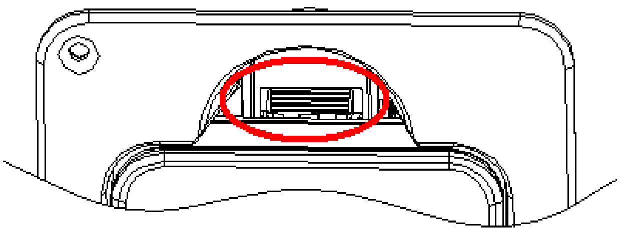


Figure 10-5 Position of the tabs

CAUTION

The keypad inside should be protected from liquids, dust and debris as they may cause short circuit.
Do not press the keypad LCD screen heavily during operation to avoid screen and interface damage.

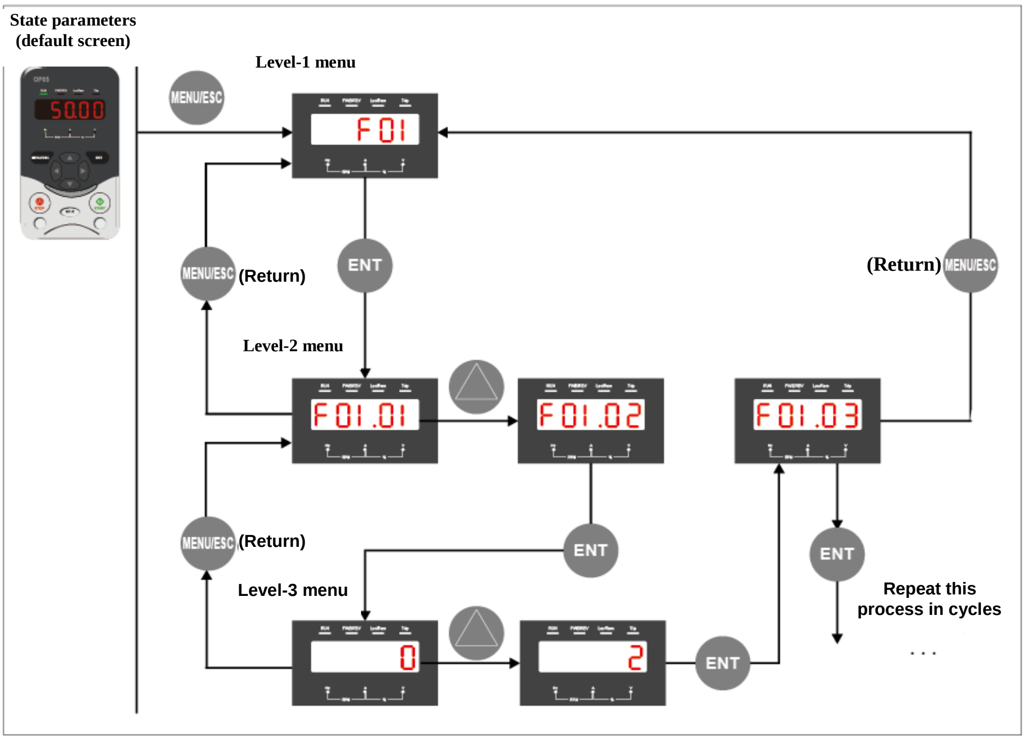
10.2.3 Operation Instructions

10.2.3.1 Viewing and Modifying Parameters

The keypad of HV350 inverter is adopted with a 3-level menu for parameter settings. The menu is as follows:

Home → **Function parameter group (Level-1 menu)** → **Parameter (Level-2 menu)** → **Parameter setting values (Level-3 menu)**

After entering each level of the menu, you can press the UP and DOWN keys to modify the parameters when the display digit is blinking. The operation flowchart is as follows:



10.2.3.2 Display and Operation in 32 Digits

If the parameter display value exceeds 5 digits, it can just be partly displayed on the keypad. In this case, HV350 inverter is developed to support 32-digit display. The rules of 32-bit parameter display and operation are as follows:

(1) Positive numbers: When the display value is greater than 99999, the decimal place will be automatically hidden. For example, when a parameter is 1500.00 and its display value 150000 is greater than 99999, 1 decimal place will be hidden and the display value will be 1500.0.

(2) Negative numbers: When the display value is less than -9999, the decimal place will be automatically hidden. For example, when a parameter is -1500.00 and its display value -150000 is less than -9999, 2 decimal places will be hidden and the display value will be -1500.

(3) When the display value is greater than 99999 or less than -9999, the decimal places of the parameter will be automatically hidden, and the SHIFT key acts on the lowest digit of the current display value. When the display value is less than 99999, or greater than -9999, the decimal places of will be restored automatically, and the SHIFT key acts on the lowest digit of the current display value.

10.2.3.3 Modifying Parameters through Keypad Arrow Keys

Press △ (UP key) or ▽ (DOWN key) to modify the parameters, with long-press and short-press acceptable. But this is valid only when the operation/shutdown parameters on the home page are displayed.

Short-press: Shortly press the key, and the lowest digit of the digital tube will add or subtract itself at a rate of about 10 times/second. Release the key, then parameter modification is completed after about 1 second and operation/shutdown parameters are displayed again.

Long-press: Long-press supports automatic carry according to the number of decimal places. For example, if the set frequency is 2 decimal places, press ▽ (DOWN key) for several seconds, and the lowest digit decreases 10 times at a rate of about 10 times/second. Then the next lowest digit decreases 10 times at a rate of about 6 times/second, and then the ones place decreases at a rate of about 4 times/second. Release the key and press △ (UP key) or ▽ (DOWN key) again within 1 second, and the above process will be repeated.

F08.11 UP/DOWN parameter modification provides decimal parameter settings, excluding F08 system parameter group, F42 user-customized parameter group, F99 factory parameter group and read-only parameter group. The parameter modification is only valid when the ones place of F08.10 UP/DOWN function selection is set to 4.

Ones: Reset parameters 0: Disabled 1: Digital setting 2: Terminal UP/DOWN 3: PID reference 4: F08.11 reference **Tens: Retention at power failure** 0: Non-retentive at power failure 1: Retentive at power failure **Hundreds: Reserved** **Thousands: Reserved**

F08.10 Keypad UP/DOWN function selection

10.2.3.4 Viewing Version No.

F08.20 is the product model.

F08.21 shows the product version. Enter the level-3 menu of this parameter and press the “>>” key to switch version V, B and D cyclically.

10.2.3.5 Viewing and Changing Factory Parameters

F99 Group is the factory parameters. Enter level-2 menu of “F99.01: Factory password” and press UP, DOWN or ENT key to enter the password for access.

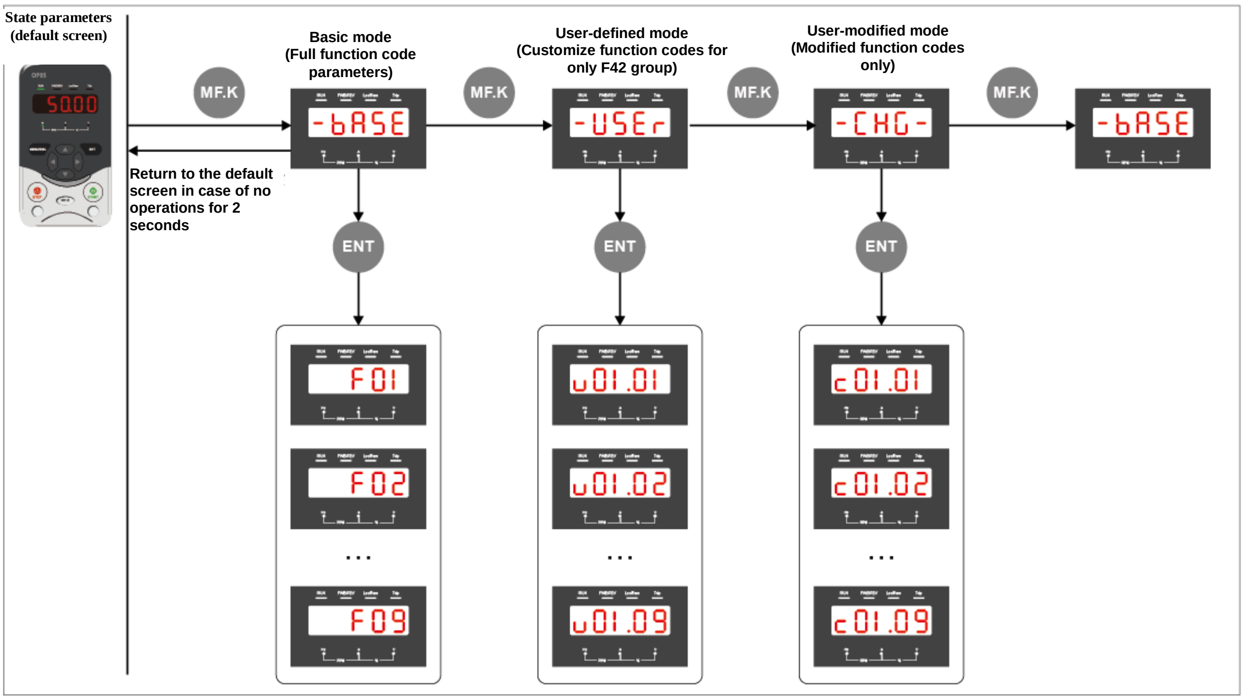
To enter the password, move to the corresponding tube through the SHIFT key, enter the password through UP and DOWN keys and press the ENTER key. If the password is correct, the factory parameter group is available. Otherwise, enter the password again.

10.2.3.6 Parameter Composition

Parameter group	Function	Description
F01~F79	Basic parameter group	Run command, frequency command, motor parameter, control mode, AIAO correction, control optimization, etc.
F80~F89	Monitoring parameter group	Inverter monitoring parameters, i.e., read-only parameters
F90~F99	Factory parameter group	Factory-related parameters not displayed by default

10.2.3.7 Viewing Parameters

The parameters of HV350 series inverters can be viewed in three modes, including the basic menu mode (default mode and all parameter groups are accessible) and two modes for quick access to parameters (i.e. user-defined menu mode and user-modified menu mode).



As for the user-defined menu above, the parameters are displayed, for example, as "u03.02", indicating the function parameter F03.02. The method for modifying parameters in the user-defined menu mode is the same as that in the basic menu mode.

The display modes and the corresponding display codes of the parameters are as follows:

Parameter display mode	Display	Description
Basic menu mode	-bASE-	Access for all parameters
User-defined menu mode	-USEr-	Access for user-defined parameters
User-modified menu mode	-CHG-	Access for all parameters that differ from factory values

1) Basic viewing mode

The standard function parameter group refers to all parameters of the inverter. And the three parameter display modes are switched via the MF.K key. For details about query or modification of the parameters, please refer to **10.2.3.1**.

2) Quick viewing mode

◆ View user-defined parameters

Press MF.K key to enter the “User-defined menu” mode and view relevant parameters. Users can customize commonly used parameters with a maximum of 36 through F14 (F14.01 to F14.36) group. If a parameter in F14 group is set to F00.00, it means that no custom parameter has been set. Press the MF.K key. If the “u.NULL” is displayed, it indicates that the user-defined menu is empty.

◆ View the user-modified parameters

Press the MF.K key on the Keypad to enter the “User-modified Menu” mode and quickly view the parameters that differ from the factory value. In the User-modified parameter group, parameters that have been modified are automatically listed by the inverter. If “c.NULL” is displayed after the MF.K key is pressed, it means that there are no parameters different from the factory values.

◆ Query of state parameters

In the shutdown or running state, press the ◁ or ▷ keys on the keypad to switch each byte of parameters F08.12, F08.13 and F08.14 to display several state parameters.

In the running state, there are 32 relevant parameters, and whether the corresponding parameter for each binary bit is displayed is determined by “F08.12: Display parameter 1 in running state” and “F08.13: Display parameter 2 in running state”. In the stopping state, there are 13 relevant parameters, and whether the corresponding parameter for each binary bit is displayed is determined by “F08.14: Display parameter 1 in shutdown state”.

The parameters in the running state can be viewed via the keypad: operating frequency, bus voltage, output voltage, output current, output power, PID setting.

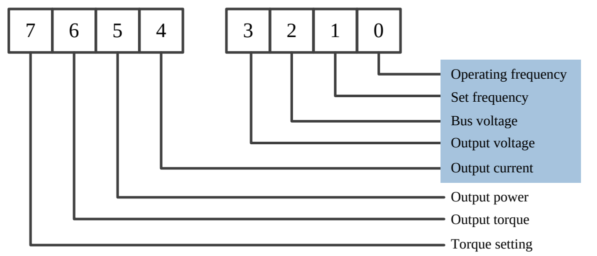
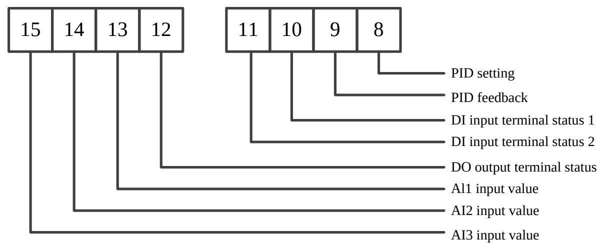
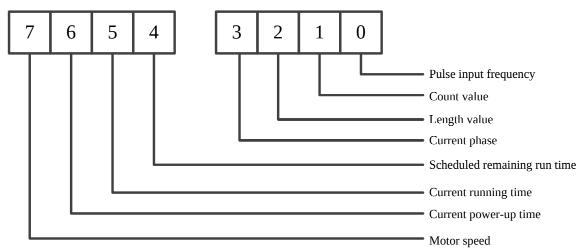
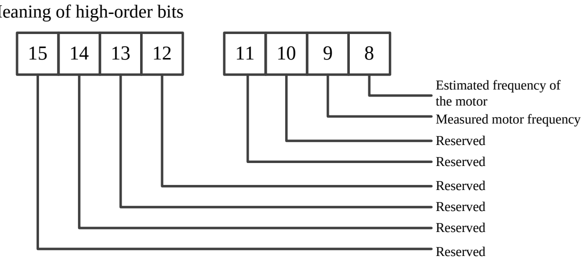
1. Set the corresponding bit to 1 according to the correspondence of each byte in parameter “F08.12: Display parameter 1 in running state” to the above parameters.

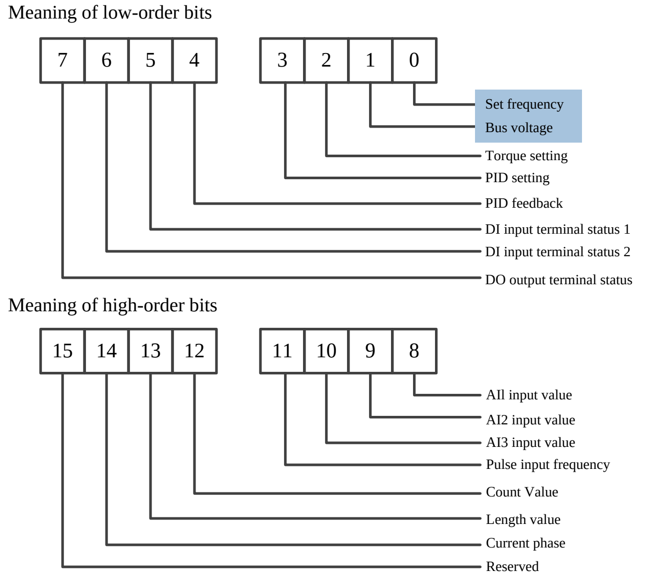
2. Set this binary number to F08.12 after converting it to hexadecimal, and the setting value on the keypad is displayed as H.001F.

3. Use the ◁ or ▷ keys on the keypad to toggle each byte of F08.12 to view the values of relevant parameters. The settings are shown in the following figure:

	High															Low
F08-12	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Hexadecimal	0				0				1				F			

The other state parameters can be viewed in the same way. The corresponding state parameters in each byte of F08.12, F08.13 and F08.14 are shown as follows:

Parameter	Function	Factory value	Setting scope	Description
F08.12	Display parameter 1 in running state	1F	0000~FFFF	If the following parameters are to be displayed during operation, set the corresponding bits to 1, convert the binary number to hexadecimal, and set it to F08.12. Meaning of low-order bits:  Meaning of high-order bits:  Note: The underlined part is the default factory display.
F08.13	Display parameter 2 in running state	33	0000~FFFF	If the following parameters are to be displayed during operation, set the corresponding bits to 1, convert the binary number to hexadecimal and set it to F08.13. Meaning of low-order bits  Meaning of high-order bits 
F08.14	Display	0	0000~FFFF	If the following parameters are to be displayed during

Parameter	Function	Factory value	Setting scope	Description
	parameter in shutdown state			shutdown, set the corresponding bits to 1, convert the binary number to hexadecimal and set it to F08.14.  Note: The underlined part is the default factory display.

10.2.3.8 Parameters and Key Lock Mode

[F08.02: Parameter and key lock]

0: No locking

All the parameters are changeable and all the keys can be used.

1: Parameters locked

All the parameters are unchangeable (except for the initial frequency reference which can be changed by pressing the △/▽ keys). Users cannot enter the parameter changing interface through the keypad, but the number of “Read only” parameters can be selected through the “>>” key. All the keys on the keypad can be used.

2: Parameters and some keys locked

All the parameters are unchangeable. Users can neither enter the parameter changing interface through the keypad nor choose the number of “Read only” parameters. Also, all keys on the keypad are locked except for MENU/RUN/STOP.

3: Parameters and all keys locked

All parameters are locked, and no parameters can be modified. All keys on the keypad except MENU are also locked.

[Unlocking]

If 0 is not set for F08.01, press the “MENU” key to display “-----”, then press the “>>/△/▽/ENT” key, and a digital tube blinks. Next, enter the password through the △/▽ keys and press the “ENT” key. If the password is correct, unlocking can be achieved.

After unlocking, the lock function will be enabled again once returning to the main interface or upon restarting after power failure.

10.2.3.9 Parameter Copy

Upload and download parameters through “F08.05: Parameter copy”.

10.2.3.10 Keypad Display Self-Inspection

In the shutdown state, the keypad conducts display self-inspection when the ones place of “F08.06: Keypad display self-inspection” is set to “1: Enabled”. During the inspection, the digital tubes and indicators are all on and off alternately for about 10s.

10.2.3.11 Keypad Priority

(1) Both built-in and external keypads enabled

Both built-in and external keypads are enabled, but shutdown/reset command is preferred.

(2) Built-in keypad enabled

The built-in keypad is enabled and the external keypad is disabled.

(3) External keypad enabled

The external keypad is enabled and the built-in keypad is disabled.

10.2.3.12 Long-Time No Key Operation

If there are no operations on keys for more than 5 min in a non-home menu, the keypad will automatically jump to the home page, which is enabled through the tens place of “F08.07: Keypad special function”.

10.2.3.13 Fault or Alarm

If a fault or alarm occurs, the keypad will automatically jump to the home page and the fault code (Exx) or alarm code (Axx) will be displayed.

10.2.3.14 Power failure

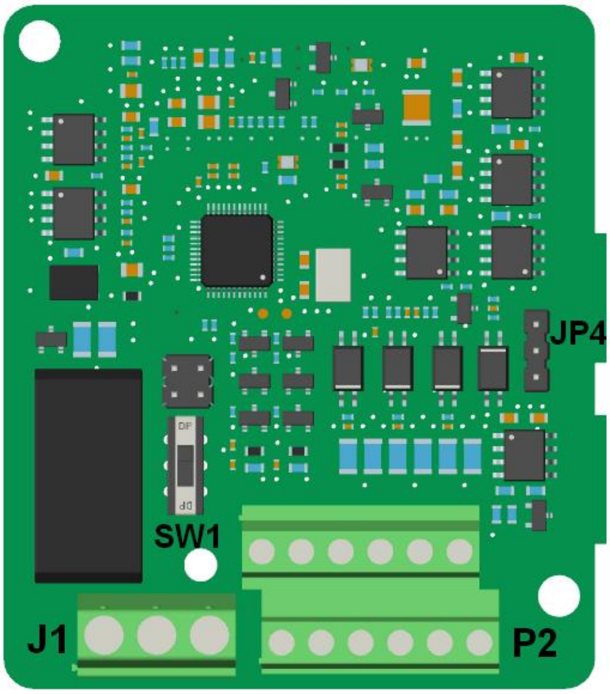
When the bus voltage falls below the threshold and the inverter is in a power-off state, the keypad will jump to the home page and “P.oFF” will be displayed with the highest priority.

10.3 Appendix III: HVIO-01 Expansion Card Manual

10.3.1 Product Introduction

The HVIO-01 expansion card is a multifunctional I/O expansion card suitable for HV350 series models. It can add 3-channel DIs, 1-channel DO, 1-channel AI or 1-channel motor temperature detection (PT100/PT1000), 2-channel AOs and 1-channel relay output.

10.3.2 Appearance and Interface



AI3+	DI6	DI7	DI8	DCOM	DO3

J1

2A	2B	2C

AI3-	AGND	AO2	AO3	DGND	24V

P2

Figure 10-6 Interfaces of the HVIO-01 expansion card

10.3.2.1 Terminal Functions

Interface type	Quantity	Specifications	Remarks
24V power supply interface	1	Output voltage: 24 V Maximum output current: 100 mA	Provide +24V supply as the power supply of digital input/output terminal operation and circumscribed sensor.
DO interface	1	**Open collector output** Output voltage range: 0 V - 24 V Current load capacity: 50 mA Output delay: 50 μs	---
DI interface	3	Supporting both sourcing and sinking input Input high level: 10~30V Input low level: 0~5V Typical input impedance: 2.4 kΩ Hardware filter time: 0.05ms Software filter time: 500ms max	---

Interface type	Quantity	Specifications	Remarks
AI interface	1	**Voltage mode** Input voltage range: -10 VDC to 10 VDC Input impedance: 124 kΩ Hardware filter time: 0.25ms Software filter time: 10s max **Temperature sensor mode** PT100 and PT1000 supported Temperature detection range: -40°C~200°C	The input mode is determined through DIP switch SW1 and the two modes cannot be used at the same time.
AO interface	2	**Voltage mode** Output voltage range: 0~10V Load capacity: 10mA Short-circuit Protection **Current mode** Output current range: 0~20mA Load capacity: 500Ω	Switchover between the two modes are realized through F07.33.
Relay output interface	1	Contact current load capacity: 3A Contact voltage: 250V AC/30V DC Mechanical life: 100,000 times	---

10.3.2.2 Jumpers and DIP Switch

The functions of the jumpers and DIP switch on I/O expansion card can be selected according to the table below.

Terminal label	Terminal name	Function
JP4	DI input type selection	It can be configured as open collector NPN or PNP input. When 24V and DCOM are connected on the jumper cap, it serves as open collector NPN input. When DCOM and DGND are connected on the jumper cap, it serves as open collector PNP input. DCOM and DGND on the jumper cap are short-circuited before ex-work.
SW1	AI3, PT100/PT1000 function selection	When the switch is put to silkscreen “AI”, AI3 is selected as the input terminal. When it is put to silkscreen “TEMP”, PT100/PT1000 is selected as the input terminal with the probe set through F03.47. The switch is put to “AI” before ex-work.

Note: The AO output type (voltage/current output) is set by F07.37 of the control board.

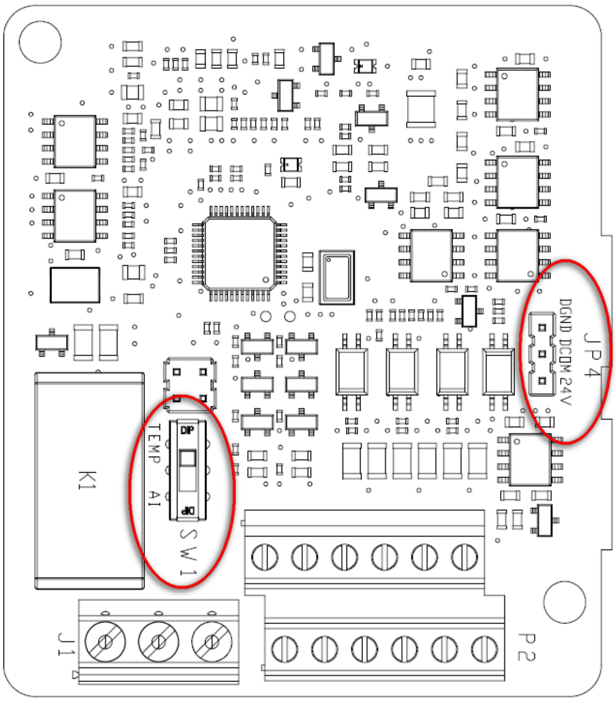


Figure 10-7 Jumper and DIP switch position for HVIO-01

10.3.3 Installation and Wiring

10.3.3.1 Installation

There are two card slots on the HV350 inverter, and SLOT1 is used to connect the HVIO-01 expansion card to the inverter.

1) Power the inverter off and turn off all indicators before installation.
2) Check the appearance of the HVIO-01 expansion card. If it is damaged, please contact the supplier.
3) Remove the outer cover of the inverter.
4) Align the 26pin plug on the back of the expansion card with the socket and plug it in.
5) Fix the expansion card on the inverter with 2 M3 screws.

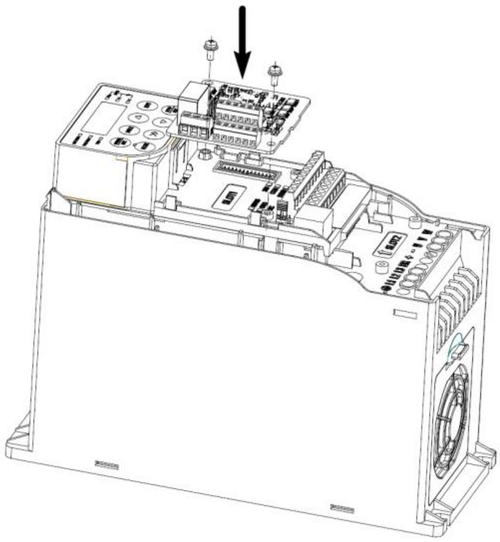


Figure 10-8 Expansion card installation

10.3.3.2 Wiring

It is recommended to use a control cable with a wire diameter of 0.5mm² to 0.75mm² for the control terminal of the expansion card, and the maximum cable diameter for the relay output terminals is 1.5 mm².

10.3.3.3 Digital Input Terminals Wiring

The HVIO-01 expansion card has 3 sets of digital input terminals. Select the functions of these three terminals via function codes “F06.06: DI6 input function”, “F06.07: DI7 input function”, and “F06.08: DI8 input function”.

The open collector PNP is wired as follows:

1) Using internal power supply

When the internal +24V power supply of the inverter is used, short-circuit DCOM and DGND on the jumper cap of JP4 (short-circuited before ex-work).

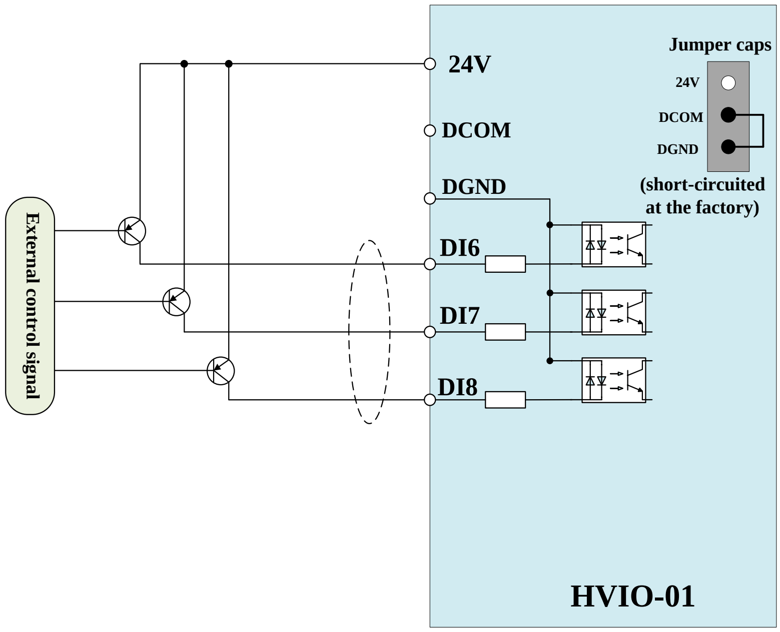


Figure 10-9 PNP wiring of using internal 24V power supply

2) Using external power supply

When the external +24V power supply is used, short-circuit DCOM and DGND on the jumper cap of JP4 (short-circuited before ex-work). Connect DCOM terminal to 0V of the external power supply, and connect the positive pole of the external +24V supply to the corresponding DI terminals through the external control contact.

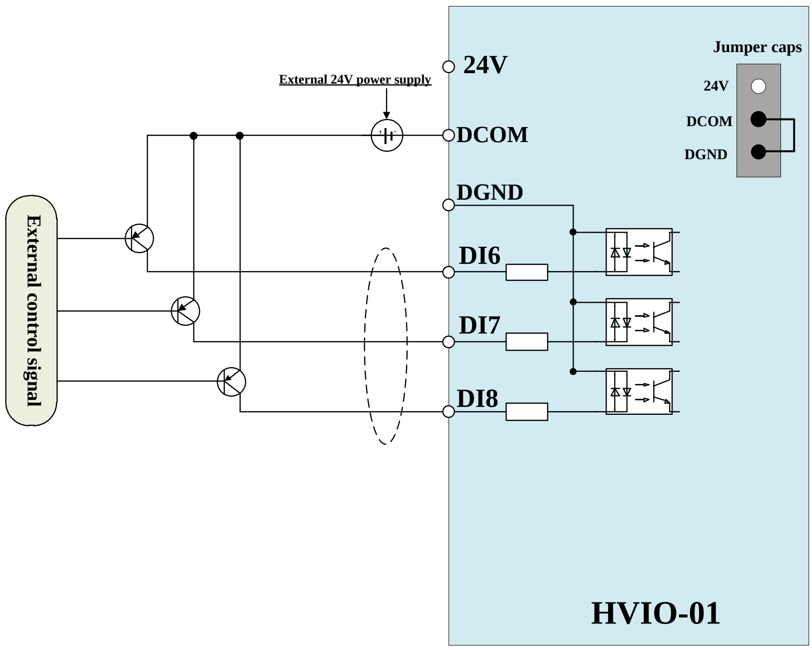


Figure 10-10 PNP wiring of using external 24V supply

The open collector NPN wiring is as follows:

1) Using internal power supply

When the internal +24V power supply of the inverter is adopted, short-circuit 24V and DCOM on the jumper cap of JP4, and connect the DGND terminal to 0V of the external power supply.

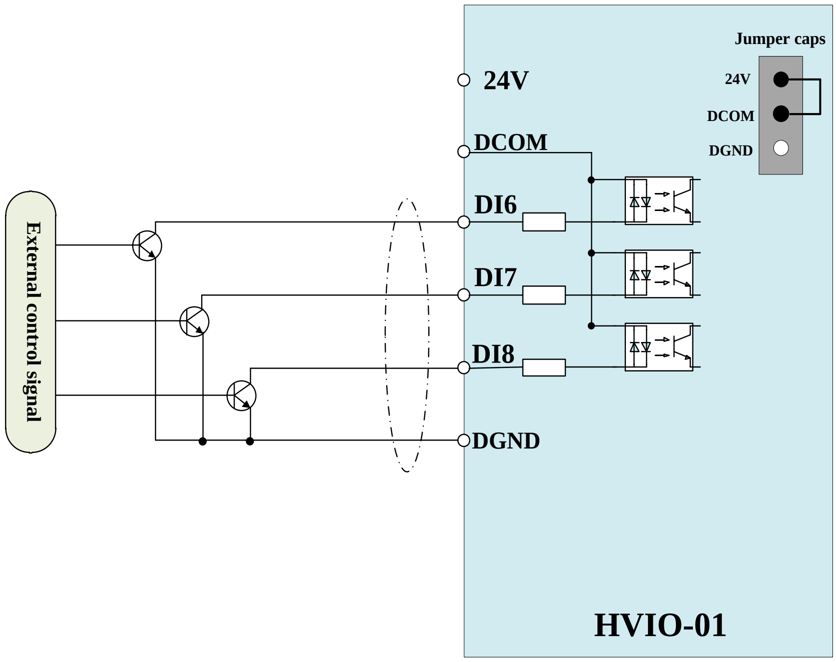


Figure 10-11 NPN wiring of using internal 24V power supply

2) Using external power supply

When the external +24V power supply is adopted, remove the JP4 jumper cap. Connect the DCOM terminal to +24V of the external power supply, and connect the DGND terminal to 0V of the external power supply.

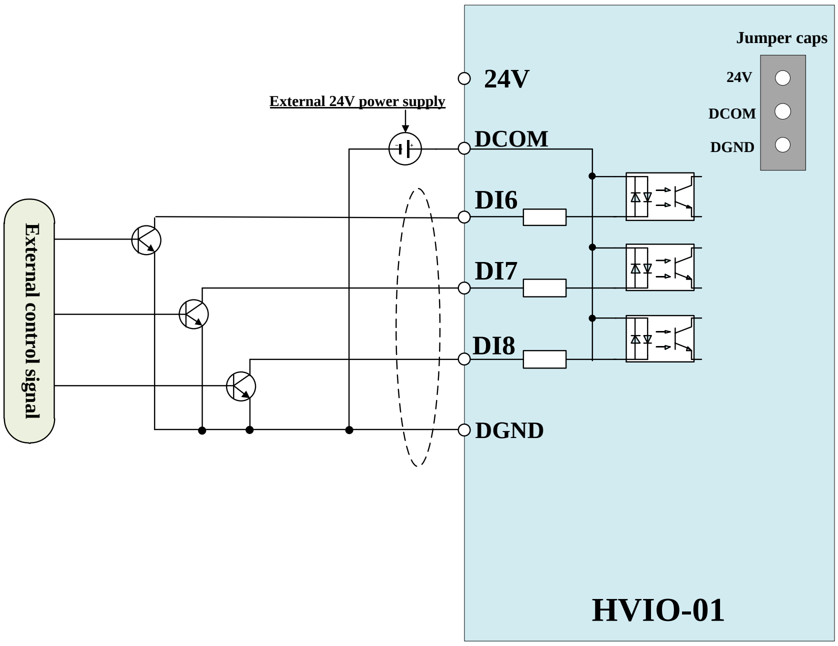


Figure 10-12 NPN wiring of using external 24V power supply

10.3.3.4 Digital Output Terminal Wiring

The HVIO-01 expansion card is equipped with one open collector digital output interface (+24V) DO3. Select the functions of DO3 via function code “F07.04: DO3 output function”.

When the digital output terminal drives a relay, a freewheeling diode must be installed in correct polarity at both ends of the relay coil, otherwise the internal circuit may be damaged. The driving capacity must not be greater than 50 mA.

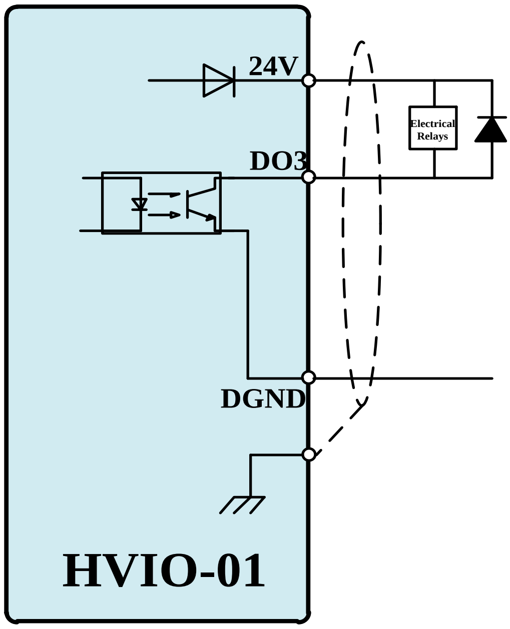


Figure 10-13 Wiring of digital output terminal

10.3.3.5 Analog Input Terminal Wiring

The analog input mode can be selected via DIP switch SW1.

Put the DIP switch SW1 to AI by default (AI input mode). Set AI3 to voltage input by “F06.49: AI input type”.

When it is switched to TEMP, the temperature sensor mode works, and whether it is PT100 or PT1000 input can be selected via “F03.47: Motor temperature sensor type” or “F17.47: Motor temperature sensor type”. Connect the temperature sensor wires to the “AI3+” and “AI3-” terminals respectively (no distinction of positive or negative).

As the analog signal is susceptible to external interference, it is generally transmitted through shielded cables, and the wiring distance should be as short as possible. In addition, the end of the shielding layer near the inverter should be well grounded and the transmission distance should not exceed 20m.

When the analog signal is seriously interfered, a filter capacitor or common mode inductor can be installed between “AI3+” and “AI3-”.

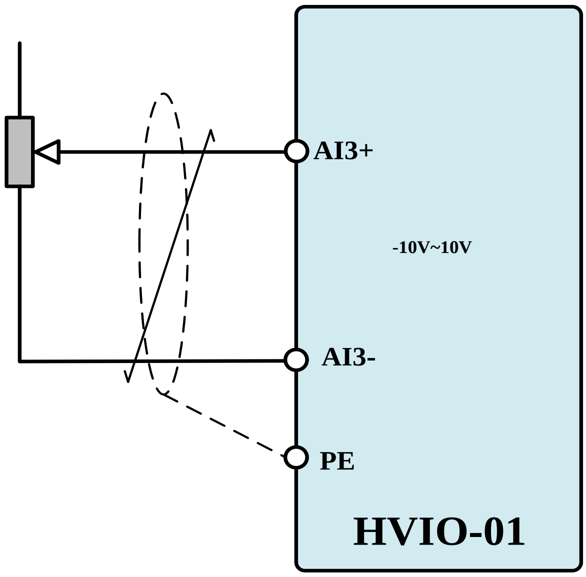


Figure 10-14 Terminal wiring for voltage type analog input

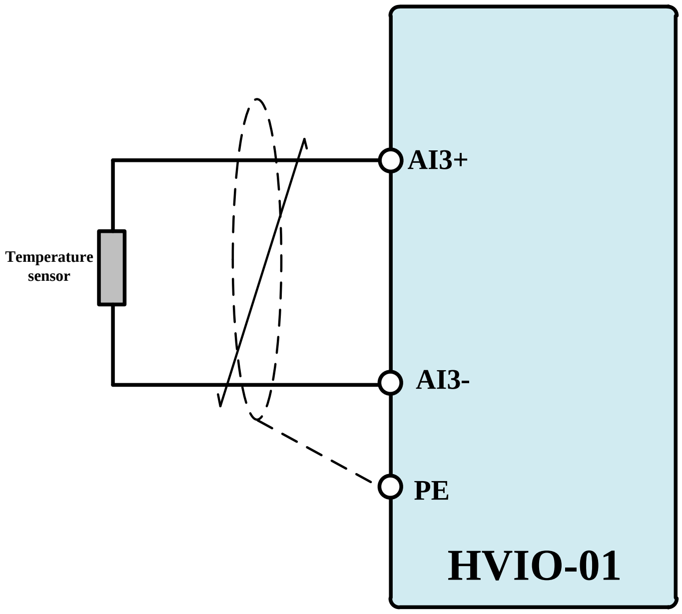


Figure 10-15 Terminal wiring for temperature sensor input

10.3.3.6 Analog Output Terminal Wiring

Set the output signal of AO2 and AO3 to voltage signal or current signal through function code “F07.37: AO output type”. The voltage range is 0V to 10V and the output current is less than 10mA. The wiring distance shall be as short as possible.

The current range is 0/4 mA to 20 mA, and the user load impedance should be less than 500 Ω.

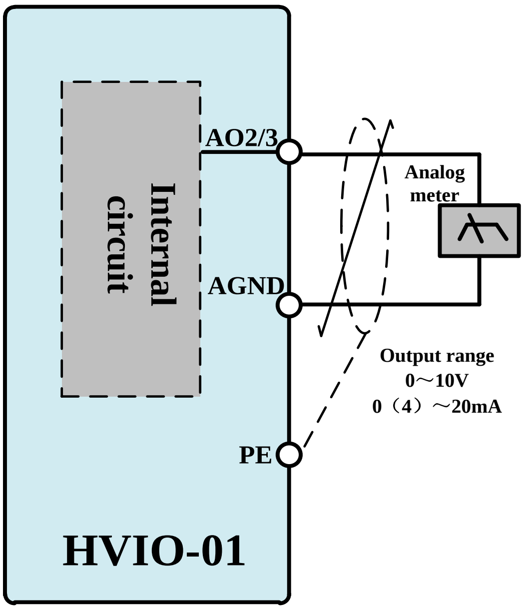


Figure 10-16 Wiring of analog output terminals

10.3.3.7 Relay Output Terminal Wiring

The HVIO-01 expansion card is equipped with two sets of dry contacts, with 2A-2B for NC and 2B-2C for NO. Set the RO2 output functions through “F07.08: RO2 output function”.

Inductive loads (relays, contactors and motors) may cause voltage spikes when the current is cut off. Adopt varistors to protect the relay contacts and install such absorption circuits as varistors, RC absorption circuits and diodes on inductive loads to minimize the interference during shutdown.

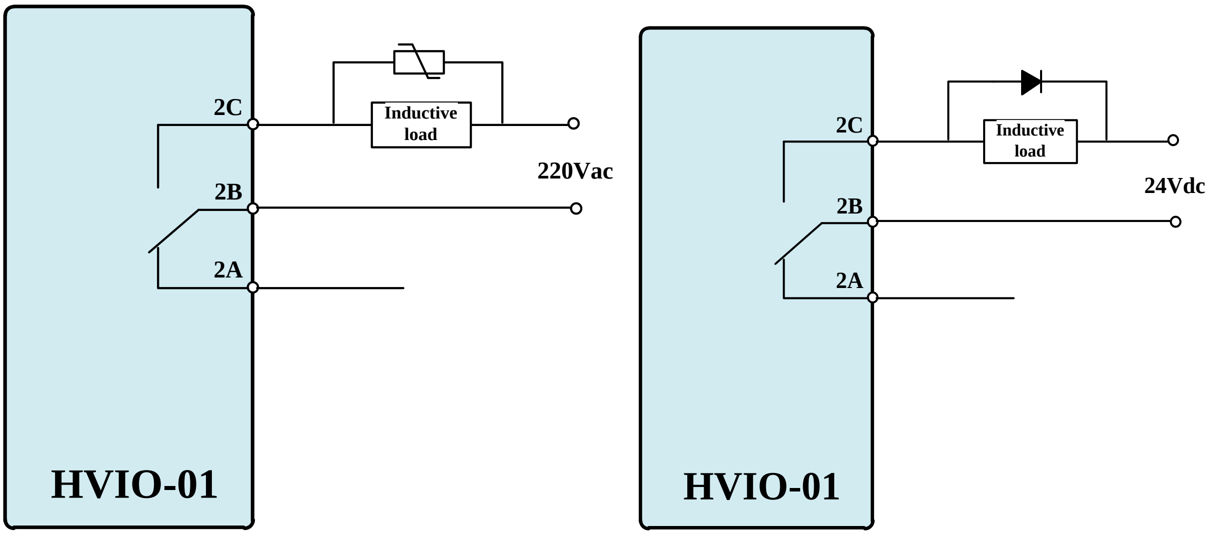


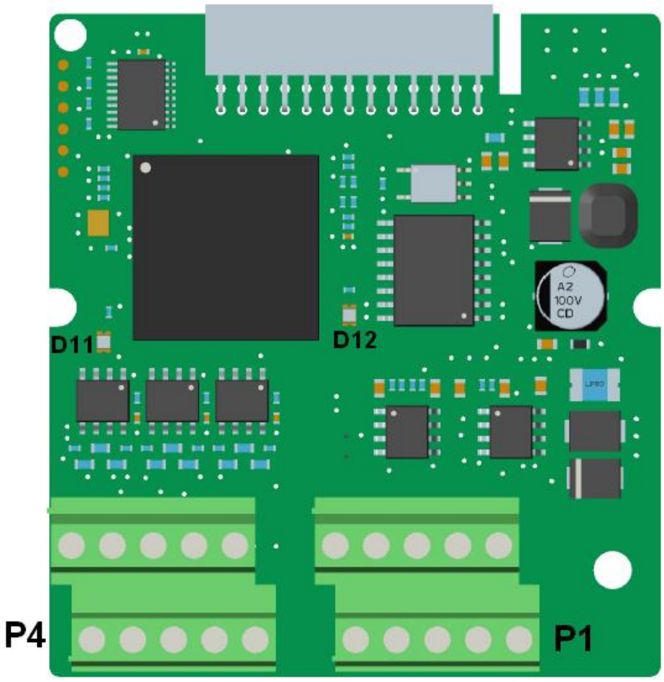
Figure 10-17 Wiring of relay output terminals

10.4 Appendix IV: HVPG-ABZ-01 Incremental Encoder Card Manual

10.4.1 Product Description

The HVPG-ABZ-01 expansion card is an incremental encoder expansion card for HV350 series models. It supports differential, collector voltage and push-pull inputs, as well as differential and open collector outputs. In addition, it provides 0-255 divider output.

10.4.2 Appearance and Interface



P4

OA+	OB+	OZ+	OA	OB
OA-	OB-	OZ-	GND	OZ

P1

A+	B+	Z+	COM	VCC
A-	B-	Z-	COM	PE

Figure 10-17 PG card interface

Table 10-1 PG card terminal function

Terminal identification		Function
P1	A+	The encoder outputs A signal (positive).
	A-	The encoder outputs A signal (negative).
	B+	The encoder outputs B signal (positive).
	B-	The encoder outputs B signal (negative).
	Z+	The encoder outputs Z signal (positive).
	Z-	The encoder outputs Z signal (negative).
	COM	Encoder power supply grounding terminal
	VCC	Encoder power supply
	PE	Shielding layer grounding terminal

Terminal identification		Function
		(The grounding terminals of the FA~FC frame are different from those of the FD~FG frame. Please refer to the grounding instructions in Chapter 3 for details)
P4	OA+	Differential frequency division outputs A signal (positive).
	OA-	Differential frequency division outputs A signal (negative).
	OB+	Differential frequency division outputs B signal (positive).
	OB-	Differential frequency division outputs B signal (negative).
	OZ+	Differential frequency division outputs Z signal (positive).
	OZ-	Differential frequency division outputs Z signal (negative).
	GND	Frequency division output reference ground
	OA	Open collector frequency division outputs A signal.
	OB	Open collector frequency division outputs B signal.
	OZ	Open collector frequency division outputs Z signal.
P3	Connected to P6 of the 26Pin on the control board	

10.4.3 Indicator

Table 10-2 PG card indicator state

Indicator name	Indicator status	Status description
D11 Power supply indicator (yellow-green when on)	On	PG card’s power supply is normal.
	Off	PG card’s power supply is not connected
D12 PG card running state indicator (yellow-green when the indicator is blinking or on)	Slow blinking	It blinks at 0.5Hz when the PG card is operating normally.
	Fast blinking	It blinks at 5Hz when the PG card is faulty.

10.4.4 Product Specifications

Encoder type supported	Incremental ABZ encoder.
Encoder power supply	5V~24V, with a maximum of 24V/200mA supported, determined by F03.51. Default voltage: 5V
Maximum input frequency of encoder	Differential: 300 kHz; Collector: 100kHz
Encoder interface type	Differential, collector voltage and push-pull inputs supported
Frequency division coefficient	0~255
Frequency division interface type	Differential and open collector output supported
Terminal clearance	3.81mm
Terminal screw	Slotted screw

10.4.5 Installation and Wiring

10.4.5.1 Installation

There are two card slots on the HV350 inverter, of which SLOT2 is used to connect the HVPG-ABZ-01 expansion PG card to the inverter.

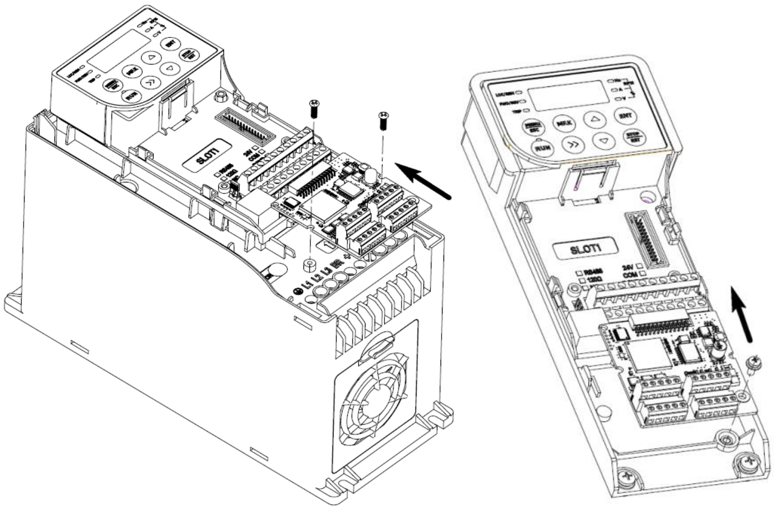
1) Power the inverter off and turn off all indicators before installation.

2) Check the appearance of the HVPG-ABZ-01 Expansion PG Card. If there is any damage, contact the supplier.

3) Remove the outer cover of the inverter.

4) Align the 26pin plug on the back of the expansion PG card with the socket and plug it in.

5) For FA~FB, the PG card shall be fixed with two M3 self-tapping screws. For FC~FG, the PG card shall be fixed with one M3 combination screw. See the figure below for the installation position.

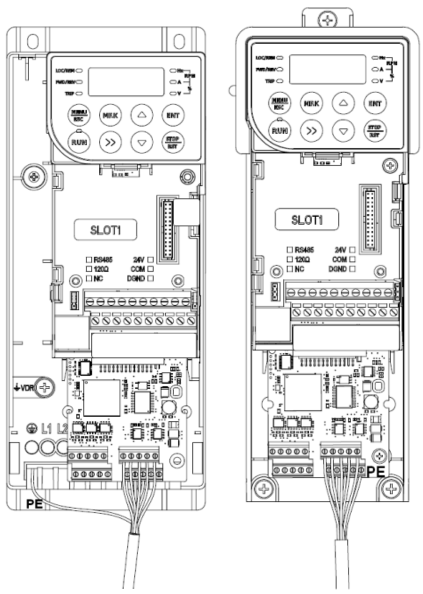


(a) FA~FB (b) FC~FG

Figure 10-18 PG card installation

10.4.5.2 Grounding

Since incremental encoder signals are susceptible to external interference, the cables with shielding layers and signal lines with twisted pair are required, and the shielding layers should be grounded. The grounding position varies with the frames or models. The shielded cable of the encoder for FA~FC should be connected to the PE terminal of the power terminal, while the shielded cable of the encode for FD~FG r is directly connected to the PE port of the P1 terminal on the PG card. See the following diagram for the specific wiring position.



(a) FA~FC (b) FD~FG

Figure 10-19 Cable grounding for PG card encoder

10.4.5.3 Wiring

- **Differential input wiring**

1) Connect the incremental encoder output signal to A+/A-, B+B-, Z+Z-, VCC, and COM of the signal input terminal P1 on the PG card respectively.
2) Set the encoder type and power supply according to the descriptions in “3.4.2 Control Cable Selection”, and the power supply is set to 5V by default.
3) Connect the shielding layer of the encoder cable to the PE terminal according to the grounding instructions.

- **Collector voltage input wiring**

1) Connect the output phase A/B/Z of the incremental encoder to the A+/B+/Z+ of the input terminal P1 on the PG card respectively. Connect the power cable of the encoder to VCC and COM. Keep the A-/B-/Z- on the PG card unconnected.
2) Set the encoder type and power supply according to parameter instructions, and the power supply is set to 5V by default.
3) Connect the shielding layer of the encoder cable to the PE terminal according to the grounding instructions.

- **Push-pull input wiring**

(1) For the push-pull differential output, connect the output signal A+/B+/Z+ of the incremental encoder to the A+/B+/Z+ of the PG card respectively and keep the output signal A-/B-/Z- unconnected. For push-pull single-ended signal output, connect the output phase A/B/Z to the A+/B+/Z+ of the PG card respectively. Then connect the power cable of the encoder to the VCC and COM and keep the A-/B-/Z- on the PG card unconnected.
2) Set the encoder type and power supply according to parameter instructions, and the power supply is set to 5V by default.
3) Connect the shielding layer of the encoder cable to the PE terminal according to the grounding instructions.

- **Differential frequency division output wiring**

1) Connect the frequency division output cable to the OA+/OA-, OB+/OB-, OZ+/OZ- of the frequency division output terminal P4 on the PG card. If conditions permit, it is recommended to connect it to the frequency division output reference ground (GND).
2) Set the frequency division coefficient (0~255) through “F03.62: Encoder output frequency division coefficient”. When the coefficient is 0, the frequency division output function is disabled.
(3) Connect the shielding layer of the frequency division output cable to the PE terminal of the equipment receiving frequency division signal.

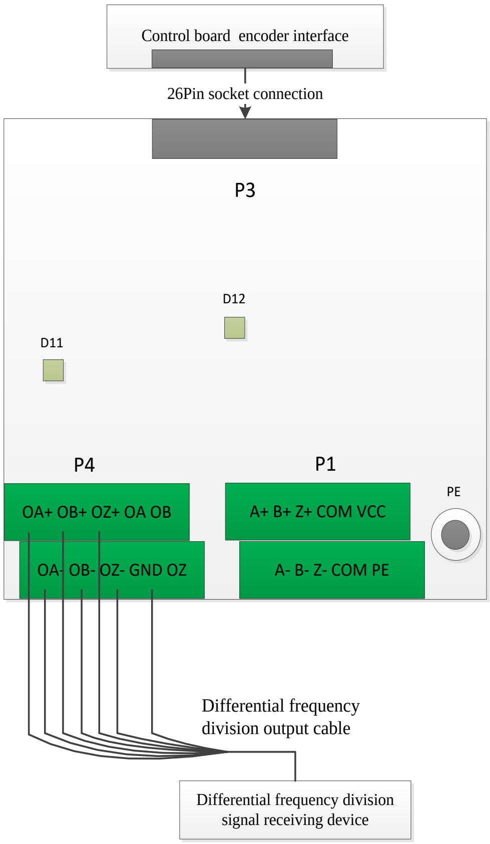


Figure 10-20 Differential frequency division output wiring

➢ Collector frequency division output wiring

1) Connect the frequency division output cable to the OA, OB, OZ and GND of the PG card.
2) Set the frequency division coefficient (0~255) through the function code F03.62 (encoder output frequency division coefficient). When the coefficient is 0, the frequency division output function is disabled.
3) Connect the shielding layer of the frequency division output cable to the PE terminal of the equipment receiving frequency division signal.

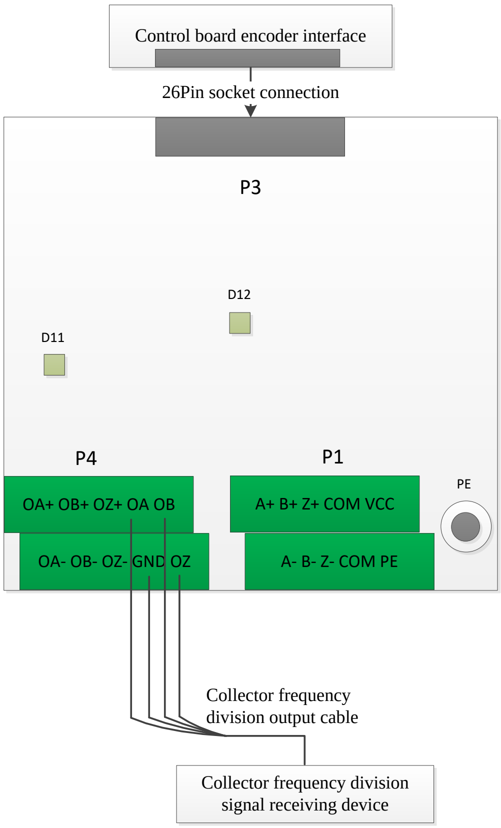


Figure 10-21 Wiring of the collector frequency division output

10.4.6 Parameters

10.4.6.1 Inverter parameters setting

Make sure the HVPG-ABZ-01 expansion PG card has been installed correctly, power on the inverter, and press “MENU” to enter the menu.

1) Choose the corresponding encoder type through “F03.50: Encoder type (reserved)”.

F03.50	Remarks
0	Incremental encoder
1	Absolute value encoder
2	Resolver
3	Sine-cosine encoder

2) Choose the corresponding encoder power supply through “F03.51: Encoder power supply”.

F03.51	Remarks
0	5V
1	24V
2	12V
3	15V

3) Select the corresponding encoder direction through “F03.52: Encoder direction”.

F03.52	Remarks
0	A ahead of B
1	B ahead of A

4) For encoders without Z-signal, the Z-signal should be ignored, which can be achieved through “F03.53: Encoder pulse correction”.

F03.53	Remarks
0	Disabled
1	Enabled

5) Set the corresponding pulses generated per revolution of the encoder disk (PPR) through “F03.54: Encoder PPR”.

6) Set the corresponding filter time through “F03.57: Encoder signal filter time”.

10.4.6.2 Other Functions of the PG Card

1) The PG card also has the function of frequency division output. Choose “F03.62: Encoder output frequency division coefficient” to set the corresponding value.

F03.62	Remarks
0	Frequency division output function disabled
1~255	Frequency division coefficient

2) Check the setting of F82.33 and F82.34 to determine whether the encoder rotation direction is the same as that of the motor. If they are inconsistent, the rotation direction of the encoder is opposite to that of the motor, as shown in the table below. The encoder direction can be changed through “F03.52: Encoder direction”.

Function code	Description	Value
F82.33	Estimated motor frequency	50
F82.34	Measured motor frequency	-50

10.5 Appendix V: Modbus-RTU Communication Protocol

Note: Modbus communication and field bus communication (or CANopen communication) cannot be adopted simultaneously.

10.5.1 Protocol Mode

The Modbus protocol for this inverter is RTU mode.

10.5.1.1 Frame Structure

Standard structure of RTU frames:

Frame header START	T1-T2-T3-T4 (3.5 bytes of transmission time)
Slave address field ADDR	Communication address: 0 to 247 (decimal) (0 is the broadcast address)
Function field CMD	03H: Read slave parameters 06H: Write slave parameters 10H: Multi-write slave parameters
Data field DATA(N-1) … DATA(0)	2*N bytes of data. This part is the main content of the communication and is the core of the data exchange in the communications.
CRC CHK low-order byte	Detection value: CRC checksum value (16BIT)
CRC CHK high-order byte	
End of frame: END	T1-T2-T3-T4 (3.5 bytes of transmission time)

Modbus adopts the "Big Endian" encoding method, where high-order bytes are sent first, followed by the low-order bytes.

In RTU mode, the inter-frame idle time should be the greater one between the function code setting value and the Modbus internal convention value. The minimum inter-frame idle time agreed internally by Modbus is as follows: The header and end of the frame delimit a frame by bus idle time not less than 3.5 bytes. The data can be checked by CRC-16, and the high and low bytes of the checksum need to be exchanged before being sent. Please refer to the example in the protocol for the specific Cyclical Redundancy Check (CRC). Pay attention that at least 3.5 symbols of bus idle with start and end idles excluded should be kept between frames.

10.5.1.2 CRC Check

CRC adopts RTU frame format and the frame includes a frame error detection field calculated based on the CRC method. With two bytes and 16-bit binary values, the CRC field is added into the frame after the calculation by transmission equipment to detect the whole frame. The receiving equipment will recalculate the CRC of the received frame and compare it with the value of the received CRC field. If the two CRC values differ, there is an error in the transmission.

The CRC stores 0xFFFF first, and then calls a procedure to process more than 6 consecutive bytes in the frame and the current value in the register. Only the 8Bit data in each character is valid for CRC, and the start and stop bits as well as the parity bits are invalid.

During CRC generation, the XOR calculation between each 8-bit byte and the register contents is performed, and the result moves to the LSB and the MSB is filled with 0. Then the LSB is extracted for check. If the LSB is 1, the XOR calculation between the register and the preset value is performed. If the LSB is 0, the calculation is not performed. The whole process is repeated for 8 times. And the XOR calculation between the next 8-bite byte and the register begins after the calculation of the last bit (bit 8) is completed. The final value of the register is the CRC value after all the bytes of the frame have been calculated.

This method of CRC calculation is based on the CRC check rule of international standard. Users can write a truly compliant CRC calculation program by referring to the CRC algorithm of the relevant standard.

A simple function for CRC calculation is provided for reference (programmed in C language):

```
unsigned int calc_crc_value (unsigned char *data_value, unsigned char data_length)
```

```
{
    unsigned int crc_value = 0xffff;
    int i;


    while(data_length--)
    {
        crc_value ^= *data_value++;

        for(i = 0; i < 8; i++)
        {
            if(crc_value & 0x0001)
                crc_value = (crc_value >> 1) ^ 0xa001;
            else
                crc_value = crc_value >> 1;
        }
    }

    return(crc_value);
}
```

10.5.2 Protocol Functions

10.5.2.1 Meanings of Command Codes

The main function of Modbus is to read/write parameters. The different command codes determine different operation requests. The operations supported by the Modbus protocol of the inverter are shown in the table below.

Command code	Meaning
0x03	Read 16-bit inverter parameters, including function code parameters, control parameters and state parameters.
0x06	Rewrite a single 16-bit function code parameter or control parameter of the inverter.
0x10	Rewrite multiple 16-bit function codes or control parameters.
0x64	Read 32-bit inverter parameters, including function code parameters, control parameters and state parameters.
0x65	Rewrite a single 32-bit function code parameter or control parameter of the inverter.
0x66	Rewrite multiple 32-bit function code parameters or control parameters of the inverter.

10.5.2.2 Command Code 03H

The command code 03H indicates that the master reads 16-bit parameters from the inverter. The number of data to be read depends on the "number of data" in the command and up to 16 data can be read. The parameter address to be read must be consecutive. Each parameter consists of two bytes, i.e., one word. The following commands are in hexadecimal format (a number followed by an "H" indicates a hexadecimal value) and each hexadecimal number occupies one byte. The function of this command is to read the parameters and operating state of the inverter.

The command code begins with the 010BH (F01.11) of the inverter whose address is 01H and reads the contents of the two consecutive data (i.e., the contents of 010BH and 010CH). In this case, the structure of this frame is described as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H

CMD	03H
High-order byte of start address	01H
Low-order byte of start address	0BH
High-order byte of number of data	00H
Low -order byte of number of data	02H
CRC high-order byte	B4H
CRC low-order byte	35H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	03H
Number of bytes	04H
High-order byte of address 010BH data content	13H
Low-order byte of address 010BH data content	88H
High-order byte of address 010CH data content	13H
Low-order byte of address 010CH data content	88H
CRC low-order byte	73H
CRC high-order byte	CBH
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.2.3 Command Code 06H

This command indicates that the master writes 16-bit data to the inverter and one command can only write one data. It is used to change the parameters and the working mode of the inverter.

For example: If we want to write 5000 (1388H) to the 010BH (F01.11) of the inverter whose address is 01H, the structure of the frame should be as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	06H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of data content	13H

Low-order byte of data content	88H
CRC low-order byte	F4H
CRC high-order byte	A2H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	06H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of data content	13H
Low-order byte of data content	88H
CRC low-order byte	F4H
CRC high-order byte	A2H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.2.4 Command Code 10H

The command code 10H indicates that the master writes multiple 16-bit data to the inverter. The number of data to be written depends on the "number of data" in the command and up to 16 data can be consecutively written.

For example, if we want to write 2500 (9C4H) to 010BH (F01.11) of the inverter whose address is 01H, and 5000 (1388H) to 010CH (F01.12) of the inverter whose address is 01H, the structure of the frame should be as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	10H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of number of data	00H
Low-order byte of number of data	02H
Number of bytes	04H
High-order byte of address 010BH data content	09H
Low-order byte of address 010BH data content	C4H
High-order byte of address 010CH data content	13H

Low-order byte of address 010CH data content	88H
CRC low-order byte	F0H
CRC high-order byte	BBH
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	10H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of number of data	00H
Low-order byte of number of data	02H
CRC low-order byte	31H
CRC high-order byte	F6H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.2.5 Command Code 64H

The command code 64H indicates that the master reads 32-bit data from the inverter. The number of data to be read depends on the "number of data" in the command and up to 16 data can be read. The parameter address to be read must be consecutive. Each data consists of 4 bytes, i.e., a double word. The following commands are in hexadecimal format (a number followed by an "H" indicates a hexadecimal value). Each hexadecimal number occupies one byte. The function of this command is to read the parameters and operating state of the inverter.

For example, if we want to ask the inverter (whose address is 01H) to read the content of two consecutive addresses from 010BH (F01.11) (that is, 010BH and 010CH), the frame structure should be as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	64H
High-order byte of start address	01H
Low-order byte of start address	0BH
High-order byte of number of data	00H
Low-order byte of number of data	02H
CRC low-order byte	81H
CRC high-order byte	FDH

END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	64H
Number of bytes	08H
High-order byte of address 010BH data content	00H
Second high-order byte of address 010BH data content	00H
Low-order byte of address 010BH data content	13H
Second low-order byte of address 010BH data content	88H
High-order byte of address 010CH data content	00H
Second high-order byte of address 010CH data content	02H
Low-order byte of address 010CH data content	49H
Second low-order byte of address 010CH data content	F0H
CRC low-order byte	53H
CRC high-order byte	1BH
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.2.6 Command Code 65H

The command indicates that the master writes 32-bit data to the inverter and one command can only write one data. It is used to change the parameters and the working mode of the inverter.

For example, if we want to write 150000 (249F0H) to 010CH (F01.12) of the inverter whose address is 01H, the structure of the frame should be as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	65H
High-order byte of write data address	01H
Low-order byte of write data address	0CH
High-order byte of data content	00H
Second high-order byte of data content	02H
Low-order byte of data content	49H
Second low-order byte of data content	F0H

CRC low-order byte	33H
CRC high-order byte	05H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	65H
High-order byte of write data address	01H
Low-order byte of write data address	0CH
High-order byte of data content	00H
Second high-order byte of data content	02H
Low-order byte of data content	49H
Second low-order byte of data content	F0H
CRC low-order byte	33H
CRC high-order byte	05H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.2.7 Command Code 66H

The command code 66H indicates that the master writes multiple 32-bit data to the inverter. The number of data to be written depends on the “number of data” in the command and up to 16 data can be consecutively written.

For example, if we want to write 150000 (249F0H) respectively to 010BH (F01.11) and 010CH (F01.12) of the inverter whose address is 01H, the frame structure should be as follows:

RTU master command message (command sent from the master to the inverter):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	66H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of number of data	00H
Low-order byte of number of data	02H
Number of bytes	08H
High-order byte of address 010BH data content	00H
Second high-order byte of address 010BH data content	02H

Low-order byte of address 010BH data content	49H
Second low-order byte of address 010BH data content	F0H
High-order byte of address 010CH data content	00H
Second high-order byte of address 010CH data content	02H
Low-order byte of address 010CH data content	49H
Second low-order byte of address 010CH data content	F0H
CRC low-order byte	3DH
CRC high-order byte	11H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

RTU slave response message (message sent from the inverter to the master):

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
CMD	66H
High-order byte of write data address	01H
Low-order byte of write data address	0BH
High-order byte of number of data	00H
Low-order byte of number of data	02H
CRC low-order byte	F8H
CRC high-order byte	3DH
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

10.5.3 Access Method

Types and value ranges of the inverter parameters are shown in the table below:

Type	**Digit capacity**	**Value range**	**Remarks**
short	16	-32768～32767	Class I parameter
int	32	-2147483648～2147483647	
unsigned short	16	0～65535	Class II parameter
unsigned int	32	0～4294967296	

10.5.3.1 Read Operation

If a 32-bit parameter is read by 16-bit access method, its lower 16 bits will be intercepted and returned. The intercepted value may not be equal to the actual value.

If a 16-bit parameter is read by 32-bit access method, it will be extended and returned as a 32-bit data. The extension rule is: If the MSB of the 16-bit parameter value is 0, the higher 16 bits should be complemented by 0. If the MSB of the 16-bit parameter value is 1, determine the class of the parameter first. For Class I parameter, the higher 16 bits should be complemented by 1; for Class II parameter, complement the bits with 0.

If the 16-bit parameter is read by 16-bit access method and the 32-bit parameter is read by 32-bit access method, they can be directly returned without extension or intercept.

When a 32-bit parameter is read by 16-bit access method, its returned value may not equal to the actual value.

Therefore, it should be noted that 16-bit read method is only available for the parameters with a current value between -32768 and 32767, and other parameters should be read by 32-bit read method.

10.5.3.2 Write Operation

The 16-bit write method is only available for Class I parameters with a value between -32768 to 32767 and Class II parameters with a value between 0 to 0xFFFF, and other parameters should be read by 32-bit write method.

For Class I parameters, if a 16-bit value is written into a 32-bit parameter by the 16-bit access method, the written value is an extended one. The extension rule is that to extend the value according to the MSB of the 16-bit parameter to be written. If the MSB is 1, the higher 16 bits should be complemented by 0xFFFF. If the MSB is 0, complement the bits with 0x0000. The extended data is written successfully if it does not exceed the upper/lower limit of the parameter, its value is valid and the parameter can be re-written. Class II parameters do not need to be extended, so the values of their higher 16 bits are irrelevant during write operation.

By the 32-bit access method, the 32-bit value can be successfully written into a 16-bit or 32-bit parameter, provided that it does not exceed the limits of the parameter, the value is valid and the parameter can be rewritten.

For details about rewriting a 16-bit parameter by the 16-bit access method, please refer to the previous section.

Note: In most cases, the 16-bit access method can be adopted. When a parameter is set to 1500, meaning that the bits of the corresponding parameter exceed 16, the 32-bit access method should be adopted. The same is also true for other parameters.

10.5.4 Exception Codes

If the above command code operation fails, the exception response frame is returned. The exception response frame consists of an error code and an exception code. The error code is equal to the command code + 0x80 and the exception code indicates the error cause.

Exception answer frame:

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
ADDR	01H
Error code	82H
Exception codes	02H
CRC LSB	C1H
CRC MSB	61H
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

All exception codes supported by the inverter and their meanings are shown in the following table:

Exception codes	**Meaning**
0x00	No error
0x01	Frame error
0x02	Command error
0x03	Invalid address
0x04	Invalid parameter
0x05	Password error
0x06	System lock
0x07	Parameter read-only
0x08	Parameter storage failure

10.5.5 Address Definition

This section describes the address definition of the communication data used to control the inverter operation, obtain the state information of the inverter, and set relevant function parameters.

10.5.5.1 Rules for Representing Parameter Address

The parameter address occupies two bytes, with the high-order byte first and the low-order byte last. The ranges of for high-order bytes is 00~ffH and that for low-order bytes is 00~ffH. High-order byte refers to the group number of the parameter while low-order byte refers to the number after the dot, and both of them should be converted to hexadecimal format. For example, for F05.06, the high-order byte and low-order byte of the parameter address are 05 and 06 respectively. In hexadecimal format, the parameter address is 0506H. similarly, for F10.01, the parameter address is 0A01H.

F10.01	Fault auto reset times	0~10	0	Changeable at any time
F10.02	Fault auto reset duration	0.0s~120.0s	1.0s	Changeable at any time

Note: Some parameters are unchangeable when the inverter is running and some are unchangeable themselves. When changing parameters, attention should also be paid to the setting range, unit and related instructions.

In addition, the service life of the EEPROM will decrease due to frequent parameter storage. In communication mode, users can just change the value in the on-chip RAM instead of storing it. This can be achieved by simply changing the highest-order byte of the corresponding parameter address from 0 to 1. For example, instead of storing F01.11 to EEPROM, users can change its value in RAM to set the address to 810BH.

10.5.5.2 Other Function Addresses

In addition to operating the parameters of the inverter, the master can also control the operation and shutdown of the inverter and monitor its working state.

The control parameters do not support read and multi-write operation; the status parameters do not support write and multi-read operation; and the user-defined parameters support multi-read and multi-write operation.

Control parameter table:

Function	Address definition	Meaning	Scope	R/W characteristics
Communication control command	2000H	0: Disabled 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Stop according to the stop mode 6: Coast to stop 7: Fault reset	0~7	W
Communication settings address	2001H	Frequency	0.00~600.00Hz	W
	2002H	Torque	-300.00~300.00%	W
	2003H	PID	-100.00~100.00%	W
	2004H	PID feedback	-100.00~100.00%	W
	2005H	V/F separation voltage	0.0~300.0%	W
	2006H	HDO	0.00~100.00%	W
	2007H	AO1	0.00~100.00%	W
	2008H	AO2	0.00~100.00%	W
	2009H	AO3	0.00~100.00%	W
	200AH	Digital input terminal control	0~65535	W
	200BH	Digital output terminal control	0~65535	W

Function	Address definition	Meaning	Scope	R/W characteristics
	200CH	Electric torque upper limit	0.00~300.00%	W
	200DH	Generating torque upper limit	0.00~300.00%	W
	200EH	Electric power upper limit	0.00~200.00%	W
	200FH	Generating power upper limit	0.00~200.00%	W
	2010H	Torque control forward maximum speed limit	0.00~100.00%	W
	2011H	Torque control reverse maximum speed limit	0.00~100.00%	W
	2012H	Frequency upper limit	0.00~600.00 Hz	W

Status parameter table (also available directly from “F82 Group: Basic Monitoring Parameters”):

Function	Address definition	Meaning	Unit	R/W characteristics
Running frequency	3000H	Used to view F82 Group: Basic Monitoring Parameters	0.01Hz	R
Frequency reference	3001H		0.01Hz	R
Ramp frequency	3002H		0.01Hz	R
Bus voltage	3003H		1V	R
Output voltage	3004H		1V	R
Output current	3005H		0.1A	R
Output power	3006H		0.1kW	R
Output torque	3007H		0.01%	R
Motor speed	3008H		0.1RPM	R
Inverter status 1	3009H		1	R
Inverter status 2	300AH		1	R
Active fault code	300BH		1	R
Active fault subcode (reserved)	300CH		1	R
Active alarm code	300DH		1	R
Active alarm subcode (reserved)	300EH		1	R
DI input terminal status 1	300FH		1	R
DI input terminal status 2	3010H		1	R
DO output terminal status	3011H		1	R
AI1 input value	3012H		0.01V/mA	R
AI2 input value	3013H		0.01V/mA	R
AI3 input value	3014H		0.01V	R
AO1 output value	3015H		0.01V/mA	R
AO2 output value	3016H		0.01V/mA	R
AO3 output value	3017H		0.01V/mA	R
Pulse input frequency	3018H		0.01kHz	R

Function	Address definition	Meaning	Unit	R/W characteristics
Pulse output frequency	3019H		0.01kHz	R
PID setting	301AH		0.01%	R
PID feedback	301BH		0.01%	R
Torque setting	301CH		0.01%	R
Heatsink 1 temperature	301DH		0.1℃	R

User-defined parameters:

Function	Address definition	Meaning	R/W characteristics
F14.01	2065H	Used to modify the mapping address of the user-defined parameters	R/W
F14.02	2066H		R/W
…	…		R/W
F14.36	2088H		R/W

10.6 Appendix VI: Warranty

The product with faults can be repaired or replaced for free within the warranty period.

Any faults arising from the following conditions are not covered by the warranty.

- Dismantlement of the product without our permission or maintenance in a wrong way
- Out of the warranty period
- Operation out of the application scope stipulated in relevant international standards
- Failure to install and operate the product according to the user manual
- Product damage caused by abnormal natural environments
- Product damage caused by the usage of non-standard parts or software not provided by Hopewind
- Product damage due to the failure of external devices
- Any accidental damage due to personal dismantlement or maintenance.

When repair service for the above faults is needed, Hopewind offers paid repair service upon service agency's approval. Please contact us in advance.

--End of the chapter--

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