Preface

Thank you for purchasing the H8 series AC drive developed by ADTECH (SHENZHEN) TECHNOLOGY CO., LTD.

The H8 series AC drive is a general-purpose high-performance current vector control AC drive. It is an upgrade product based on T8 and can implement the control of asynchronous motor and permanent magnet synchronous motor (PMSM).

It increases the user programmable function. Background monitoring software and communication bus function, and supports multi-kind PG cards. It is used to drive various automation production equipment involving textile, paper-making, wire drawing, machine tool, Packing, food, printing, lifting, Plastics, wire and cable.

This manual describes the correct use of the H8 series AC drive, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

Notes
• Whether the nameplate mode and AC drive rating are consistent with you order. • Whether the packing list items are complete. (The box contains the AC drive, certificate of conformity, user manual and warranty card.) • The drawings in the manual are shown for description only and may not match the product you purchased. • The drawings in the manual are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and the perform operations in accordance with the instructions. • The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. • Contact our agents or customer service center if you have problems during the use.

ADTECH (SHENZHEN) TECHNOLOGY CO., LTD.
Revision: V1.0
Revision date: 2015.04.25

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Safety Information and Precautions

Chapter 1 Safety Information and Precautions

In this manual, the notices are graded based on the degree of danger:

DANGER	Indicates that failure to comply with the notice will result in severe personal injury or even death.
WARNING	Indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. ADTECH will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety Information

Before installation:

DANGER	• Don't touch the components with you hands. • Don't install the equipment if you find water seepage, component missing or damage upon unpacking.
WARNING	• Handle the equipment with care during transportation to prevent damage to the equipment.

During installation:

DANGER	• Must be performed only by qualified personnel installation work. Failure to comply may result in electric shock. • Don't loosen the fixed screws of the components, especially the screws with red mark. • Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • The AC drive shall be installed in the far away from flammable and explosive hazardous goods places. • The AC drive should be installed in to load-bearing places. Failure to comply will result in equipment damage and accidents.

WARNING	• When two AC drives are laid in the same cabinet, arrange the installation positions properly to ensure the cooling effect. • Install the AC drive in places free of vibration and direct sunlight. • Don't drop wire end or screw into the AC drive. Failure to comply will result in damage to the AC drive.

At Wiring:

DANGER	• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Tie the AC drive to ground properly by standard. Failure to comply may result in electric shock. • All wiring should conform to EMC and safety standards. • In strict accordance with the AC drive terminal screen printing wiring, prohibit connect the three-phase power to the output terminals (U,V,W) of the AC drive. • AC over 220V only allowed at Control terminals A,B,C.
WARNING	• Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire. • Use wire sizes recommended in the manual. Failure to comply may result in accidents. • Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded. • Don't perform the voltage resistance test of the AC drive. Failure to comply will result in accidents. • Motor cable length more than 100 meters is proposed using output reactor. • Terminal signal lines should be as possible as far away from the main power line, can not guarantee the distance to the vertical cross distribution.

Before power-on:

DANGER	• The AC drive storage time of more than 2 years, application the voltage regulator gradually boost power up. Failure to comply will result in risk damage to the equipment. · Check that the following requirements are met: —The voltage class of the power supply is consistent with the rated voltage class of the AC drive. —The input terminals (R,S,T) and output terminals (U,V,W) are properly connected. —No short circuit exists in the peripheral circuit. —The wiring is secured. Failure to comply will result in damage to the AC drive.
WARNING	• Cover the drive properly before power-on to prevent electric shock. • All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents.

After Power-on:

DANGER	• Don’t open the AC drive’s cover after power-on. Failure to comply may result in electric shock. • Don’t touch any I/O terminal of the AC drive. Failure to comply may result in electric shock.
WARNING	• Don’t touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents. • Don’t change the default settings of the AC drive. Failure to comply will result in damage to the AC drive.

During Operation:

DANGER	• Don’t touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt. • Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive.
WARNING	• Avoid objects falling into the AC drive when it is running. Failure to comply will result in damage to the AC drive. • Don’t start/stop the AC drive by turning the contactor ON/OFF. Failure to comply will result in damage to the AC drive.

During Maintenance:

DANGER	• Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive. • Don’t repair or maintain the AC drive at power-on. Failure to comply will result in electric shock. • Repair or maintain the AC drive only ten minutes after the AC drive is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. • Ensure that the AC drive is disconnected from all power supplies before starting repair or maintenance on the AC drive. • Set and check the parameters again after the AC drive is replaced. • All the pluggable components must be plugged or removed only after power-off.
WARNING	• The rotating motor generally feeds back power to the AC drive. As a result, the AC drive is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the AC drive is disconnected from the motor before starting repair or maintenance on the AC drive.

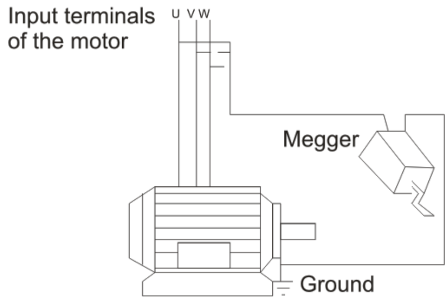
1.2 General precautions

1) Input source

The series AC drive does not apply to exceed the manual specified operating voltage range, if necessary, please use the step-up or step-down device voltage rises or falls to the specified voltage limit.

2) Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor winding from damaging the AC drive. The motor must be disconnected from the AC drive during the insulation test. A 500V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5m.



3) Requirement on residual current device (RCD)

The AC drive generates high leakage current during running, which flows through the protective earthing (PE) conductor. Thus install a type-B RCD at primary side of the power supply. When selecting the RCD, you should consider the transient and steady state leakage current to ground that may be generated at start-up and during running of the AC drive. You can select a specialized RCD with the function of suppressing high harmonics or a general-purpose RCD with relatively large residual current.

4) Thermal protection of motor

If the rated capacity of the motor selected does not match that of the AC drive, especially when the AC drive's rated power is greater than the motor's, adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay in the motor circuit for protection.

5) Running at over 50 Hz

The AC drive provides frequency output of 0 to 500 Hz (Up to 500 Hz is supported if the AC drive runs in SVC and FVC mode). If the AC drive is required to run at over 50 Hz, consider the capacity of the machine.

6) Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the AC drive runs at power frequency (50 Hz).

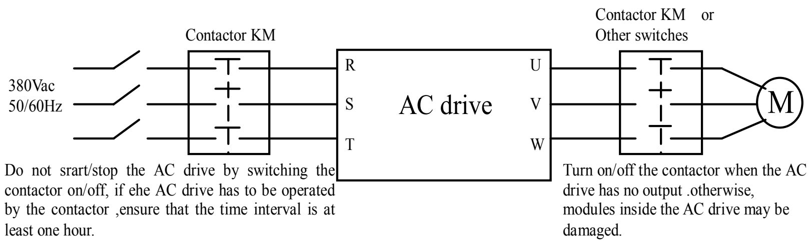
7) Vibration of mechanical device

The AC drive may encounter the mechanical resonance point at some output frequencies, which can be avoided by setting the skip frequency.

8) Contator at the I/O terminal of the AC drive

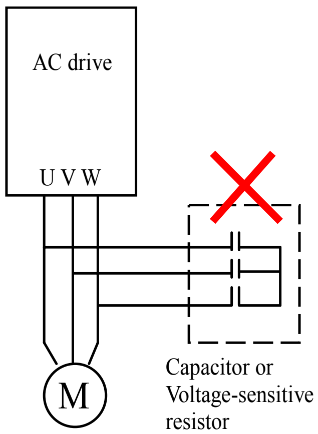
When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor, don't turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.



9) Voltage-sensitive device or capacitor on output side of the AC drive

Don't install the capacitor for improving power factor or lightning protection voltage-sensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient overcurrent or even be damaged.



10) When external voltage is out of rated voltage range

The AC drive must not be used outside the allowable voltage range specified in this manual. Otherwise, the AC drive's components may be damaged. If required, use a corresponding voltage step-up or step-down device.

11) Prohibition of three-phase input changed into two-phase input.

Don\t change the three-phase input of the AC drive into two-phase input. Otherwise, a fault will result or the AC drive will be damaged.

12) Surge suppressor

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor, electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the AC drive are switched ON or OFF. If the inductive loads generate a very high surge voltage, use a surge suppressor for the inductive load or also use a diode.

13) Altitude and de-rating

In places where the altitude is above 1000m and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. Contact ADTECH for technical support.

14) Some special usages

If wiring that is not described in this manual such as common DC bus is applied, contact the agent or ADTECH for technical support.

15) Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

16) Adaptable motor

The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper AC drive according to the rated motor current.

• The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.

• The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.

• The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor.

• Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.

2

Product Information

Chapter 2 Product Information

2.1 Designation Rules and Nameplate of the H8

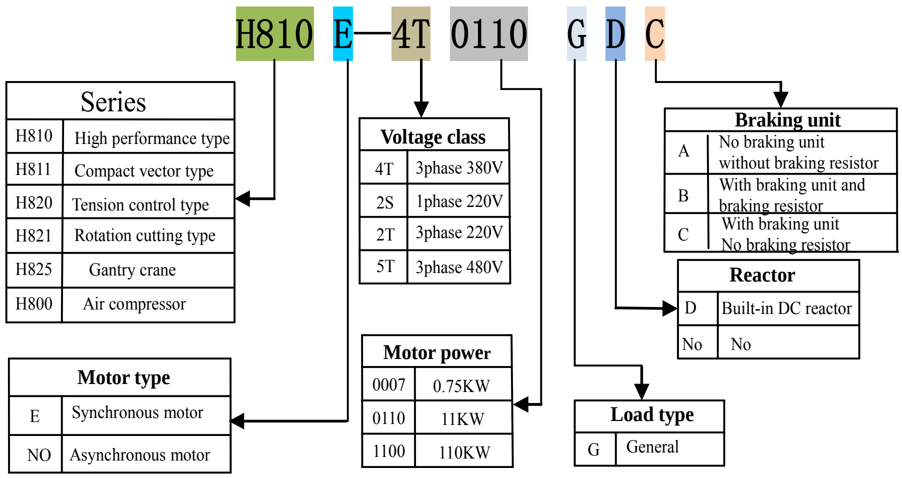


Figure 2-1 Designation rules of the H8

Figure 2-2 Description of H8 nameplate

2.2 Communication of the H8

The H8 series AC drives have two housing types, plastic housing and sheet metal housing, according to different voltage and power classes.

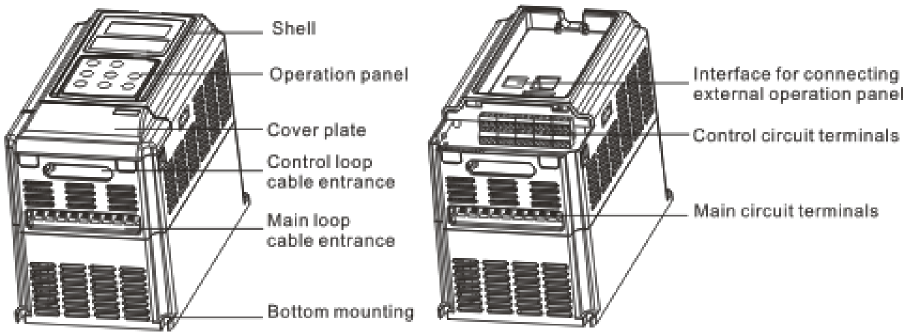


Figure 2-3 Components of the H8 series AC drive (plastic housing)

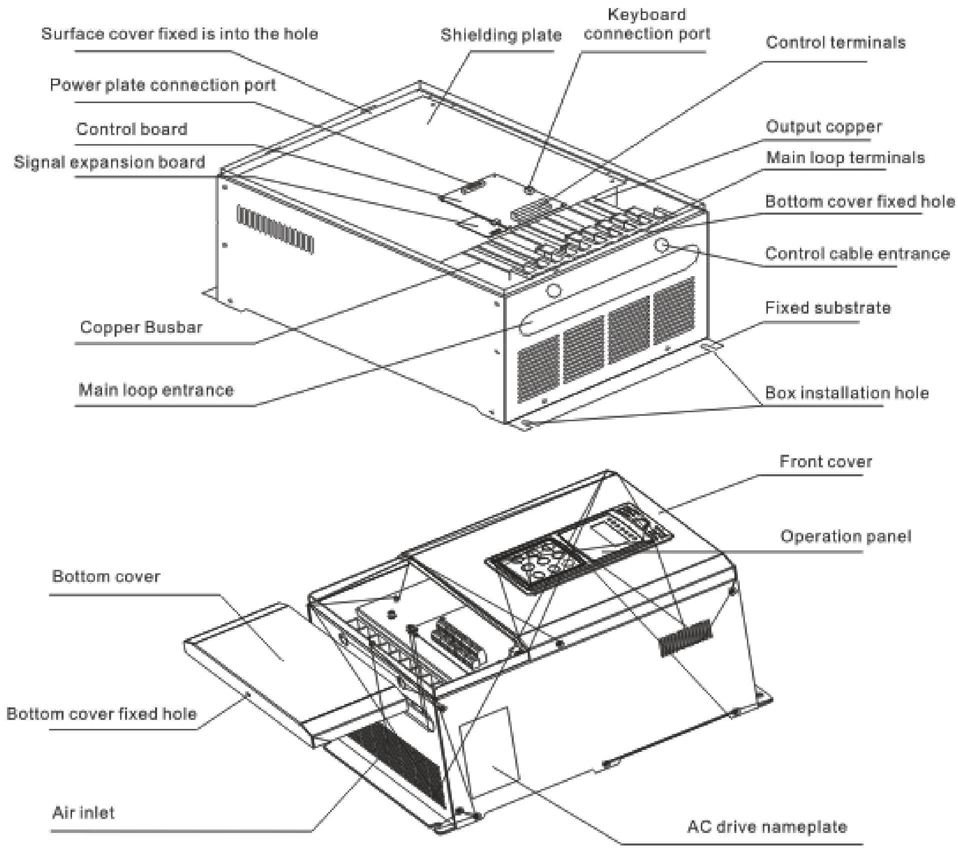


Figure 2-4 Components of the H8 Series AC drive (Sheet metal housing)

The housing types of the H8 models with different voltage and power classes are listed in the following table.

Voltage Class	Power Class	Housing Type
Single-phase 220V	0.75KW~2.2KW	Plastic housing
Three-phase 220V	0.75KW~2.2KW	Plastic housing
	4.0KW~75KW	Sheet metal housing
Three-phase 380V	0.75KW~4.0KW	Plastic housing
	5.5KW~450KW	Sheet metal housing
Three-phase 480V	0.75KW~4.0KW	Plastic housing
	5.5KW~450KW	Sheet metal housing

2.3 Technical Specifications

Table 2-1 Technical specifications of the H8

Item		Specifications	
Standard functions	Input voltage range	Voltage continuous fluctuation: ±10% Voltage transient fluctuation: -15% ~ +10%	
	Input frequency	50Hz/60Hz Fluctuation range: ±5%	
	Maximum frequency	Vector control: 0~400HZ V/F control: 0~400HZ	
	Carrier frequency	0.5Khz ~16KHz The carrier frequency is automatically adjusted based on the load features.	
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency ±0.025%	
	Control mode	Sensorless fux vector control (SVC) Closed-loop vector control (FVC) Voltage/Frequency (V/F) control	
	Start-up torque	0.5Hz/150% (SVC); 0Hz/180% (FVC)	
	Speed range	1:100 (SVC)	1:1000 (FVC)
	Speed stability accuracy	±0.5% (SVC)	±0.02% (FVC)
	Torque control accuracy	±5% (FVC)	

Item		Specifications
Standard functions	Overload capacity	60s for 150% of the rated current, 3s for 180% of the rated current.
	Torque boost	Fixed boost; Customized boost 0.1%~30.0%
	V/F curve	Straight-line V/F curve; Multi-point V/F curve; N-power V/F curve (1.2-power, 1.4-power, 1.6-power, 1.8-power, Square).
	V/F separation	Two types: complete separation; half separation
	Torque limit and control	It can limit the torque automatically and prevent frequent over current tripping during the running process. Torque control can be implemented in the FVC mode.
	DC braking	DC braking frequency: 0.00Hz to maximum frequency Braking time: 0.0s ~ 36.0s Braking action current value: 0.0% ~ 100.0%
	JOG control	JOG frequency range: 0.00Hz ~ 50.00Hz JOG acceleration/deceleration time: 0.0s ~ 6500.0s
	Simple PLC、Onboard multiple preset speeds	It implements up to 16 speeds via the simple PLC function or combination of X terminal states.
	Onboard PID	It realizes process-controlled closed loop control system easily.
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes.
	Overvoltage/Overcurrent stall control	The current and voltage are limited automatically during the running process so as to avoid frequency tripping due to overvoltage/overcurrent.
Individualized functions	High performance	Control of asynchronous motor and synchronous motor are implemented through the high-performance current vector control technology.
	Torque control mode	Speed control and torque control mode, can realize the open-loop tension control.
	Power dip ride through	The load feedback energy compensates the voltage reduction so that the AC drive can continue to run for a short time.

Item		Specifications
Individualized functions	Rapid current limit	It helps to avoid frequent overcurrent faults of the AC drive.
	Virtual IO	Five groups of virtual DIDO can realize simple logic control.
	Fixed length control	According to the number of pulses to achieve constant length control.
	Timing control	Time range: 0.0Min ~ 6500.0Min
	Multi-motor switchover	Two motors can be switched over via two groups of motor parameters.
	Multiple communication protocols	It supports communication via Modbus-RTU, PROFIBUS-DP, CANlink and CANopen.
	Motor overheat protection	The optional I/O extension card enables AI3 to receive the motor temperature sensor input so as to realize motor overheat protection.
	Multiple encoder types	It supports various encoders such as differential encoder, open-collector encoder, resolver, UVW encoder, and SIN/COS encoder.
RUN	Running command source	Operation panel; control terminals; Serial communication pot. You can perform switchover between these sources in various ways.
	Frequency source A	There are a total of 10 frequency sources, such as digital setting, analog voltage setting, analog current setting, pulse setting and serial communication port setting. You can perform switchover between these sources in various ways.
	Frequency source B	There are ten frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis.
	Input terminal	**Standard:** 5 digital input(X) terminals, one of which supports up to 100KHz high-speed pulse input; 2 analog input(AI) terminals, one of which only supports 0 ~ 10V voltage input or 4 ~ 20mA current input. **Expanding capacity:** 5 X terminals; 1 AI terminal that supports -10 ~ 10V voltage input.

Item		Specifications
RUN	Output terminal	**Standard:** 1high-speed pulse output terminal (open-collector) that supports 0 ~ 100KHz square wave signal output; 1 digital output (DO) terminal; 1 relay output terminal; 1 analog output (AO) terminal that supports 0 ~ 20mA current output or 0 ~ 10V voltage output. **Expanding capacity:** 1 DO terminal; 1 relay output terminal; 1 AO terminal that supports 0 ~ 20mA current output or 0 ~ 10V voltage output.
Display and operation on the operation panel	LED display	It displays the parameters.
	Key locking and function selection	It can lock the keys partially or completely and define the function range of some keys so as to prevent mis-function.
	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection , overheat protection and overload protection
	Optional parts	Braking unit, I/O extension card, PROFIBUS-DP communication card, CANlink communication card, CANopen communication card, differential input PG card, UVW differential input PG card, resolver PG card and OC input PG card
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt.
	Altitude	Lower than 1000m
	Ambient temperature	-10℃ to +40℃ (de-rated if the ambient temperature is between 40℃ and 50℃)
	Humidity	Less than 95% RH, without condensing
	Vibration	Less than 5.9m/s^2 (0.6g)
	Storage temperature	-20℃ to +60℃

Item		Specifications
Environment	IP level	IP20
	Pollution degree	PD2
	Power distribution system	TN, TT

2.4 Peripheral Electrical Devices and System Configuration

When the H8 is used to control the synchronous or asynchronous motor, forming a control system, it is necessary to install various electrical devices on the input and output sides of the AC drive to ensure the system safety and stability.

In addition, several optional extension cards are available for the H8 to implement various functions. The system configuration of three-phase 220V/380V voltage class, 4.0KW and above is shown in the following figure.

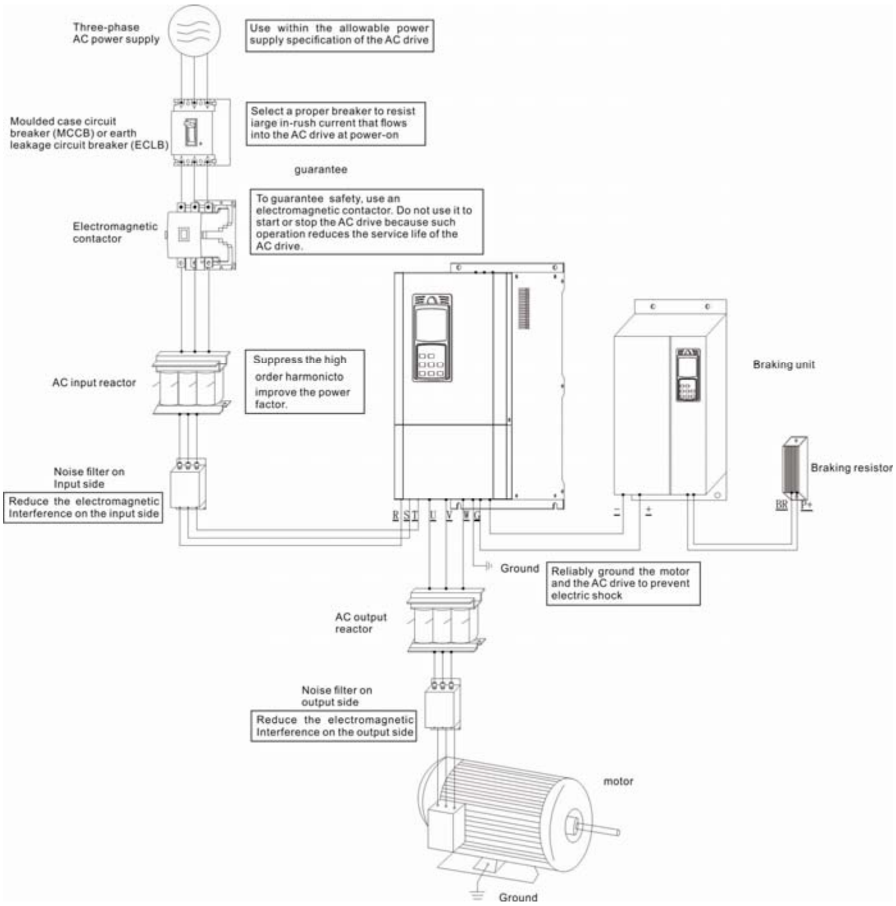


Figure 2-5 The system configuration of H8 series

2.4.1 Description of Peripheral Electrical Devices

Table 2-2 Description of peripheral electrical devices

Part	Mounting Location	Function Description
MCCB	Power receiving side	Interrupt the power supply when overcurrent occurs on downstream devices.
Contactor	Between MCCB and AC drive input side	Start and stop the AC drive. Don't start and stop the AC drive frequently by switching the contactor ON and OFF (less than twice per minute) nor use it to directly start the AC drive.
AC input reactor	AC drive input side	Improve the power factor of the input side. Eliminate the higher harmonics of the input side effectively and prevent other devices from being damaged due to distortion of the voltage waveform. Eliminate the input current unbalance due to unbalance between the power phases.
EMC Input filter	AC drive input side	Reduce the external conduction and radiation interference of the AC drive. Decrease the conduction interference flowing from the power end to the AC drive and improve the anti-interference capacity of the AC drive.
DC reactor	H8 series AC drive of 110G and above configured with DC reactor as standard	Improve the power factor of the input side. Improve the efficiency and thermal stability of the AC drive. Eliminate the impact of higher harmonics of the AC drive input side and reduce the external conduction and radiation interference.
AC output reactor	Between AC drive output side and the motor, close to the AC drive	The output side of the AC drive generally has much drive, there is much distributed capacitance in the circuit higher harmonics. When the motor is far from the AC and certain harmonics may cause resonance in the circuit, bringing about the following two impacts: • Degrade the motor insulation performance and damage the motor in the long run. • Generate large leakage current and cause frequent AC drive protection trips. If the distance between the AC drive and the motor is greater then 100m, install an AC output reactor.

1) Don't install the capacitor or surge suppressor on the output side of the AC drive. Otherwise, it may cause faults to the AC drive or damage to the capacitor and surge suppressor.
2) Inputs/Outputs (main circuit) of the AC drive contain harmonics, which may interfere with the communication device connected to the AC drive. Therefor, install an anti-interference filter to minimize the interference.
3) For more details on peripheral devices, refer to related selection manual.

2.4.2 Description of Optional Parts

The optional parts include braking unit, extension cards of different functions and external operation panel, etc. If any optional part is required, specify it in your order.

Table 2-3 Optional parts of the H8

Name	Model	Function	Remark
I/O extension card 1	H8IO1	It extends five Xs, an analog voltage input AI3 (isolation analog), two relay output, and an AO2.	Applied to all H8 models
CANlink communication extension card	H8CAN1	CANlink communication card	Applied to all H8 models
CANopen communication extension card	H8CAN2	CANopen communication card	Applied to all H8 models
Differential encoder interface card	H8PG1	Differential encoder interface card requiring 5V power supply	Applied to all H8 models

3

Installation Size and Selection

Chapter 3 Installation Size and Selection

3.1 Mechanical Installation

3.1.1 Installation Environment Requirements

1) Vibration: Less than 0.6G. Far away from the punching machine or the like.

2) Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation.Install the AC drive vertically on the support using screws.

3) Ambient temperature has great influence on the AC drive life, the operating temperature environment does not allow the AC drive exceeds the allowable temperature range (-10℃ to +50℃).

4) Free from direct sunlight, high humidity and condensation.

5) Free from oil dirt, dust and metal powder.

6) Free from corrosive, explosive and combustible gas.

3.1.2 Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the H8, as shown in the following figure.

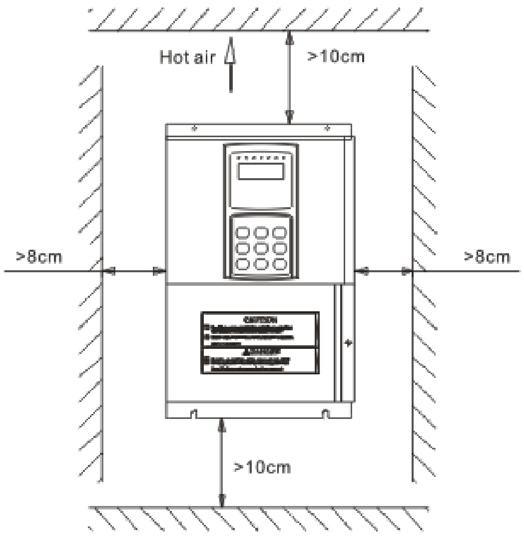


Figure 3-1 Clearance around the H8 for installation

The H8 series AC drive dissipates heat from the bottom to the top. When multiple AC drives are required to work together, install them side by side.

For application installing multiple AC drives, if one row of AC drives needs to be installed above another row, install an insulation guide plate to prevent AC drives in the lower row from heating those in the upper row and causing faults.

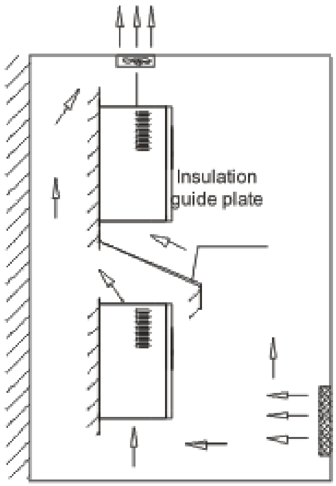


Figure 3-2 Installation of the insulation guide plate

⚠WARNING	• The higher the temperature was, the shorter service life of AC drive. • Please as far as possible from the AC drive to the heating device. • AC drive is installed in the box body, full consideration should be given to the size of the space and ventilation.

3.2 Electrical Installation

3.2.1 Description of Main circuit Terminals Function

Terminal	Function description
R, S, T	Three-phase power supply input terminals. Connect to the three-phase AC power supply.
U, V, W	AC drive output terminals. Connect to a three-phase motor.
P1, P+	Connecting terminals of external reactor. Connect to an external reactor.
P+, P-	Connecting terminals of brake assembly. Positive connect to terminal P+; Negative connect to terminal P-.

Terminal	Function description
P+, DB	Connecting terminals of braking resistor. Connect to an external reactor.
G ⏚	Grounding terminal; Must be grounded.

3.2.2 Precautions on the Wiring

1) Power input terminals L1, L2 or R, S, T

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

▪ The specification and installation method of external power cables must comply with local safety regulations and related IEC standards.

2) DC bus terminals P+, P-

▪ Terminals (P+) and (P-) of DC bus have residual voltage after the AC drive is switched off. After indicator CHARGE goes off, wait at least 10 minutes before touching the equipment. Otherwise, you may get electric shock.

▪ Connecting external braking components for the AC drive of 18.5KW and above (220V) and 37KW and above (other voltage classes), don't reverse poles (P+) and (P-). Otherwise, it may damage the AC drive and even cause a fire.

▪ The cable length of the braking unit shall be no longer than 10m. Use twisted pair wire or pair wires for parallel connection.

▪ Don't connect the braking resistor directly to the DC bus. Otherwise, it may damage the AC drive and even cause fire.

3) Braking resistor connecting terminals P+, DB

▪ The connecting terminals of the braking resistor are effective only for the AC configured with the built-in braking unit.

▪ The cable length of the braking resistor shall be less than 5m. Otherwise, it may damage the AC drive.

4) External reactor connecting terminals P1, P+

For the AC drive of 37KW and above (220V) and 75KW and above (other voltage classes), remove the jumper bar across terminals P1 and (P+) and install the reactor between the two terminals.

5) AC drive output terminals U, V, W

▪ The specification and installation method of external power cables must comply with the local safety regulations and related IEC standards.

▪ The Capacitor or surge absorber cannot be connected to the output side of the AC drive. Otherwise, it may cause frequent AC drive fault or even damage the AC drive.

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

6) Terminal G

▪ This terminal must be reliably connected to the main earthing conductor. Otherwise, it may cause electric shock, mal-function or even damage to the AC drive.

▪ Don't connect the earthing terminal to the neutral conductor of the power supply.

▪ The impedance of the G conductor must be able to withstand the large short-circuit current that may arise when a fault occurs.

▪ Select the size of the G conductor according to the following table:

Cross-sectional Area of a Phase Conductor (S)	Min.Cross-sectional Area of Protective Conductor (Sp)
S≦16 mm^2	S
16 mm^2 ＜S ≦35mm^2	16 mm^2
35 mm^2 ＜S	S/2

▪ You must use a yellow/green cable as the G conductor.

7) Requirements on upstream protection device

▪ Install upstream protection device on the input power circuit. The protection device must provide the protections on overcurrent, short-circuit and electrical isolation.

▪ When selecting the protective device, you should consider the current capacity of the power cable, system overload capacity and short-circuit capacity of the upstream power distribution of the equipment.

3.2.3 Description of Control Circuit Terminals

According to terminal Arrangement of Control Circuit,When the AC drive of the terminal control, please refer to the following control terminal wiring diagram, and set the appropriate parameters to achieve the peripheral control.

RA	10V	AI1	AI2	X1	X2	X3	X4	X5	CM
RB	GND	GND	AO1	CE	FM	DO1	CM	0V	24V

A	C	B

Description of Control Circuit Terminals:

Table 3-1 Description of control circuit terminals

Type	Terminal	Name	Function Description
Power supply	+10V－GND	External +10V Power Supply	Provide +10V power supply to external unit. Generally, it provides power supply to external potentiometer with resistance range of 1~5KΩ. Maximum output current:10mA.
	+24V－COM	External +24V Power Supply Applying to Overvoltage Category II circuit	Provide +24V power supply to external unit. Generally, it provides power supply to X/DO terminals and external sensors. Maximum output current: 200mA.
	V	Input Terminal of External Power Supply	Connect to +24V by default. When X1－X5 need to be driven by external power supply and be disconnected from +24V.
Analog input	AI1－GND	Analog input 1	Input voltage range: 0V ~ 10V DC Impedance: 22KΩ.
	AI2－GND	Analog input 2	Input range: 0 ~10VDC/4 ~20mA, decided by jumper J8 on the control board. Impedance: 22KΩ (voltage input), 500Ω (current input).
Digital input	X1 - V	Digital input 1	Optical coupling isolation, compatible with dual polarity input. Impedance: 2.4KΩ. Voltage range for level input: 9V ~ 30V.
	X2 - V	Digital input 2	
	X3 - V	Digital input 3	
	X4 - V	Digital input 4	
	X5 - V	High-speed pulse input	Besides features of X1-X4, it can be used for high-speed pulse input. Maximum input frequency: 100KHz.
Analog output	AO1 - GND	Analog output 1	Voltage or current output is decided by jumper J5. Output voltage range: 0 ~ 10V Output current range: 0 ~ 20mA.

Type	Terminal	Name	Function Description
Digital output	DO1 - CE	Digital output 1	Optical coupling isolation, dual polarity open collector output. Output voltage range: 0 ~ 24V Output current range: 0 ~ 50mA Note that CE and CM are internally insulated, but they are shorted by jumper externally. In this case DO1 is driven by +24V by default. If you want to drive DO1 by +24V by external power supply, remove the jumper.
	FM - CM	High-speed pulse output	It is limited by F5-00 (FM terminal output mode selection). As high-speed pulse output, the maximum frequency hits 100KHz. As open-collector output, its specification is the same as that of DO1.
Relay output	A - B	NC terminal	Contact driving capacity: 250VAC, 3A, $Cos_{\varnothing}$=0.4. 30VDC, 1A
	A - C	NO terminal	
Auxiliary interface	J12	Extension card interface	28-Pin terminal Connect to an optional card (I/O extension card, PLC card and various bus cards)
	J3	PG card interface	Support various types of PG cards: OC, differential, UVW and resolver.
	J7	External operation panel interface	Connect to external operation panel.

3.2.4 Wiring of AC Drive Control Circuit

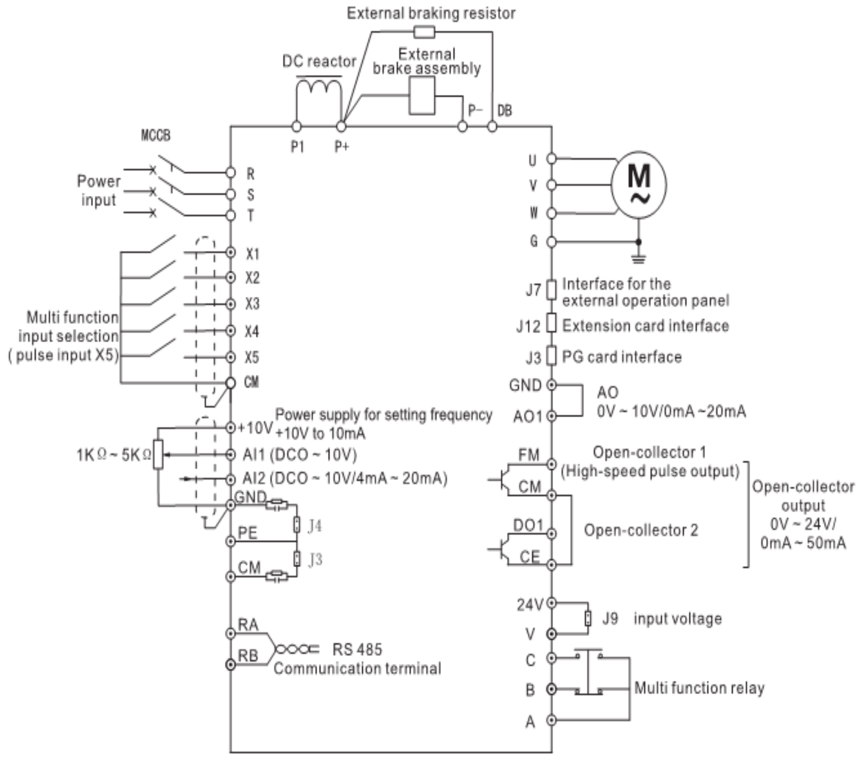


Figure 3-4 Wiring mode of the AC drive control circuit

Note : All H8 series drives have the same wiring mode.

Description of Wiring of Signal Terminals:

1) Wiring of AI terminals

Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20m,

as shown in figure 3-5.

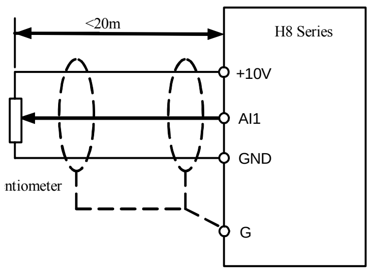


Figure 3-5 Wiring mode of AI terminals

In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source, as shown in figure 3-6.

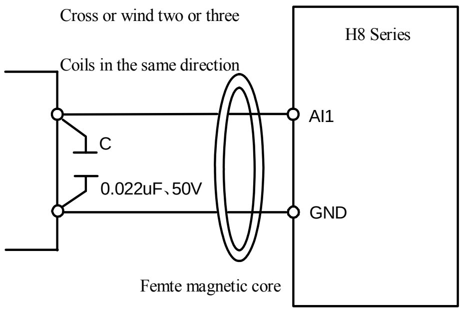


Figure 3-6 Install filter capacitor or ferrite magnetic core

2) Wiring of X terminals

Generally, select shielded cable no longer than 20m. When active driving is adopted, necessary filtering measures shall be taken to prevent the interference to the power supply. It is recommended to use the contact control mode.

◆ SINK Wiring

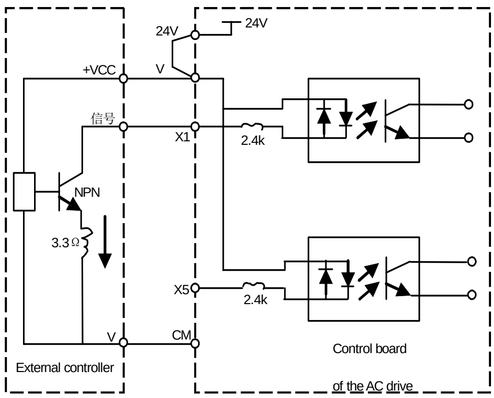


Figure 3-7 Wiring in SINK mode

This is the most commonly used wiring mode. To apply external power supply, remove jumpers between +24V and V and between CM and CE, and connect the positive pole of external power supply to V and negative pole to CE.

In such wiring mode, the X terminals of different AC drives cannot be connected in parallel. Otherwise, X mal-function may result. If parallel connection (different AC drives) is required, connect a diode in series at the X and the diode needs to satisfy the requirement: 1F > 10mA, UF < 1V, as show in following figure.

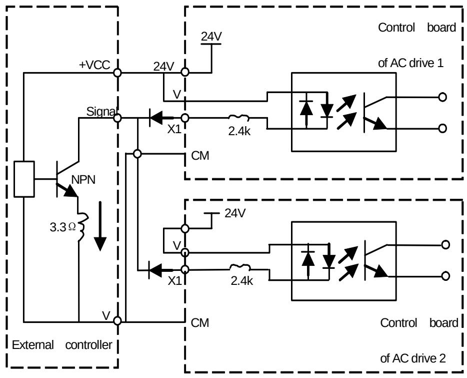


Figure 3-8 X terminals connected in parallel in SINK mode

◆ SOURCE Wiring

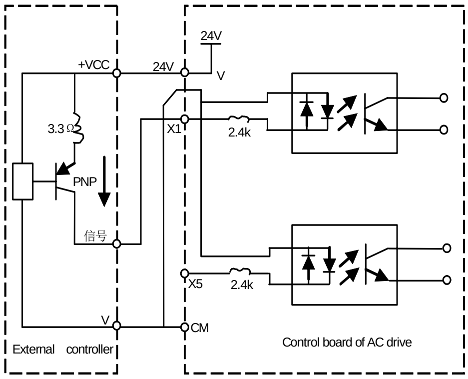


Figure 3-9 Wiring in SOURCE mode

In such wiring mode, remove the jumper between +24V and V. Connect +24V to the common port of external controller and meanwhile connect V to CM. If external power supply is applied, remove the jumper between CE and CM.

Description of Wiring of control Signal output Terminals:

3) Wiring of DO terminal

When the digital output terminal needs to drive the relay, an absorption diode shall be installed between two sides of the relay coil. Otherwise, it may cause damage to the 24VDC power supply. The driving capacity is not more than 50mA.

Note: Don’t reverse the polarity of absorption diode during installation, as shown in Figure 3-10. Otherwise, the 24VDC power supply will be damaged immediately once there is digital output.

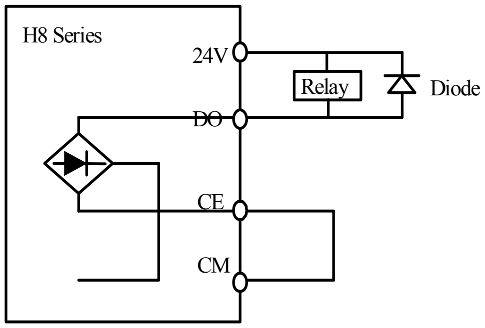


Figure 3-10 DO terminal wiring diagram

3.3 The AC drive electrical specifications of the H8

Table 3-2 The AC drive model and technical data

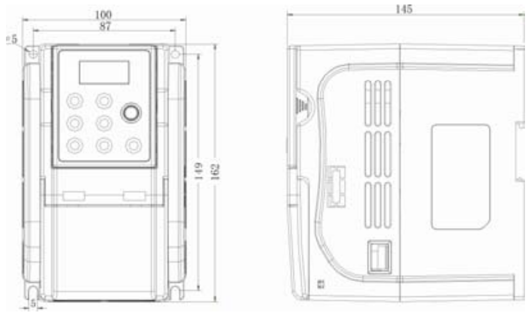
Model	Rated capacity (KVA)	Rated output current (A)	Adaptation motor power (KW)	control loop of wire (mm²)	main circuit of wire (mm²)
2S0004G	0.9	2.3	0.4	0.5	0.75
2S0007G	1.5	4	0.75	0.5	1.5
2S0015G	2.7	7	1.5	0.5	2.5
2S0022G	3.7	9.6	2.2	0.5	4
2T0004G	0.8	2.1	0.4	0.5	0.75
2T0007G	1.4	3.8	0.75	0.5	1.5
2T0015G	2.7	7	1.5	0.5	2.5
2T0022G	3.4	9	2.2	0.5	4
2T0040G	5	13	4.0	0.75	6
2T0055G	9.5	25	5.5	0.75	10
2T0075G	12.2	32	7.5	0.75	10
2T0110G	17	45	11	0.75	16
2T0150G	23	60	15	0.75	25
2T0185G	28.6	75	18.5	1.0	25
2T0220G	35	91	22	1.0	25
2T0300G	43	112	30	1.0	35
2T0370G	57	150	37	1.0	50

Model	Rated capacity (KVA)	Rated output current (A)	Adaptation motor power (KW)	control loop of wire (mm^2)	main circuit of wire (mm^2)
2T0450G	67	176	45	1.0	70
2T0550G	80	210	55	1.0	70
2T0750G	116	304	75	1.0	120
4T0007G	1.4	2.1	0.75	0.5	1
4T0015G	2.5	3.8	1.5	0.5	1.5
4T0022G	3.4	5.1	2.2	0.5	2.5
4T0040G	6	9	4.0	0.5	4
4T0055G	8.6	13	5.5	0.75	4
4T0075G	11	17	7.5	0.75	6
4T0110G	16.5	25	11	0.75	6
4T0150G	21	32	15	0.75	10
4T0185G	24	37	18.5	1.0	10
4T0220G	30	45	22	1.0	16
4T0300G	39.5	60	30	1.0	25
4T0370G	49.4	75	37	1.0	25
4T0450G	60	91	45	1.0	35
4T0550G	74	112	55	1.0	50
4T0750G	99	150	75	1.0	70
4T0900G	116	176	90	1.0	70
4T1100G	138	210	110	1.0	95
4T1320G	167	253	132	1.0	150
4T1600G	200	304	160	1.0	185
4T1850G	224	340	185	1.0	185
4T2000G	248	377	200	1.0	240
4T2200G	280	426	220	1.0	300
4T2500G	306	465	250	1.0	300
4T2800G	342	520	280	1.0	185*2
4T3150G	385	585	315	1.0	400

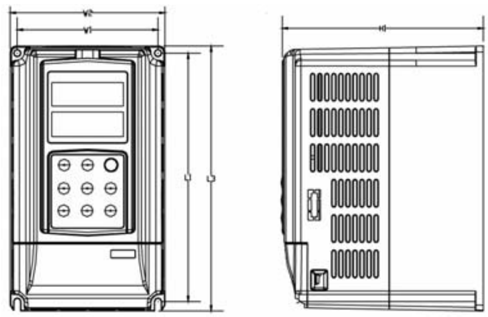
Model	Rated capacity (KVA)	Rated output current (A)	Adaptation motor power (KW)	control loop of wire (mm^2)	main circuit of wire (mm^2)
4T3550G	428	650	355	1.0	400
4T4000G	477	725	400	1.0	240*2
4T4500G	540	820	450	1.0	185*4
5T0007G	1.7	2.1	0.75	0.5	1
5T0015G	3.2	3.8	1.5	0.5	1.5
5T0022G	4.2	5.1	2.2	0.5	2.5
5T0040G	7.5	9	4	0.5	4
5T0055G	11	13	5.5	0.75	4
5T0075G	14	17	7.5	0.75	6
5T0110G	21	25	11	0.75	6
5T0150G	27	32	15	0.75	10
5T0185G	31	37	18.5	1.0	10
5T0220G	37	45	22	1.0	16
5T0300G	50	60	30	1.0	25
5T0370G	62	75	37	1.0	25
5T0450G	76	91	45	1.0	35
5T0550G	93	112	55	1.0	50
5T0750G	125	150	75	1.0	70
5T0900G	146	176	90	1.0	70
5T1100G	175	210	110	1.0	95
5T1320G	210	253	132	1.0	150
5T1600G	253	304	160	1.0	185
5T1850G	283	340	185	1.0	185
5T2000G	313	377	200	1.0	240
5T2200G	354	426	220	1.0	300
5T2500G	387	465	250	1.0	300
5T2800G	432	520	280	1.0	185*2
5T3150G	486	585	315	1.0	400

Model	Rated capacity (KVA)	Rated output current (A)	Adaptation motor power (KW)	control loop of wire (mm²)	main circuit of wire (mm²)
5T3550G	540	650	355	1.0	400
5T4000G	603	725	400	1.0	240*2
5T4500G	682	820	450	1.0	185*4

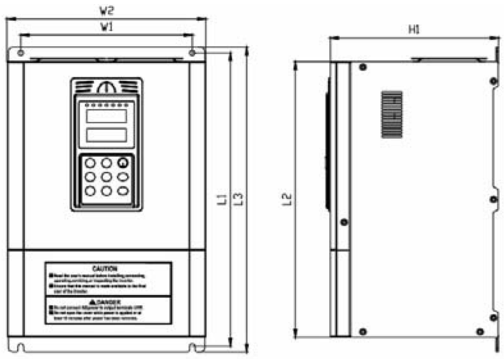
3.4 Physical Appearance and Overall Dimensions of the H8



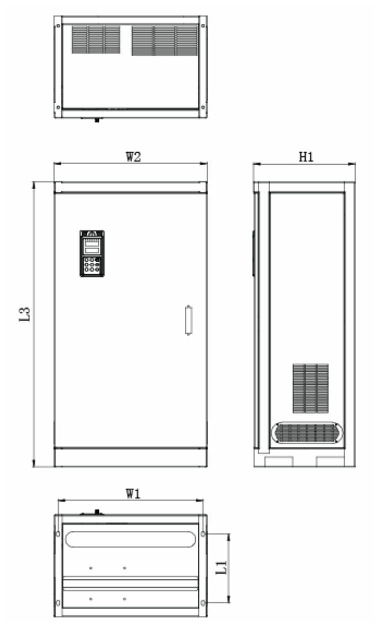
Models size chart in H811



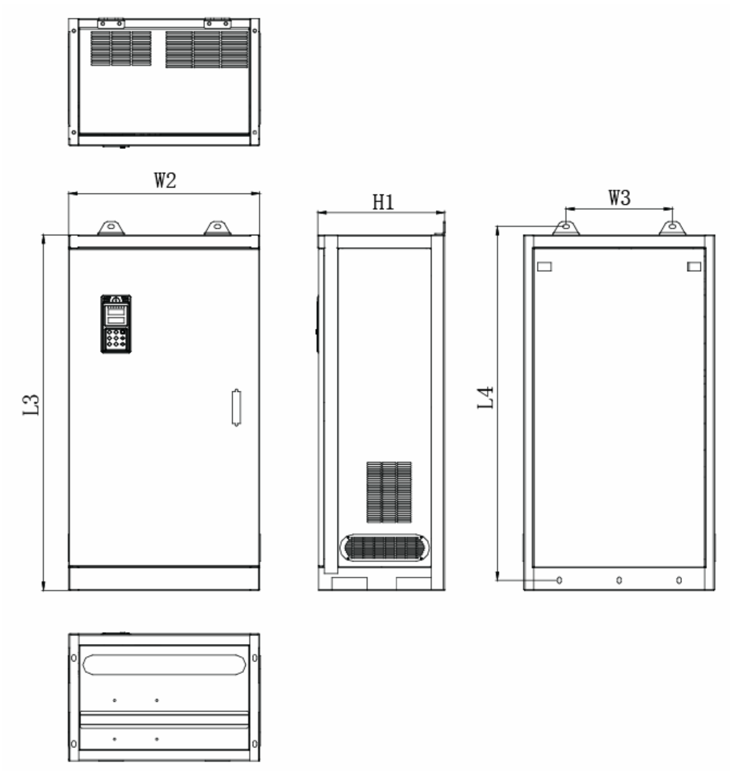
Models size chart 4T0040G below



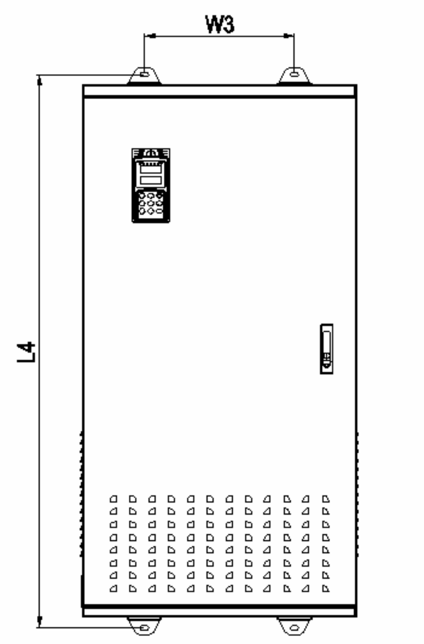
Models size chart 4T0055G ~ 4T00900G



The floor type diagram model types of more than 4T1100G



Wall-mounting installation of the 4T1100G ~ 4T1320G



Wall-mounting installation of the 4T1600G ~ 4T2500G

Table 3-3 Overall dimensions and mountings dimension（≦90kw)

Model			Outline dimensions			Mounting dimensions		Mounting mm	Weight Kg
Three-Phase 380V	Single-phase 480V	Single /Three-phase 220V	L3mm	W2 mm	H1 mm	L1 mm	W1 mm		
4T0007G	5T0007G	2S/2T0004G	225	132	172	212	120	4	2.3
4T0015G	5T0015G	2S/2T0007G							
4T0022G	5T0022G	2S/2T0015G							
4T0040G	5T0040G	2S/2T0022G							
4T0055G	5T0055G	--	332	195	170	317	175	7	6.8
4T0075G	5T0075G	2T0040G							
4T0110G	5T0110G	2T0055G	393	243	206	378	175	7	11.3
4T0150G	5T0150G	2T0075G							
4T0185G	5T0185G	--	480	253	233	463	216	9	17
4T0220G	5T0220G	2T0110G							
4T0300G	5T0300G	2T0150G	499	283	230	482	250	9	20.5
4T0370G	5T0370G	2T0185G							

Model			Outline dimensions			Mounting dimensions		Mounting mm	Weight Kg
Three-Phase 380V	Single-phase 480V	Single /Three-phase 220V	L3 mm	W2 mm	H1 mm	L1 mm	W1 mm		
4T0450G	5T0450G	2T0220G	580	360	270	563	250	9	32.9
4T0550G	5T0550G	2T0300G							
4T0750G	5T0750G	2T0370G	743	440	300	720	280	10	53
4T0900G	5T0900G	2T0450G							

Table 3-4 Overall dimensions and mountings dimension（≧110kw)

Model			Outline dimensions			Floor mounting		Wall mounting		Mounting mm	Weight Kg
Three-Phase 380V	Single-phase 480V	Single /Three-phase 220V	L3 mm	W2 mm	H1 mm	L1 mm	W1 mm	L4 mm	W3 mm		
4T1100G	5T1100G	2T0550G	1066	574	382	258	544	1061	320	12	106
4T1320G	5T1320G	--									
4T1600G	5T1600G	2T0750G	1240	640	395	240	600	1530	350	12	123
4T1850G	5T1850G	--									
4T2000G	5T2000G	--									
4T2200G	5T2200G	--	1480	640	395	240	600	1530	350	12	158
4T2500G	5T2500G	--									
4T2800G	5T2800G	--	1700	713	440	250	553	\	\	20	285
4T3150G	5T3150G	--									
4T3550G	5T3550G	--	1800	900	440	352	574	\	\	20	340
4T4000G	5T4000G	--									
4T4500G	5T4500G	--									

4

Operation and Display

Chapter 4 Operation and Display

4.1 Operation Panel

You can modify the parameters, monitor the working status and start or stop the H8 by operating the operation panel, as shown in the following figure.

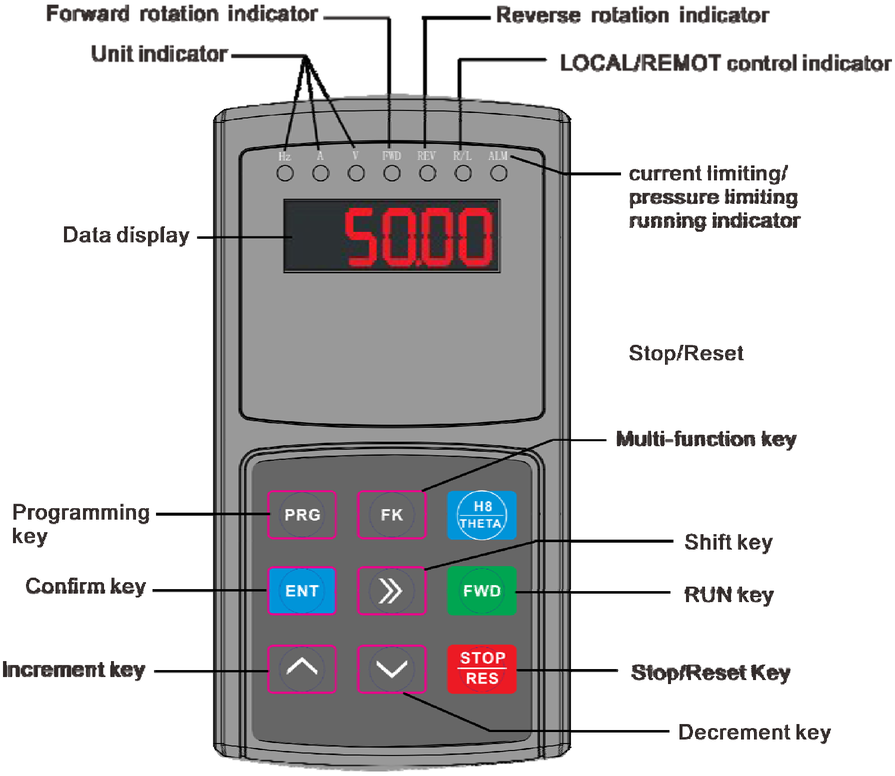


Figure 4-1 Diagram of the operation panel

Description of Indicators:

Hz: If the LED display as a frequency data, the indicator is ON;

A: If the LED display as a current data, the indicator is ON;

V: If the LED display as a voltage data, the indicator is ON;

FWD: ON indicates that the AC drive is in the Forward rotation;

REV: ON indicates that the AC drive is in the Reverse rotation;

R/L: When the indicator is ON, it indicates Remote control;

ALM: When the AC drive current limiting/pressure limiting running, the indicator in ON;

Digital Display

The 5-digit LED display is able to display the set frequency, output frequency, monitoring data and fault codes.

Description of Keys on the Operation Panel

Table 4-1 Description of keys on the operation panel

Key	Name	Function
	Programming	Enter or exit Level I menu.
	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
	Increment	Increase data or function code
	Decrement	Decrease data or function code
	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
	Run	Start the AC drive in the operation panel control mode.
	Stop/Reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the fault state. The functions of this key are restricted in F7-02.
	Function	Perform function switchover (such as quick switchover of command source or direction) according to the setting of F7-01.

4.2 Viewing and Modifying function codes

The operation panel of the H8 adopts three-level menu.

The three-level menu consists of function code group (Level I), function code (Level II), and function code setting value (Level III), as shown in the following figure.

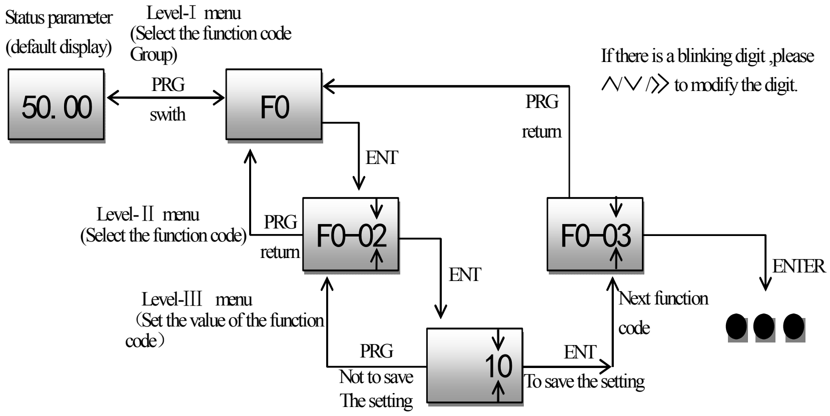


Figure 4-2 Operation procedure on the operation panel

You can return to Level II menu from Level III menu by pressing PRG or ENT.

After you press ENT, the system saves the parameter setting first, and then goes back to Level II menu and shifts to next function cede.

After you press PRG, the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

Here is an example of changing the value of F3-02 to 15.00Hz.

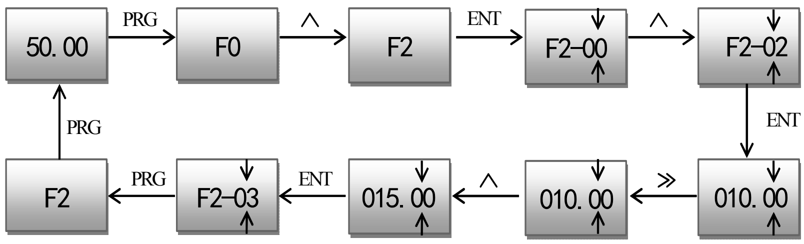


Figure 4-3 Example of changing the parameter value

In Level III menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This may be because:

1) Such a function code is only readable, such as, AC drive model, actually detected parameter and running record parameter.

2) Such a function code cannot be modified in the running state and can only be changed at stop.

4.3 Structure of Function codes

The H8, an advanced product based on T8, groups A and U, and new function codes to group F.

Function Code Group	Function	Description
F0 to FP	Standard AC drive function code group	H8 series function codes.
A0 to AC	Advanced function code group	Multi-motor parameters, AI/AO correction, optimization control, PLC card extension function setting.
U0 to U3	Running function code group	Display of AC drive basic parameters.

In the function code display state, select the required function code by pressing the key ︿ or ﹀, as shown in the following figure.

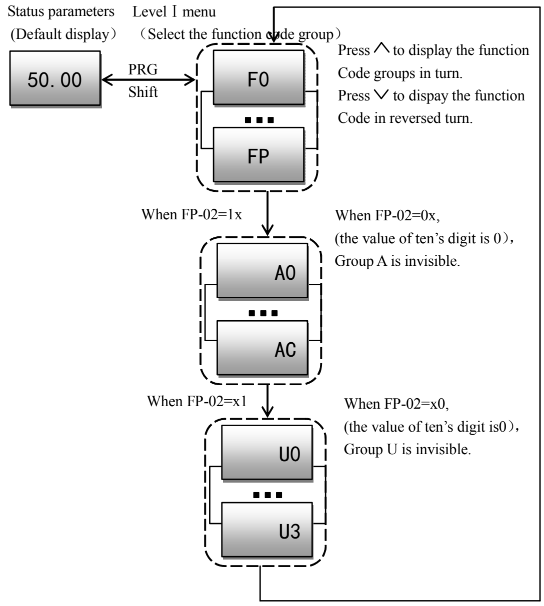


Figure 4-4 Selecting the required function code

FP-02 is used to determine whether group A and group U are displayed.

FP-02	Default: 11		
	Set Value	Ten's digit	Unit's digit
	Function	Group A display selection	Group U display selection
	Setting Range	0: Not display 1: Display	0: Not display 1: Display

4.4 Definition and Operation of the function Key (FK)

You can define the function (command source switchover or rotation direction switchover) of the multifunction key in F7-01. For details, see the description of F7-01.

4.5 Viewing Status Parameters

In the stop or running state, you can press "››" on the operation panel to display status parameters. Whether parameters are displayed is determined by the binary bits of values converted from the values of F7-03, F7-04, and F7-05 in the hexadecimal format.

In stop state, a total of 13 status parameters can be displayed, as listed in the following table.

F7-05	LED display stop parameters	Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: X input status Bit03: DO output status Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: AI3 voltage (V)	Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: Pulse setting frequency (KHz)	33

In running state, five running status parameters are displayed by default, and you can set whether other parameters are displayed by setting F7-03 and F7-04, as listed in the following table.

F7-03	LED display running parameters 1	Bit00: Running frequency1(Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (KW) Bit06: Output torque (%) Bit07: X input status	Bit08: DO output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: AI3voltage (V) Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F
F7-04	LED display running parameters 2	Bit00: PID feedback Bit01: PLC stage Bit02: Pulse setting frequency Bit03: Running frequency 2 Bit04: Remaining running time Bit05: AI1 voltage before correction Bit06: AI2 voltage before correction Bit07: AI3 voltage before correction	Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Minute) Bit11: Pulse setting frequency (Hz) Bit12: Communication setting value Bit13: Encoder feedback speed (Hz) Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display (Hz)	0

When the AC drive is powered on again after power failure, the parameters that are selected before power failure are displayed.

Select the required parameters by pressing "››". Set the values of the parameters by referring to the following example.

Determine the parameters to be displayed:
Running frequency, Bus voltage, Output voltage, Output current, Output frequency, Output torque, PID feedback, main frequency A display.
Set the binary data:
F7-03: 0000 0000 0111 1101B;
F7-04: 0100 0000 0000 0001B.
Convert the binary data to hexadecimal data:
F7-03: 007DH;
F7-04: 4001H.
The values displayed on the operation panel are respectively H.1043 and H.4001 respectively for F7-03 and F7-04.

4.6 Password Setting

The AC drive provides the user password protection function. When FP-00 is set to a nonzero value, the value is the user password. The password takes effect after you after exit the function code editing state. When you press PRG again, "------" will be displayed, and you must enter the correct user password to enter the menu.
To cancel the password protection function, enter with password and set FP-00 to 0.

4.7 Parameter Saving and Default Setting Restoring

After a function code is modified on the operation panel, the modification will be saved in the register of the AC drive and remain effective at next power-on.
The AC drive supports backup and restoration of parameter setting, which is convenient for commissioning.
The AC drive also provides the retentive function on alarm information and accumulative running time.
You can restore the backup values or default settings of the function codes of the AC drive or clear the running data through FP-01. For details, see the description of FP-01.

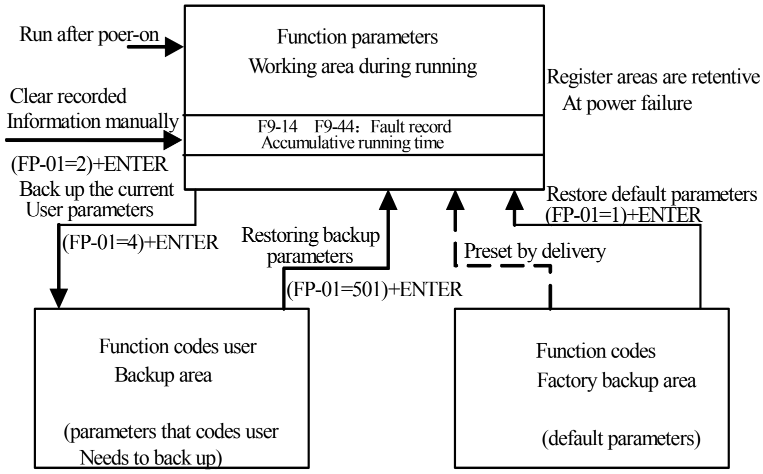


Figure 4-5 Parameter saving and default parameter restoring

5

Function Code Table

Chapter 5 Function Code Table

If FP-00 is set to a non-zero number, parameter protection is enabled. You must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set FP-00 to 0.

Group F and Group A are standard function parameters. Group U includes the monitoring function parameters.

5.1 Monitoring Parameters

Table 5-1 Monitoring Parameters

Function Code	Parameter Name	Min.Unit	Communication Address
Group U0: Standard Monitoring Parameters			
U0-00	Running frequency (Hz)	0.01Hz	7000H
U0-01	Set frequency (Hz)	0.01Hz	7001H
U0-02	Bus voltage	0.1V	7002H
U0-03	Output voltage	1V	7003H
U0-04	Output current	0.01A	7004H
U0-05	Output power	0.1KW	7005H
U0-06	Output torque	0.1%	7006H
U0-07	X state	1	7007H
U0-08	DO state	1	7008H
U0-09	AI1 voltage (V)	0.01V	7009H
U0-10	AI2 voltage (V) / current (mA)	0.01V/0.01mA	700AH
U0-11	AI3 voltage (V)	0.01V	700BH
U0-12	Count value	1	700CH
U0-13	Length value	1	700DH
U0-14	Load speed	1	700EH
U0-15	PID setting	1	700FH
U0-16	PID feedback	1	7010H

Function Code	Parameter Name	Min.Unit	Communication Address
U0-17	PLC stage	1	7011H
U0-18	Input pulse frequency (Hz)	0.01KHz	7012H
U0-19	Feedback speed	0.01Hz	7013H
U0-20	Remaining running time	0.1Min	7014H
U0-21	AI1 voltage before correction	0.001V	7015H
U0-22	AI2 voltage/current before correction	0.001V/0.01mA	7016H
U0-23	AI3 voltage before correction	0.001V	7017H
U0-24	Linear speed	1m/Min	7018H
U0-25	Accumulative power-on time	1Min	7019H
U0-26	Accumulative running time	0.1Min	701AH
U0-27	Pulse input frequency	1Hz	701BH
U0-28	Communication setting value	0.01%	701CH
U0-29	Encoder feedback speed	0.01Hz	701DH
U0-30	Main frequency A	0.01Hz	701EH
U0-31	Auxiliary frequency B	0.01Hz	701FH
U0-32	Viewing any register address value	1	7020H
U0-33	Synchronous motor rotor position	0.1°	7021H
U0-34	Motor temperature	1℃	7022H
U0-35	Target torque	0.1%	7023H
U0-36	Resolver position	1	7024H
U0-37	Power factor angle	0.1°	7025H
U0-38	ABZ position	1	7026H
U0-39	Target voltage upon V/F separation	1V	7027H
U0-40	Output voltage upon V/F separation	1V	7028H
U0-41	X state visual display	1	7029H
U0-42	DO state visual display	1	702AH
U0-43	X function state visual display 1 (funciton01-40)	1	702BH

Function Code	Parameter Name	Min.Unit	Communication Address
U0-44	X function state visual display 2 (function41-48)	1	702CH
U0-45	Fault information	1	702DH
U0-58	Phase Z counting	1	703AH
U0-59	Current set frequency	0.01%	703BH
U0-60	Current running frequency	0.01%	703CH
U0-61	AC drive running state	1	703DH
U0-62	Current fault code	1	703EH
U0-63	Sent value of point-point communication	0.01%	703FH
U0-64	Slave station numbers	1	7040H
U0-65	Torque upper limit	0.1%	7041H
U0-66	Communication extension card	100:CANopen 200:profibus-DP 300:CANlink	7042H
U0-67	The version of the communication extension card	Display range	-
U0-68	AC drive status of DP card	bit0-Running state bit1-Running direction bit2-AC dirve fault bit3-target frequency reached bit～bit7- reserved bit8～bit15- Fault code	7043H
U0-69	Send DP card speed/0.01Hz	0.01~Max.freq	7044H
U0-70	Send DP rotation speed/RMP	0~65535	7045H
U0-71	Cmmunication card current display	Display range	-
U0-72	Cmmunication card fault status	Display range	-
U0-73	Motor serial number	0:motor1 1:mortor2	7046H

Function Code	Parameter Name	Min.Unit	Communication Address
U0-74	AC drive output torque	-300~300%	7047H

The symbols in the function code table are described as follow:

“ √ ” : The parameter can be modified when the AC drive is in either stop or running state.

“ × ” : The parameter cannot be modified when the AC drive is in the running state.

“ * ” : The parameter is factory parameter and can be set only by the manufacturer.

“ ● ” : The parameter is the actually measured value and cannot be modified.

5.2 Standard Function Parameters

Table 5-2 Standard function parameters

Function code	Parameter Name	Setting Range	Default	Property
Group F0: Standard Function Parameters				
F0-00	G/P type display	1: G type (constant torque load)	Model dependent	●
F0-01	Motor 1 control mode	0: Senseless fux vector control (SVC) 1: Closed-loop vector control (FVC) 2: Voltage/Frequency (V/F) control	0	×
F0-02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking)	0	√
F0-03	Main frequency source A selection	0: Digital setting (non-retentive at power failure) 1: Digital setting (retentive at power failure) 2: AI1 3: AI2 4: AI3(Extended) 5: Pulse setting (X5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0	×

Function code	Parameter Name	Setting Range	Default	Property
F0-04	Auxiliary frequency source B selection	The same as F0-03 (Main frequency source A selection)	0	×
F0-05	Range base of auxiliary frequency B for A and B superposition	0: Relative to maximum frequency 1: Relative to main frequency A	0	√
F0-06	Range of auxiliary frequency B for A and B superposition	0% ~ 150%	100%	√
F0-07	Frequency source selection	Unit's digit (Frequency source selection) 0: Main frequency source A 1: A and B operation (operation relationship determined by ten\s digit) 2: Switchover between A and B 3: Switchover between A and “A and B operation” 4: Switchover between B and “A and B operation” Ten's digit (A and B operation relationship) 0: A+B 1: A-B 2: Max(A,B) 3: Min(A,B)	00	√
F0-08	Preset frequency	0.00 to maximum frequency (valid when frequency source is digital setting)	50.00Hz	√
F0-09	Rotation direction	0: Same direction 1: Reverse direction	0	√
F0-10	Maximum frequency	50.00Hz ~ 400HZ	50.00Hz	×
F0-11	Source of frequency upper limit	0: Set by F0-12 1: AI1 2: AI2 3: AI3	0	×

Function code	Parameter Name	Setting Range	Default	Property
F0-11	Source of frequency upper limit	4: Pulse setting (X5) 5: Communication setting	0	×
F0-12	Frequency upper limit	Frequency lower limit (F0-14) to maximum frequency (F0-10)	50.00Hz	√
F0-13	Frequency upper limit offset	0.00Hz to maximum frequency (F0-10)	0.00Hz	√
F0-14	Frequency lower limit	0.00Hz to frequency upper limit (F0-12)	0.00Hz	√
F0-15	Carrier frequency	0.5KHz ~ 16.0KHz	Model dependent	√
F0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	1	√
F0-17	Acceleration time 1	0.00s ~ 650.00s (F0-19=2) 0.0s ~ 6500.0s (F0-19=1) 0s ~ 65000s (F0-19=0)	Model dependent	√
F0-18	Deceleration time 1	0.00s ~ 650.00s (F0-19=2) 0.0s ~ 6500.0s (F0-19=1) 0s ~ 65000s (F0-19=0)	Model dependent	√
F0-19	Acceleration / Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	×
F0-21	Frequency offset of auxiliary frequency source B at A and B superposition	0.00Hz to maximum frequency (F0-10)	0.00Hz	√
F0-22	Frequency reference resolution	2: 0.01Hz	2	×
F0-23	Retentive of digital setting frequency upon stop	0: Not retentive 1: Retentive	0	√
F0-24	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	×

Function code	Parameter Name	Setting Range	Default	Property
F0-25	Acceleration / Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Set frequency 2: 100Hz	0	×
F0-26	Base frequency for UP/DOWN modification during running	0: Running frequency 1: Set frequency	0	×
F0-27	Binding command source to frequency source	Unit's digit (Binding operation panel command to frequency source) 0: No binding 1: Frequency source by digital setting 2: AI1 3: AI2 4: AI3 5: Pulse setting (X5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting Ten's digit (Binding terminal command to frequency source) 0 - 9, same as unit's digit Hundred's digit (Binding communication command to frequency source) 0 - 9, same as unit's digit	0000	√
F0-28	Serial communication protocol selection	0: Modbus protocol 1: Profbus-DP bridge or CANopen bridge	0	√
Group F1: Motor 1 Parameters				
F1-00	Motor type selection	0:Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0	×
F1-01	Rated motor power	0.1KW ~ 1000.0KW	Model dependent	×

Function code	Parameter Name	Setting Range	Default	Property
F1-02	Rated motor voltage	1V ~ 2000V	Model dependent	×
F1-03	Rated motor current	0.01A ~ 655.35A (AC drive power ≦55KW) 0.1A ~ 6553.5A (AC drive power > 55KW)	Model dependent	×
F1-04	Rated motor frequency	0.01Hz to maximum frequency	Model dependent	×
F1-05	Rated motor rotational speed	1RPM ~ 65535RPM	Model dependent	×
F1-06	Stator resistance (asynchronous motor)	0.001Ω ~65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Tuning parameters	×
F1-07	Rotor resistance (asynchronous motor)	0.001Ω ~65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Tuning parameters	×
F1-08	Leakage inductive reactance (asynchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Tuning parameters	×
F1-09	Mutual inductive reactance (asynchronous motor)	0.1mH ~ 6553.5mH (AC drive power ≦55KW) 0.01mH ~ 655.35mH (AC drive power > 55KW)	Tuning parameters	×
F1-10	No-load current (asynchronous motor)	0.0A1 to F1-03 (AC drive power ≦55KW) 0.1A to F1-03 (AC drive power > 55KW)	Tuning parameters	×
F1-16	Stator resistance (synchronous motor)	0.001Ω ~65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Tuning parameters	×

Function code	Parameter Name	Setting Range	Default	Property
F1-17	Shaft D inductance (synchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Tuning parameters	×
F1-18	Shaft Q inductance (synchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Tuning parameters	×
F1-20	Back EMF (synchronous motor)	0.1V ~ 6553.5V	Tuning parameters	×
F1-27	Encoder pulses per revolution	1 ~ 65535	1024	×
F1-28	Encoder type	0: ABZ incremental encoder 1: UVW incremental encoder 2: Resolver 3: SIN/COS encoder 4: Wire-saving UVW encoder	0	×
F1-30	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reverse	0	×
F1-31	Encoder installation angle	0.0° ~ 359.9°	0.0°	×
F1-32	U, V, W phase sequence of UVW encoder	0: Forward 1: Reverse	0	×
F1-33	UVW encoder angle offset	0.0° ~ 359.9°	0.0°	×
F1-34	Number of pole pairs of resolver	1 ~ 65535	1	×
F1-36	Encoder wire-break fault detection time	0.0s: No action 0.1s ~ 10.0s	0.0s	×
F1-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 1 2: Asynchronous motor dynamic auto-tuning 3: Asynchronous motor static auto-tuning 2	0	×

Function code	Parameter Name	Setting Range	Default	Property
F1-37	Auto-tuning selection	11: Synchronous motor with-load auto-tuning 12: Synchronous motor no-load auto-tuning	0	×
Group F2: Vector Control Parameters				
F2-00	Speed loop proportional gain 1	0 ~100	30	√
F2-01	Speed loop integral time 1	0.01s ~ 10.00s	0.50s	√
F2-02	Switchover frequency 1	0.00 to F2-05	5.00Hz	√
F2-03	Speed loop proportional gain 2	0 ~ 100	20	√
F2-04	Speed loop integral time 2	0.01s ~ 10.00s	1.00s	√
F2-05	Switchover frequency 2	F2-02 to maximum output frequency	10.00Hz	√
F2-06	Vector control slip gain	50% ~ 200%	100%	√
F2-07	SVC speed feedback filter time	0.000s ~ 0.100s	0.050s	√
F2-08	Vector control over-excitation gain	0 ~ 200	64	√
F2-09	Torque upper limit source in speed control mode	0: F2-10 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2）	0	√
F2-10	Digital setting of torque upper limit in speed control mode	0.0% ~ 200.0%	150.0%	√
F2-11	Torque upper limit source in speed control mode (generator)	0: F2-12 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2）	0	√
F2-12	Digital setting of torque upper limit in speed control mode (generator)	0.0% ~ 200.0%	150.0%	√

Function code	Parameter Name	Setting Range	Default	Property
F2-13	Excitation adjustment proportional gain	0 ~ 6000	2000	√
F2-14	Excitation adjustment integral gain	0 ~ 6000	1300	√
F2-15	Torque adjustment proportion gain	0 ~ 6000	2000	√
F2-16	Torque adjustment integral gain	0 ~ 6000	1300	√
F2-17	Speed loop integral property	Unit's digit: integral separation 0: Disabled 1: Enabled	0	√
F2-18	Field weakening mode of synchronous motor	0: No field weakening 1: Automatic adjustment 2: Direct calculation+ Automatic adjustment	1	√
F2-19	Field weakening Coefficient of synchronous motor	0~ 50	10	√
F2-20	Maximum output voltage coefficient	100%~110%	105%	√
F2-21	Field weakening Maximum torque coefficient	50%~200%	100%	√
F2-23	Synchronous motor output Saturation voltage margin	1%～100%	5%	√
F2-24	synchronous motor initial position angle of the current	50%～120%	80%	√
F2-25	synchronous motor Initial Position angle detection	0：everytime running detection 1：No detection 2：The first running detection	0	√
F2-27	Synchronous motor salient-pole Rate adjustment gain	50～500	100	√
F2-28	The maximum ratio of torque to current	0：close 1：open	0	√
F2-30	Adjust the current loop Kp tuning	1～100	6	√
F2-31	Adjust the current loop Ki tuning	1～100	6	√
F2-32	Z signal correction	0、1	0	√
F2-33	SVC speed Filter coefficient estimation	10~1000	100	√
F2-36	Synchronous motor SVC initial Excitation current limit	0~80%	30%	√

Function code	Parameter Name	Setting Range	Default	Property
F2-37	Synchronous motor SVC initial Minimum carrier frequency	0.8K～F0-15	2.0K	√
F2-38	SVC low frequency braking mode	0：NO 1：Stopping 2：Starting and stopping	0	√
F2-39	SVC Low frequency braking Forced frequency	0.00Hz～10.00Hz	2.00Hz	√
F2-40	SVC Low frequency braking frequency change step	0.0000Hz～1.0000Hz	0.0010Hz	√
F2-41	SVC Low frequency braking current	0%～80%	50%	√
F2-42	SVC Synchronous motor speed tracking	0:closed 1:open	0	√
F2-43	Zero servo enable	0:closed 1:open	0	√
F2-44	switching frequency	0.00Hz～F2-02	0.30Hz	√
F2-45	Zero servo speed Loop proportional gain	1～100	10	√
F2-46	Zero servo speed loop integral time	0.01s～10.00s	0.5s	√
F2-47	stopping Prohibit reversal	0～1	0	√
F2-48	Stopping angle	0.0˚～10.0˚	0.8˚	√
Group F3 : V/F Control Parameters				
F3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation	0	×
F3-01	Torque boost	0.0% (fixed torque boost) 0.1% ~ 30.0%	Model dependent	√
F3-02	Cut-off frequency of torque boost	0.00Hz to maximum output frequency	50.00Hz	×
F3-03	Multi-point V/F frequency 1 (F1)	0.00Hz to F3-05	0.00Hz	×
F3-04	Multi-point V/F voltage 1 (V1)	0.0% ~ 100.0%	0.0%	×

Function code	Parameter Name	Setting Range	Default	Property
F3-05	Multi-point V/F frequency 2 (F2)	F3-03 to F3-07	0.00Hz	×
F3-06	Multi-point V/F voltage 2 (V2)	0.0% ~ 100.0%	0.0%	×
F3-07	Multi-point V/F frequency 3 (F3)	F3-05 to rated motor frequency (F1-04)	0.00Hz	×
F3-08	Multi-point V/F voltage 3 (V3)	0.0% ~ 100.0%	0.0%	×
F3-09	V/F slip compensation gain	0.0% ~ 200.0%	0.0%	√
F3-10	V/F over-excitation gain	0 ~ 200	64	√
F3-11	V/F oscillation suppression gain	0 ~ 100	Model dependent	√
F3-12	oscillation suppression mode selection	0~4	3	×
F3-13	Voltage source for V/F separation	0: Digital setting (F3-14) 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication setting 100.0% corresponds to the rated motor voltage	0	√
F3-14	Voltage digital setting for V/F separation	0V to rated motor voltage	0V	√
F3-15	Voltage rise time of V/F separation	0.0s ~ 1000.0s It indicates the time for the voltage rising from 0V to rated motor voltage.	0.0s	√
F3-16	Voltage decline time of V/F separation	0.0s ~ 1000.0s It indicates the time for the voltage to	0.0s	√

Function code	Parameter Name	Setting Range	Default	Property
F3-16	Voltage decline time of V/F separation	decline from rated motor voltage to 0V.	0.0s	√
F3-17	Stop mode selection upon V/F separation	0: Frequency and voltage declining to 0 independently. 1: Frequency declining after voltage declines to 0.	0	√
F3-18	Overcurrent stall current	50%~200%	150%	×
F3-19	Overcurrent stall inhibit enable	0: disable 1: enable	1	×
F3-20	Overcurrent stall inhibit gain	0~100	20	√
F3-21	Double overcurrent stall current compensation coefficient	50%~200%	50%	×
F3-22	Overvoltage stall voltage	200.0V～2000.0V	Model dependent	×
F3-23	Overvoltage stall inhibit enable	0: disable 1: enable	1	×
F3-24	Overvoltage stall inhibit frequency gain	0~100	30	√
F3-25	Overvoltage stall inhibit voltage gain	0~100	30	√
F3-26	Overvoltage stall maximum rise frequency limit	0～50Hz	5Hz	×
F3-27	Slip compensation time constant	0.1～10.0S	5S	√
Group F4: Input Terminals				
F4-00	X1 function selection	0: No function 1: Forward RUN (FWD) 2: Reverse RUN (REV) 3: Three-line control	1	×

Function code	Parameter Name	Setting Range	Default	Property
Group F4: Input Terminals				
F4-00	X1 function selection	4: Forward JOG (F JOG) 5: Reverse JOG (R JOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: RUN pause 11: Normally open (NO) input of external fault 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Terminal 1 for acceleration / deceleration time selection 17: Terminal 2 for acceleration / deceleration time selection 18: Frequency source switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover terminal 1 21: Acceleration / Deceleration prohibited 22: PID pause 23: PLC status reset 24: Swing pause 25: Counter input 26: Counter reset 27: Length count input 28: Length reset	1	×
F4-01	X2 function selection		4	×
F4-02	X3 function selection		9	×
F4-03	X4 function selection		12	×
F4-04	X5 function selection		13	×

<table>
<tr><th>Function code</th><th>Parameter Name</th><th>Setting Range</th><th>Default</th><th>Property</th></tr>
<tr><td>F4-05</td><td>X6 function selection</td><td rowspan="5">29: Torque control prohibited
30: Pulse input (enabled only for X5)
31: Reserved
32: Immediate DC braking
33: Normally closed (NC) input of external fault
34: Frequency modification forbidden
35: Reverse PID action direction
36: External STOP terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source A and preset frequency
40: Switchover between auxiliary frequency source B and preset frequency
41: Motor selection terminal 1
42: Reserved
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control / Torque control switchover
47: Emergency stop
48: External STOP terminal 2
49: deceleration DC braking
50: Clear the current running time
51: Switchover between two-line mode and three-line mode
52: Prohibit reversal
53 ~ 59: Reserved</td><td>0</td><td>×</td></tr>
<tr><td>F4-06</td><td>X7 function selection</td><td>0</td><td></td></tr>
<tr><td>F4-07</td><td>X8 function selection</td><td>0</td><td>×</td></tr>
<tr><td>F4-08</td><td>X9 function selection</td><td>0</td><td>×</td></tr>
<tr><td>F4-09</td><td>X10 function selection</td><td>0</td><td>×</td></tr>
</table>

Function code	Parameter Name	Setting Range	Default	Property
F4-10	X terminals Filter time	0.000s ~ 1.000s	0.010s	√
F4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	×
F4-12	Terminal UP / DOWN rate	0.001Hz/s ~ 65.535Hz/s	1.00Hz/s	√
F4-13	AI curve 1 minimum input	0.00V to F4-15	0.00V	√
F4-14	Corresponding setting of AI curve 1 minimum input	-100.0% ~ 100.0%	0.0%	√
F4-15	AI curve 1 maximum input	F4-13 to 10.00V	10.00V	√
F4-16	Corresponding setting of AI curve 1 maximum input	-100.0% ~ 100.0%	100.0%	√
F4-17	AI1 filter time	0.00s ~ 10.00s	0.10s	√
F4-18	AI curve 2 minimum input	0.00V to F4-20	0.00V	√
F4-19	Corresponding setting of AI curve 2 minimum input	-100.0% ~ 100.0%	0.0%	√
F4-20	AI curve 2 maximum input	F4-18 to 10.00V	10.00V	√
F4-21	Corresponding setting of AI curve 2 maximum input	-100.0% ~ 100.0%	100.0%	√
F4-22	AI2 filter time	0.00s ~ 10.00s	0.10s	√
F4-23	AI curve 3 minimum input	-10.00V to F4-25	-10.00V	√
F4-24	Corresponding setting of AI curve 3 minimum input	-100.0% ~ 100.0%	-100.0%	√
F4-25	AI curve 3 maximum input	F4-23 to 10.00V	10.00V	√
F4-26	Corresponding setting of AI curve 3 maximum input	-100.0% ~ 100.0%	100.0%	√
F4-27	AI3 filter time	0.00s ~ 10.00s	0.10s	√
F4-28	Pulse minimum input	0.00KHz to F4-30	0.00KHz	√
F4-29	Corresponding setting of pulse minimum input	-100.0% ~ 100.0%	0.0%	√
F4-30	Pulse maximum input	F4-28 to 100.0KHz	50.0KHz	√

Function code	Parameter Name	Setting Range	Default	Property
F4-31	Corresponding setting of pulse maximum input	-100.0% ~ 100.0%	100.0%	√
F4-32	Pulse filter time	0.00s ~ 10.00s	0.10s	√
F4-33	AI curve selection	Unit's digit (AI1 curve selection) Curve 1 (2 points, see F4-13 to F4-16) Curve 2 (2 points, see F4-18 to F4-21) Curve 3 (2 points, see F4-23 to F4-26) Curve 4 (4 points, see A6-00 to A6-07) Curve 5 (4 points, see A6-08 to A6-15)	321	√
		Ten's digit (AI2 curve selection) Curve 1 to curve 5 (same as AI1)		
		Hundred's digit (AI3 curve selection) Curve 1 to curve 5 (same as AI1)		
F4-34	Setting for AI less than minimum input	Unit's digit (Setting for AI1 less than minimum input) 0: Minimum value 1: 0.0%	000	√
		Ten's digit (setting for AI2 less than minimum input) 0, 1 (same as AI1)		
		Hundred's digit (Setting for AI3 less than minimum input) 0, 1 (same as AI1)		
F4-35	X1 delay time	0.0s ~ 3600.0s	0.0s	×
F4-36	X2 delay time	0.0s ~ 3600.0s	0.0s	×
F4-37	X3 delay time	0.0s ~ 3600.0s	0.0s	×

Function code	Parameter Name	Setting Range	Default	Property
F4-38	X valid mode selection 1	Unit's digit (X1 valid mode) 0: High level valid 1: Low level valid	00000	×
		Ten's digit (X2 valid mode) 0, 1 (same as X1)		
		Hundred's digit (X3 valid mode) 0, 1 (same as X1)		
		Thousand's digit (X4 valid mode) 0, 1 (same as X1)		
		Ten thousand's digit (X5 valid mode) 0, 1 (same as X1)		
F4-39	X valid mode selection 2	Unit's digit (X6 valid mode) 0, 1 (same as X1)	00000	×
		Ten's digit (X7 valid mode) 0, 1 (same as X1)		
		Hundred's digit (X8 valid mode) 0, 1 (same as X1)		
		Thousand's digit (X9 valid mode) 0, 1 (same as X1)		
		Ten thousand's digit (X10 valid mode) 0, 1 (same as X1)		
F4-40	AI2 input signal selection	0: Voltage signal 1: Current signal	0	×
Group F5: Output Terminals				
F5-00	FM terminal output mode	0: Pulse output (FMP) 1: Switch signal output (FMR)	0	√
F5-01	FMR function (open- collector output terminal)	0: No output 1: AC drive running 2: Fault output (stop) 3: Frequency-level detection FDT1 output 4: Frequency reached 5: Zero-speed running (no output at stop)	0	√

<table>
<tr><th>Function code</th><th>Parameter Name</th><th>Setting Range</th><th>Default</th><th>Property</th></tr>
<tr><td>F5-01</td><td>FMR function (open- collector output terminal)</td><td rowspan="4">6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle complete
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for RUN
16: AI1 larger than AI2
17: Frequency upper limit reached
18: Frequency lower limit reached
19: Undervoltage state output
20: Communication setting
21: Reserved(Location completed)
22: Reserved(Location close)
23: Zero-speed running 2
(having output at stop)
24: Accumulative power-on time reached
25: Frequency level detection FDT2
output
26: Frequency 1 reached
27: Frequency 2 reached
28: Current 1 reached
29: Current 2 reached
30: Timing reached
31: AI1 input limit exceeded
32: Load becoming 0
33: Reverse running
34: Zero current state
35: Module temperature reached
36: Software current limit exceeded
37: Frequency lower limit reached
(having output at stop)</td><td>0</td><td>√</td></tr>
<tr><td>F5-02</td><td>Relay function (A-B -C)</td><td>2</td><td>√</td></tr>
<tr><td>F5-03</td><td>Extension card relay function (A1-C1)</td><td>0</td><td>√</td></tr>
<tr><td>F5-04</td><td>DO1 function selection (open-collector output terminal)</td><td>1</td><td>√</td></tr>
</table>

<table>
<tr><th>Function code</th><th>Parameter Name</th><th>Setting Range</th><th>Default</th><th>Property</th></tr>
<tr><td>F5-05</td><td>Extension card relay function (A2-C2)</td><td>38: Alarm output
39: Motor overheat warning
40: Current running time reached
41: Fault output
(There is no output if it is the coast to stop fault and undervoltage occurs.)</td><td>4</td><td>√</td></tr>
<tr><td>F5-06</td><td>FMP function selection</td><td rowspan="3">0: Running frequency
1: Set frequency
2: Output current
3: Motor output torque (absolute value)
4: Output power
5: Output voltage
6: Pulse input
7: AI1
8: AI2
9: AI3(Extension card)
10: Length
11: Count value
12: Communication setting
13: Motor rotational speed
14: Output current
15: Output voltage
16: Motor output torque (actual value)
17:AC drive output torque (actual value)</td><td>0</td><td>√</td></tr>
<tr><td>F5-07</td><td>AO1 function selection</td><td>0</td><td>√</td></tr>
<tr><td>F5-08</td><td>Extension card AO2 function selection</td><td>1</td><td>√</td></tr>
<tr><td>F5-09</td><td>Maximum FMP output frequency</td><td>0.01KHz ~ 100.00KHz</td><td>50.00KHz</td><td>√</td></tr>
<tr><td>F5-10</td><td>AO1 offset coefficient</td><td>-100.0% ~ 100.0%</td><td>0.0%</td><td>√</td></tr>
<tr><td>F5-11</td><td>AO1 gain</td><td>-10.00 ~ 10.00</td><td>1.00</td><td>√</td></tr>
<tr><td>F5-12</td><td>Extension card AO2 offset coefficient</td><td>-100.0% ~ 100.0%</td><td>0.00%</td><td>√</td></tr>
<tr><td>F5-13</td><td>Extension card AO2 gain</td><td>-10.00 ~ 10.00</td><td>1.00</td><td>√</td></tr>
</table>

Function code	Parameter Name	Setting Range	Default	Property
F5-17	FMR output delay time	0.0s ~3600.0s	0.0s	√
F5-18	Relay 1 output delay time	0.0s ~3600.0s	00s	√
F5-19	Relay 2output delay time	0.0s ~3600.0s	0.0s	√
F5-20	DO1 output delay time	0.0s ~3600.0s	00s	√
F5-21	Relay3 output delay time	0.0s ~3600.0s	0.0s	√
F5-22	DO valid mode selection	Unit's digit (FMR valid mode) 0: Positive logic 1: Negative logic Ten's digit (Relay 1 valid mode) 0, 1 (same as FMR) Hundred's digit (Relay 2 valid mode) 0, 1 (same as FMR) Thousand's digit (DO 1 valid mode) 0, 1 (same as FMR) Ten thousand's digit (Relay 3 valid mode) 0, 1 (same as FMR)	00000	√
F5-23	AO1 output signal selection	0: Voltage signal 1: Current signal	0	×
Group F6: Start / Stop Control				
F6-00	Start mode	0: Direct start 1: Rotational speed tracking restart 2: Pre-excited start (asynchronous motor)	0	√
F6-01	Rotational speed tracking mode	0: From frequency at stop 1: From zero speed 2: From maximum frequency	0	×
F6-02	Rotational speed tracking speed	1 ~ 100	20	√

Function code	Parameter Name	Setting Range	Default	Property
F6-03	Startup frequency	0.00Hz ~ 10.00Hz	0.00Hz	√
F6-04	Startup frequency holding time	0.0s ~ 100.0s	0.0s	×
F6-05	Startup DC braking current / Pre-excited current	0% ~ 100%	0%	×
F6-06	Startup DC braking time / Pre-excited time	0.0s ~ 100.0s	0.0s	×
F6-07	Acceleration / Deceleration mode	0: Linear acceleration / deceleration 1: Static s-curve acceleration / deceleration 2: Dynamic S-curve acceleration / deceleration	0	×
F6-08	Time proportion of S-curve start segment	0.0% to (100.0% ~ F6-09)	30.0%	×
F6-09	Time proportion of S-curve end segment	0.0% to (100.0% ~ F6-08)	30.0%	×
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	√
F6-11	Initial frequency of stop DC braking	0.00Hz to maximum frequency	0.00Hz	√
F6-12	Waiting time of stop DC braking	0.0s ~ 100.0s	0.0s	√
F6-13	Stop DC braking current	0% ~ 100%	0%	√
F6-14	Stop DC braking time	0.0s ~ 100.0s	0.0s	√
F6-15	Brake use ratio	0% ~ 100%	100%	√
F6-16	Brake pipe opening time	0s~65000s	0s	√
F6-18	Rotational speed tracking current	30%~200%	Model dependen	×
F6-21	Eliminate excitation time	0s~5.0s	Model dependen	×

Function code	Parameter Name	Setting Range	Default	Property
Group F7: Operation Panel and Display				
F7-01	F.K Key function selection	0: F.K key disabled 1: Switchover between operation panel control and remote command control (terminal or communication) 2: Switchover between forward rotation and reverse rotation 3: Forward JOG 4: Reverse JOG	0	×
F7-02	STOP / RESET key function	0: STOP / RESET key enabled only in operation panel control 1: STOP / RESET key enabled in any operation mode	1	√
F7-03	LED display running parameters 1	0000 ~ FFFF Bit00: Running frequency 1 (Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (KW) Bit06: Output torque (%) Bit07: X input status Bit08: DO output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: AI3 voltage (V) Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F	√
F7-04	LED display running parameters 2	0000 ~ FFFF Bit00: PID feedback Bit01: PLC stage Bit02: Pulse setting frequency (KHz)	0	√

Function code	Parameter Name	Setting Range	Default	Property
F7-04	LED display running parameters 2	Bit03: Running frequency 2 (Hz) Bit04: Remaining running time Bit05: AI1 voltage before correction (V) Bit06: AI2 voltage before correction (V) Bit07: AI3 voltage before correction (V) Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min) Bit11: Pulse setting frequency (Hz) Bit12: Communication setting value Bit13: Encoder feedback speed (Hz) Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display(Hz)	0	√
F7-05	LED display stop parameters	0000 ~ FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: X input status Bit03: DO output status Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: AI3 voltage (V) Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: Pulse setting frequency (KHz)	33	√
F7-06	Load speed display coefficient	0.0001 ~ 6.5000	1.0000	√
F7-07	Heatsink temperature of inverter module	0.0℃ ~ 100℃	—	●
F7-09	Accumulative running time	0h ~ 65535h	—	●

Function code	Parameter Name	Setting Range	Default	Property
F7-12	Number of decimal places for load speed display	Unit's digit:U0~U14 Number of decimal places 0: 0 decimal place 1: 1 decimal place 2: 2 decimal place 3: 3 decimal place Ten's digit:U0-19/U0-29 Number of decimal places 1: 1 decimal place 2: 2 decimal place	1	√
F7-13	Accumulative power-on time	0h ~ 65535h	—	●
F7-14	Accumulative power consumption	0KWh ~ 65535KWh	—	●
Group F8: Auxiliary Functions				
F8-00	JOG running frequency	0.00Hz to maximum frequency	2.00Hz	√
F8-01	JOG acceleration time	0.0s ~ 65000s	20.0s	√
F8-02	JOG deceleration time	0.0s ~ 65000s	20.0s	√
F8-03	Acceleration time 2	0.0s ~ 65000s	Model dependent	√
F8-04	Deceleration time 2	0.0s ~ 65000s	Model dependent	√
F8-05	Acceleration time 3	0.0s ~ 65000s	Model dependent	√
F8-06	Deceleration time 3	0.0s ~ 65000s	Model dependent	√
F8-07	Acceleration time 4	0.0s ~ 65000s	Model dependent	√
F8-08	Deceleration time 4	0.0s ~ 65000s	Model dependent	√
F8-09	Jump frequency 1	0.00Hz to maximum frequency	0.00Hz	√
F8-10	Jump frequency 2	0.00Hz to maximum frequency	0.00Hz	√
F8-11	Frequency jump amplitude	0.00Hz to maximum frequency	0.01Hz	√

Function code	Parameter Name	Setting Range	Default	Property
F8-12	Forward / Reverse rotation dead-zone time	0.0s ~ 3000.0s	0.0s	√
F8-13	Reverse control	0: Enabled 1: Disabled	0	√
F8-14	Running mode when set frequency lower than frequency lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	0	√
F8-15	Droop control	0.00Hz ~ 10.00Hz	0.00Hz	√
F8-16	Accumulative power-on time threshold	0.0h ~ 65000.0h	0h	√
F8-17	Accumulative running time threshold	0.0h ~ 65000.0h	0h	√
F8-18	Startup protection	0: No 1: Yes	0	√
F8-19	Frequency detection value (FDT 1)	0.00Hz to maximum frequency	50.00Hz	√
F8-20	Frequency detection hysteresis (FDT 1)	0.0% ~ 100.0% (FDT 1 level)	5.0%	√
F8-21	Detection range of frequency reached	0.0% ~ 100.0% (maximum frequency)	0.0%	√
F8-22	Jump frequency during acceleration / deceleration	0: Disabled 1: Enabled	0	√
F8-25	Frequency switchover point between acceleration time 1 and acceleration time 2	0.00Hz to maximum frequency	0.00Hz	√
F8-26	Frequency switchover point between deceleration time 1 and deceleration time 2	0.00Hz to maximum frequency	0.00Hz	√
F8-27	Terminal JOG preferred	0: Disabled 1: Enabled	0	√
F8-28	Frequency detection value (FDT 2)	0.00Hz to maximum frequency	50.00Hz	√
F8-29	Frequency detection hysteresis (FDT 2)	0.0% ~ 100.0% (FDT 2 level)	5.0%	√
F8-30	Any frequency reaching detection value 1	0.00Hz to maximum frequency	50.00Hz	√

Function code	Parameter Name	Setting Range	Default	Property
F8-31	Any frequency reaching detection amplitude 1	0.0% ~ 100.0% (maximum frequency)	0.0%	√
F8-32	Any frequency reaching detection value 2	0.00Hz to maximum frequency	50.00Hz	√
F8-33	Any frequency reaching detection amplitude 2	0.0% ~ 100.0% (maximum frequency)	0.0%	√
F8-34	Zero current detection level	0.0% ~ 300.0% (100% corresponds to rated motor current)	5.0%	√
F8-35	Zero current detection delay time	0.00s ~ 600.00s	0.10s	√
F8-36	Output overcurrent threshold	0.0% (no detection) 0.1% ~ 300.0% (rated motor current)	200..0%	√
F8-37	Output overcurrent detection delay time	0.00s ~ 600.00s	0.00s	√
F8-38	Any current reaching 1	0.0% ~ 300.0% (rated motor current)	100.0%	√
F8-39	Any current reaching 1 amplitude	0.0% ~ 300.0% (rated motor current)	0.0%	√
F8-40	Any current reaching 2	0.0% ~ 300.0% (rated motor current)	100.0%	√
F8-41	Any current reaching 2 amplitude	0.0% ~ 300.0% (rated motor current)	0.0%	√
F8-42	Timing function	0: Disabled 1: Enabled	0	×
F8-43	Timing duration source	0: F8-44 1: AI1 2: AI2 3: AI3 (100% of analog input corresponds to the value of F8-44)	0	×
F8-44	Timing duration	0.0min ~ 6500.0min	0.0min	×
F8-45	AI1 input voltage lower limit	0.00V to F8-46	3.10V	√

Function code	Parameter Name	Setting Range	Default	Property
F8-46	AI1 input voltage upper limit	F8-45 to 11.00V	6.80V	√
F8-47	Module temperature threshold	0℃ ~ 100℃	75℃	√
F8-48	Cooling fan control	0: Fan working during running 1: Fan working continuously	0	√
F8-49	Wakeup frequency	Dormant frequency (F8-51) to maximum frequency (F0-10)	0.00Hz	√
F8-50	Wakeup delay time	0.0s ~ 6500.0s	0.0s	√
F8-51	Dormant frequency	0.00Hz to wakeup frequency (F8-49)	0.00Hz	√
F8-52	Dormant delay time	0.0s ~ 6500.0s	0.0s	√
F8-53	Current running time reached	0.0min ~ 6500.0min	0.0min	√
F8-54	Output power correction coefficient	0.00% ~ 200.0%	100.0%	√
Group F9: Fault and Protection				
F9-00	Motor overload protection selection	0: Disabled 1: Enabled	1	√
F9-01	Motor overload protection gain	0.20 ~ 10.00	1.00	√
F9-02	Motor overload warning coefficient	50% ~ 100%	80%	√
F9-03	Overvoltage stall gain	0 ~ 100	0	√
F9-04	Overvoltage stall protective voltage	120% ~ 150%	130%	√
F9-05	Overcurrent stall gain	0 ~ 100	20	√
F9-06	Overcurrent stall protective current	100% ~ 200%	150%	√
F9-07	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	1	√
F9-08	braking unit action voltage	200.0~2000.0V	Model dependent	√
F9-09	Fault auto reset time	0 ~ 20	0	√

Function code	Parameter Name	Setting Range	Default	Property
F9-10	Do action during fault auto reset	0: Not act 1: Act	0	√
F9-11	Time interval of fault auto	0.1s ~ 100.0s	1.0s	√
F9-12	Input phase loss protection / contactor energizing protection selection	Unit's digit: Input phase loss protection Ten's digit: Contactor energizing protection 0: Disabled 1: Enabled	11	√
F9-13	Output phase loss protection selection	0: Disabled 1: Enabled	1	√
F9-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Buffer resistance overload 9: Undervoltage 10: AC drive overload 11: Motor overload 12: Power input phase loss 13: Power output phase loss 14: Module overheat 15: External equipment fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder / PG card fault 21: EEPROM read-write fault 22: AC drive hardware fault 23: Short circuit to ground	—	●
F9-15	2nd fault type		—	●

Function code	Parameter Name	Setting Range	Default	Property
F9-15	2nd fault type	24: Reserved 25: Reserved 26: Accumulative running time reached 27: User-defined fault 1 28: User-defined fault 2 29: Accumulative power-on time reached 30: Load becoming 0 31: PID feedback lost during running 40: With-wave current limit fault 41: Motor switchover fault during running 42: Too large speed deviation 43: Motor over-speed 45: Motor overheat 51: Initial position fault 55: Load distribution fault	—	●
F9-16	3rd (latest) fault type		—	●
F9-17	Frequency upon 3rd fault	—	—	●
F9-18	Current upon 3rd fault	—	—	●
F9-19	Bus voltage upon 3rd fault	—	—	●
F9-20	X status upon 3rd fault	—	—	●
F9-21	Output terminal status upon 3rd fault	—	—	●
F9-22	AC drive status upon 3rd fault	—	—	●
F9-23	Power-on time upon 3rd fault	—	—	●
F9-24	Running time upon 3rd fault	—	—	●
F9-27	Frequency upon 2nd fault	—	—	●
F9-28	Current upon 2nd fault	—	—	●

Function code	Parameter Name	Setting Range	Default	Property
F9-29	Bus voltage upon 2nd fault	—	—	●
F9-30	X status upon 2nd fault	—	—	●
F9-31	Output terminal status upon 2nd fault	—	—	●
F9-32	AC drive status upon 2nd fault	—	—	●
F9-33	Power-on time upon 2nd fault	—	—	●
F9-34	Running time upon 2nd fault	—	—	●
F9-37	Frequency upon 1st fault	—	—	●
F9-38	Current upon 1st fault	—	—	●
F9-39	Bus voltage upon 1st fault	—	—	●
F9-40	X status upon 1st fault	—	—	●
F9-41	Output terminal status upon 1st fault	—	—	●
F9-42	AC drive status upon 1st fault	—	—	●
F9-43	Power-on time upon 1st fault	—	—	●
F9-44	Running time upon 1st fault	—	—	●
F9-47	Fault protection action selection 1	Unit's digit (Motor overload, Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	00000	√
		Ten's digit (Power input phase loss, Err12) Same as unit's digit		
		Hundred's digit (Power output phase loss, Err13) Same as unit's digit		

Function code	Parameter Name	Setting Range	Default	Property
F9-47	Fault protection action selection 1	Thousand's digit (External equipment fault, Err15) Same as unit's digit Ten thousand's digit (Communication fault, Err16) Same as unit's digit	00000	√
F9-48	Fault protection action selection 2	Unit's digit (Encoder fault, Err20) 0: Coast to stop Ten's digit (EEPROM read-write fault, Err21) 0: Coast to stop 1: Stop according to the stop mode Hundred's digit: Reserved Thousand's digit (Motor overheat, Err25) Same as unit's digit in F9-47 Ten thousand's digit (Accumulative running time reached, Err26) Same as unit's digit in F9-47	00000	√
F9-49	Fault protection action selection 3	Unit's digit (User-defined fault 1, Err27) Same as unit's digit in F9-47 Ten's digit (User-defined fault 2, Err28) Same as unit's digit in F9-47 Hundred's digit (Accumulative power-on time reached, Err29) Same as unit's digit in F9-47 Thousand's digit (load becoming 0, Err30) 0: Coast to stop 1: Decelerate to stop 2: Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers	00000	√

Function code	Parameter Name	Setting Range	Default	Property
F9-49	Fault protection action selection 3	Ten thousand's digit (PID feedback lost during running, Err31) Same as unit's digit in F9-47	00000	√
F9-50	Fault protection action selection 4	Unit's digit (Too large speed deviation, Err42) Same as unit's digit in F9-47	00000	√
		Ten's digit (Motor over-speed, Err43) Same as unit's digit in F9-47		
		Hundred's digit (Initial position fault, Err51) Same as unit's digit in F9-47		
		Thousand's digit: Reserved		
		Ten thousand's digit: Reserved		
F9-54	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Set frequency 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0	√
F9-55	Backup frequency upon abnormality	0.0% ~ 100.0% (maximum frequency)	100.0%	√
F9-56	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	√
F9-57	Motor overheat protection threshold	0℃ ~ 200℃	110℃	√
F9-58	Motor overheat warning threshold	0℃ ~ 200℃	90℃	√
F9-59	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0	√
F9-60	Action pause judging voltage at instantaneous power failure	80.0% ~ 100.0%	85.0%	√

Function code	Parameter Name	Setting Range	Default	Property
F9-61	Voltage rally judging time at instantaneous power failure	0.0s ~ 100.00s	0.50s	√
F9-62	Action judging voltage at instantaneous power failure	60.0% ~ 100.0% (standard bus voltage)	80.0%	√
F9-63	Protection upon load becoming 0	0: Disabled 1: Enabled	0	√
F9-64	Detection level of load becoming 0	0.0% ~ 100.0%	10.0%	√
F9-65	Detection time of load becoming 0	0.0s ~ 60.0s	1.0s	√
F9-67	Over-speed detection value	0.0% ~ 50.0% (maximum frequency)	20.0%	√
F9-68	Over-speed detection time	0.0s: No detection 0.1s ~ 60.0s	1.0s	√
F9-69	Detection value of too large speed deviation	0.0% ~ 50.0% (maximum frequency)	20.0%	√
F9-70	Detection time of too large speed deviation	0.0s: No detection 0.1s ~ 60.0s	5.0s	√
F9-71	Instantaneous power failure gain Kp	0~100	40	√
	UVW encoder fault (synchronous motor)	0:Closed 1:Open	1	√
F9-72	Instantaneous power failure integral coefficient Ki	0~100	30	√
	Fault protection action selection 5 (synchronous motor)	Unit's digit (Initial position fault, Err51) 0: Continue to run 1: Coast to stop Ten's digit (Motor auto-tuning fault, Err19) Same as unit's digit	11	√
F9-73	Instantaneous power failure deceleration time	0~300s	20s	×
Group FA: Process Control PID Function				
FA-00	PID setting source	0: FA-01 1: AI1 2: AI2 3: AI3	0	√

Function code	Parameter Name	Setting Range	Default	Property
FA-00	PID setting source	4: Pulse setting (X5) 5: Communication setting 6: Multi-reference	0	√
FA-01	PID digital setting	0.0% ~ 100.0%	50.0%	√
FA-02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1-AI2 4: Pulse setting (X5) 5: Communication setting	0	√
FA-02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1-AI2 4: Pulse setting (X5) 5: Communication setting 6: AI1+AI2 7: MAX (|AI1|, |AI2|) 8: MIN (|AI1|, |AI2|)	0	√
FA-03	PID action direction	0: Forward action 1: Reverse action	0	√
FA-04	PID setting feedback range	0 ~ 65535	1000	√
FA-05	Proportional gain Kp1	0.0 ~ 100.0	20.0	√
FA-06	Integral time Ti1	0.01s ~ 10.00s	2.00s	√
FA-07	Differential time Td1	0.000 ~ 10.000s	0.000s	√
FA-08	Cut-off frequency of PID reverse rotation	0.00Hz to maximum frequency	2.00Hz	√
FA-09	PID deviation limit	0.0% ~ 100.0%	0.0%	√
FA-10	PID differential limit	0.00% ~ 100.00%	0.10%	√
FA-11	PID setting change time	0.00s ~ 650.00s	0.00s	√
FA-12	PID feedback filter time	0.00s ~ 60.00s	0.00s	√
FA-13	PID output filter time	0.00s ~ 60.00s	0.00s	√
FA-14	Reserved	—	—	√
FA-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	√
FA-16	Integral time Ti2	0.01s ~ 10.00s	2.00s	√
FA-17	Differential time Td2	0.000s ~ 10.000s	0.000s	√

Function code	Parameter Name	Setting Range	Default	Property
FA-18	PID parameter switchover condition	0: No switchover 1: Switchover via X 2: Automatic switchover based on deviation 3: Automatic switchover based on running frequency	0	√
FA-19	PID parameter switchover deviation 1	0.0% to FA-20	20.0%	√
FA-20	PID parameter switchover deviation 2	FA-19 to 100.0%	80.0%	√
FA-21	PID initial value	0.0% ~ 100.0%	0.0%	√
FA-22	PID initial value holding time	0.00s ~ 650.00s	0.00s	√
FA-23	Maximum deviation between two PID outputs in forward direction	0.00% ~ 100.00%	1.00%	√
FA-24	Maximum deviation between two PID outputs in reverse direction	0.00% ~ 100.00%	1.00%	√
FA-25	PID integral property	Unit's digit (Integral separated) 0: Invalid 1: Valid Ten's digit (Whether to stop integral operation when the output reaches the limit) 0: Continue integral operation 1: Stop integral operation	00	√
FA-26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1% ~ 100.0%	0.0%	√
FA-27	Detection time of PID feedback loss	0.0s ~ 20.0s	0.0s	√
FA-28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0	√

Function code	Parameter Name	Setting Range	Default	Property
Group B: Swing Frequency, Fixed Length and Count				
FB-00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	√
FB-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	√
FB-02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%	√
FB-03	Swing frequency cycle	0.0s ~ 3000.0s	10.0s	√
FB-04	Triangular wave rising time coefficient	0.0% ~ 100.0%	50.0%	√
FB-05	Set length	0m ~ 65535m	1000m	√
FB-06	Actual length	0m ~ 65535m	0m	√
FB-07	Number of pulses per meter	0.1 ~ 6553.5	100.0	√
FB-08	Set count value	1 ~ 65535	1000	√
FB-09	Designated count value	1 ~ 65535	1000	√
Group FC: Multi-Reference and Simple PLC Function				
FC-00	Reference 0	-100.0% ~ 100.0%	0.0%	√
FC-01	Reference 1	-100.0% ~ 100.0%	0.0%	√
FC-02	Reference 2	-100.0% ~ 100.0%	0.0%	√
FC-03	Reference 3	-100.0% ~ 100.0%	0.0%	√
FC-04	Reference 4	-100.0% ~ 100.0%	0.0%	√
FC-05	Reference 5	-100.0% ~ 100.0%	0.0%	√
FC-06	Reference 6	-100.0% ~ 100.0%	0.0%	√
FC-07	Reference 7	-100.0% ~ 100.0%	0.0%	√
FC-08	Reference 8	-100.0% ~ 100.0%	0.0%	√
FC-09	Reference 9	-100.0% ~ 100.0%	0.0%	√
FC-10	Reference 10	-100.0% ~ 100.0%	0.0%	√
FC-11	Reference 11	-100.0% ~ 100.0%	0.0%	√
FC-12	Reference 12	-100.0% ~ 100.0%	0.0%	√
FC-13	Reference 13	-100.0% ~ 100.0%	0.0%	√

Function code	Parameter Name	Setting Range	Default	Property
FC-14	Reference 14	-100.0% ~ 100.0%	0.0%	√
FC-15	Reference 15	-100.0% ~ 100.0%	0.0%	√
FC-16	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0	√
FC-17	Simple PLC retentive selection	Unit's digit: retentive upon power failure 0: No 1:Yes Ten's digit: Retentive upon stop 0: No 1: Yes	00	√
FC-18	Running time of simple PLC reference 0	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-19	Acceleration / Deceleration time of simple PLC reference 0	0 ~ 3	0	√
FC-20	Running time of simple PLC reference 1	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-21	Acceleration / Deceleration time of simple PLC reference 1	0 ~ 3	0	√
FC-22	Running time of simple PLC reference 2	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-23	Acceleration / Deceleration time of simple PLC reference 2	0 ~ 3	0	√
FC-24	Running time of simple PLC reference 3	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-25	Acceleration / Deceleration time of simple PLC reference 3	0 ~ 3	0	√

Function code	Parameter Name	Setting Range	Default	Property
FC-26	Running time of simple PLC reference 4	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-27	Acceleration / Deceleration time of simple PLC reference 4	0 ~ 3	0	√
FC-28	Running time of simple PLC reference 5	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-29	Acceleration / Deceleration time of simple PLC reference 5	0 ~ 3	0	√
FC-30	Running time of simple PLC reference 6	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-31	Acceleration / Deceleration time of simple PLC reference 6	0 ~ 3	0	√
FC-32	Running time of simple PLC reference 7	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-33	Acceleration / Deceleration time of simple PLC reference 7	0 ~ 3	0	√
FC-34	Running time of simple PLC reference 8	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-35	Acceleration / Deceleration time of simple PLC reference 8	0 ~ 3	0	√
FC-36	Running time of simple PLC reference 9	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-37	Acceleration / Deceleration time of simple PLC reference 9	0 ~ 3	0	√
FC-38	Running time of simple PLC reference 10	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-39	Acceleration / Deceleration time of simple PLC reference 10	0 ~ 3	0	√
FC-40	Running time of simple PLC reference 11	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√

Function code	Parameter Name	Setting Range	Default	Property
FC-41	Acceleration / Deceleration time of simple PLC reference 11	0 ~ 3	0	√
FC-42	Running time of simple PLC reference 10	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-43	Acceleration / Deceleration time of simple PLC reference 10	0 ~ 3	0	√
FC-44	Running time of simple PLC reference 10	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-45	Acceleration / Deceleration time of simple PLC reference 10	0 ~ 3	0	√
FC-46	Running time of simple PLC reference 10	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-47	Acceleration / Deceleration time of simple PLC reference 10	0 ~ 3	0	√
FC-48	Running time of simple PLC reference 10	0.0s (h) ~ 6553.5s (h)	0.0s (h)	√
FC-49	Acceleration / Deceleration time of simple PLC reference 10	0 ~ 3	0	√
FC-50	The unit of simple PLC running time	0: s (second) 1: h (hour)	0	√
FC-51	Reference 0 source	0: Set by FC-00 1: AI1 2: AI2 3: AI3 4: Pulse setting 5: PID 6: Set by preset frequency (F0-08), modified via terminal UP / DOWN	0	√

Function code	Parameter Name	Setting Range	Default	Property
Group FD: Communication Parameters				
FD-00	Baud rate	Unit's digit (Modbus baud rate) 0: 300BPs 1: 600BPs 2: 1200BPs 3: 2400BPs 4: 4800BPs 5: 9600BPs 6: 19200BPs 7: 38400BPs 8: 57600BPs 9: 115200BPs Ten's digit (PROFIBUS-DP baud rate) 0: 115200BPs 1: 208300BPs 2: 256000BPs 3: 512000BPs Hundred's digit (Reserved) Thousand's digit (CANlink baud rate) 0: 20 1: 50 2: 100 3: 125 4: 250 5: 500 6: 1M	6005	√
FD-01	Data format	0: No check, data format < 8, N, 2 > 1: Even parity check, data format < 8, E, 1 > 2: Odd Parity check, data format < 8, O, 1 > 3: No check, data format < 8, N, 1 > (Valid for Modbus)	0	√
FD-02	Local address	0: Broadcast address 1-247 Valid for Modbus, PROFIBUS-DP and CANlink	1	√
FD-03	Response delay	0ms ~ 20ms Valid for Modbus	2ms	√
FD-04	Communication timeout	0.0s (invalid) 0.1s ~ 60.0s Valid for Modbus, PROFIBUS-DP and CANopen	0.0s	√

Function code	Parameter Name	Setting Range	Default	Property
FD-05	Modbus protocol selection and PROFIBUS-DP data format	Unit's digit (Modbus protocol) 0: Non-standard Modbus protocol 1: Standard Modbus protocol Ten's digit (PROFIBUS-DP data format) 0: PP01 format 1: PP01 format 2: PP03 format 3: PP04 format	30	√
FD-06	Communication reading current resolution	0: 0.01A 1: 0.1A	0	√
FD-08	CANlink communication timeout time	0.0s: Invalid 0.1s ~ 60.0s	0	√
Group FE: User-defined Parameters				
FE-00	User-defined function code 0	F0-00 to FP-xx A0-00 to Ax-xx U0-xx to U0-xx U3-00 to U3-xx	U3-17	√
FE-01	User-defined function code 1		U3-16	√
FE-02	User-defined function code 2		F0-00	√
FE-03	User-defined function code 3		F0-00	√
FE-04	User-defined function code 4		F0-00	√
FE-05	User-defined function code 5		F0-00	√
FE-06	User-defined function code 6		F0-00	√
FE-07	User-defined function code 7		F0-00	√
FE-08	User-defined function code 8		F0-00	√
FE-09	User-defined function code 9		F0-00	√
FE-10	User-defined function code 10		F0-00	√
FE-11	User-defined function code 11		F0-00	√
FE-12	User-defined function code 12		F0-00	√
FE-13	User-defined function code 13		F0-00	√
FE-14	User-defined function code 14		F0-00	√

Function code	Parameter Name	Setting Range	Default	Property
FE-15	User-defined function code 15	F0-00 to FP-xx A0-00 to Ax-xx U0-xx to U0-xx	F0-00	√
FE-16	User-defined function code 16		F0-00	√
FE-17	User-defined function code 17		F0-00	√
FE-18	User-defined function code 18		F0-00	√
FE-19	User-defined function code 19		F0-00	√
FE-20	User-defined function code 20		U0-68	√
FE-21	User-defined function code 21		U0-69	√
FE-22	User-defined function code 22		F0-00	√
FE-23	User-defined function code 23		F0-00	√
FE-24	User-defined function code 24		F0-00	√
FE-25	User-defined function code 25		F0-00	√
FE-26	User-defined function code 26		F0-00	√
FE-27	User-defined function code 27		F0-00	√
FE-28	User-defined function code 28		F0-00	√
FE-29	User-defined function code 26		F0-00	√
Group FP: Function Code Management				
FP-00	User password	0 ~ 65535	0	√
FP-01	Restore default settings	0: No operation 01: Restore factory settings except motor parameters 02: Clear records 04: Backup current user parameters 501: Restore user backup parameters	0	×
FP-02	AC drive parameter display property	Unit's digit (Group U display selection) 0: Not display 1: Display	11	×

Function code	Parameter Name	Setting Range	Default	Property
FP-02	AC drive parameter display property	Ten's digit (Group A display selection) 0, 1 (Same as unit's digit)	11	×
FP-03	Individualized parameter display property	Unit's digit (User-defined parameter display selection) 0: Not display 1: Display	00	√
		Ten's digit (User-modified parameter display selection)) 0, 1 (Same as unit's digit)		√
FP-04	Parameter modification property	0: Modifiable 1: Not modifiable	0	√
Group A0: Torque Control and Restricting Parameters				
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0	×
A0-01	Torque setting source in torque control	0: Digital setting (A0-03) 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2) Full range of values 1-7 corresponds to the digital setting of A0-03	0	×
A0-03	Torque digital setting in torque control	-200.0% ~ 200.0%	150.0%	√
A0-05	Forward maximum frequency in torque control	0.00Hz to maximum frequency (F0-10)	50.00Hz	√
A0-06	Reverse maximum frequency in torque control	0.00Hz to maximum frequency (F0-10)	50.00Hz	√
A0-07	Acceleration time in torque control	0.00s ~ 65000s	0.00s	√
A0-08	Deceleration time in torque control	0.00s ~ 65000s	0.00s	√

Function code	Parameter Name	Setting Range	Default	Property
Group A1: Virtual DI (VDI) / Virtual DO (VDO)				
A1-00	VX1 function selection	0 ~ 59	0	×
A1-01	VX2 function selection	0 ~ 59	0	×
A1-02	VX3 function selection	0 ~ 59	0	×
A1-03	VX4 function selection	0 ~ 59	0	×
A1-04	VX5 function selection	0 ~ 59	0	×
A1-05	VX state setting mode	Unit's digit (VX1) 0: Decided by state of VDOx 1: Decided by A1-06 Ten's digit (VX2) 0, 1 (same as VX1) Hundred's digit (VX3) 0, 1 (same as VX1) Thousand's digit (VX4) 0, 1 (same as VX1) Ten thousand's digit (VX5) 0, 1 (same as VX1)	00000	×
A1-06	VX state selection	Unit's digit (VX1) 0: Invalid 1: Valid Ten's digit (VX2) 0, 1 (same as VX1) Hundred's digit (VX3) 0, 1 (same as VX1) Thousand's digit (VX4) 0, 1 (same as VX1) Ten thousand's digit (VX5) 0, 1 (same as VX1)	00000	×
A1-07	Function selection for AI1 used as X	0 ~ 59	0	×
A1-08	Function selection for AI2 used as X	0 ~ 59	0	×

Function code	Parameter Name	Setting Range	Default	Property
A1-09	Function selection for AI3 used as X	0 ~ 59	0	×
A1-10	State selection for AI used as X	Unit's digit (AI1) 0: High level valid 1: Low level valid Ten's digit (AI2) 0, 1 (Same as unit's digit) Hundred's digit (AI3) 0, 1 (Same as unit's digit)	000	×
A1-11	VDO1 function selection	0: Short with physical Xx internally 1-40: Refer to function selection of physical DO in group F5.	0	√
A1-12	VDO2 function selection	0: Short with physical Xx internally 1-40: Refer to function selection of physical DO in group F5.	0	√
A1-13	VDO3 function selection	0: Short with physical Xx internally 1-40: Refer to function selection of physical DO in group F5.	0	√
A1-14	VDO4 function selection	0: Short with physical Xx internally 1-40: Refer to function selection of physical DO in group F5.	0	√
A1-15	VDO5 function selection	0: Short with physical Xx internally 1-40: Refer to function selection of physical DO in group F5.	0	√
A1-16	VDO1 output delay time	0.0s ~ 3600.0s	0.0s	√
A1-17	VDO2 output delay time	0.0s ~ 3600.0s	0.0s	√
A1-18	VDO3 output delay time	0.0s ~ 3600.0s	0.0s	√
A1-19	VDO4 output delay time	0.0s ~ 3600.0s	0.0s	√
A1-20	VDO5 output delay time	0.0s ~ 3600.0s	0.0s	√
A1-21	VDO state selection	Unit's digit (VDO1) 0: Positive logic 1: Reverse logic	00000	√

Function code	Parameter Name	Setting Range	Default	Property
A1-21	VDO state selection	Ten's digit (VDO2) 0, 1 (same as unit's digit) Hundred's digit (VDO3) 0, 1 (same as unit's digit) Thousand's digit (VDO4) 0, 1 (same as unit's digit) Ten thousand's digit (VDO5) 0, 1 (same as unit's digit)	00000	√
Group A2: Motor 2 Parameters				
A2-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0	×
A2-01	Rated motor power	0.1KW ~ 1000.0KW	Model dependent	×
A2-02	Rated motor voltage	1V ~ 2000V	Model dependent	×
A2-03	Rated motor current	0.01A ~ 655.35A (AC drive power ≦55KW) 0.1A ~ 6553.5A (AC drive power > 55KW)	Model dependent	×
A2-04	Rated motor frequency	0.01Hz to maximum frequency	Model dependent	×
A2-05	Rated motor rotational speed	1RPM ~ 65535RPM	Model dependent	×
A2-06	Stator resistance (asynchronous motor)	0.001Ω ~ 65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Model dependent	×
A2-07	Rotor resistance (asynchronous motor)	0.001Ω ~ 65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Model dependent	×

Function code	Parameter Name	Setting Range	Default	Property
A2-08	Leakage inductive reactance (asynchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Model dependent	×
A2-09	Mutual inductive reactance (asynchronous motor)	0.1mH ~ 6553.5mH (AC drive power ≦55KW) 0.01mH ~ 655.35mH (AC drive power > 55KW)	Model dependent	×
A2-10	No-load current (asynchronous motor)	0.01A to A2-03 (AC drive power ≦55KW) 0.1A to A2-03 (AC drive power > 55KW)	Model dependent	×
A2-16	Stator resistance (synchronous motor)	0.001Ω ~ 65.535Ω (AC drive power ≦55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	Model dependent	×
A2-17	Shaft D inductance (synchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Model dependent	×
A2-18	Shaft Q inductance (synchronous motor)	0.01mH ~ 655.35mH (AC drive power ≦55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	Model dependent	×
A2-20	Back EMF (synchronous motor)	0.1V ~ 6553.5V	Model dependent	×
A2-27	Encoder pulses per revolution	1 ~ 65535	1024	×
A2-28	Encoder type	0: ABZ incremental encoder 1: UVW incremental encoder 2: Resolver 3: SIN/COS encoder 4: Wire-saving UVW encoder	0	×

Function code	Parameter Name	Setting Range	Default	Property
A2-29	Speed feedback PG selection	0: Local PG 1: Extension PG 2: Pulse setting (X5)	0	×
A2-30	A, B phase sequence of ABZ incremental encoder	0: Forward 1: Reverse	0	×
A2-31	Encoder installation angle	0.0° ~ 359.9°	0.0°	×
A2-32	U, V, W phase sequence of UVW encoder	0: Forward 1: Reverse	0	×
A2-33	UVW encoder angle offset	0.0° ~ 359.9°	0.0°	×
A2-34	Number of pole pairs of resolver	1 ~ 65535	1	×
A2-36	Encoder wire-break fault detection time	0.0s: No action 0.1s ~ 10.0s	0.0s	×
A2-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 1 2: Asynchronous motor Dynamic auto-tuning 3: Asynchronous motor static auto-tuning 2 11: Synchronous motor with-load auto-tuning 12: Synchronous motor no-load auto-tuning	0	×
A2-38	Speed loop proportional gain 1	0 ~ 100	30	√
A2-39	Speed loop integral time 1	0.01s ~ 10.00s	0.50s	√
A2-40	Switchover frequency 1	0.00 to A2-43	5.00Hz	√
A2-41	Speed loop proportional gain 2	0 ~ 100	15	√
A2-42	Speed loop integral time 2	0.01s ~ 10.00s	1.00s	√
A2-43	Switchover frequency 2	A2-40 to maximum output frequency	10.00Hz	√
A2-44	Vector control slip gain	50% ~ 200%	100%	√

Function code	Parameter Name	Setting Range	Default	Property
A2-45	Time constant of speed loop filter	0.000s ~ 1.000s	0.050s	√
A2-46	Vector control over-excitation gain	0 ~ 200	64	√
A2-47	Torque upper limit source in speed control mode	0: A2-48 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Via communication 6: MIN (AI1, AI2) 7:MAX (AI1, AI2) 1-7 option corresponds to A2-48 digital setting.	0	√
A2-48	Digital setting of torque upper limit in speed control mode	0.0% ~ 200.0%	150.0%	√
A2-49	Torque upper limit source in speed control mode (generator)	0: A2-50 1: AI1 2: AI2 3: AI3 4: Pulse setting (X5) 5: Via communication 6: MIN (AI1, AI2) 7:MAX (AI1, AI2) 1-7 option corresponds to A2-50 digital setting.	0	√
A2-50	Digital setting of torque upper limit in speed control mode (generator)	0.0% ~ 200.0%	150.0%	√
A2-51	Excitation adjustment proportional gain	0 ~20000	2000	√
A2-52	Excitation adjustment integral gain	0 ~20000	1300	√

Function code	Parameter Name	Setting Range	Default	Property
A2-53	Torque adjustment proportional gain	0 ~20000	2000	√
A2-54	Torque adjustment integral gain	0 ~20000	1300	√
A2-55	Speed loop integral property	Unit's digit: Integral separation 0: Disabled 1: Enabled	0	√
A2-56	Field weakening mode of synchronous motor	0: No field weakening 1: Adjustment 2: Direct calculation+ adjustment	0	√
A2-57	Field weakening Coefficient of synchronous motor	0~ 50	10	√
A2-58	Maximum field weakening current	1% ~ 300%	50%	√
A2-59	Field weakening automatic adjustment gain	10% ~ 500%	100%	√
A2-60	Field weakening integral multiple	2 ~ 10	2	√
A2-61	Motor 2 control mode	0: Sensorless fux vector control (SVC) 1: Closed-loop vector control (FVC) 2: Voltage / frequency (V/F) control	0	√
A2-62	Motor 2 acceleration / deceleration time	0: Same as motor 1 1: Acceleration / Deceleration time 1 2: Acceleration / Deceleration time 2 3: Acceleration / Deceleration time 3 4: Acceleration / Deceleration time 4	0	√

Function code	Parameter Name	Setting Range	Default	Property
A2-63	Motor 2 torque boost	0.0%: Automatic torque boost 0.1% ~ 30.0%	Model dependent	√
A2-65	Motor 2 oscillation suppression gain	0 ~ 100	Model dependent	√
A2-66	Synchronous motor output Saturation voltage margin	1%～100%	5%	√
A2-67	synchronous motor initial position angle of the current	50%～120%	80%	√
A2-68	synchronous motor Initial Position angle detection	0:everytime running detection 1：No detection 2：The first running detection	0	√
A2-70	Synchronous motor projection machine Rate adjustment gain	50～500	100	√
A2-71	The maximum ratio of torque to current	0：close 1：open	0	√
A2-73	Adjust the current loop Kp tuning	1～100	6	√
A2-74	Adjust the current loop Ki tuning	1～100	6	√
A2-75	Z signal correction	0、1	0	√
A2-76	SVC speed Filter coefficient stimation	10~1000	100	√
A2-79	Synchronous motor SVC initial Excitation current limit	0~80%	30%	√
A2-80	Synchronous motor SVC initial Minimum carrier frequency	0.8K～F0-15	2.0K	√
A2-85	SVC Synchronous motor speed tracking	0:closed 1:open	0	√
A2-86	Zero servo enable	0:closed 1:open	0	√
A2-87	switching frequency	0.00Hz～F2-02	0.30Hz	√
A2-88	Zero servo speed Loop proportional gain	1～100	10	√
A2-89	Zero servo speed loop integral time	0.01s～10.00s	0.5s	√
A2-90	stopping Prohibit reversal	0～1	0	√
A2-91	Stopping angle	0.0˚～10.0˚	0.8˚	√

Function code	Parameter Name	Setting Range	Default	Property
Group A5: Control Optimization Parameters				
A5-00	DPWM switchover frequency upper limit	5.00Hz ~ F0-10	8.00Hz	√
A5-01	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0	√
A5-02	Dead-zone compensation mode selection	0: No compensation 1: Compensation mode 1	1	√
A5-03	Random PWM depth	0: Random PWM invalid 1 ~ 10: PWM carrier random depth	0	√
A5-04	Rapid current limit	0: Disabled 1: Enabled	1	√
A5-05	Current detection compensation	0 ~ 100	5	√
A5-06	Undervoltage threshold	200V ~ 2000V	Model dependent	√
A5-07	SVC optimization mode selection	1: Optimization mode 1 2: Optimization mode 2	2	√
A5-08	Dead-zone time adjustment	100% ~ 200%	150%	√
A5-09	Overvoltage threshold	200.0V ~ 2200.0V	Model dependent	×
Group A6: AI Curve Setting				
A6-00	AI curve 4 minimum input	-10.00V to A6-02	0.00V	√
A6-01	Corresponding setting of AI curve 4 minimum input	-100.0% ~100.0%	0.0%	√
A6-02	AI curve 4 infexion 1 input	A6-00 to A6-04	3.00V	√
A6-03	Corresponding setting of AI curve 4 infexion 1 input	-100.0% ~100.0%	30.0%	√
A6-04	AI curve 4 infexion 2 input	A6-02 to A6-06	6.00V	√

Function code	Parameter Name	Setting Range	Default	Property
A6-05	Corresponding setting of AI curve 4 infexion 2 input	-100.0% ~100.0%	60.0%	√
A6-06	AI curve 4 maximum input	A6-06 to 10.00V	10.00V	√
A6-07	Corresponding setting of AI curve 4 maximum input	-100.0% ~100.0%	100.0%	√
A6-08	AI curve 5 minimum input	-10.00V to A6-10	-10.00V	√
A6-09	Corresponding setting of AI curve 4 minimum input	-100.0% ~100.0%	-100.0%	√
A6-10	AI curve 5 infexion 1 input	A6-08 to A6-12	-3.00V	√
A6-11	Corresponding setting of AI curve 5 infexion 1 input	-100.0% ~100.0%	-30.0%	√
A6-12	AI curve 5 infexion 2 input	A6-10 to A6-14	3.00V	√
A6-13	Corresponding setting of AI curve 5 infexion 2 input	-100.0% ~100.0%	30.0%	√
A6-14	AI curve 5 maximum input	A6-14 to 10.00V	10.00V	√
A6-15	Corresponding setting of AI curve 5 maximum input	-100.0% ~100.0%	100.0%	√
A6-24	Jump point of AI1 input corresponding setting	-100.0% ~100.0%	0.0%	√
A6-25	Jump amplitude of AI1 input corresponding setting	0.0% ~100.0%	0.5%	√
A6-26	Jump point of AI2 input corresponding setting	-100.0% ~100.0%	0.0%	√
A6-27	Jump amplitude of AI2 input corresponding setting	0.0% ~100.0%	0.5%	√
A6-28	Jump point of AI3 input corresponding setting	-100.0% ~100.0%	0.0%	√
A6-29	Jump amplitude of AI3 input corresponding setting	0.0% ~100.0%	0.5%	√
Group A7: User Programmable Function				
A7-00	User programmable function selection	0: Disabled 1: Enabled	0	×

Function code	Parameter Name	Setting Range	Default	Property
A7-01	control mode of output terminals on the control board	Unit's digit: FMR (FM used as digital output) 0: Control by AC drive 1: Control by user programmable card Ten's digit: Relay (A-B-C) Same as unit's digit Hundred's digit: DO1 Same as unit's digit Thousand's digit: FMR (FM used as pulse output) Same as unit's digit Ten thousand's digit: AO1 Same as unit's digit	0	×
A7-02	Function selection of AI/AO on user programmable card	0: AI3 (voltage input), AO2 (voltage output) 1: AI3 (voltage input), AO2 (current output) 2: AI3 (current input), AO2 (voltage output) 3: AI3 (current input), AO2 (current output) 4: AI3 (PTC input), AO2 (voltage output) 5: AI3 (PTC input), AO2 (current output) 6: AI3 (PT100 input), AO2 (voltage output) 7: AI3 (PT100 input), AO2 (current output)	0	×

Function code	Parameter Name	Setting Range	Default	Property
A7-03	FMP output	0.0% ~ 100.0%	0.0%	√
A7-04	AO1 output	0.0% ~ 100.0%	0.0%	√
A7-05	Digital output	Binary setting Unit’s digit: FMR Ten’s digit: Relay 1 Hundred’s digit: DO	1	√
A7-06	Frequency setting of user programmable card	-100.0% ~ 100.0%	0.0%	√
A7-07	Torque setting of user programmable card	-200.0% ~ 200.0%	0.0%	√
A7-08	Command given by the user programmable card	0:NO 1: Forward RUN 2: Reverse RUN 3: Forward JOG 4: Reverse JOG 5: Coast to stop 6: Deceleration to stop 7: Fault reset	0	√
A7-09	Faults given by the user programmable card	0: No fault 80-90: Fault codes	0	√
Group A8: Point-point Communication				
A8-00	Master and slave control function	0: Disabled 1: Enabled	0	√
A8-01	Master and slave selection	0: Master 1: Slave	0	√
A8-02	Master and slave interaction	0:NO 1:Yes Unit’s digit: Whether the slave follows the master command Ten’s digit: Whether sending fault information	011	√

Function code	Parameter Name	Setting Range	Default	Property
A8-02	Master and slave interaction	Hundred's digit: Whether alarming if the slave gets offline	011	√
A8-03	Message frame selection	0: Master and slave control frame 1: Droop control frame	0	√
A8-04	Zero offset of received data (torque)	-100.00% ~ 100.00%	0.00%	×
A8-05	Gain of received data (torque)	-10.00 ~ 10.00	1.00	×
A8-06	Point-point communication interruption detection time	0.0s ~ 10.0s	1.0s	√
A8-07	Master data sending cycle	0.001s ~ 10.000s	0.001s	√
A8-08	Zero offset of received data zero offset (frequency)	-100.00% ~ 100.00%	0.00%	×
A8-09	Gain of received data gain (frequency)	-10.00 ~ 100.00	1.00	×
A8-10	Reserved	-	-	-
A8-11	Windows width	0.20Hz～10.00Hz	0.5Hz	×
Group AC: AI/AO Correction				
AC-00	AI1 measured voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-01	AI1 displayed voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-02	AI1 measured voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-03	AI1 displayed voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-04	AI2 measured voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-05	AI2 displayed voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-06	AI2 measured voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-07	AI2 displayed voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-08	AI3 measured voltage 1	-9.999V ~ 10.000V	Factory corrected	√
AC-09	AI3 displayed voltage 1	-9.999V ~ 10.000V	Factory corrected	√
AC-10	AI3 measured voltage 2	-9.999V ~ 10.000V	Factory corrected	√

Function code	Parameter Name	Setting Range	Default	Property
AC-11	AI3 displayed voltage 2	-9.999V ~ 10.000V	Factory corrected	√
AC-12	AO1 target voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-13	AO1 measured voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-14	AO1 target voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-15	AO1 measured voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-16	AO2 target voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-17	AO2 measured voltage 1	0.500V ~ 4.000V	Factory corrected	√
AC-18	AO2 target voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-19	AO2 measured voltage 2	6.000V ~ 9.999V	Factory corrected	√
AC-20	AI2 measured current 1	0.000mA ~ 20.000mA	Factory corrected	√
AC-21	AI2 sampling current 1	0.000mA ~ 20.000mA	Factory corrected	√
AC-22	AI2 measured current 2	0.000mA ~ 20.000mA	Factory corrected	√
AC-23	AI2 sampling current 2	0.000mA ~ 20.000mA	Factory corrected	√
AC-24	AO1 ideal current 1	0.000mA ~ 20.000mA	Factory corrected	√
AC-25	AO1 sampling current 1	0.000mA ~ 20.000mA	Factory corrected	√
AC-26	AO1 ideal current 2	0.000mA ~ 20.000mA	Factory corrected	√
AC-27	AO1 sampling current 2	0.000mA ~ 20.000mA	Factory corrected	√

6

Description of Function code

Chapter 6 Description of Function Code

Group U0: Monitoring Parameters

Group U0 is used to monitor the AC drive's running state. You can view the Parameter values by using operation panel, convenient for on-site commissioning, or from the host computer by means of communication (address: 0x7000 - 0x7047).

U0-00 to U0-31 are the monitoring parameters in the running and stop state defined by F7-03 and F7-04.

U0-00	Running frequency	Display range	0.00Hz ~ 500.00Hz
U0-01	Set frequency		0.00Hz ~ 500.00Hz

These two parameters display the absolute value of theoretical running frequency and set frequency. For the actual output frequency of the AC drive, see U0-19.

U0-02	Bus voltage	Display range	0.0V ~ 3000.0V

It displays the AC drive's bus voltage.

U0-03	Output voltage	Display range	0V ~ 1140V

It displays the AC drive's output voltage in the running state.

U0-04	Output current	Display range	0.00A ~ 655.35A (AC drive power ≦ 55KW) 0.0A ~ 6553.5A (AC drive power > 55KW)

It displays the AC drive's output current in the running state.

U0-05	Output power	Display range	0 ~ 32767

It displays the AC drive's output power in the running state.

U0-06	Output torque	Display range	-200.0% ~ 200.0%

It displays the AC drive's output torque in the running state.

U0-07	X state	Display range	0 ~ 32767

It displays the current state of X terminals. After the value is converted into a binary number, each bit corresponds to a X. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and Xs is described in the following table.

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
X1	X2	X3	X4	X5	X6	X7	X8
Bit8	Bit9	Bit10	Bit11	Bit12	Bit13	Bit14	Bit15
X9	X10	VX11	VX12	VX13	VX14	VX15	—

U0-08	DO state	Display range	0 ~ 1023

It indicates the current state of DO terminals. After the value is converted into a binary number, each bit corresponds to a DO. “1” indicates high level signal, and “0” indicates low level signal. The corresponding relationship between bits ans DOs is described in the following table.

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5
FMR	Relay 1	Relay 2	DO1	Relay 3	VDO1
Bit6	Bit7	Bit8	Bit9	Bit10	Bit11
VDO2	VDO3	VDO4	VDO5	—	—

U0-10	AI2 voltage (V) /current (mA)	Display range	0.00V ~ 10.57V 0.00mA ~ 20.00mA

When F4-04 is set to 0, AI2 sampling data is displayed in the unit of V.

When F4-04 is set to 1, AI2 sampling data is displayed in the unit of mA.

U0-14	Load speed	Display range	0 ~ 65535

For more details, see the description of F7-12.

U0-15	PID setting	Display range	0 ~ 65535
U0-16	PID feedback	Display range	0 ~ 65535

They display the PID setting value and PID feedback value.

◆ PID setting = PID setting (percentage) * FA-04

◆ PID feedback = PID feedback (percentage) * FA-04

U0-18	Input pulse frequency	Display range	0.00KHz ~ 100.00KHz

It displays the high-speed pulse sampled frequency of X5, in minimum unit of 0.01KHz.

U0-19	Feedback speed	Display range	-500.00Hz ~ 500.00Hz -500.0Hz ~ 500.0Hz

It displays the actual output frequency of the AC drive.

The ten’s digit of F7-12 (Number of decimal places for load speed display) determines the number of decimal places of U0-19/U0-29.

- If the ten’s digit is set to 2, the display range is -500.00–500.00 Hz.
- If the ten’s digit is set to 1, the display range is -500.0 Hz–500.0 Hz.

U0-20	Remaining running time	Display range	0.0min ~ 6500.0min

It displays the remaining running time when the timing operation is enabled. For details on timing operation, refer to F8-42 to F8-44.

U0-21	AI1 voltage before correction	Display range	0.000V ~ 10.570V
U0-22	AI2 voltage (V) / current (mA) before correction	Display range	0.000V ~ 10.570V 0.00mA ~ 20.00mA

U0-23	AI3 voltage before correction	Display range	-10.570V ~ 10.570V

They display the AI sampleding voltage/current value of AI. The actually used voltage/ current is obtained after linear correction to reduce the deviation between the sampled voltage/current and the actual input voltage/current.

For actual corrected voltage, see U0-09, U0-10 and U0-11. Refer to group AC for the correction mode.

U0-24	Linear speed	Display range	0 ~ 65535m/min

It displays the linear speed of the X5 high-speed pulse sampling. The unit is meter/minute. The linear speed is obtained according to the pulses sampled per minute and FB-07 (Number of pulses per meter).

U0-27	Pulse input frequency	Display range	0Hz ~ 65535Hz

It displays the X5 high-speed pulse sampling frequency, in minimum unit of 1Hz. It is the same as U0-18, except for the difference in units.

U0-28	Communication setting value	Display range	-100.00% ~ 100.00%

It displays the data written by means of the communication address 0x1000.

U0-29	Encoder feedback speed	Display range	-500.00Hz ~ 500.00Hz
			-500.0Hz ~ 500.0Hz

It displays the motor running frequency measured by the encoder.

The ten’s digit of F7-12 (Number of decimal places for load speed display) determines the number of decimal places of U0-19/U0-29.

• If the ten’s digit is set to 2, the display range is -500.00–500.00 Hz.

• If the ten’s digit is set to 1, the display range is -500.0 Hz–500.0 Hz.

U0-30	Main frequency A	Display range	0.00Hz ~ 500.00Hz

It displays the setting of main frequency A.

U0-31	Auxiliary frequency B	Display range	0.00Hz ~ 500.00Hz

It displays the setting of auxiliary frequency B.

U0-33	Synchronous motor rotor position	Display range	0.0° ~ 359.9°

It displays the rotor position of the synchronous motor.

U0-34	Motor temperature	Display range	0℃-200℃

It displays the motor temperature obtained by means of AI3 sampling. For the motor temperature detection, see F9-56.

U0-35	Target torque	Display range	-200.0% ~ 200.0%

It displays the current torque upper limit.

U0-36	Resolver position	Display range	0 ~ 4095

It displays the current resolver position.

U0-37	Power factor angle	Display range	—

It displays the current power factor angle.

U0-38	ABZ position	Display range	0 ~ 65535

It displays the phase A and B pulse counting of the current ABZ or UVW encoder. This value is four times the number of pulses that the encoder runs. For example, if the display is 4000, the actual number of pulses that the encoder runs is 4000/4=1000.

The value increase when the encoder rotates in forward direction and decreases when the encoder rotates in reverse direction. After increasing to 65535, the value starts to increase from 0 again. After decreasing to 0, the value starts to decrease from 65535 again.

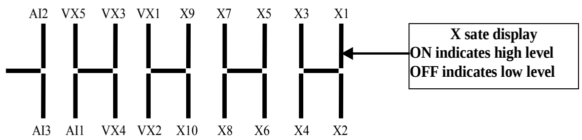
You can check whether the installation of the encoder is normal by viewing U0-38.

U0-39	Target voltage upon V/F separation	Display range	0V to rated motor voltage
U0-40	Output voltage upon V/F separation	Display range	0V to rated motor voltage

They display the target output voltage and current actual output voltage in the V/F separation state. For V/F separation, see the descriptions of group F3.

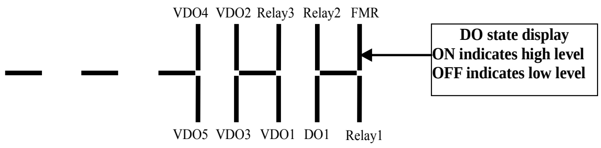
U0-41	X state visual display	Display range	—

It displays the X state visually and the display format is shown in the following figure.



U0-42	DO state visual display	Display range	—

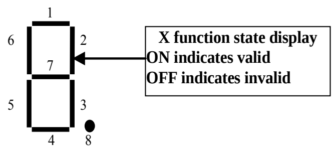
It displays the DO state visually and the display format is shown in the following figure.



U0-43	X function state visual display 1	Display range	—

It displays whether the X functions 1 ~ 40 are valid.

The operation panel has five 7-segment LEDs and each 7-segment LED displays the selection of eight functions. The 7-segment LED is defined in the following figure.



The 7-segment LED display function 1 ~ 8, 9 ~ 16, 17 ~ 24, 25 ~32 and 33 ~ 40 respectively from right to left.

U0-44	X function state visual display 2	Display range	—

It displays whether the X functions 41 ~ 59 are valid.

The display format is similar to U0-43.

The 7-segment LEDs display functions 41 ~ 48, 49 ~ 56 and 57 ~ 59, respectively from right to left.

U0-58	Phase Z counting	Display range	0 ~ 65535

It displays the phase Z counting of the current ABZ or UVW encoder. The value increases or decreases by 1 every time the encoder rotates one revolution forwardly or reversely.

You can check whether the installation of the encoder is normal by viewing U0-58.

U0-59	Current set frequency	Display range	-100.00% ~ 100.00%
U0-60	Current running frequency	Display range	-100.00% ~ 100.00%

It displays the current set frequency and running frequency. 100.00% corresponds to the AC drive's maximum frequency (F0-10).

U0-61	AC drive running state	Display range	0 ~ 65535

It displays the running state of the AC drive.

The data format is listed in the following table:

U0-61	Bit0	0: Stop 1: Forward 2: Reverse
	Bit1	
	Bit2	0: Constant 1: Accelerate 2: Decelerate
	Bit3	
	Bit4	0: Bus voltage normal 1: Undervoltage

U0-62	Current fault code	Display range	0 ~ 99

It displays the current fault code.

U0-63	Sent value of point-point communication	Display range	-100.00% ~ 100.00%
U0-64	Slave station numbers	Display range	0 ~ 63

It displays the data at point-point communication. U0-63 is the data sent by the master, and U0-64 can view online from the master station the number of slave stations.

U0-65	Torque upper limit	Display range	-200.00% ~ 200.00%

It display the current setting torque upper limit.

U0-68	AC drive status of DP card	Display range	bit0-Running state bit1-Running direction bit2-AC dirve fault
U0-68	AC drive status of DP card	Display range	bit3-target frequency reached bit～bit7- reserved bit8～bit15- Fault code

U0-69	Send DP card speed/0.01Hz	Display range	0.00Hz~Maximum frequency (Hz)
U0-70	Send DP rotation speed/RMP	Display range	0~65535
U0-73	Motor serial number	Display range	0:motor1 1:mortor2
U0-74	AC drive output torque	Display range	-300~300%

AC drive current is as based torque output value; select the U0-74 as slave torque current given value. But you cannot use the CAN bus communication mode of master-slave control.

For more details about U0-68, see in the following Table.

U0-68	Bit0	0:Stop 1:RUN
	Bit1	0: Forward 1: Reverse
	Bit2	0:No fault 1:Fault
	Bit3	0: Target frequency don’t reached 1: Target frequency reached
	Bit4	-
	Bit5	-
	Bit6	-
	Bit7	-
	Bit8~ Bit15	Fault code

Group F0: Basic Parameters

F0-00	G/P type display		Default	Model dependent
	Setting Range	1	G type (constant torque load)	

This parameter is used to display the delivered model and cannot be modified.

1: Applicable to constant torque load with rated parameters specified

F0-01	Motor 1 control mode		Default	0
	Setting Range	0	Sensorless fux vector control (SVC)	
		1	Colsed-loop vector control (FVC)	
		2	Voltage/Frequency (V/F) control	

0: Sensorless fux vector control (SVC)

It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. One AC drive can operate only one motor.

1: Closed-loop vector control (FVC)

It is applicable to high-accuracy speed control or torque control applications such as high-speed paper making machine, crane and elevator. One AC drive can operate only one motor. An encoder must be installed at the motor side, and a PG card matching the encoder must be installed at the AC drive side.

2: Voltage/Frequency (V/F) control

It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

Note: If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting speed regulator parameters in group F2 (or groups A2 respectively for motor 2).

For the permanent magnetic synchronous motor (PMSM), FVC is used generally. In some low-power motor applications, you can also use V/F.

F0-02	Command source selection		Default	0
	Setting Range	0	Operation panel control (LED off)	
		1	Terminal control (LED on)	
		2	Communication control (LED blinking)	

It is used to determine the input channel of the AC drive control commands, such as run, stop, forward rotation, reverse rotation and jog operation. You can input the commands in the following three channels:

0: Operation panel control (“REMOT / LOCAL” indicator off)

Commands are given by pressing keys FWD and STOP / RESET on the operation panel.

1: Terminal control (“REMOT / LOCAL” indicator on)

Communication are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF and JOGR.

2: Communication control (“REMOT / LOCAL” indicator blinking)

Communication are given from host computer. If this parameter is set to 2, a communication card (Modbus RTU, PROFIBUS-DP card, CANlink card, user programmable card or CANopen card) must be installed.

If a PROFIBUS-DP card is selected and PZD1 data is valid, commands are given by means of PZD1 data.

If a user programmable card is selected, commands are written to A7-08 by means of the programmable card.

If any other card is selected, commands are written by means of the communication address 0x2000.

F0-03	Main frequency source X selection		Default	0
	Setting Range	0	Digital setting (non-retentive at power failure)	
		1	Digital setting (retentive at power failure)	
		2	AI1	
		3	AI2	
		4	AI3	
		5	Pulse setting (X5)	
		6	Multi-reference	
		7	Simple PLC	
		8	PID	
		9	Communication setting	

It is used to select the setting channel of the main frequency. You can set the main frequency in the following ten channels:

0: Digital setting (retentive at power failure)

The initial value of the set frequency is the value of F8-08 (Preset frequency). You can change the set frequency by pressing keys ︿ and ﹀ on the operation panel (or using the UP / DOWN function of input terminals).

When the AC drive is powered on again after power failure, the set frequency reverts to the value of F0-08.

1: Digital setting (retentive at power failure)

The initial value of the set frequency is the value of F8-08 (Preset frequency). You can change the set frequency by pressing keys ︿ and ﹀ on the operation panel (or using the UP / DOWN function of input terminals).

When the AC drive is powered on again after power failure, the set frequency is the value memorized at the moment of the last power failure.

Note that F0-23 (Retentive of digital setting frequency upon power failure) determines whether the set frequency is memorized or cleared when the AC drive stops. It is related to stop rather than power failure.

2: AI1 (0 ~ 10V voltage input)

3: AI2 (0 ~ 10V voltage input or 4 ~ 20mA current input, determined by jumper J8)

4: AI3 (0 ~ 10V voltage input)

The frequency is set by analog input. The H8 control board provides two analog input (AI) terminals (AI1, AI2). Another AI terminal (AI3) is provided by the I /O extension card.

The H8 provides five curves indicating the mapping relationship between the input voltage of AI1, AI2 and AI3 and the target frequency, three of which are linear (point-point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes F4-13 to F4-27 and function codes in group A6, and select curves for AI1, AI2 and AI3 in F4-33.

When AI is used as the frequency setting source, the corresponding value 100% of the voltage / current input corresponds to the value of F0-10 (Maximum frequency).

5: Pulse setting (X5)

The frequency is set by X5 (high-speed pulse), and the corresponding set by F4-28 to F4-31. The signal specification of pulse setting is 9 ~ 30V (voltage range) and 0 ~ 100KHz (frequency range). The corresponding value 100% of pulse setting corresponds to the value of F0-10 (Maximum frequency).

6: Multi-reference

In multi-reference mode, combinations of different X terminal states correspond to different set frequencies. The H8 supports a maximum of 16 speeds implemented by 16 state combinations of four X terminals (allocated with functions 12 to 15) in Group FC. The multiple references indicate percentages of the value of F0-10 (Maximum frequency).

If a X terminal is used for the multi-reference function, you need to perform related setting in group F4.

7: Simple PLC

When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched over among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group FC.

8: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

When applying PID as the frequency source, you need to set parameters of PID function in group FA.

9: Communication setting

The frequency is set by means of communication.

If the AC drive is a slave in point-point communication and receives data as the frequency source, data transmitted by the master is used as the set frequency. For details, see the description of group A8.

If PROFIBUS-DP communication is valid and PZD1 is used for frequency setting, data transmitted by PDZ1 is directly used as the frequency source. The data format is -100.00% to 100.00%. 100.00% corresponds to the value of F0-10 (Maximum frequency).

In other conditions, data is given by the host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100.00% corresponds to the value of F0-10 (Maximum frequency).

The H8 supports four host computer communication protocols: Modbus, PROFIBUS-DP, CANopen and CANlink. They cannot be used simultaneously.

If the communication mode is used, a communication card must be installed. The H8 provide four optional communication cards and you can select one based on actual requirements. If the communication protocol is Modbus, PROFIBUS-DP or CANopen, the corresponding serial communication protocol needs to be selected based on the setting of F0-28.

The CANlink protocol is always valid.

F0-04	Auxiliary frequency source B selection	Default	0
	Setting Range	0	Digital setting (non-retentive at power failure)
		1	Digital setting (retentive at power failure)
		2	AI1
		3	AI2
		4	AI3
		5	Pulse setting (X5)
		6	Multi-reference
		7	Simple PLC
		8	PID
		9	Communication setting

When used as an independent frequency input channel (frequency source switched over from A to B), the auxiliary frequency source B is used in the same way as the main frequency source A (refer to F-03).

When the auxiliary frequency source is used for operation (frequency source is "A and B operation"), pay attention to the following aspects:

1. If the auxiliary frequency source B is digital setting, the preset frequency (F0-08) does not take effect. You can directly adjust the main frequency by pressing keys ︿ and ﹀ on the operation panel (or using the UP/DOWN function of input terminals).

2. If the auxiliary frequency source is analog input (AI1, AI2 and AI3) or pulse setting, 100% of the input corresponds to the range of the auxiliary frequency B (set in F0-05 and F0-06).

3. If the auxiliary frequency source is pulse setting, it is similar to analog input.

Note: The main frequency source A and auxiliary frequency source B must not use the same channel. That is, F0-03 and F0-04 cannot be set to the same value.

F0-05	Range base of auxiliary frequency B for A and B superposition		Default	0
	Setting Range	0	Relative to maximum frequency	
		1	Relative to main frequency A	
F0-06	Range of auxiliary frequency B for A and B superposition		Default	0
	Setting Range		0% ~ 150%	

If A and B superposition is used, F0-05 and F0-06 are used to set the adjustment range of the auxiliary frequency source.

You can set the auxiliary frequency to be relative to either maximum frequency or main frequency A. If relative to main frequency A, the setting range of the auxiliary frequency B varies according to the main frequency A.

F0-07	Frequency source selection		Default	0
	Setting Range	Unit's digit	Frequency source selection	
		0	Main frequency source A	
		1	A and B superposition (superposition relationship determined by ten's digit)	
		2	Switchover between A and B	
		3	Switchover between A and "A and B superposition"	
		4	Switchover between B and "A and B superposition"	
		Ten's digit	A and B superposition relation ship	
		0	A+B	
		1	A-B	
		2	Max (A,B)	
		3	Min(A,B)	

It is used to select the frequency setting channel. The frequency reference is implemented based on main frequency source X and auxiliary frequency source Y superposition.

The following figure, frequency setting based on main frequency source A and auxiliary frequency source B.

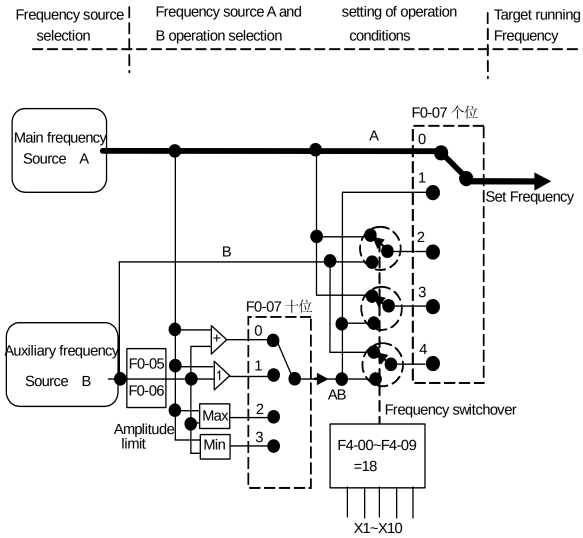


Figure 6-1 Frequency setting based on main frequency source A and auxiliary frequency source B.

If the frequency source involves A and B superposition, you can set the frequency offset in F0-21, which is added to the A and B superposition result to flexibly satisfy various requirements.

F0-08	Preset frequency	Default	50Hz
	Setting Range	0.00Hz to maximum frequency (valid when frequency source is digital setting)	

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

F0-09	Rotation direction		Default	0
	Setting Range	0	Same direction	
		1	Reverse direction	

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of U, V, W cables of the motor.

Note: The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is completed.

F0-10	Maximum frequency	Default	50Hz
	Setting Range	50.00 ~ 500.00	

When the frequency source is AI, pulse setting (X5), or multi-reference, 100% of the input corresponds to the value of this parameter.

F0-11	Rotation direction		Default	0
	Setting Range	0	Set by F0-12	
		1	AI1	
		2	AI2	
		3	AI3	
		4	Pulse setting (X5)	
		5	Communication setting	

It is used to set the source of the frequency upper limit, including digital setting (F0-12), AI, pulse setting or communication setting.

If the frequency upper limit is set by means of AI1, AI2, AI3, X5 or communication, the setting is similar to that of the main frequency source A. For details, see the description of F0-03.

For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

F0-12	Frequency upper limit	Default	50.00Hz
	Setting Range	Frequency lower limit (F0-14) to maximum frequency (F0-10)	

This parameters is used to set the frequency upper limit.

F0-13	Frequency upper limit offset	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency (F0-10)	

If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter to the frequency upper limit set in F0-11.

F0-14	Frequency lower limit	Default	0.00Hz
	Setting Range	0.00Hz to frequency upper limit (F0-12)	

If the frequency reference is lower than value of this parameter, the AC drive can stop, run at the frequency lower limit, or run at zero speed, determined by F8-14.

F0-15	Carrier frequency	Default	Model dependent
	Setting Range	0.5KHz ~ 16.0KHz	

It is used to adjust the carrier frequency of the AC drive, helping to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the AC drive.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference.

Adjusting the carrier frequency will exert influences on the aspects listed in the following table.

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

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

F0-16	Carrier frequency adjustment with the temperature		Default	1
	Setting Range	0	No	
		1	Yes	

It is used to set whether the carrier frequency is adjusted based on the temperature. The AC drive automatically reduces the carrier frequency when detecting that the heatsink temperature is high. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the overheat alarms.

F0-17	Acceleration time 1	Default	Model dependent
	Setting Range	0.00s ~ 650.0s (F0-19=2) 0.0s ~ 6500.0s (F0-19=1) 0s ~ 65000s (F0-19=0)	
F0-18	Deceleration time 1	Default	Model dependent
	Setting Range	0.00s ~ 650.0s (F0-19=2) 0.0s ~ 6500.0s (F0-19=1) 0s ~ 65000s (F0-19=0)	

Acceleration time indicates the time required by the AC drive to accelerate from 0Hz to "Acceleration/Deceleration base frequency" (F0-25), that is , t1 in Figure 6-2.

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (F0-25) to 0Hz, that is , t2 in Figure 6-2.

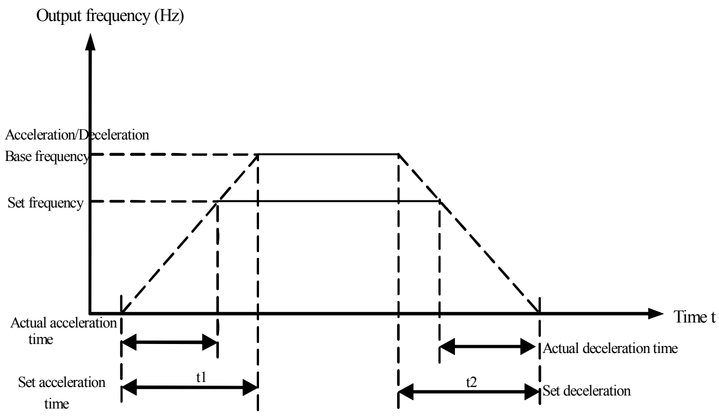


Figure 6-2 Acceleration / Deceleration time

The H8 provides totally four groups of acceleration/deceleration time for selection.

You can perform switchover by using a X terminal.

Group 1: F0-17, F0-18

Group 2: F8-03, F8-04

Group 3: F8-05, F8-06

Group 4: F8-07, F8-08

F0-19	Acceleration/Deceleration time unit		Default	1
	Setting Range	0	1s	
		1	0.1s	
		2	0.01s	

To satisfy requirements of different applications, the H8 provides three acceleration/ deceleration time units, 1s, 0.1s and 0.01s.

Note: Modifying this parameter will make the displayed decimal places change and corresponding acceleration/deceleration time also change.

F0-21	Frequency offset of auxiliary frequency source for A and B superposition	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency (F0-10)	

This parameter is valid only when the frequency source is set to “A and B superposition”. The final frequency is obtained by adding the frequency offset set in this parameter to the A and B superposition result.

F0-22	Frequency reference resolution		Default	2
	Setting Range	2	0.01Hz	

It is used to set the resolution of all frequency-related parameters.

F0-23	Retentive to digital setting frequency upon power failure		Default	0
	Setting Range	1	Not retentive	
		2	Retentive	

This parameter is valid only when the frequency source is digital setting.

If F0-23 is set to 0, the digital setting frequency value resumes to the value of F0-08 (Preset frequency) after the AC drive stops. The modification by using keys ﹀ and ︿ or the terminal UP/DOWN function is cleared.

If F0-23 is set to 1, the digital setting frequency value is the set frequency at the moment when the AC drive stops, The modification by using keys ﹀ and ︿ or the terminal UP/ DOWN function remains effective.

F0-24	Motor parameter group selection		Default	0
	Setting Range	0	Motor parameter group 1	
		1	Motor parameter group 2	

The H8 can drive two motors at different time. You can set the motor nameplate parameters respectively, independent motor auto-tuning, different control modes, and parameters related to running performance respectively for the two motors.

Motor parameter group1 corresponds to groups F1 and F2. Motor parameter groups 2 correspond to groups A2.

You can select the current motor parameter group by using F0-24 or perform switchover between the motor parameter groups by means of a X terminal. If motor parameters selected by means of F0-24 conflict with those selected by means of X terminal, the selection by X is preferred.

F0-25	Acceleration/Deceleration time base frequency		Default	0
	Setting Range	0	Maximum frequency (F0-10)	
		1	Set frequency	
		2	100Hz	

The acceleration/deceleration time indicates the time for the AC drive to increase from 0Hz to the frequency set in F0-25. If this parameter is set to 1, the acceleration/deceleration time is related to the set frequency. If the set frequency changes frequency, the motor's acceleration/deceleration also changes.

F0-26	Base frequency for UP/DOWN modification during running		Default	0
	Setting Range	0	Running frequency	
		1	Set frequency	

This parameter is valid only when the frequency source is digital setting.

It is used to set the base frequency to be modified by using keys ︿ and ﹀ or the terminal UP/ DOWN function.

If the running frequency and set frequency are different, there will be a large difference between the AC drive's performance during the acceleration/deceleration process.

F0-27	Binding command source to frequency source		Default	000
	Setting Range	Unit's digit	Binding operation panel command to frequency source	
		0	No binding	
		1	Frequency source by digital setting	
		2	AI1	
		3	I2	
		4	AI3	
		5	Pulse setting (X5)	
		6	Multi-reference	
		7	Simple PLC	
		8	PID	
		9	Communication setting	
		Ten's digit	Binding terminal command to frequency source (0 ~9, same as unit's digit)	
		Hundred's digit	Binding communication command to frequency source (0 ~9, same as unit's digit)	

It is used to bind the three running command sources with the nine frequency sources, facilitating to implement synchronous switchover.

For details on the frequency sources, see the description of F0-03 (Main frequency source A selection).Different running command sources can be bound to the same frequency source.

If a command source has a bound frequency source, the frequency source set in F0-03 to F0-07 no longer takes effect when the command source is effective.

F0-28	Serial communication protocol		Default	0
	Setting Range	0	Modbus protocol	
		1	PROFIBUS-DP bridge or CANopen bridge	

The H8 supports Modbus, PROFIBUS-DP bridge and CANopen bridge. Select a proper based on the actual requirements.

Group F1: Motor 1 Parameters

F1-00	Motor type selection		Default	0
	Setting Range	0	Common asynchronous motor	
		1	Variable frequency asynchronous motor	
		2	Permanent magnetic synchronous motor	
F1-01	Rated motor power		Default	Model dependent
	Setting Range		0.1KW ~ 1000.0KW	
F1-02	Rated motor voltage		Default	Model dependent
	Setting Range		1V ~ 2000V	
F1-03	Rated motor current		Default	Model dependent
	Setting Range		0.01A ~ 655.35A (AC drive power ≦ 55KW) 0.1A ~ 6553.5A (AC drive power > 55KW)	
F1-04	Rated motor frequency		Default	Model dependent
	Setting Range		0.01Hz to maximum frequency	
F1-05	Rated motor rotational speed		Default	Model dependent
	Setting Range		1RPM ~ 65535RPM	

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted.

To achieve better V/F or vector control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

F1-06	Stator resistance	Default	Model dependent
	Setting Range	0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
F1-07	Rotor resistance	Default	Model dependent
	Setting Range	0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
F1-08	Leakage inductive reactance	Default	Model dependent
	Setting Range	0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	
F1-09	Mutual inductive reactance	Default	Model dependent
	Setting Range	0.1mH ~ 6553.5mH (AC drive power ≦ 55KW) 0.01mH ~ 655.35mH (AC drive power > 55KW)	
F1-10	No-load current	Default	Model dependent
	Setting Range	0.01A ~ F1-03 (AC drive power ≦ 55KW) 0.1A ~ F1-03 (AC drive power > 55KW)	

The parameters in F1-06 to F1-10 are asynchronous motor parameters. These parameters are unavailable on the motor nameplate and are obtained by means of motor auto-tuning. Only F1-06 to F1-08 can be obtained through static motor auto-tuning. Through complete motor auto-tuning, encoder phase sequence and current loop PI can be obtained besides the parameters in F1-06 to F1-10.

Each time "Rated motor power" (F1-01) or "Rated motor voltage" (F1-02) is changed, the AC drive automatically restores values of F1-06 to F1-10 to the parameter setting for the common standard Y series asynchronous motor.

If it is impossible to perform motor auto-tuning onsite, manually input the values of these parameters according to data provided by the motor manufacturer.

F1-16	Stator resistance (synchronous motor)	Default	Model dependent
	Setting Range	0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
F1-17	Shaft D inductance (synchronous motor)	Default	Model dependent
	Setting Range	0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	
F1-18	Shaft Q inductance (synchronous motor)	Default	Model dependent
	Setting Range	0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	
F1-20	Back EMF (synchronous motor)	Default	Model dependent
	Setting Range	0.1V ~ 6553.5V	

F1-16 to F1-20 are synchronous motor parameters. These parameters are unavailable on the nameplate of most synchronous motors and can be obtained by means of "Synchronous motor no-load auto-tuning". Through "Synchronous motor with-load auto-tuning", only the encoder phase sequence and installation angle can be obtained. Each time "Rated motor power" (F1-01) or "Rated motor voltage" (F1-02) is changed, the AC drive automatically modifies the values of F1-16 to F1-20.

You can also directly set the parameters based on the data provided by the synchronous motor manufacturer.

F1-27	Encoder pulses per revolution	Default	1024
	Setting Range	1 ~ 65535	

This parameter is used to set the pulses per revolution (PPR) or ABZ or UVW incremental encoder. In FVC mode, the motor cannot run properly if this parameter is set incorrectly.

F1-28	Encoder type		Default	0
	Setting Range	0	ABZ incremental encoder	
		1	UVW incremental encoder	
		2	Resolver	
		3	SIN / COS encoder	
		4	Wire-saving UVW encoder	

The H8 supports multiple types of encoder. Different PG cards are required for different types of encoder. Select the appropriate PG card for the encoder used. Any of the five encoder types is applicable to synchronous motor. Only ABZ incremental encoder and resolver are applicable to asynchronous motor.

After installation of the PG card is complete, set this parameter F1-28 properly based on the actual condition. Otherwise, the AC drive cannot run properly.

F1-30	A/B phase sequence of ABZ incremental encoder		Default	0
	Setting Range	0	Forward	
		1	Reserve	

This parameter is valid only for ABZ incremental encoder (F1-28=0) and is used to set the A/B phase sequence of the ABZ incremental encoder.

It is valid for both asynchronous motor and synchronous motor. The A/B phase sequence can be obtained through “Asynchronous motor complete auto-tuning” or “Synchronous motor no-load auto-tuning”.

F1-31	Encoder installation angle	Default	0.0°
	Setting Range	0.0° ~ 359.9°	

This parameter is applicable only to synchronous motor. It is valid for ABZ incremental encoder, UVW incremental encoder, resolver and wire-saving UVW encoder, but invalid for SIN/COS encoder.

It can be obtained through synchronous motor no-load auto-tuning or with-load auto-tuning. After installation of the synchronous motor is complete, the value of this parameter must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

F1-32	U, V, W phase sequence of UVW		Default	0
	Setting Range	0	Forward	
		1	Reserve	
F1-33	UVW encoder angle offset		Default	0.0°
	Setting Range		0.0° ~ 359.9°	

These two parameters are valid only when the UVW encoder is applied to a synchronous motor. They can be obtained by synchronous motor no-load auto-tuning or with-load auto-tuning. After installation of the synchronous motor is complete, the values of these two parameters must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

F1-34	Number of pole pairs of resolver	Default	1
	Setting Range	1 ~ 65535	

If a resolver is applied, set the number of pole pairs properly.

F1-36	Encoder wire-break fault detection time	Default	0.0s
	Setting Range	0.0s: No action	0.1s ~ 10.0s

This parameter is used to set the time that a wire-break fault lasts. If it is set to 0.0s, the AC drive does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the AC drive exceeds the time set in this parameter, the AC drive reports Err20.

F1-37	Auto-tuning selection		Default	0
	Setting Range	0	No auto-tuning	
		1	Asynchronous motor static auto-tuning 1	
		2	Asynchronous motor dynamic auto-tuning	
		3	Asynchronous motor static auto-tuning 2	
		11	Synchronous motor with-load auto-tuning	
		12	Synchronous motor no-load auto-tuning	

Vector control in order to ensure AC drive of the best control performance, please ensure the motor is disconnected from the load and then complete auto-tuning, otherwise it will affect the effect of vector control.

If the motor with large-interia load is not easily disengaged and need to use vector control, so you must to use static auto-tuning 1.

Auto-tuning note: Before performing auto-tuning, properly set the motor type and motor nameplate parameters fist and then press FWD, the AC drive will starts auto-tuning.

0: No auto-tuning

Auto-tuning is prohibited.

1: Asynchronous motor static auto-tuning 1

It is applicable to scenarios where dynamic auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from the large-interia load.

Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of F1-00 to F1-05 fist. The AC drive will obtain parameters of F1-06 to F1-08 by static auto-tuning.

2: Asynchronous motor dynamic auto-tuning

To perform this type of auto-tuning, ensure that the motor is disconnected from the load.

During the process of complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in F0-17. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in F0-18.

3: Asynchronous motor static auto-tuning 2

It is applicable to scenarios without the encoder and is performed in the motor standstill state. Be careful during the auto-tuning process becuase the motor may joggle slightly.

11: Synchronous motor with-load auto-tuning

It is applicable to scenarios where the synchronous motor cannot be disconnected from the load. During with-load auto-tuning, the motor rotates at the speed of 10PRM.

By with-load auto-tuning, the AC drive obtains the initial position angle of the synchronous motor, which is a necessary prerequisite of the motor's normal running. Before the first use of the synchronous motor after installation, motor auto-tuning must be performed.

12: Synchronous motor no-load auto-tuning

If the synchronous motor can be disconnected from the load, no-load, auto-tuning is recommended, which will achieve better running performance compared with with-load auto-tuning.

During the process of no-load auto-tuning first and then accelerates to 40% of the rated motor frequency within the acceleration time set in F0-17. The AC drive keeps running for a certain period and the decelerates to stop within the deceleration time set in F0-18.

Note: Motor auto-tuning can be performed in operation panel control, terminal control and communication control.

Group F2: Vector Control Parameters

Group F2 is valid for vector control, and invalid for V/F control.

F2-00	Speed loop proportional gain 1	Default	30
	Setting Range	1 ~ 100	
F2-01	Speed loop integral time 1	Default	0.50s
	Setting Range	0.01s ~ 10.00s	
F2-02	Switchover frequency 1	Default	5.00Hz
	Setting Range	0.00Hz to F2-05	
F2-03	Speed loop proportional gain 2	Default	20
	Setting Range	1 ~ 100	
F2-04	Speed loop integral time 2	Default	1.00s
	Setting Range	0.01s ~ 10.00s	
F2-05	Switchover frequency 2	Default	10.00Hz
	Setting Range	F2-02 to maximum output frequency	

Speed loop PI parameters vary with running frequencies of the AC drive.

If the running frequency is less than or equal to “Switchover frequency 1” (F2-02), the speed loop PI parameters are F2-00 and F2-01.

If the running frequency is equal to or greater than “Switchover frequency 2” (F0-05), the speed loop PI parameters are F2-03 and F2-04.

If the running frequency is between F2-02 and F2-05, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 6-3.

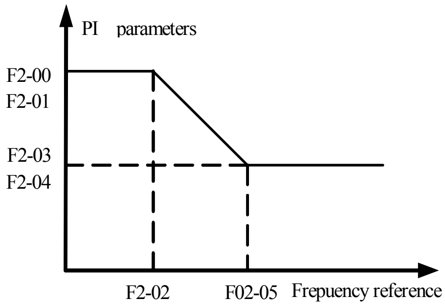


Figure 6-3 Relationship between running frequency and PI parameters

The speed dynamic response characteristics in vector control can be adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

Note: Improper PI parameter setting may cause too large speed overshoot, and overvoltage fault may even occur when the overshoot drops.

F2-06	Vector control slip gain	Default	100%
	Setting Range	50% ~ 200%	

For SVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter.

For FVC, it is used to adjust the output current of the AC drive with same load.

F2-07	SVC speed feedback filter time	Default	0.050s
	Setting Range	0.000s ~ 0.100s	

In the vector control mode and F0-01 by set to 0, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

If the value of this parameter is small, the output torque of the AC drive may fluctuate greatly, but the response is quick.

F2-08	Vector control over-excitation gain	Default	64
	Setting Range	0 ~ 200	

During deceleration of the AC drive, over-excitation control restrain rise of the bus voltage to avoid the overvoltage fault. The larger the over-excitation gain is, the better the restraining effect is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

F2-09	Torque upper limit source in speed control mode	Default	0
	Setting Range	0	F2-10
		1	AI1
		2	AI2
		3	AI3
		4	Pulse setting (X5)
		5	Communication setting
F2-10	Digital setting of torque upper limit in speed control mode	Default	150.0%
	Setting Range	0.0% ~ 200.0%	
F2-11	Torque upper limit source in speed control mode (generator)	Default	0
	Setting Range	0	F2-12
		1	AI1
		2	AI2
		3	AI3
		4	Pulse setting (X5)
		5	Communication setting
F2-12	Digital setting of torque upper limit in speed control mode (generator)	Default	150.0%
	Setting Range	0.0% ~ 200.0%	

In the speed control mode (by electric mode), the maximum output torque of the AC drive is restricted by F2-09. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of F2-10, and 100% of the value of F2-10 corresponds to the AC drive rated torque.

In the speed control mode (by electric generator mode), the maximum output torque of the AC drive is restricted by F2-11. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of F2-12, and 100% of the value of F2-12 corresponds to the AC drive rated torque.

For details on the AI1, AI2 and AI3 setting, see the description of the AI curves in group F4.

For details on the pulse setting, see the description of F4-28 to F4-32.

When the AC drive is in communication with the master, if F2-09(F2-11) is set to 5 "communication setting", F2-10(F2-12) "Digital setting of torque upper limit in speed control mode" can be set via communication from the master (see group A8).

In other conditions, the host computer writes data -100.00% to 100.00% by the communication address 0x1000, where 100.0% corresponds to the value of F2-10and F2-12. The communication protocol can be Modbus, CANopen, CANlink or PROFIBUS-DP.

F2-13	Excitation adjustment proportional gain	Default	2000
	Setting Range	0 ~ 20000	
F2-14	Excitation adjustment integral gain	Default	1300
	Setting Range	0 ~ 20000	
F2-15	Torque adjustment proportional gain	Default	2000
	Setting Range	0 ~ 20000	
F2-16	Torque adjustment integral gain	Default	1300
	Setting Range	0 ~ 20000	

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning", and need not be modified.

The dimension of the current loop integral regulator is integral gain rather than integral time. Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

F2-18	Field weakening mode of synchronous motor		Default	1
	Setting Range	0	No field weakening	
		1	Automatic adjustment	
		2	Direct calculation+ Automatic adjustment	
F2-19	Field weakening Coefficient of synchronous motor		Default	10
	Setting Range		0 ~ 50	

These parameters are used to set field weakening control for the synchronous motor.

F2-18 is set to 0. Not for weak magnetic control.

Synchronous motor are not weak magnetic control motor speed, at this time can the maximum value relevant and inverter bus voltage to achieve, advantage is that there is no weak magnetic current, output current is small, the disadvantage is the operating frequency can not achieve the set frequency, if customers want to achieve higher speed to open the weak magnetic function.

F2-18=1 Automatic mode.

The weak magnetic field is simple and reliable, high speed ultra weak magnetic current is high, to the nominal motor current is not allowed to rise speed, otherwise the long time operation cue overload, the need for fast weak magnetic situations can be properly increased synchronous motor weak magnetic coefficient F2-19, but the F2-19 General Assembly had induced current instability.

F2-18=2 Calculation + automatic adjustment mode.

This method of motor weak magnetic current adjusting speed.

Automatic adjustment in unable to meet the needs of the occasion can be arranged into this model, but the model depends on motor parameters value, if the motor parameter identification is not reasonable, regulate the weak magnetic current will have problems.

F2-20	Maximum output voltage coefficient	Default	105.0%
	Setting Range	100% ~ 110%	

The maximum output voltage coefficient shows that the maximum output voltage of AC drive capacity, the increase of F2-20 can improve the motor field weakening region of maximum load capacity, but the motor current ripple increases, will increase the motor heat; On the contrary, the motor field weakening maximum load capacity will decrease,, motor current ripple reduction, reduce motor calorific value, generally no need to adjust.

F2-21	Field weakening Maximum torque coefficient	Default	100.0%
	Setting Range	50% ~ 200%	

This parameter only when the motor running at rated frequency above will take effect.

When the motor needs speeding up to 2 times the rated motor frequency and the actual acceleration time is longer, appropriate to reduce the F2-21;

When the motor is running at 2 times the rated frequency after loading speed drop is large, the increase of F2-21, generally no need to adjust.

F2-23	Synchronous motor output Saturation voltage margin	Default	5%
	Setting Range	1% ~ 100%	

Enter the Field weakening if you want the output voltage is higher, so that the weakening current smaller can reduce synchronous motor output saturation voltage margin of F2-23, but F2-23 is too small will cause the output voltage is more easily saturated and thus influence control performance.

F2-24	synchronous motor initial position angle of the current	Default	80%
	Setting Range	50%～120%	

F2-25	synchronous motor Initial Position angle detection		Default	0
	Setting Range	0	Every time running detection
		1	Not detection
		2	The first running detection

The initial position of motor detection is generally used to SVC mode, its advantages is the reversal does not appear when starting, the disadvantage is that a certain sound, for the inversion and parking of motor rotor position will change not allowed to start when the occasion must be set to F2-25=0, the other cases can be set to 1 or 2.

Through F2-24 can set detected current value, the current is to detect small a voice is small, but it's too small may will result in inaccurate position detection, FVC mode proposal does not modify.

F2-27	Synchronous motor salient-pole Rate adjustment gain	Default	100
	Setting Range	50～500	
F2-28	The maximum ratio of torque to current	Default	0
	Setting Range	0~1	

The code function only use to salient-pole permanent magnet synchronous motor is effective, the salient-pole permanent magnet synchronous motor is generally inserted type permanent magnet synchronous motor (IPMSM), judge F1-18/ F1-17>1.5, confirmed salient-pole and then setting F2-28 to 1, in the same load output current become smaller, if the F2-28 set to 1, the same load, output current is not reduced even increase can be adjusted by F2-27, until the output current smallest.

Note: If in the SVC mode, do not open F2-28 control, it is a risk.

F2-30	Adjust the current loop Kp tuning	Default	6
	Setting Range	1～100	
F2-31	Adjust the current loop Ki tuning	Default	6
	Setting Range	1～100	

This function code can only be used in the motor parameter auto- tuning.

In the no-load auto- tuning（ F1-37=12）. If the tuning process Motor appears the concussion or divergence can appropriately reduce or enlarge the functional code value, until the auto- tuning normal.

With the load auto- tuning (F1-37=11) generally do not need to modify.

F2-32	Z signal correction	Default	0
	Setting Range	0:closed 1:open	

Only install the incremental encoder, this function code only has meaning.

When enabled by default Z signal correction, can eliminate the accumulated position error, interference of the encoder Z signal is relatively large will cause stall or effect motor output Torque, even when AC drive report Err20 encoder fault. This time can set F2-32 to 0 cancel Z signal correction.

F2-33	SVC speed Filter coefficient estimation	Default	100
	Setting Range	10～1000	

In synchronous motor SVC mode, if the velocity fluctuations or current fluctuations can be appropriate to increase the speed filter coefficients, the speed estimation more smooth.

F2-36	Synchronous motor SVC initial Excitation current limit	Default	30%
	Setting Range	0～80%	

At low speed, in order to better control effect will increase some of the exciting current by parameter F2-36. Default value is 30% of the rated motor current.

When F2-36 is set to 0, without increasing the excitation current, the running frequency can reached above 20% rated frequency, excitation current cancellation.

F2-37	Synchronous motor SVC initial Minimum carrier frequency	Default	2.0K
	Setting Range	0.8k～F0-15	

In order to better the load capacity for low speed, SVC mode in low speed will be reduced carrier frequency. When the set frequency increased, the final carrier frequency will reached set carrier frequency F0-15.

Carrier frequency low noise relative also larger, such as the noise has requirements can set F2-37 and F0-15 consistent.

F2-38	SVC low frequency braking mode	Default	0
	Setting Range	0：NO 1：Stopping 2：Starting and stopping	

F2-39	SVC Low frequency braking Forced frequency	Default	2
	Setting Range	0.00Hz～10.00Hz	
F2-40	SVC Low frequency braking frequency change step	Default	0.0010Hz
	Setting Range	0.0000Hz～1.0000Hz	
F2-41	SVC Low frequency braking current	Default	50%
	Setting Range	0%～80%	

This group of function code for SVC mode of low frequency braking.

In need of motor start or stop to not have small reversal of the occasion,can choose to use low frequency braking, similar to DC braking effect of asynchronous motor.

F2-38=1 and the state is the deceleration stop, once the running frequency is less than F2-39, will use low frequency braking, prevent the motor stopped inversion.

F2-38=2 whether to start or stop as long as the running frequency is lower than F2-39 will use low frequency braking.

F2-40 and F2-41 can be adjusted according to the actual braking effect, generally do not modify.

F2-42	SVC Synchronous motor speed tracking	Default	0
	Setting Range	0:closed 1:open	

In SVC mode, when the motor stop not steady and then need to smooth start, F2-42 can be set to 1, open the SVC tracking speed, and increase the synchronous card with the use of.

F2-43	Zero servo enable	Default	0
	Setting Range	0:closed 1:open	
F2-44	Switching frequency	Default	0.30Hz
	Setting Range	0.00Hz～F2-02	
F2-45	Zero servo speed Loop proportional gain	Default	10
	Setting Range	1～100	
F2-46	Zero servo speed loop integral time	Default	0.5s
	Setting Range	0.01s～10.00s	

Increasing the zero servo function, keep in the required position, and requires zero servo is very rigid occasions, can be set via F2-43 to 1 open, F2-43=0 by default does not open.

by set F2-26=1, using the speed loop with zero servo control, F2-44 switching frequency, F2-45 and F2-46 are zero servo speed loop proportional gain and integral time.

Which decreases the integral time can add the enhanced zero servo rigidity, but the parameter value is too small may be a little vibration, reasonable adjustment according to the actual needs of.

F2-47	Stopping Prohibit reversal	Default	0
	Setting Range	0～1	
F2-48	Stopping angle	Default	0.8°
	Setting Range	0.0°～10.0°	

When the motor deceleration to Stop or by operating frequency down to 0Hz may be occur the motor is reversed, If you want to avoid the occurrence , F2-47 can be set to 1 to open the anti reverse function.

F2-48 default value is 0.8 degrees, if the default value still reversal, may be appropriate to increase the F2-48, until the does not appear to be reversed.

The reverse is not strict case that it's not necessary to open this function.

Group F3: V/F Control Parameters

Croup F3 is valid only for V/F control.

The V/F control mode is applicable to low load applications or applications where one AC drive operates multiple motor or there is a large difference between the AC drive power and the motor power.

F3-00	V/F curve setting		Default	0
	Setting Range	0	Linear V/F	
		1	Multi-point V/F	
		2	Square V/F	
		3	1.2-power V/F	
		4	1.4-power V/F	
		6	1.6-power V/F	
		8	1.8-power V/F	
		9	Reserved	
		10	V/F complete separation	
		11	V/F half separation	

0: Linear V/F

It is applicable to common constant torque load.

1: Multi-point V/F

It is applicable to special load such as dehydrator and centrifuge. Any such V/F curve can be obtained by setting parameters of F3-03 to F3-08.

2: Square V/F

It is applicable to centrifugal loads such as fan and pump.

3 to 8: V/F curve between linear V/F and square V/F.

10: V/F complete separation

In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source, and the output voltage is determined by "Voltage source for V/F separation" (F3-13).

It is applicable to induction heating, inverse power supply and torque motor control.

11: V/F half separation

In this mode, V and F are proportional and the proportional and the proportional relationship can be set in F3-13. The relationship between V and F are also related to the rated motor voltage and rated motor frequency in Group F1.

Assume that the voltage source input is X (0 to 100%), the relationship between V and F is:

V/F=2*X*(Rated motor voltage)/(Rated motor frequency)

F3-01	Torque boost	Default	Model dependent
	Setting Range	0.0% ~ 30%	
F3-02	Cut-off frequency of torque boost	Default	50.00Hz
	Setting Range	0.00Hz to maximum output frequency	

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying F3-01.

If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer over current.

If the load is large and the motor startup torque is insufficient, increase the value of F3-01. If the load is small, decrease the value of F3-01. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

F3-02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure 6-4.

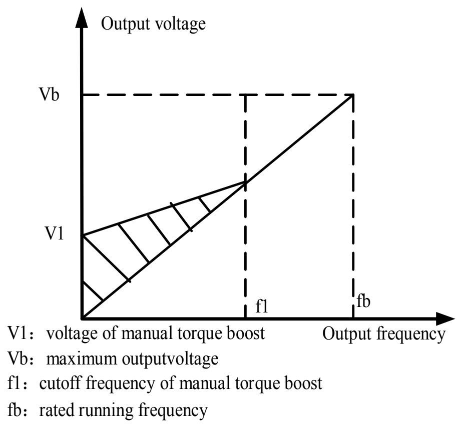


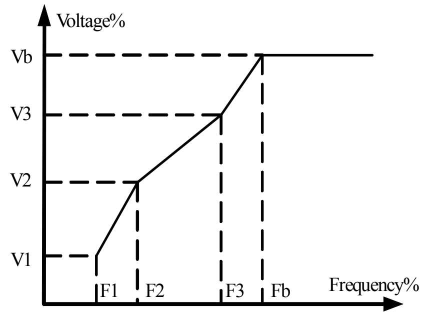
Figure 6-4 Manual torque boost

F3-03	Multi-point V/F frequency 1 (F1)	Default	0.00Hz
	Setting Range	0.00Hz to F3-05	
F3-04	Multi-point V/F voltage 1 (V1)	Default	0.0%
	Setting Range	0.0% ~ 100.0%	
F3-05	Multi-point V/F frequency 2 (F2)	Default	0.00Hz
	Setting Range	F3-03 to F3-07	
F3-06	Multi-point V/F voltage 2 (V2)	Default	0.0%
	Setting Range	0.0% ~ 100.0%	
F3-07	Multi-point V/F frequency 3 (F3)	Default	0.00Hz
	Setting Range	F3-05 to rated motor frequency (F1-04) Note: The rated frequencies of motor 2 are respectively set in A2-04.	
F3-08	Multi-point V/F voltage 3 (V3)	Default	0.0%
	Setting Range	0.0% ~ 100.0%	

These six parameters are used to define the multi-point V/F curve.

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is: V1<V2<V3, F1<F2<F3. As shown in the following figure 6-5.

At low frequency, higher voltage may cause overheat or even burnt out of the motor and over current stall or over current protection of the AC drive.



V1-V3:1st,2nd and 3rd voltage percentages of multi-point V/F
F1-F3:1st ,2nd and 3rd frequency percentages of multi-point V/F
Vb:Rated motor voltage Fb:Rated motor running frenquency

Figure 6-5 setting of multi-point V/F curve

F3-09	V/F slip compensation gain	Default	0.0%
	Setting Range	0.0% ~ 200.0%	

This parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group F1.

Generally, if the motor rotational speed is different from the target speed, slightly adjust this parameter.

F3-10	V/F over-excitation gain	Default	64
	Setting Range	0 ~ 200	

During deceleration of the AC drive, over-excitation can restrain rise of the bus voltage, preventing the over voltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the AC drive is liable to over voltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current. Set F3-09 to a proper value in actual applications.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

F3-11	V/F oscillation suppression gain	Default	Model dependent
	Setting Range	0 ~ 100	

Set this parameter to a value as small as possible in the prerequisite of effective oscillation suppression to avoid influence on V/F control.

Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The large the value is, the better the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no-load current must be correct. Otherwise, the V/F oscillation suppression effect will not be satisfactory.

<table>
<tr><td rowspan="10">F3-13</td><td colspan="2">Voltage source for V/F separation</td><td>Default</td><td>0</td></tr>
<tr><td rowspan="9">Setting Range</td><td>0</td><td colspan="2">Digital setting (F3-14)</td></tr>
<tr><td>1</td><td colspan="2">AI1</td></tr>
<tr><td>2</td><td colspan="2">AI2</td></tr>
<tr><td>3</td><td colspan="2">AI3</td></tr>
<tr><td>4</td><td colspan="2">Pulse setting (X5)</td></tr>
<tr><td>5</td><td colspan="2">Multi-reference</td></tr>
<tr><td>6</td><td colspan="2">Simple PLC</td></tr>
<tr><td>7</td><td colspan="2">PID</td></tr>
<tr><td>8</td><td colspan="2">Communication setting 100% corresponds to the rated motor voltage (F1-02, A2-02)</td></tr>
<tr><td rowspan="2">F3-14</td><td colspan="2">Voltage digital setting for V/F separation</td><td>Default</td><td>0V</td></tr>
<tr><td colspan="2">Setting Range</td><td colspan="2">0V to rated motor voltage</td></tr>
</table>

V/F separation is generally applicable to scenarios such as induction heating, inverse power supply and motor torque control.

If V/F separated control is enabled, the output voltage can be set in F3-14 or by means of analog, multi-reference, simple PLC, PID or communication. If you set the output voltage by means of non-digital setting, 100% of the setting corresponds to the rated motor voltage. If a negative percentage is set, its absolute value is used as the effective vale.

0: Digital setting (F3-14)

The output voltage is set directly in F3-14.

1: AI1

2: AI2

3: AI3

The output voltage is set by AI terminals.

4: Pulse setting (X5)

The output voltage is set by pulses of the terminal X5.

Pulse setting specification: voltage range 9 ~ 30V, frequency rang 0 ~ 100KHz.

5: Multi-reference

If the voltage source is multi-reference, parameters in group F4 and FC must be set to determine the corresponding relationship between setting signal and setting voltage. 100.0% of the multi-reference setting in group FC corresponds to the rated motor voltage.

6: Simple PLC

If the voltage source is simple PLC mode, parameters in group FC must be set to determine the setting output voltage.

7: PID

The output voltage is generated based on PID closed loop. For details, see the description of PID in group FA.

8: Communication setting

The output voltage is set by the host computer by means of communication.

The voltage source for V/F separation is set in the same way as the frequency source. For details, see F0-03. 100.0% of the setting in each mode corresponds to the rated motor voltage. If the corresponding value is negative, its absolute value is used.

F3-15	Voltage rise time of V/F separation	Default	0.0s
	Setting Range	0.0s ~ 1000.0s	
F3-16	Voltage decline time of V/F separation	Default	0.0s
	Setting Range	0.0s ~ 1000.0s	

F3-15 indicates the time required for the output voltage to rise from 0V to the rated motor voltage shown as t1 in the following figure.

F3-16 indicates the time required for the output voltage to decline from the rated motor voltage to 0V, shown as t2 in the following figure.

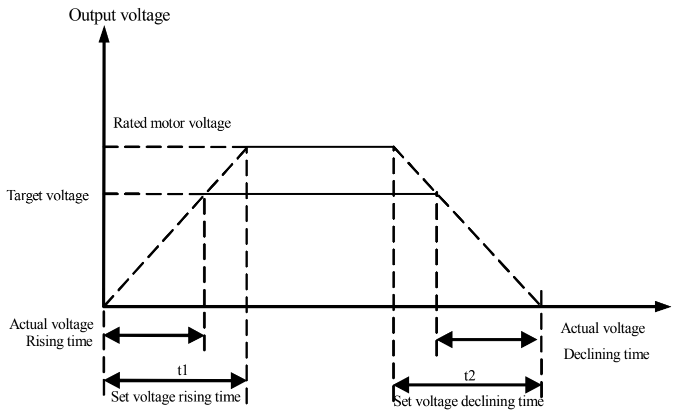


Figure 6-6 Voltage of V/F separation

F3-17	Stop mode selection upon V/F separation	Default	0
	Setting Range	0 ~ 1	

0: Frequency and voltage declining to 0 independently.

The V/F separation output voltage according to the voltage drop time (F3-15) decreased to 0V; The V/F separation output frequency at the same time according to the deceleration time (F0-18) decreased to 0Hz, as shown in Figure 6-7.

1: Frequency declining after voltage declines to 0.

The V/F separation output voltage first according to the voltage drop time (F3-15) decreased to 0V, and the output frequency according to the deceleration time (F0-18) decreasing to 0 Hz, as shown in Figure 6-8.

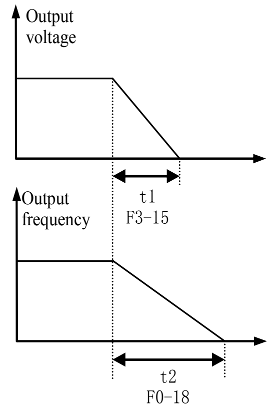


Figure 6-7 Frequency and voltage declining to 0 independently

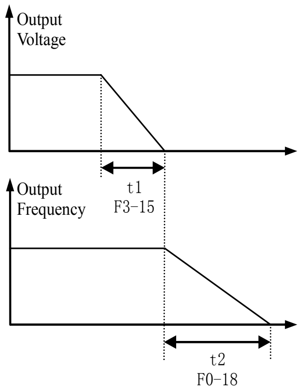


Figure 6-8 Frequency declining after voltage declines to 0

F3-18	Overcurrent stall current	Default	150%
	Setting Range	50% ~ 200%	
F3-19	Overcurrent stall inhibit enable	Default	1
	Setting Range	0: disable 1: enable	
F3-20	Overcurrent stall inhibit gain	Default	20
	Setting Range	0 ~ 100	

F3-21	Double overcurrent stall current compensation coefficient	Default	50%
	Setting Range	50% ~ 2000%	

★AC drive output current (torque) limit

At acceleration、 constant speed、deceleration, if the actual current exceeds stall point current(150%),Overcurrent stall will be valid. When the actual current exceeds the stall point current, the output frequency of began to decrease, until the actual current back to below the stall point current, frequency began to accelerate to a target frequency,

If the actual current exceeds the stall points current ，Overcurrent stall inhibit will be valid, the actual acceleration time Automatic lengthening. if the actual acceleration time can not meet the requirements can be appropriate to increase the "F3-21 Double overcurrent stall action current compensation coefficient ".

To reduce the high speed stall current, the compensation coefficient is reduced to 50 is invalid, at this time, the field weakening current corresponding to F3-18. As shown in the following figure 6-9.

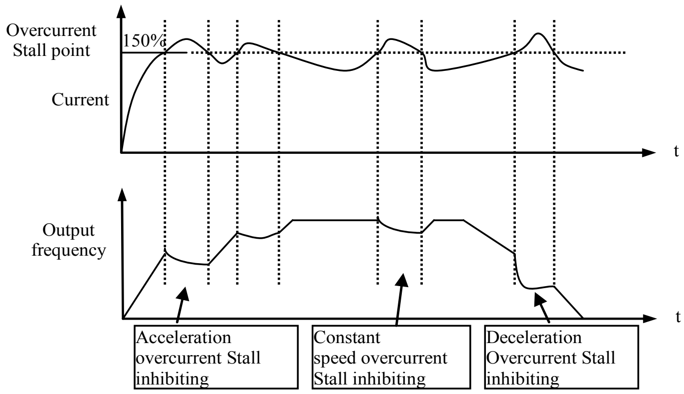


Figure 6-9 Overcurrent stall schematic diagram

In the high frequency region, motor drive current is small, relative to the rated frequency and below, the same stall current, motor speed drop greatly; in order to improve the running characteristics of the motor can reduce stall speed currents above the rated frequency.

For example, above the number of centrifuges, high operation frequency, several times in the weak magnetic field and the big inertia load, this method on the acceleration performance has very good effect.

Over rated frequency of overcurrent stall current=(fs/fn) *k*Limitcur

fs:running frequency;

fn:motor rated frequency;

k: double overcurrent stall current compensation coefficient;

LimitCur: overcurrent stall current.

As shown in the following figure 6-10.

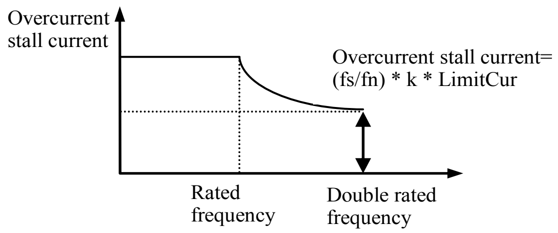


Figure 6-10 Double overcurrent stall current schematic diagram

Note: overcurrent stall current said 1.5 times the rated current of AC drive.

High power motor, carrier frequency below 2KHz, due to current ripple resulted in an increase by wave current limit response before stall inhibit, and produce torque shortage. In this case, please reduce the over-current stall inhibit current.

F3-22	Overvoltage stall action voltage	Default	Model dependent
	Setting Range	200.0V ~ 2000.0V	
F3-23	Overvoltage stall inhibit enable	Default	1
	Setting Range	0: disable 1: enable	
F3-24	Overvoltage stall inhibit frequency gain	Default	30
	Setting Range	0 ~ 100	
F3-25	Overvoltage stall inhibit voltage gain	Default	30
	Setting Range	0 ~ 100	
F3-26	Overvoltage stall maximum rise frequency limit	Default	5Hz
	Setting Range	0 ~50Hz	

★AC drive bus voltage inhibit(braking resistance Setting)

If the bus voltage exceeds the overvoltage stall point 760v, said electromechanical system has been in the state of power generation (motor speed > output frequency) and overvoltage stall functions will be valid, adjust output frequency (Consume feedback back electric), the actual deceleration time automatic lengthening and avoid power down protection, if the actual deceleration time can not meet the requirements can be appropriately increased over excitation gain. As shown in the following figure 6-11.

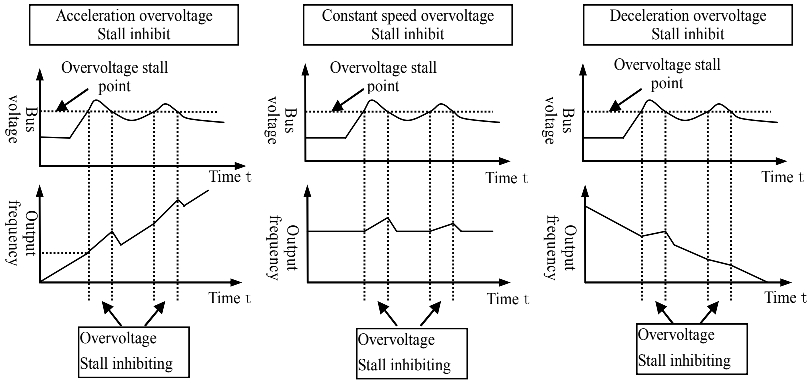


Figure 6-11 Overcurrent stall schematic diagram

Note: Increasing the value of the F3-24 can improve the control effect of bus voltage, however, the output frequency fluctuations. If the output frequency fluctuations large and then can appropriately reduce the value of F3-24.

Please set the F3-10 "over excitation gain" to 0, if not 0, AC drive has perhaps a problem of the large current in running.

Please set the F3-23"overvoltage stall " to 0, if not 0，likely to cause deceleration time to extend the problem.

F3-27	Slip compensation time constant	Default	5Hz
	Setting Range	0.1～10.0S	

The smaller the response time value of the slip compensation, the faster the response speed is.The value of slip compensation is too small, and the large inertia load is prone to the occurrence of renewable over voltage (Err07).

Group F4: Input Terminals

The H8 provides five X terminals (X5 can be used for high-speed pulse input) and two analog input (AI) terminals. The optional extension card provides another five X terminals (X6 to X10) and an AI terminal (AI3).

Function Code	Parameter Name	Default	Remark
F4-00	X1 function selection	1: Forward RUN (FWD)	Standard
F4-01	X2 function selection	4: Forward JOG (FJOG)	Standard
F4-02	X3 function selection	9: Fault reset (RESET)	Standard
F4-03	X4 function selection	12: Multi-reference terminal 1	Standard
F4-04	X5 function selection	13: Multi-reference terminal 1	Standard
F4-05	X6 function selection	0	Extended
F4-06	X7 function selection	0	Extended

Function Code	Parameter Name	Default	Remark
F4-07	X8 function selection	0	Extended
F4-08	X9 function selection	0	Extended
F4-09	X10 function selection	0	Extended

The following table lists the functions available for the X terminals:

Value	Function	Description
0	No function	Set 0 for reserved terminals to avoid malfunction.
1	Forward RUN (FWD)	The terminal is used to control forward or reverse RUN of the AC drive.
2	Reverse RUN (REV)	
3	Three-line control	The terminal determines three-line control of the AC drive. For details, see the description of F4-11.
4	Forward JOG (FJOG)	FJOG indicates forward JOG running, while RJOG indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in F8-00, F8-01 and F8-02.
5	Reverse JOG (RJOG)	
6	Terminal UP	If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification. When the frequency source is digital setting, they are used to adjust the frequency.
7	Terminal DOWN	
8	Coast to stop	The AC drive blocks its output, the motor coasts to rest and is not controlled by the AC drive. It is the same as coast to stop described in F6-10.
9	Fault reset (RESET)	The terminal is used for fault reset function, the same as the function of RESET key on the operation panel. Remote fault reset is implemented by this function.
10	Run pause	The AC drive decelerates to stop, but the running parameters are all memorized, such as PLC, swing frequency and PID parameter. After this function is disabled, the AC drive resumes its status before stop.
11	Normally open (NO) input of external fault	If this terminal becomes ON, the AC drive reports Err15 and performs the fault protection action. For more details, see the description of F9-47.

Value	Function	Description
12	Multi-reference terminal 1	The setting of 16 speeds or 16 other references can be implemented through combinations of 16 states of these four terminals.
13	Multi-reference terminal 2	
14	Multi-reference terminal 3	
15	Multi-reference terminal 4	
16	Terminal 1 for acceleration/ deceleration time selection	Totally four groups of acceleration/deceleration time can be selected through combinations of two states of these two terminals.
17	Terminal 2 for acceleration/ deceleration time selection	
18	Frequency source switchover	The terminal is used to perform switchover between two frequency source according to the setting in F0-07.
19	UP and DOWN setting clear (terminal, operation panel)	If the frequency source is digital setting, the terminal is used to clear the modification by using the UP/DOWN function or the increment/ decrement key on the operation panel, returning the set frequency to the value of F0-08.
20	Command source switchover terminal 1	If the command source is set to terminal control (F0-02=1), this terminal is used to perform switchover between terminal control and operation panel conel control. If the command source is set communication control (F0-02=2), this terminal is used to perform switchover between communication control and operation panel control.
21	Acceleration/Deceleration prohibited	It enables the AC drive to maintain the current frequency output without being affected by external signals (except the STOP command).
22	PID pause	PID is invalid temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source.
23	PLC status reset	The terminal is used to restore the original status of PLC control for the AC drive when PLC control is started again after a pause.

Value	Function	Description
24	Swing pause	The AC drive outputs the central frequency, and the swing frequency function pauses.
25	Counter input	This terminal is used to count pulses.
26	Counter reset	This terminal is used to clear the counter status.
27	Length count input	This terminal is used to count the length.
28	Length reset	This terminal is used to clear the length.
29	Torque control prohibited	The AC drive is prohibited from torque control and enters the speed control mode.
30	Pulse input	X5 is used for pulse input (enabled only for X5)
31	Reserved	Reserved.
32	Immediate DC braking	After this terminal becomes ON, the AC drive directly switches over to the DC braking state.
33	Normally closed (NC) input of external fault	After this terminal becomes ON, the AC drive reports Err15 and stops.
34	Frequency modification forbidden	After this terminal becomes ON, the AC drive does not respond to any frequency modification.
35	Reverse PID action direction	After this terminal becomes ON, the PID action direction is reversed to the direction set in FA-03.
36	External STOP terminal 1	In operation panel mode, this terminal can be used to stop the AC drive, equivalent to the function of the STOP key on the operation panel.
37	Command source switchover terminal 2	It is used to perform switchover between terminal control and communication control. If the command source is terminal control, the system will switch over to communication control after this terminal becomes ON.
38	PID integral pause	After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still valid.
39	Switchover between main frequency source A and preset frequency	After this terminal becomes ON, the frequency source A is replaced by preset frequency set in F0-08.
40	Switchover between auxiliary frequency source B and preset frequency	After this terminal is enable, the frequency source B is replaced by the preset frequency set in F0-08.

Value	Function	Description
41	Motor selection terminal 1	Switchover among the four groups of motor parameters can be implemented through the four state combinations of these two terminals.
43	PID parameter switchover	If the PID parameters switchover performed by means of X terminal (FA-18=1), the PID parameters are FA-05 to FA-07 when the terminal becomes OFF; the PID parameters are Fa-15 to FA-17 when this terminal becomes ON.
44	User-defined fault 1	If these two terminals become ON, the AC drive reports Err27 and Err28 respectively, and performs fault protection actions based on the setting in F9-49.
45	User-defined fault 2	
46	Speed control/ Torque control switchover	This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in A0-00. When this terminal becomes ON, the AC drive switches over to the other control mode.
47	Emergency stop	When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state.
48	External STOP terminal 2	In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4.
49	Deceleration DC braking	When this terminal becomes ON, the AC drive deceleration to the initial frequency of stop DC braking and then switches over to DC braking state.
50	Clear the current running time	When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by F8-42 and F8-53.
51	Switchover between two-line mode and three-line mode	It is used to perform switchover between two-line control and three-line control. If F4-11 is set to two-line mode 1, the system switches over to three-line mode 1 when the X allocated with this function becomes ON.

The four multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table.

Table 6-1 State combinations of the four multi-reference terminal

K4	K3	K2	K1	Reference Setting	Corresponding Parameter
OFF	OFF	OFF	OFF	Reference 0	FC-00
OFF	OFF	OFF	ON	Reference 1	FC-01
OFF	OFF	ON	OFF	Reference 2	FC-02
OFF	OFF	ON	ON	Reference 3	FC-03
OFF	ON	OFF	OFF	Reference 4	FC-04
OFF	ON	OFF	ON	Reference 5	FC-05
OFF	ON	ON	OFF	Reference 6	FC-06
OFF	ON	ON	ON	Reference 7	FC-07
ON	OFF	OFF	OFF	Reference 8	FC-08
ON	OFF	OFF	ON	Reference 9	FC-09
ON	OFF	ON	OFF	Reference 10	FC-10
ON	OFF	ON	ON	Reference 11	FC-11
ON	ON	OFF	OFF	Reference 12	FC-12
ON	ON	OFF	ON	Reference 13	FC-13
ON	ON	ON	OFF	Reference 14	FC-14
ON	ON	ON	ON	Reference 15	FC-15

If the frequency source is multi-reference, the value 100% of FC-00 to FC-15 corresponds to the value of F0-10 (Maximum frequency).

Besides the multi-speed function, the multi-reference can be also used as the PID setting source or the voltage source for V/F separation, satisfying the requirement on switchover of different setting values.

Table 6-2 State combinations of two terminals for acceleration/deceleration time selection

Terminal 2	Terminal 1	Acceleration/Deceleration Time Selection	Corresponding Parameters
OFF	OFF	Acceleration/Deceleration time 1	F0-17, F0-18
OFF	ON	Acceleration/Deceleration time 2	F8-03, F8-04
ON	OFF	Acceleration/Deceleration time 3	F8-05, F8-06
ON	ON	Acceleration/Deceleration time 4	F8-07, F8-08

Table 6-3 State combinations of two motor selection terminals

Terminal 1	Selected Motor	Corresponding Parameters
OFF	Motor 1	Group F1, Group F2
ON	Motor 2	Group A2

F4-10	X filter time	Default	0.010s
	Setting Range	0.000s ~ 1.000s	

It is used to set the software filter time of X terminal status. If X terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of X filter time will reduce the response of X terminals.

F4-11	Terminal command mode		Default	0
	Setting Range	0	Two-line mode 1	
		1	Two-line mode 2	
		2	Three-line mode 1	
		3	Three-line mode 2	

This parameter is used to set the mode in which the AC drive is controlled by external terminals. The following uses X1, X2 and X3 among X1 to X10 as an example, with allocating functions of X1, X2 and X3 by setting F4-00 to F4-02. Detailed function definition see F4-00 ~ F4-09.

0: Two-line mode 1

It is the commonly used two-line mode, in which the forward / reverse rotation of the motor is decided by X1 and X2. The parameters are set as below:

Function Code	Parameter Name	value	Function Description
F4-11	Terminal command mode	0	Two-line 1
F4-00	X1 function selection	1	Forward RUN (FWD)
F4-01	X2 function selection	2	Reverse RUN (REV)

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

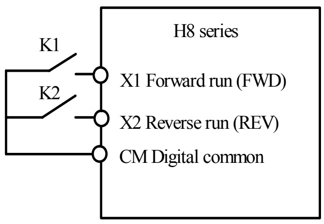


Figure 6-12 Setting of two-line mode 1

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

1: Two-line mode 2

In this mode, X1 is RUN enabled terminal, and X2 determines the running direction. The parameters are set as below:

Function Code	Parameter Name	value	Function Description
F4-11	Terminal command mode	0	Two-line 2
F4-00	X1 function selection	1	RUN enabled
F4-01	X2 function selection	2	Forward or reverse direction

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

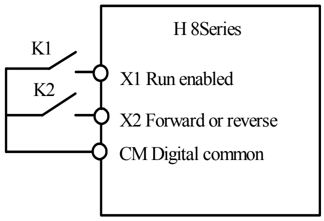


Figure 6-13 Setting of two-line mode 2

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

2: Three-line mode 1

In this mode, X3 is RUN enabled terminal, and the direction is decided by X1 and X2. The parameters are set as below:

Function Code	Parameter Name	value	Function Description
F4-11	Terminal command mode	0	Three-line 1
F4-00	X1 function selection	1	Forward RUN (FWD)
F4-01	X2 function selection	2	Reverse RUN (REV)
F4-02	X3 function selection	3	Three-line control

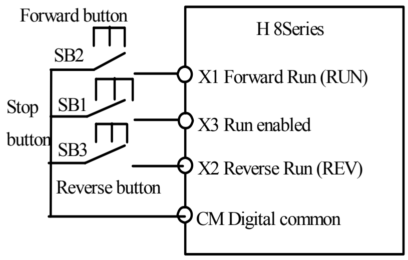


Figure 6-14 Setting of three-line mode 1

As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions on SB1, SB2 and SB3.

3: Three-line mode 2

In this mode , X3 is RUN enabled terminal. The Run command is given by X1 and the direction is decided by X2. The parameters are set as below:

Function Code	Parameter Name	value	Function Description
F4-11	Terminal command mode	0	Three-line 2
F4-00	X1 function selection	1	RUN enabled
F4-01	X2 function selection	2	Forward or reverse direction
F4-02	X3 function selection	3	Three-line control

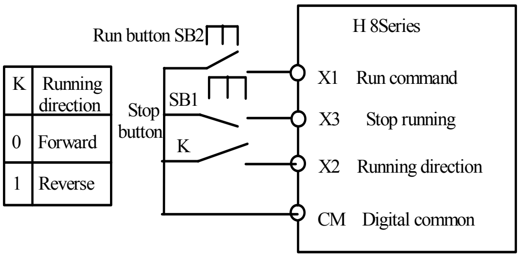


Figure 6-15 Setting of three-line mode 2

As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON; the AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive’s running state is determined by the final actions of SB1, SB2 and K.

F4-12	Terminal UP/DOWN rate	Default	1.00Hz/s
	Setting Range	0.001Hz/s ~ 65.535Hz/s	

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

F4-13	AI curve 1 minimum input	Default	0.00V
	Setting Range	0.00V to F4-15	
F4-14	Corresponding setting of AI curve 1 minimum input	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F4-15	AI curve 1 maximum input	Default	10.00V
	Setting Range	F4-13 to 10.00V	
F4-16	Corresponding setting of AI curve 1 maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	
F4-17	AI1 filter time	Default	0.10s
	Setting Range	0.00s ~ 10.00s	

These parameters are used to define the relationship between the analog input voltage and the corresponding setting.

When the analog input voltage exceeds the maximum value (F4-15), the maximum value is used. When the analog input voltage is less than the minimum value (F4-13), the value set in F4-34 (Setting for AI less than minimum input) is used.

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

F4-17 (AI1 filter time) is used to set the software filter time of AI1. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

In different application, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.

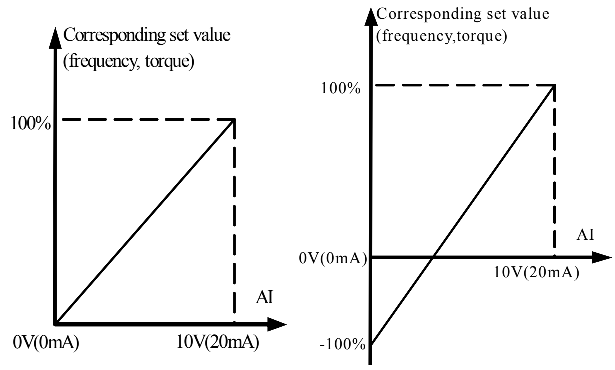


Figure 6-16 Corresponding relationship between analog input and set values

F4-18	AI curve 2 minimum input	Default	0.00V
	Setting Range	0.00V to F4-20	
F4-19	Corresponding setting of AI curve 2 minimum input	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F4-20	AI curve 2 maximum input	Default	10.00V
	Setting Range	F4-18 to 10.00V	
F4-21	Corresponding setting of AI curve 2 maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	
F4-22	AI2 filter time	Default	0.10s
	Setting Range	0.00s ~ 10.00s	

The method of setting AI2 functions is similar to that of setting AI1 function.

F4-23	AI curve 3 minimum input	Default	0.00V
	Setting Range	0.00V to F4-25	
F4-24	Corresponding setting of AI curve 3 minimum input	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F4-25	AI curve 3 maximum input	Default	10.00V
	Setting Range	F4-23 to 10.00V	
F4-26	Corresponding setting of AI curve 3 maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	
F4-27	AI3 filter time	Default	0.10s
	Setting Range	0.00s ~ 10.00s	

The method of setting AI3 functions is similar to that of setting AI1 function.

F4-28	Pulse minimum input	Default	0.00KHz
	Setting Range	0.00KHz to F4-30	
F4-29	Corresponding setting of pulse minimum input	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F4-30	Pulse maximum input	Default	50.00KHz
	Setting Range	F4-28 to 50.00KHz	
F4-31	Corresponding setting of pulse maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	
F4-32	Pulse filter time	Default	0.10s
	Setting Range	0.00s ~ 10.00s	

These parameters are used to set the relationship between X5 pulse input and corresponding settings. The pulses can only be input by X5. The method of setting this function is similar to that of setting AI1 function.

F4-33	AI curve selection		Default	321
	Setting Range	Unit's digit	AI1 curve selection	
		1	Curve 1 (2 points, see F4-13 to F4-16)	
		2	Curve 2 (2 points, see F4-18 to F4-21)	
		3	Curve 3 (2 points, see F4-23 to F4-26)	
		4	Curve 4 (4 points, see A6-00 to A6-07)	
		5	Curve 5 (4 points, see A6-08 to A6-15)	

F4-33	AI curve selection		Default	321
	Setting Range	Ten's digit	AI2 curve selection Curve 1 to curve 5 (same as AI1)	
		Hundred's digit	AI3 curve selection Curve 1 to curve 5 (same as AI1)	

The unit's digit, ten's digit and hundred's digit of this parameter are respectively used to select the corresponding curve of AI1, AI2 and AI3. Any of the five curves can be selected for AI1, AI2 and AI3.

Curve 1, curve 2 and curve 3 are all 2-point curves, set in group F4. Curve 4 and curve 5 are both 4-point curves, set in group A6.

The H8 provides two AI terminals as standard. AI3 is provided by an optional extension card.

F4-34	Setting for AI less than minimum input		Default	000
	Setting Range	Unit's digit	Setting for AI1 less than minimum input	
		0	Minimum value	
		1	0.0%	
		Ten's digit	Setting for AI2 less than minimum input 0, 1 (same as AI1)	
		Hundred's digit	Setting for AI3 less than minimum input 0, 1 (same as AI1)	

This parameter is used to determine the corresponding setting when the analog input voltage is less than the minimum value. The unit's digit, ten's digit and hundred's digit of this parameter respectively correspond to the setting for AI1, AI2 and AI3.

If the value of a certain digit is 0, when analog input voltage is less than the minimum input, the corresponding setting of the minimum input (F4-14, F4-19, F4-24) is used.

If the value of a certain digit is 1, when analog input voltage is less than the minimum input, the corresponding value of this analog input is 0.0%.

F4-35	X1 delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F4-36	X2 delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F4-37	X3 delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	

These parameters are used to set the delay time of the AC drive when the status of X terminals changes.

Currently, only X1, X2 and X3 support the delay time function.

F4-38	X valid mode selection 1		Default	00000
	Setting Range	Unit's digit	X1 valid mode	
		0	High level valid	
		1	Low level valid	
		Ten's digit	X2 valid mode (0, 1 same as X1)	
		Hundred's digit	X3 valid mode (0, 1 same as X1)	
		Thousand's digit	X4 valid mode (0, 1 same as X1)	
		Ten thousand's digit	X5 valid mode (0, 1 same as X1)	
F4-39	X valid mode selection 2		Default	00000
	Setting Range	Unit's digit	X6 valid mode (0, 1 same as X1)	
		Ten's digit	X7 valid mode (0, 1 same as X1)	
		Hundred's digit	X8 valid mode (0, 1 same as X1)	
		Thousand's digit	X9 valid mode (0, 1 same as X1)	
		Ten thousand's digit	X10 valid mode (0, 1 same as X1)	

These parameters are used to set the valid mode of X terminals.

0: High level valid

The X terminal is valid when being connected with COM, and invalid when being disconnected from COM.

1: Low level valid

The X terminal is invalid when being connected with COM, and valid when being disconnected from COM.

F4-40	AI2 input signal selection	Default	0
	Setting Range	0: Voltage signal 1: Current signal	

AI2 supports voltage/current output, which is determined by jumper. After setting the jumper, perform corresponding setting in F4-40.

Group F5: Output Terminals

The H8 provides an analog output (AO) terminal, a digital output (DO) terminal, a relay terminal and a FM terminal (used for high-speed pulse output or open-collector switch signal output) as standard. If these output terminals cannot satisfy requirements, use an optional I/O extension card that provides an AO terminal (AO2), two relay terminals (Relay 2 and Relay3）.

F5-00	FM terminal output mode		Default	0
	Setting Range	0	Pulse output (FMP)	
		1	Switch signal output (FMR)	

The FM terminal is programmable multiplexing terminal. It can be used for high-speed pulse output (FMP), with maximum frequency of 50KHz. Refer to F5-06 for relevant functions of FMP. It can also be used as open collector switch signal output (FMR).

F5-01	FMR function (open-collector output terminal)	Default	0
F5-02	Relay function (A-B-C)	Default	2
F5-03	Extension card relay function (A1- C1)	Default	0
F5-04	DO1 function selection (open-collector output terminal)	Default	1
F5-05	Extension card relay function (A2-C2)	Default	4

These five parameters are used to select the functions of the five digital output terminals. A-B-C, A1- C1 and A2-C2 are respectively the relays on the control board and the extension card.

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

Value	Function	Description
0	No output	The terminal has no function.
1	AC drive running	When the AC drive is running and has output frequency (can be zero), the terminal becomes ON.
2	Fault output (stop)	When the AC drive stops due to a fault, the terminal becomes ON.
3	Frequency-level detection FDT1 output	Refer to the descriptions of F8-19 and F8-20.
4	Frequency reached	Refer to the descriptions of F8-21.
5	Zero-speed running (no output at stop)	If the AC drive runs with the output frequency of 0, the terminal becomes ON.If the AC drive is in the stop state, the terminal becomes OFF.
6	Motor overload pre-warning	The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of F9-00 to F9-02.
7	AC drive overload pre-warning	The terminal becomes ON 10s before the AC drive overload protection action is performed.
8	Set count value reached	The terminal becomes ON when the count value reaches the value set in FB-08.
9	Designated count value reached	The terminal becomes ON when the count value reaches the value set in FB-09.

Value	Function	Description
10	Length reached	The terminal becomes ON when the detected actual length exceeds the value set in FB-05.
11	PLC cycle complete	When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250ms.
12	Accumulative running time reached	If the accumulative running time of the AC drive exceeds the time set in F8-17, the terminal becomes ON.
13	Frequency limited	If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON.
14	Torque limited	In speed control mode, if the output torque reaches the torque limit, the AC drive enters enters the stall protection state and meanwhile the terminal becomes ON.
15	Ready for RUN	If the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON.
16	AI1 larger than AI2	When the input of AI1 is larger than the input of AI2, the terminal becomes ON.
17	Frequency upper limit reached	If the running frequency reaches the upper limit, the terminal becomes ON.
18	Frequency lower limit reached (no output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF.
19	Undervoltage state output	If the AC drive is in undervoltage state, the terminal becomes ON.
20	Communication setting	Refer to the communication protocol.
21	Reserved	Reserved
22	Reserved	Reserved
23	Zero-speed running 2 (having output at stop)	If the output frequency of the AC drive is 0, the terminal becomes ON. In the state of stop, the signal is still ON.
24	Accumulative power-on time reached	If the AC drive accumulative power-on time (F7-13) exceeds the value set in F8-16, the terminal becomes ON.

Value	Function	Description
25	Frequency level detection FDT2 output	Refer to the descriptions of F8-28 and F8-29.
26	Frequency 1 reached	Refer to the descriptions of F8-30 and F8-31.
27	Frequency 2 reached	Refer to the descriptions of F8-32 and F8-33.
28	Current 1 reached	Refer to the descriptions of F8-38 and F8-39.
29	Current 2 reached	Refer to the descriptions of F8-40 and F8-41.
30	Timing reached	If the timing function (F8-42) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time.
31	AI1 input limit exceeded	If AI1 input is larger than the value of F8-46 (AI1 input voltage upper limit) or lower than the value of F8-45 (AI1 input voltage lower limit), the terminal becomes ON.
32	Load becoming 0	If the load becomes 0, the terminal becomes ON.
33	Reverse running	If the AC drive is in the reverse running state, the terminal becomes ON.
34	Zero current state	Refer to the description of F8-28 and F8-29.
35	Module temperature reached	If the heatsink temperature of the inverter module (F7-07) reaches the set module temperature threshold (F8-47), the terminal becomes ON.
36	Software current limit exceeded	Refer to the descriptions of F8-36 and F8-37.
37	Frequency lower limit reached (having output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the signal is still ON.
38	Alarm output	If a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal.
39	Motor overheat warning	If the motor temperature reaches the temperature set in F9-58 (Motor overheat warning threshold), the terminal becomes ON. You can view the motor temperature by using U0-34.
40	Current running time reached	If the current running time of AC drive exceeds the value of F8-53, the terminal becomes ON.

F5-06	FMP function selection	Default	0
F5-07	AO1 function selection	Default	0
F5-08	AO2 function selection	Default	1

The output pulse frequency of the FMP terminal ranges from 0.01KHz to "Maximum FMP output frequency" (F5-09). The value of F5-09 is between 0.01KHz and 100.00KHz.

The output range of AO1 and AO2 is 0 ~ 10V or 0 ~ 20mA. The relationship between pulse and analog ranges and corresponding functions is listed in the following table.

Value	Function	Range (Corresponding to Pulse or Analog Output Range 0.0% ~ 100.0%)
0	Running frequency	0 to maximum output frequency
1	Set frequency	0 to maximum output frequency
2	Output current	0 to 2 times of rated motor current
3	Output torque (absolute value)	0 to 2 times of rated motor torque
4	Output power	0 to 2 times of rated power
5	Output voltage	0 to 1.2 times of rated AC drive voltage
6	Pulse input	0.01KHz ~ 100.00KHz
7	AI1	0V ~ 10V
8	AI2	0V ~ 10V (or 0mA ~ 20mA)
9	AI3	0V ~ 10V
10	Length	0 to maximum set length
11	Count value	0 to maximum count value
12	Communication setting	0.0% ~ 100.0%
13	Motor rotational speed	0 to rotational speed corresponding to maximum output frequency
14	Output current	0.0 A ~ 1000.0A
15	Output voltage	0.0V ~ 1000.0V
16	Output torque (actual value)	-2 times of rated motor torque to 2 times of rated motor torque
17	AC drive output torque (actual value)	Relative to the percentage of AC drive

F5-09	Maximum FMP output frequency	Default	50.00KHz
	Setting Range	0.01KHz ~ 100.00KHz	

If the FM terminal is used for pulse output, this parameter is used to set the maximum frequency of pulse output.

F5-10	AO1 offset coefficient	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F5-11	AO1 gain	Default	1.00
	Setting Range	-10.00 ~ 10.00	
F5-12	AO2 offset coefficient	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
F5-13	AO2 gain	Default	1.00
	Setting Range	-10.00 ~ 10.00	

These parameters are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve.

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output，the actual output is: Y = kX + b.

The zero offset coefficient 100% of AO1 and AO2 corresponds to 10V (or 20mA). The standard output refers to the value corresponding to the analog output of 0 to 10V (or 0 to 20mA) with no zero offset or gain adjustment.

For example if the analog output is used as the running frequency, and it is expected that the output is 8V when the frequency is 0 and 3V at the maximum frequency, the gain shall be set to -0.50, and the zero offset shall be set to 80%. as shown in the following figures

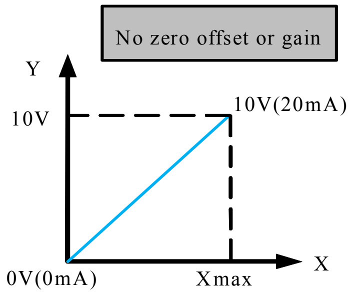


Figure 6-17 No zero offset or gain output diagram

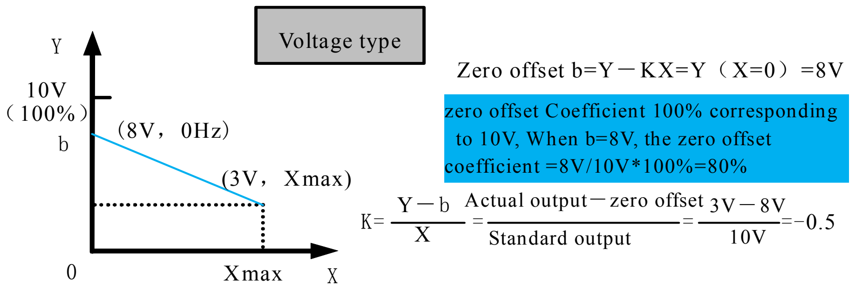


Figure 6-18 Zero offset or gain output diagram (voltage type)

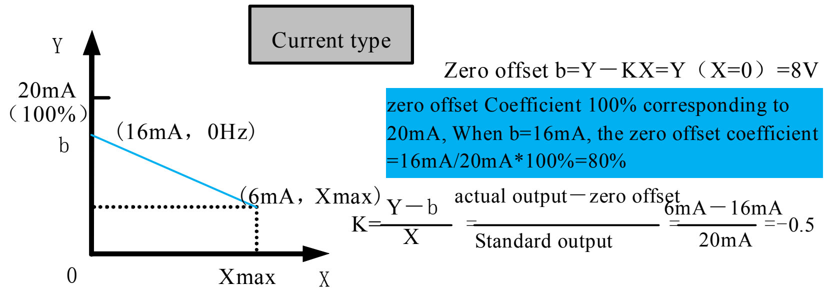


Figure 6-19 Zero offset or gain output diagram (current type)

F5-17	FMR output delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F5-18	Relay 1 output delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F5-19	Relay 2 output delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F5-20	DO1 output delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	
F5-21	Relay 3 output delay time	Default	0.0s
	Setting Range	0.0s ~ 3600.0s	

These parameters are used to set the delay time of output terminals FMR, relay 1, relay 2, DO1 and Relay 3 from status change to actual output.

F5-22	DO valid mode selection		Default	00000
	Setting Range	Unit's digit	FMR valid mode	
		0	Positive logic	
		1	Negative logic	
		Ten's digit	Relay 1 valid mode (0,1 same as FMR)	
F5-22	DO valid mode selection		Default	00000
	Setting Range	Hundred's digit	Relay 2 valid mode (0,1 same as FMR)	
		Thousand's digit	DO1 valid mode (0,1 same as FMR)	
		Ten thousand's digit	Relay 3 valid mode (0,1 same as FMR)	

It is used to set the logic of output terminals FMR, relay 1, relay 2, DO1 and Relay 3.

0: Positive logic

The output terminal is valid when being connected with the corresponding common terminals, and invalid when being disconnected from the corresponding common terminals.

1: Positive logic

The output terminal is invalid when being connected with the corresponding common terminals, and valid when being disconnected from the corresponding common terminals.

F5-23	AO1 output signal selection	Default	0
	Setting Range	0: voltage signal 1:current signal	

AO1 supports voltage / current signal output, through hardware jumper selection.

When the jumper selection for voltage or current,also need to set the parameters of the corresponding F5-23.

Note: This parameter is used according to the actual choice of models (H8 series contains synchronous motor and special models).

Group F6: Start/Stop Control

F6-00	Start mode		Default	0
	Setting Range	0	Direct start	
		1	Rotational speed tracking restart	
		2	Pre-excited start (asynchronous motor)	

0: Direct start

If the DC braking time is set to 0, the AC drive starts to run at the startup frequency.

If the DC braking time is not 0, the AC drive performs DC braking fist and then starts to run at the startup frequency. It is applicable to small-inertia load application where the motor is likely to rotate at startup.

1: Rotational speed tracking restart

The AC drive judges the rotational speed and direction of the motor first and then starts at the tracked frequency. Such smooth start has no impact on the rotating motor. It is applicable to the restart upon instantaneous power failure of large-inertia load. To ensure the performance of rotational speed tracking restart, set the motor parameters in group F1 correctly.

2: Pre-excited start (asynchronous motor)

It is valid only for asynchronous motor and used for building the magnetic field before the motor runs. For pre-excited current and pre-excited time, see parameters of F6-05 and F6-06.

If the pre-excited time is 0, the AC drive cancels pre-excitation and starts to run at startup frequency.

If the pre-excited time is not 0, the AC drive pre-excites first before startup, improving the dynamic response of the motor.

F6-01	Rotational speed tracking mode		Default	0
	Setting Range	0	From frequency at stop	
		1	From zero speed	

F6-01	Rotational speed tracking mode		Default	0
	Setting Range	2	From maximum frequency	

To complete the rotational speed tracking process within the shortest time, select the proper mode in which the AC drive tracks the motor rotational speed.

0: From frequency at stop

It is the commonly selected mode.

1: From zero frequency

It is applicable to restart after a long time of power failure.

2: From maximum frequency

It is applicable to the power-generating load.

F6-02	Rotational speed tracking speed	Default	20
	Setting Range	1 ~ 100	

In the rotational speed tracking restart mode, select the rotational speed tracking speed. The larger the value is, the faster the tracking is. However, too large value may cause unreliable tracking.

F6-03	Startup frequency	Default	0.00Hz
	Setting Range	0.00Hz ~ 10.00Hz	
F6-04	Startup frequency holding time	Default	0.0s
	Setting Range	0.0s ~ 100.0s	

To ensure the motor torque at AC drive startup, set a proper startup frequency. In addition, to build excitation when the motor starts up, the startup frequency must be held for a certain period.

The startup frequency (F6-03) is not restricted by the frequency lower limit. If the set target frequency is lower than the startup frequency, the AC drive will not start and stays in the standby state.

During switchover between forward rotation and reverse rotation, the startup frequency holding time is disabled. The holding time is not included in the acceleration time but in the running time of simple PLC.

Example 1:

F0-03=0 The frequency source is digital setting.

F0-08=2.00Hz The digital setting frequency is 2.00Hz.

F6-03=5.00Hz The startup frequency is 5.00Hz

F6-04=2.0s The startup frequency holding time is 2.0s.

In this example, the AC drive stays in the standby state and the output frequency is 0.00Hz.

Example 2:

F0-03=0 The frequency source is digital setting.

F0-08=10.00Hz The digital setting frequency is 10.00Hz.

F6-03=5.00Hz The startup frequency is 5.00Hz

F6-04=2.0s The startup frequency holding time is 2.0s.

In this example, the AC drive accelerates to 5.00Hz, and then accelerates to the set frequency 10.00Hz after 2s.

F6-05	Startup DC braking current/Pre-excited current	Default	0%
	Setting Range	0% ~ 100%	
F6-06	Startup DC braking time/Pre-excited time	Default	0.0s
	Setting Range	0.0s ~ 100.0s	

Startup DC braking is generally used during restart of the AC drive after the rotating motor stops. Pre-excitation is used to make the AC drive build magnetic field for the asynchronous motor before startup to improve the responsiveness.

Startup DC braking is valid only for direct start (F6-00=0). In this case, the AC drive performs DC braking at the set startup DC braking current. After the startup DC braking time, the AC drive starts to run. If the startup DC braking time is o, the AC drive starts directly without DC braking. The larger the startup DC braking current is, the larger the braking force is.

If the startup mode is pre-excited start (F6-00=3), the AC drive builds magnetic field based on the set pre-excited current. After the pre-excited time, the AC drive starts to run. If the pre-excited time is 0, the AC drive starts directly without pre-excitation.

The startup DC braking current or pre-excited current is a percentage relative to the base value.

If the rated motor current is less than or equal to 80% of the rated AC drive current, the base value is the rated motor current.

If the rated motor current is greater than 80% of the rated AC drive current, the base value is 80% of the rated AC drive current.

F6-07	Acceleration/Deceleration mode		Default	0
	Setting Range	0	Linear acceleration/deceleration	
		1	Static S-curve acceleration/deceleration	
		2	Dynamic S-curve acceleration/deceleration	

It is used to set the frequency change mode during the AC drive start and stop process.

0: Linear acceleration/deceleration

The output frequency increases or decreases in linear mode. The H8 provides four group of acceleration/deceleration time, which can be selected by using F4-00 to F4-08.

1: Static S-curve acceleration/deceleration

In the case of target frequency fixed, the output frequency increases or decreases along the Static S-curve. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. F6-08 and F6-09 respectively define the time proportions of the start segment and the end segment.

2: Dynamic S-curve acceleration/deceleration

In the case of real-time dynamic changes of target frequency, the output frequency increases or decreases along the dynamic S-curve. This mode is generally used in the applications where high comfort and real-time response to rapid.

When the set frequency is higher than the rated frequency, the acceleration/deceleration time is:

$$t = (\frac{4}{9} * (\frac{f}{f_b})^2 + \frac{5}{9}) * T$$

In the formula, f is the set frequency, f_b is the rated motor frequency and T is the acceleration time from 0Hz to f_b. see the figure 6-20.

Note: The dynamic S curve of time and the target frequency can not too big, when the acceleration and deceleration time more than 100s or target frequency is greater than 6 times the motor rated frequency, the dynamic S curve is invalid, automatic switching for linear acceleration and deceleration.

F6-08	Time proportion of S-curve start segment	Default	30%
	Setting Range	0.0% to (100.0% ~ F6-09)	
F6-09	Time proportion of S-curve end segment	Default	30%
	Setting Range	0.0% to (100.0% ~ F6-08)	

These two parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement: F6-08+F6-09≦100.0%.

In figure 6-20, t1 is the time defined in F6-08, within which the slope of the output frequency change increases gradually. T2 is the time defined in F6-09, within which the slope of the output frequency change gradually decreases to 0. Within the time between t1 and t2, the slope of the output frequency change remains unchanged, that is, linear acceleration/deceleration.

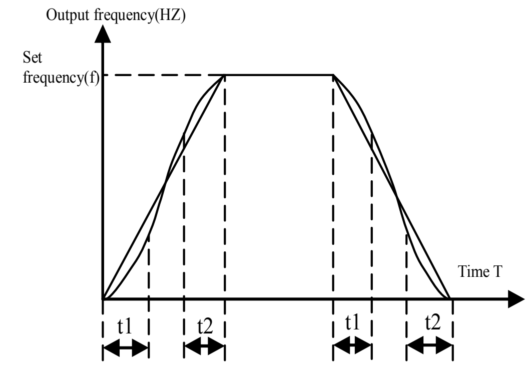


Figure 6-20 Static S-curve acceleration/deceleration

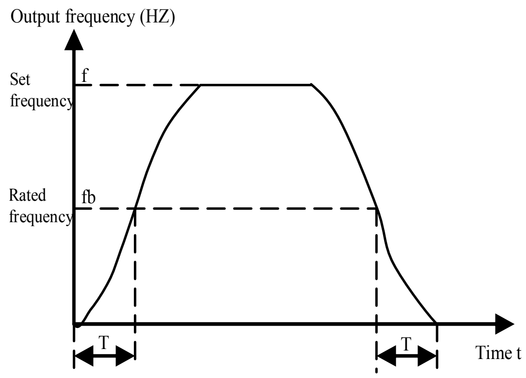


Figure 6-21 Dynamic S-curve acceleration/deceleration

F6-10	Stop mode		Default	0
	Setting Range	0	Decelerate to stop	
		1	Coast to stop	

0: Decelerate to stop

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

1: Cost to stop

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

F6-11	Initial frequency of stop DC braking	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	
F6-12	Waiting time of stop DC braking	Default	0.0s
	Setting Range	0.0s ~ 36.0s	
F6-13	Stop DC braking current	Default	0%
	Setting Range	0% ~ 100%	

F6-14	Stop DC braking time	Default	0.0s
	Setting Range	0.0s ~ 36.0s	

F6-11 (Initial frequency of stop DC braking)

During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in F6-11.

F6-12 (Waiting time of stop DC braking)

When the running frequency decreases to the initial frequency of stop DC braking, the AC drive stops output for a certain period and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed.

F6-13(Stop DC braking current)

This parameter specifies the output current at DC braking and is a percentage relative to the base value.

If the rated motor current is less than or equal to 80% of the rated AC drive current, the base value is the rated motor current.

If the rated motor current is greater than 80% of the rated AC drive current, the base value is 80% of the rated AC drive current.

F6-14(Stop DC braking time)

This Parameter specifies the holding time of DC braking. If it is set to 0, DC braking is canceled.

The stop DC braking process is shown in the following figure.

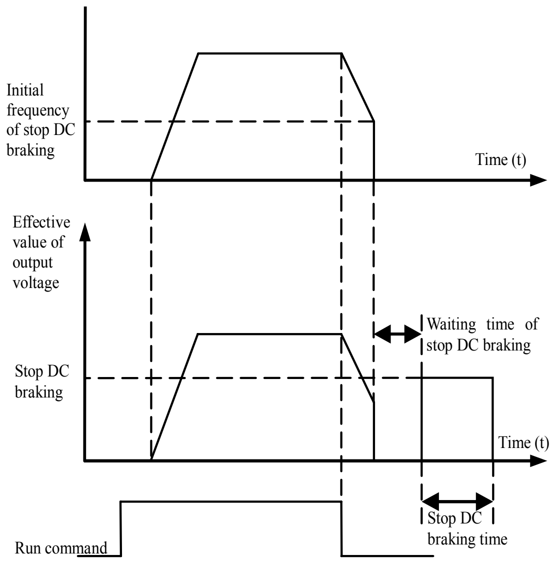


Figure 6-22 Stop DC braking process

F6-15	Brake use ratio	Default	100%
	Setting Range	0% ~ 100%	

It is valid only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

F6-16	Brake pipe opening time	Default	0s
	Setting Range	0s~ 65000s	

Brake pipe continuous opening time exceeds the set value will be reported to the brake pipe fault, When the brake pipe is open and easy to cause damage, the function code is required, for example, set to 10s.which is set to 0 no fault.

F6-18	Rotational speed tracking current	Default	Model dependen
	Setting Range	30% ~ 200%	

The maximum current limit of the speed tracking process is within the setting range of the rotational speed tracking current. The setting value is too small; the effect of the speed tracking will be poor.

F6-21	Eliminate excitation time	Default	Model dependen
	Setting Range	0s ~ 5s	

The Eliminate excitation time is the minimum time interval between the stopping and the starting time. Only the function code “Rotational speed tracking” is opened valid, and the setting value is too small to cause the over-voltage fault.

Group F7: Operation Panel Display

F7-01	FK key function selection		Default	0
	Setting Range	0	FK key disabled	
		1	Switchover between operation panel control and remote command control (terminal or communication)	
		2	Switchover between forward rotation and reverse rotation	
		3	Forward JOG	
		4	Reverse JOG	

FK key refers to multifunctional key. You can set the function of the FK key by using this parameter. You can perform switchover by using this key both in stop or running state.

0: FK key disabled

This key is disabled.

1: Switchover between operation panel control and remote command control (terminal or communication)

You can perform switchover from the current command source to the operation panel control (local operation). If the current command source is operation panel control, this key is invalid.

2: Switchover between forward rotation and reverse rotation

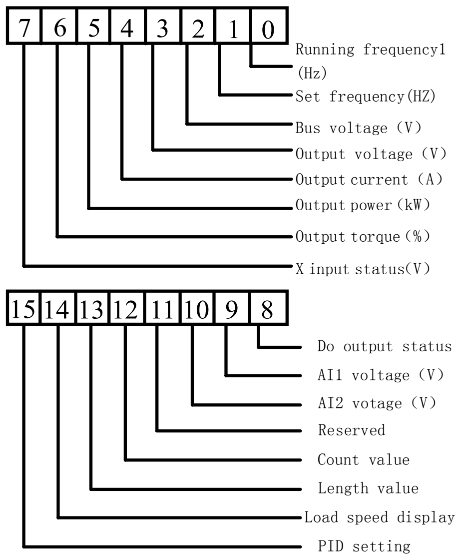
You can change the direction of the frequency reference by using the FK key. It is valid only when the current command source is operation panel control.

3: Forward JOG

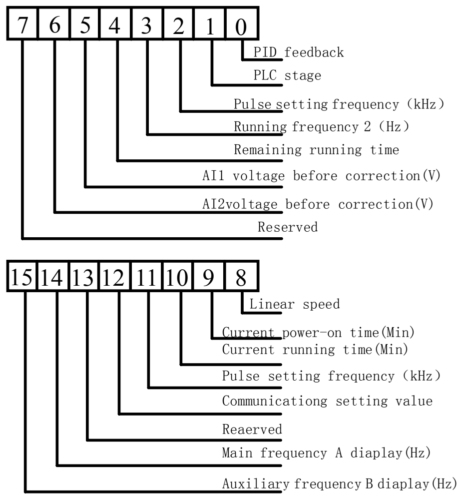
You can perform forward JOG (FJOG) by using the FK key.

4: Reverse JOG

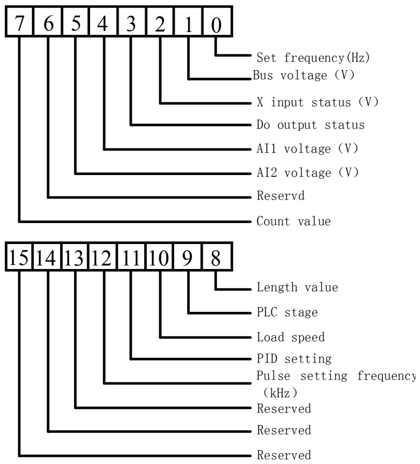
You can perform reverse JOG (RJOG) by using the FK key.

<table>
<tr><td rowspan="3">F7-02</td><td colspan="2">STOP/RESET key function</td><td>Default</td><td>1</td></tr>
<tr><td rowspan="2">Setting Range</td><td>0</td><td colspan="2">STOP/RESET key enabled only in operation panel control</td></tr>
<tr><td>1</td><td colspan="2">STOP/RESET key enabled in any operation mode</td></tr>
<tr><td rowspan="2">F7-03</td><td colspan="2">LED display running parameters 1</td><td>Default</td><td>1F</td></tr>
<tr><td>Setting Range</td><td>0000-FFFF</td><td colspan="2">

If a parameter needs to displayed during the running, set the corresponding bit to 1, and set F7-03 to the hexadecimal equivalent of this binary number.</td></tr>
</table>

F7-04	LED display running parameters 2		Default	0
	Setting Range	0000-FFFF	 If a parameter needs to displayed during the running, set the corresponding bit to1, and set F7-04 to the hexadecimal equivalent of this binary number.	

These two parameters are used to set the parameters that can be viewed when the AC drive is in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of F7-03.

F7-05	LED display stop parameters		Default	0
	Setting Range	0000-FFFF	 If a parameter needs to displayed during the running, set the corresponding bit to1, and set F7-05 to the hexadecimal equivalent of this binary number.	

F7-06	Load speed display coefficient	Default	1.0000
	Setting Range	0.0001 ~ 6.5000	

This parameter is used to adjust the relationship between the output frequency of the AC drive and the load speed. For details, see the description of F7-12.

F7-07	Heatsink temperature of inverter module	Default	—
	Setting Range	0.0℃ ~ 100.0℃	

It is used to display the insulated gate bipolar transistor temperature of the inverter module, and the IGBT overheat protection value of the inverter module depends on the model.

F7-09	Accumulative running time	Default	0h
	Setting Range	0h ~ 65535h	

It is used to display the accumulative running time of the AC drive. After the accumulative running time reaches the value set in F8-17, the terminal with the digital output function 12 becomes ON.

F7-12	Number of decimal places for load speed display		Default	1
	Unit's digit (U0~U14)	0	0 decimal place	
		1	1 decimal place	
		2	2 decimal place	
		3	3 decimal place	
	Ten's digit (U0-19/U0-29)	1	1 decimal place	
		2	2 decimal place	

F7-12 is used to set the number of decimal places for load speed display. The following gives an example the explain how to calculate the load speed:

Assume that F7-06 (Load speed display coefficient) is 2.000 and F7-12 is 2 (2 decimal places). When the running frequency of the AC drive is 40.0Hz, the load speed is 40.00*2.000=80.00 (display of 2 decimal places).

Assume that the AC drive is in a stopping state, When the set frequency of the AC drive is 50.0Hz, the load speed is 50.00*2.000=100.00 (display of 2 decimal places).

F7-13	Accumulative power-on time	Default	—
	Setting Range	0h ~ 65535h	

It is used to display the accumulative power-on time of the AC drive since the delivery. If the time reaches the set power-on time (F8-17), the terminal with the digital output function 24 becomes ON.

F7-14	Accumulative power consumption	Default	—
	Setting Range	0KWh ~ 65535KWh	

It is used to display the accumulative power consumption of the AC drive until now.

Group F8: Auxiliary Functions

F8-00	JOG running frequency	Default	2.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-01	JOG acceleration time	Default	20.0s
	Setting Range	0.0s ~ 6500.0s	
F8-02	JOG deceleration time	Default	20.0s
	Setting Range	0.0s ~ 6500.0s	

These parameters are used to define the set frequency and acceleration/deceleration time of the AC drive when jogging. The startup mode is “Direct start” (F6-00=0) and the stop mode is “Decelerate to stop” (F6-10=0) during jogging.

F8-03	Acceleration time 2	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	
F8-04	Deceleration time 2	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	
F8-05	Acceleration time 3	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	
F8-06	Deceleration time 3	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	
F8-07	Acceleration time 4	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	
F8-08	Deceleration time 4	Default	Model dependent
	Setting Range	0.0s ~ 6500.0s	

The H8 provides a total of four groups of acceleration/deceleration time, that is, the preceding three groups and the group defined by F0-17 and F0-18. Definitions of four groups are completely the same. You can switch over between the four groups of acceleration/deceleration time through different state combinations of X terminals. For more details, see the descriptions of F4-01 to F4-05.

F8-09	Jump frequency 1	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-10	Jump frequency 2	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-11	Frequency jump amplitude	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load.

The H8 supports two jump frequencies. If both are set to 0, the frequency jump function is disabled. The principle of the jump frequencies and jump amplitude is shown in the following figure.

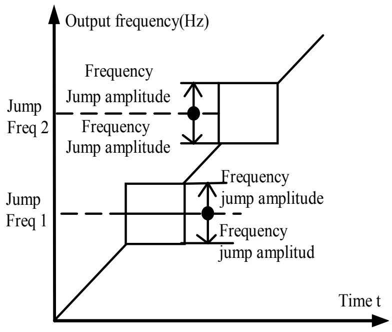


Figure 6-23 principle of the jump frequencies and jump amplitude

F8-12	Forward/Reverse rotation dead-zone time	Default	0.0s
	Setting Range	0.0s ~ 3000.0s	

It is used to set the time when the output is 0Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

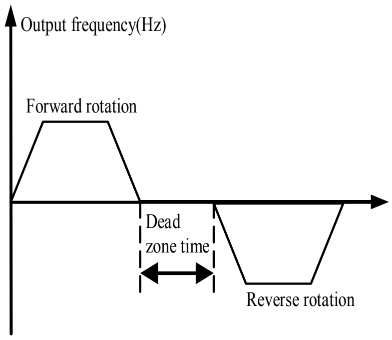


Figure 6-24 Forward/Reverse rotation dead-zone time

F8-13	Reverse control		Default	0
	Setting Range	0	Enabled	
		1	Disabled	

When the given frequency is negative through communication or Analog quantity, the motor running direction will change with the frequency .which will be called the reverse frequency.

It is used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to 1.

F8-14	Running mode when set frequency lower than frequency lower limit		Default	0
	Setting Range	0	Run at frequency lower limit	
		1	Stop	
		2	Run at zero speed	

It is used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The H8 provides three running modes to satisfy requirements of various applications.

F8-15	Droop control	Default	0.00Hz
	Setting Range	0.00Hz ~ 10.00Hz	

This function is used for balancing the workload allocation when multiple motors are used to drive the same load. The output frequency of the AC drives decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

The droop rate allows the host station and the slave station to have a small speed difference, and then avoid the conflict between them. The default value for this parameter is 0.

Do not set the F8-15 value too large; otherwise, the steady state speed will decrease obviously when load is large. The host and the slave must be set up the droop rate.

Droop speed = synchronous frequency * output torque*droop rate÷10.

For example: F8-15 = 1.00, synchronous frequency is 50Hz, output torque is 50%, then:

Droop speed = 50Hz * 50% *1÷10=2.5Hz,The AC drive actual frequency is 50Hz-2.5Hz= 47.5Hz

F8-16	Accumulative power-on time threshold	Default	0h
	Setting Range	0h ~ 65000h	

If the accumulative power-on time (F7-13) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

For example, combining virtual X/DO functions, to implement the function that AC drive reports an alarm when the actual accumulative power-on time reaches the threshold of 100 hours, perform the setting as follows:

Set virtual X1 to user-defined fault 1: A1-00=44.

Set that the valid state of virtual X1 is from virtual DO1: A1-05=0000.

Set virtual DO1 to power-on time reached: A1-11=24.

Set the accumulative power-on time threshold to 100h: F8-16=100h.

Then, the AC drive reports Err27 when the accumulative power-on time reaches 100 hours.

F8-17	Accumulative running time threshold	Default	0h
	Setting Range	0h ~ 65000h	

It is used to set the accumulative running time threshold of the AC drive. If the accumulative running time (F7-09) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

F8-18	Startup protection		Default	0
	Setting Range	0	No	
		1	Yes	

This parameter is used to set whether to enable the safety protection. If it is set to 1, the AC drive does not respond to the run command valid upon AC drive power-on (for example, an input terminal is ON before power-on). The AC drive responds only after the run command is canceled and becomes valid again.

In addition, the AC drive does not respond to the run command valid upon fault reset of the AC drive. The run protection can be disabled only after the run command is canceled.

In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

F8-19	Frequency detection value (FDT1)	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-20	Frequency detection hysteresis (FDT1)	Default	5.0%
	Setting Range	0.0% ~ 100.0% (FDT1 level)	

If the running frequency is higher than the value of F8-19, the corresponding DO terminal becomes ON. If the running frequency is lower than value of F8-19, the DO terminal goes OFF.

These two parameters are respectively used to set the detection value of out put frequency and hysteresis value upon cancellation of the output. The value of F8-20 is a percentage of the hysteresis frequency to the frequency detection value (F8-19).

The FDT function is shown in the following figure.

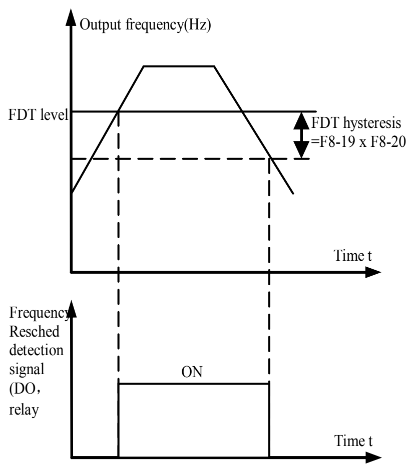


Figure 6-25 FDT level

F8-21	Detection range of frequency reached	Default	0.0%
	Setting Range	0.0% ~ 100.0%	

If the AC drive running frequency is within the certain range of the set frequency, the corresponding DO terminal becomes ON.

This parameter is used to set the range within which the output frequency is detected to reach the set frequency. The value of this parameter is a percentage relative to the maximum frequency. The detection range of frequency reached is shown in the following figure.

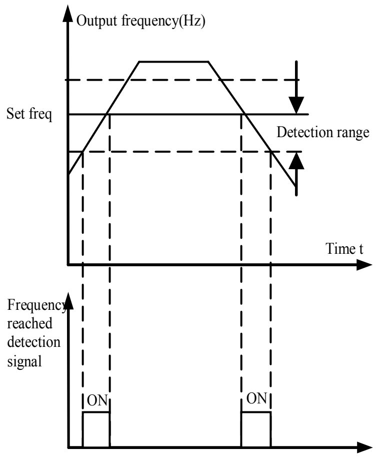


Figure 6-26 Detection range of frequency reached

F8-22	Jump frequency during acceleration/deceleration	Default	0
	Setting Range	0: Disabled 1: Enabled	

It is used to set whether the jump frequencies are valid during acceleration/deceleration.

When the jump frequencies are valid during acceleration/deceleration, and the running frequency is within the frequency jump range, the actual running frequency will jump over the set frequency jump amplitude (rise directly from the lowest jump frequency to the highest jump frequency). The following figure shows the diagram when the jump frequencies are valid during acceleration/deceleration.

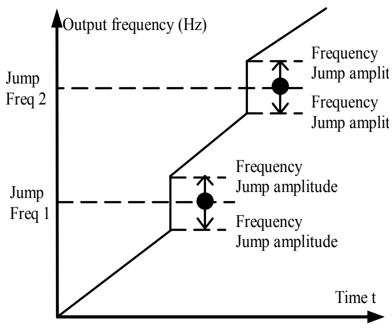


Figure 6-27 Diagram when the jump frequencies are valid during acceleration/deceleration

F8-25	Frequency switchover point between acceleration time 1 and acceleration time 2	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-26	Frequency switchover point between deceleration time 1 and deceleration time 2	Default	0.00Hz
	Setting Range	0.00Hz to maximum frequency	

This function is valid when motor 1 is selected and acceleration/deceleration time switchover is not performed by means of X terminal. It is used to select different groups of acceleration/deceleration time based on the running frequency range rather than X terminal during the running process of the AC drive.

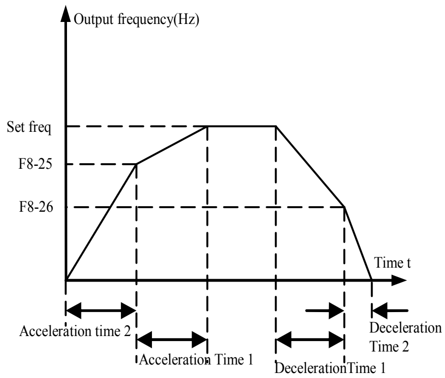


Figure 6-28 Acceleration/Deceleration time switchover

During acceleration, if the running frequency is smaller than the value of F8-25, acceleration time 2 is selected. If the running frequency is larger than the value of F8-25, acceleration time 1 is selected.

During deceleration, if the running frequency is larger than the value of F8-26, deceleration time 1 is selected. If the running frequency is smaller than the value of F8-26, deceleration time 2 is selected.

F8-27	Terminal JOG preferred	Default	0
	Setting Range	0: Disabled 1: Enabled	

It is used to set whether terminal JOG is preferred.

If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

F8-28	Frequency detection value (FDT2)	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-29	Frequency detection hysteresis (FDT2)	Default	5.0%
	Setting Range	0% ~ 100.0% (FDT2 level)	

The frequency detection function is the same as FDT1 function. For details, refer to the descriptions of F8-19 and F8-20.

F8-30	Any frequency reaching detection value 1	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-31	Any frequency reaching detection amplitude 1	Default	0.0%
	Setting Range	0% ~ 100.0% (maximum frequency)	
F8-32	Any frequency reaching detection value 2	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency	
F8-33	Any frequency reaching detection amplitude 2	Default	0.0%
	Setting Range	0% ~ 100.0% (maximum frequency)	

If the output frequency of the AC drive is within the positive and negative amplitudes of the any frequency reaching detection value, the corresponding DO becomes ON.

The H8 provides two groups of any frequency reaching detection parameters, including frequency detection value and detection amplitude, as shown in the following figure.

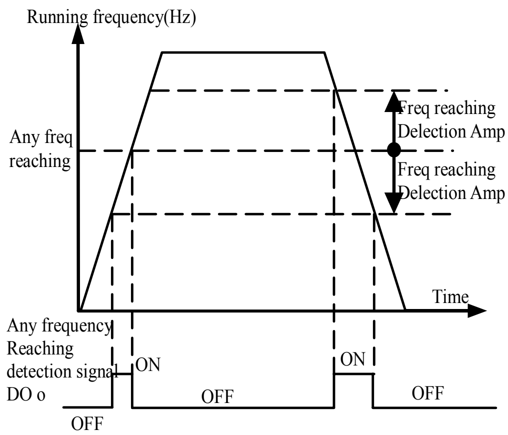


Figure 6-29 Any frequency reaching detection

F8-34	Zero current detection level	Default	5.0%
	Setting Range	0.0% ~ 300.0% (rated motor current)	
F8-35	Zero current detection delay time	Default	0.10s
	Setting Range	0.00s ~ 600.00s	

If the output current of the AC drive is equal to or less than the zero current detection level and the duration exceeds the zero current detection delay time, the corresponding DO becomes ON. The zero current detection is shown in the following figure.

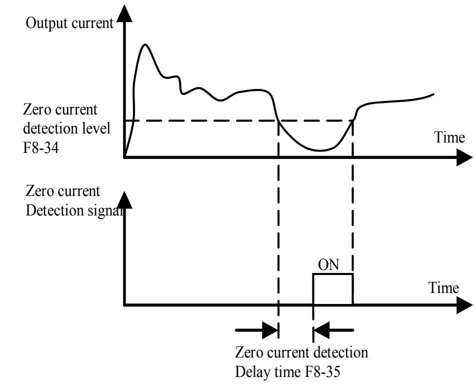


Figure 6-30 Zero current detection

F8-36	Output overcurrent threshold	Default	200.0%
	Setting Range	0.0% (no detection) 0.1% ~ 300.0% (rated motor current)	
F8-37	Output overcurrent detection delay time	Default	0.10s
	Setting Range	0.00s ~ 600.00s	

If the output current of the AC drive is equal to or higher than the overcurrent threshold and the duration exceeds the detection delay time, the corresponding DO becomes ON. The output overcurrent detection function is shown in the following figure.

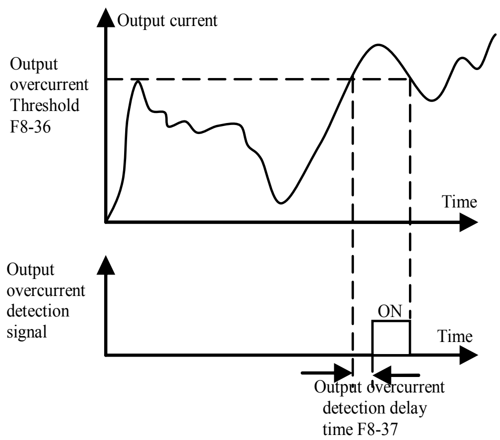


Figure 6-31 Output overcurrent detection

F8-38	Any current reaching 1	Default	100.0%
	Setting Range	0.0% ~ 300.0% (rated motor current)	
F8-39	Any current reaching 1 amplitude	Default	0.0%
	Setting Range	0.0% ~ 300.0% (rated motor current)	

F8-40	Any current reaching 2	Default	100.0%
	Setting Range	0.0% ~ 300.0% (rated motor current)	
F8-41	Any current reaching 2 amplitude	Default	0.0%
	Setting Range	0.0% ~ 300.0% (rated motor current)	

If the output current of the AC drive is within the positive and negative amplitudes of any current reaching detection value, the corresponding DO becomes ON.

The H8 provides two groups of any current reaching detection parameters, including current detection value and detection amplitudes, as shown in the following figure.

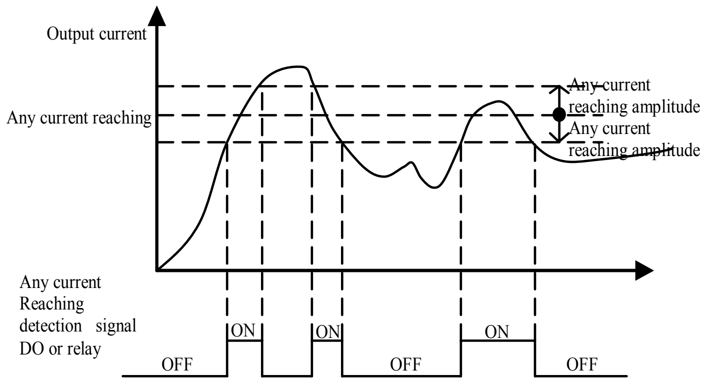


Figure 6-32 Any current reaching detection

F8-42	Timing function		Default	0
	Setting Range	0	Disabled	
		1	Enabled	
F8-43	Timing duration source		Default	0
	Setting Range	0	F8-44	
		1	AI1	
		2	AI2	
		3	AI3	
		100% of analog input corresponds to the value of F8-44		
F8-44	Timing duration		Default	0.0Min
	Setting Range		0.0Min ~ 6500.0Min	

These parameters are used to implement the AC drive timing function.

If F8-42 is set to 1, the AC drive starts to time at startup. When the set timing duration is reached, the AC drive stops automatically and meanwhile the corresponding DO becomes ON.

The AC drive starts timing from 0 each time it starts up and the remaining timing duration can be queried by U0-20. The timing duration is set in F8-43 and F8-44, in unit of minute.

F8-45	AI1 input voltage lower limit	Default	3.10V
	Setting Range	0.00V ~ F8-46	
F8-46	AI1 input voltage upper limit	Default	6.80V
	Setting Range	F8-45 ~ 10.00V	

These two parameters are used to set the limits of the input voltage to provide protection on the AC drive. When the AI1 input is larger than the value of F8-46 or smaller than the value of F8-45, the corresponding DO becomes ON, indicating that AI1 input exceeds the limit.

F8-47	Module temperature threshold	Default	75℃
	Setting Range	0℃ ~ 100℃	

When the heatsink temperature of the AC drive reaches the value of this parameter, the corresponding DO becomes ON, indicating that the module temperature reaches the threshold.

F8-48	Cooling fan control		Default	0
	Setting Range	0	Fan working during running	
		1	Fan working continuously	

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40℃, and stops working if the heatsink temperature is lower than 40℃.

If this parameter is set to 1, the cooling fan keeps working after power-on.

F8-49	Wakeup frequency	Default	0.00Hz
	Setting Range	Dormant frequency (F8-51) to maximum frequency (F0-10)	
F8-50	Wakeup delay time	Default	0.0s
	Setting Range	0.0s ~ 6500.0s	
F8-51	Dormant frequency	Default	0.00Hz
	Setting Range	0.00Hz to wakeup frequency (F8-49)	
F8-52	Dormant delay time	Default	0.0s
	Setting Range	0.0s ~ 6500.0s	

These parameters are used to implement the dormant and wakeup functions in the water supply application.

When the AC drive is in running state, the AC drive enters the dormant state and stops automatically after the dormant delay time (F8-52) if the set frequency is lower than or equal to the dormant frequency (F8-51).

When the AC drive is in dormant state and the current running command is effective, the AC drives starts up after the wakeup delay time (F8-50) if the set frequency is higher than or equal to the wakeup frequency (F8-49).

Generally, set the wakeup frequency equal to or higher than the dormant frequency. If the wakeup frequency and dormant frequency are set to 0, the dormant and wakeup functions are disabled.

When the dormant function is enabled, if the frequency source is PID, whether PID operation is performed in the dormant state is determined by FA-28. In this case, select PID operation enabled in the stop state (FA-28=1).

F8-53	Current running time reached	Default	0.0Min
	Setting Range	0.0Min ~ 6500.0Min	

If the current running time reaches the value set in this parameter, the corresponding DO becomes ON, indicating that the current running time is reached.

F8-54	Output power correction coefficient	Default	100.0%
	Setting Range	0.0% ~ 200.0%	

When the output power (U0-05) is not equal to the required value, you can perform linear correction on output power by using this parameter.

Group F9: Fault and Protection

F9-00	Motor overload protection selection		Default	0
	Setting Range	0	Disabled	
		1	Enabled	
F9-01	Motor overload protection gain		Default	1.00
	Setting Range		0.20 ~ 10.00	

F9-00=0

The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating, A thermal relay is suggested to be installed between the AC drive and the motor.

F9-00=1

The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

The inverse time-lag curve of the motor overload protection is as shown in the following figure.

when the motor running current is reached 175% times the motor rated current conditions, If the load remains at this value for 2 minutes, the AC drive reports motor overload fault(Err11);

when the motor running current is reached 115% times the motor rated current conditions, If the load remains at this value for 80 minutes, the AC drive reports motor overload fault(Err11);

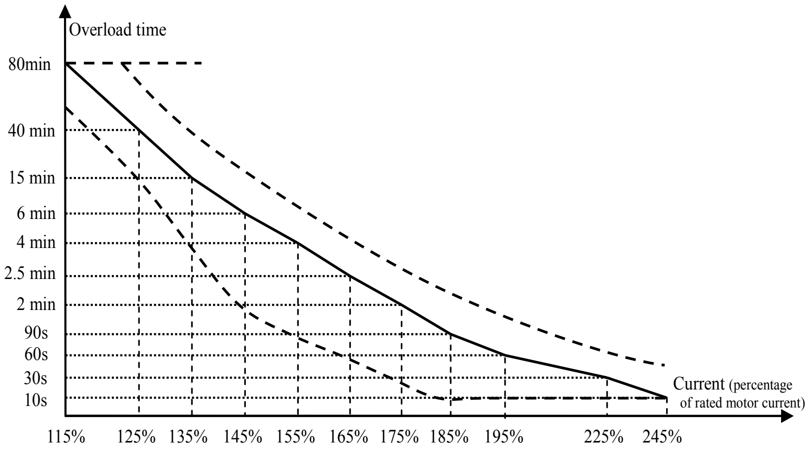


Figure 6-33 The inverse time-lag curve of the motor overload protection

For example 1:

The motor rated current is set to 1.00,So, when the motor running current is reached 125% times the motor rated current, the load remains at this value for 40 minutes, the AC drive reports motor overload fault;

The motor rated current is set to 1.20,when the motor running current is reached 125% times the motor rated current, the load remains at this value for 40*1.2=48 minutes, the AC drive reports motor overload fault;

For example 2: Motor overload protection.

The motor overload fault needs to be reported after the motor runs at 150% of the rated motor current for 2 minutes.

Through Figure 6-32 that 150% (I) current is located in 145% (I1) and 155% (I2) current range, 145% current 6 min (T1) overload, 155% current 4 min (T2) overload. Seen from the preceding curve, the 150% (I) overload current is between 145% (I1) and 155%(I2) of the rated motor current, Corresponding to 6 minutes (T1) and 4 minutes (T2) of time.

From formula T=T1+ (T2-T1)*(I-I1)/ (I2-I1), T=4+ (6-4)*(150%-145%)/ (155%-145%) = 5(min).Then the F9-01 is obtained from formula F9-01 = 2÷5=0.4.

Set F9-01 properly based on the actual overload capacity. If the value of F9-01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

F9-02	Motor overload warning coefficient	Default	80%
	Setting Range	50% ~ 100%	

When the motor overload detection level reached the parameter setting value, multi function output terminal DO or Relay output motor overload alarm signal, the parameters value is according to the motor in a overload continued to run without overload time calculated as a percentage.

For example:

when the motor overload protection gain is set to 1.00, motor overload warning coefficient set is 80%, when the motor running current reach to 145% of the motor rated current and continue to run 4.8 minutes (80% * 6 minutes), multi function output terminal DO or Relay output the motor overload warning signal.

This function is used to give a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by F9-02, the DO terminal on the AC drive allocated with function 6 (Motor overload pre-warning) becomes ON.

F9-03	Overvoltage stall gain	Default	0
	Setting Range	0 (no stall overvoltage) ~ 100	
F9-04	Overvoltage stall protective voltage	Default	130%
	Setting Range	120% ~ 150%	

When the DC bus voltage exceeds the value of F9-04 (Overvoltage stall protective voltage) during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate.

F9-03 (Overvoltage stall gain) is used to adjust the overvoltage suppression capacity of the AC drive. The larger the value is, the greater the overvoltage suppression capacity will be. In the prerequisite of no overvoltage occurrence, set F9-03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overvoltage fault may occur.

If the overvoltage stall gain is set t o 0, the overvoltage stall function is disabled.

The overvoltage stall protective voltage setting 100% corresponds to the base values in the following table:

Voltage Class	Corresponding Base Value
Single-phase 220V	290V
Three-phase 220V	290V
Three-phase 380V	530V
Three-phase 481V	620V

F9-05	Overcurrent stall gain	Default	20
	Setting Range	0 ~ 100	

F9-06	Overcurrent stall protective current	Default	150%
	Setting Range	100% ~ 200%	

When the output current exceeds the overcurrent stall protective current during acceleration/ deceleration of the AC drive, the AC drive stops acceleration/deceleration and keeps the present running frequency. After the output current declines, the AC drive continues to accelerate/decelerate.

Overcurrent stall gain is used to adjust the overcurrent suppression capacity of the AC drive. The larger the value is, the greater the overcurrent suppression capacity will be. In the prerequisite of no overcurrent occurrence, set F9-05 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and overcurrent fault may occur.

If the overcurrent stall gain is set to 0, the overcurrent stall function is disabled.

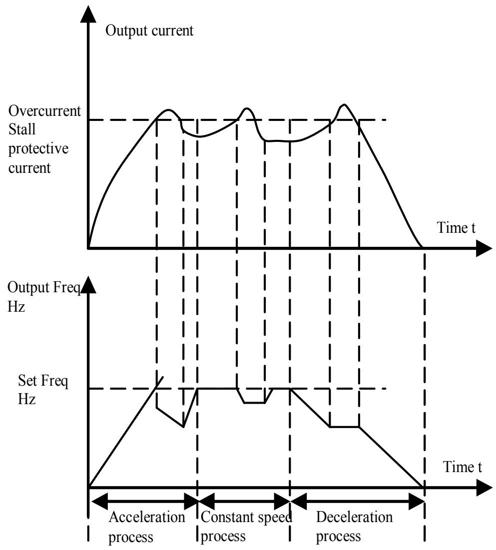


Figure 6-34 Diagram of the overcurrent stall protection function

F9-07	Short-circuit to ground upon power-on		Default	1
	Setting Range	0	Disabled	
		1	Enabled	

It is used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive. If this function is enabled, the AC drive's UVW will have voltage output a while after power-on.

F9-08	braking unit action voltage	Default	Model dependent
	Setting Range	200.0V ~ 2000.0V	

The starting voltage of the built-in brake unit (Vbreak) , the setting of this voltage value for reference to:800 ≥ Vbreak ≥ (1.414Vs+30),

Vs=AC drive input voltage;

Note: this voltage setup may cause the built-in brake unit to run abnormally!

F9-09	Fault auto reset times	Default	0
	Setting Range	0 ~ 20	

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state.

F9-10	DO action during fault auto reset		Default	0
	Setting Range	0	Not act	
		1	Act	

It is used to decide whether the DO acts during the fault auto reset if the fault auto reset function is selected.

F9-11	Time interval of fault auto reset	Default	1.0s
	Setting Range	0.1s ~ 100.0s	

It is used to set the waiting time from the alarm of the AC drive to fault auto reset.

F9-12	Input phase loss protection/contactor energizing protection selection	Default	11
	Setting Range	Unit's digit: Input phase loss protection Ten's digit: Contactor energizing protection 0: Disabled 1: Enabled	

It is used to determine whether to perform input phase loss or contactor energizing protection.

F9-13	Output phase loss protection selection		Default	1
	Setting Range	0	Disabled	
		1	Enabled	

It is used to determine whether to perform output phase loss protection.

F9-14	1st fault type	0 ~ 99
F9-15	2nd fault type	
F9-16	3rd (latest) fault type	

It is used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 8.

F9-17	Frequency upon 3rd fault	It displays the frequency when the latest fault occurs.
F9-18	Current upon 3rd fault	It displays the current when the latest fault occurs.
F9-19	Bus voltage upon 3rd fault	It displays the bus voltage when the latest fault occurs.

F9-20	X status upon 3rd fault	It displays the status of all X terminals when the latest fault occurs. The sequence is as follows: BIT9 BIT8 BIT7 BIT6 BIT5 BIT4 BIT3 BIT2 BIT1 BIT0 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1 If a X is ON, the setting is 1. If X is OFF, the setting is 0.The value is the equivalent decimal number converted from the X status.
F9-21	Output terminal status upon 3rd fault	It displays the status of all output terminals when the latest fault occurs. The sequence is as follows: BIT4 BIT3 BIT2 BIT1 BIT0 REL3 DO1 REL2 REL1 FMP If an output terminal is ON, the setting is 1. If the output terminal is OFF, the setting is 0. The value is the equivalent decimal number converted form the X statuses.
F9-22	AC drive status upon 3rd fault	Reserved
F9-23	Power-on time upon 3rd fault	It displays the present power-on time when the latest fault occurs.
F9-24	Running time upon 3rd fault	It displays the present running time when the latest fault occurs.
F9-27	Frequency upon 2nd fault	Same as F9-17 ~ F9-24
F9-28	Current upon 2nd fault	
F9-29	Bus voltage upon 2nd fault	
F9-30	X status upon 2nd fault	
F9-31	Output terminal status upon 2nd fault	
F9-32	AC drive status upon 2nd fault	
F9-33	Power-on time upon 2nd fault	
F9-34	Running time upon 2nd fault	
F9-37	Frequency upon 1st fault	Same as F9-17 ~ F9-24
F9-38	Current upon 1st fault	
F9-39	Bus voltage upon 1st fault	
F9-40	X status upon 1st fault	

F9-41	Output terminal status upon 1st fault	Same as F9-17 ~ F9-24
F9-42	AC drive status upon 1st fault	
F9-43	Power-on time upon 1st fault	
F9-44	Running time upon 1st fault	

F9-47	Fault protection action selection 1		Default	00000
	Setting Range	Unit's digit	Motor overload, Err11	
		0	Coast to stop	
		1	Stop according to the stop mode	
		2	Continue to run	
	Setting Range	Ten's digit	Power input phase loss, Err12 (Same as unit's digit)	
		Hundred's digit	Power output phase loss, Err13 (Same as unit's digit)	
		Thousand's digit	External equipment fault, Err15 (Same as unit's digit)	
		Ten thousand's digit	Communication fault, Err16 (Same as unit's digit)	
F9-48	Fault protection action selection 2		Default	00000
	Setting Range	Unit's digit	Encoder fault, Err20	
		0	Coast to stop	
		1	Switch over to V/F control, stop according to the the stop mode	
		2	Switchover to V/F control, continue to run	
		Ten's digit	EEPROM read-write fault, ERR21	
		0	Coast to stop	
		1	Stop according to the stop mode	
		Hundred's digit	Reserved	
		Thousand's digit	Motor overheat, Err25 (Same as unit's digit in F9-47)	
		Ten thousand's digit	Accumulative running time reached,Err26 (Same as unit's digit in F9-47)	
F9-49	Fault protection action selection 3		Default	00000
	Setting Range	Unit's digit	User-defined fault 1, Err27 (Same as unit's digit in F9-47)	

F9-49	Fault protection action selection 3		Default	00000
	Setting Range	Ten's digit	User-defined fault 2, Err28 (Same as unit's digit in F9-47)	
		Hundred's digit	Accumulative power-on time reached, Err29 (Same as unit's digit in F9-47)	
		Thousand's digit	Load becoming 0, Err30	
		0	Coast to stop	
		1	Stop according to the stop mode	
		2	Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers	
		Ten thousand's digit	PID feedback lost during running, Err31 (Same as unit's digit in F9-47)	
F9-50	Fault protection action selection 4		Default	00000
	Setting Range	Unit's digit	Too large speed deviation, Err42 (Same as unit's digit in F9-47)	
		Ten's digit	Motor over-speed, Err43 (Same as unit's digit in F9-47)	
		Hundred's digit	Initial position fault, Err51 (Same as unit's digit in F9-47)	
		Thousand's digit	Reserved	
		Ten thousand's digit	Reserved	

If "Coast to stop" is selected, the AC drive displays Err** and directly stops.

If "Stop according to the stop mode" is selected, the AC drive displays A** and stops according to the stop mode. After stop, the AC drive displays Err**.

If "Continue to run" is selected, the AC drive continues to run and displays A**. The running frequency is set in F9-54.

F9-54	Frequency selection for continuing to run upon fault		Default	0
	Setting Range	0	Current running frequency	
		1	Set frequency	
		2	Frequency upper limit	
		3	Frequency lower limit	
		4	Backup frequency upon abnormality	
F9-55	Backup frequency upon abnormality		Default	100.0%
	Setting Range		0.0% ~ 100.0% (maximum frequency)	

If a fault occurs during the running of the AC drive and the handling of fault is set to "Continue to run", the AC drive displays A** and continues to run at the frequency set in F9-54.

The setting of F9-55 is a percentage relative to the maximum frequency.

F9-56	Type of motor temperature sensor		Default	0
	Setting Range	0	No temperature sensor	
		1	PT100	
		2	PT1000	
F9-57	Motor overheat protection threshold		Default	110℃
	Setting Range		0℃ ~ 200℃	
F9-58	Motor overheat warning threshold		Default	90℃
	Setting Range		0℃ ~ 200℃	

The signal of the motor temperature sensor needs to be connected to the optional I/O extension card. AI3 on the extension card can be used for the temperature signal input. The motor temperature sensor is connected to AI3 and GND of the extension card.

The AI3 terminal of the H8 supports both PT100 and PT1000. Set the sensor type correctly during the use. You can view the motor temperature via U0-34.

If the motor temperature exceeds the value set in F9-57, the AC drive reports an alarm and acts according to the selected fault protection action.

If the motor temperature exceeds the value set in F9-58, the DO terminal on the AC drive allocated with function 39 (Motor overheat warning) becomes ON.

F9-59	Action selection at instantaneous power failure		Default	0
	Setting Range	0	Invalid	
		1	Decelerate	
		2	Decelerate to stop	
F9-60	Action pause judging voltage at instantaneous power failure		Default	90.0%
	Setting Range		80.0% ~ 100.0%	
F9-61	Voltage rally judging time at instantaneous power failure		Default	0.50s
	Setting Range		0.00s ~ 100.00s	
F9-62	Action judging voltage at instantaneous power failure		Default	80.0%
	Setting Range		60.0% ~ 100.0% (standard bus voltage)	

F9-71	Instantaneous power failure gain Kp	Default	40
	Setting Range	0 ~ 100	
F9-72	Instantaneous power failure integral coefficient Ki	Default	30
	Setting Range	0 ~ 100	
F9-73	Instantaneous power failure deceleration time	Default	20s
	Setting Range	0 ~ 300s	

Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously. As shown in the following figure.

When the bus voltage drop to below “action judging voltage at instantaneous power failure" , the instantaneous power failure function is effective, At this time，AC drive output frequency automatically fall, the motor is in generation state .and make electricity feedback to the bus ,the bus voltage to maintain in the voltage of "action judging voltage instantaneous power failure” up and down, and make the system normal deceleration to 0Hz.

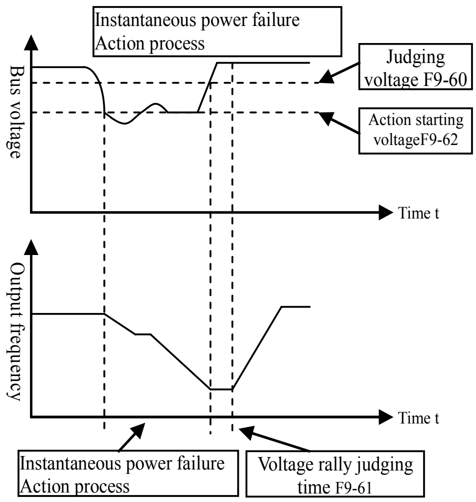


Figure 6-35 AC drive action diagram upon instantaneous power failure

Note: in the Bus voltage constant range control, When power supply recovery, the AC drive continues to run to the target frequency; In the deceleration mode ,When power supply recovery, the AC drive continues to decelerate to 0Hz until AC drive receive a start new command again.

This purpose of the instantaneous power failure function is when the power supply is not stable, the motor can normal decelerate to stop, when the power is restored, the motor can start immediately and will not cause unstable power supply in the report undervoltage then coast to stop.

In the large inertia system, the motor coast to stop to take a long time, when the power supply is normal, because the motor still in high-speed rotation, then start the motor is easy to make the AC drive overload and overcurrent fault.

F9-63	Protection upon load becoming 0		Default	0
	Setting Range	0	Disabled	
		1	Enabled	
F9-64	Detection level of load becoming 0		Default	10.0%
	Setting Range		0.0% ~ 100.0% (rated motor current)	
F9-65	Detection time of load becoming 0		Default	1.0s
	Setting Range		0.0s ~ 60.0s	

If protection upon load becoming 0 is enabled, when the output current of the AC drive is lower than the detection level (F9-64) and the lasting time exceeds the detection time (F9-65), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

F9-67	Over-speed detection value	Default	20.0%
	Setting Range	0.0% ~ 50.0% (maximum frequency)	
F9-68	Over-speed detection time	Default	1.0s
	Setting Range	0.0s ~ 60.0s	

This function is valid only when the AC drive runs in the FVC mode.

If the actual motor rotational speed detected by the AC drive exceeds the maximum frequency and the excessive value is greater than the value of F9-67 and the lasting time exceeds the value of F9-68, the AC drive reports Err43 and acts according to the selected fault protection action.

If the over-speed detection time is 0.0s, the over-speed detection function is disabled.

F9-69	Detection value of too large speed deviation	Default	20.0%
	Setting Range	0.0% ~ 50.0% (maximum frequency)	
F9-70	Detection time of too large speed deviation	Default	5.0s
	Setting Range	0.0s ~ 60.0s	

This function is valid only when the AC drive runs in the FVC mode.

If the AC drive detects the deviation between the actual motor rotational speed detected by the AC drive and the set frequency is greater than the value of F9-69 and the lasting time exceeds the value of F9-70, the AC drive reports Err42 and according to the selected fault protection action.

If F9-70 (Detection time of too large speed deviation) is 0.0s, this function is disabled.

F9-71	UVW encoder fault (synchronous motor)	Default	1
	Setting Range	0:Closed 1:Open	
F9-72	Fault protection action selection 5 (synchronous motor)	Default	11
	Setting Range	Unit's digit (Initial position fault, Err51) 0: Continue to run 1: Coast to stop	
		Ten's digit (Motor auto-tuning fault, Err19)Same as unit's digit	

These two parameters are used to set the synchronous motor parameters.

If you use the UVW encoder to report the Err20 fault, and the additional information U0-45 is 11 or 12, so, it is a UVW signal line logic error, The first need to confirm the encoder no problem, if confirmed is false alarm can be set F9-71 to 0 shielded this fault by this function code.

Group FA: Process Control PID Function

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

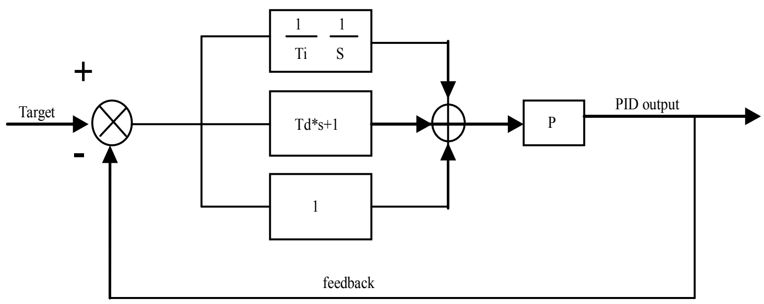


Figure 6-36 Principle block diagram of PID control

FA-00	PID setting source	Default	0
	Setting Range	0	FA-01
		1	AI1
		2	AI2
		3	AI3
		4	Pulse setting (X5)
		5	Communication setting
		6	Multi-reference
FA-01	PID digital setting	Default	50.0%
	Setting Range	0.0% ~ 100.0%	

FA-00 is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID feedback equal.

FA-02	PID feedback source	Default	0
	Setting Range	0	AI1
		1	AI2
		2	AI3
		3	AI1 - AI2
		4	Pulse setting (X5)
		5	Communication setting
		6	AI1 + AI2
		7	MAX (|AI1|, |AI2|)
		8	MIN (|AI1|, |AI2|)

This parameter is used to select the feedback signal channel of process PID.
The PID feedback is a relative value and ranges from 0.0% to 100.0%.

FA-03	PID action direction	Default	0
	Setting Range	0	Forward action
		1	Reverse action

0: Forward action
When the feedback value is smaller than the PID setting, the AC drive’s output frequency rises. For example, the winding tension control requires forward PID action.
1: Reverse action
When the feedback value is smaller than the PID setting, the AC drive’s output frequency reduces. For example, the unwinding tension control requires reverse PID action.
Note that this function is influenced by the X function 35 “Reverse PID action direction”.

FA-04	PID setting feedback range	Default	1000
	Setting Range	0 ~ 65535	

This parameter is a non-dimensional unit. It is used for PID setting display (U0-15) and PID feedback display (U0-16).

Relative value 100% of PID setting feedback corresponds to the value of FA-04. If FA-04 is set to 2000 and PID setting is 100.0%, the PID setting display (U0-15) is 2000.

FA-05	Proportional gain Kp1	Default	2.0
	Setting Range	0.0 ~ 100.0	
FA-06	Integral time Ti1	Default	2.00s
	Setting Range	0.01s ~ 10.00s	
FA-07	Differential time Td1	Default	0.000s
	Setting Range	0.000s ~ 10.000s	

FA-05 (Proportional gain Kp1)

It decides the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

FA-06 (Integral time Ti1)

It decides the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in FA-06. The the adjustment amplitude reaches the maximum frequency.

FA-07 (Differential time Td1)

It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

FA-08	Cut-off frequency of PID reverse rotation	Default	2.00Hz
	Setting Range	0.00Hz to maximum frequency	

In some situations, only when the PID output frequency is a negative value (AC drive reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and FA-08 is used to determine the reverse rotation frequency upper limit.

FA-09	PID deviation limit	Default	0.0%
	Setting Range	0.0% ~ 100.0%	

If the deviation between PID feedback and PID setting is smaller than the value of FA-09, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications.

FA-10	PID deviation limit	Default	0.10%
	Setting Range	0.0% ~ 100.0%	

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.

FA-11	PID setting change time	Default	0.00s
	Setting Range	0.00s ~ 650.00s	

The PID setting change time indicates the time required for PID setting changing from 0.0% to 100.0%. The PID setting changes linearly according to the change time, reducing the impact caused by sudden setting change on the system.

FA-12	PID feedback filter time	Default	0.00s
	Setting Range	0.00s ~ 60.00s	
FA-13	PID output filter time	Default	0.00s
	Setting Range	0.00s ~ 60.00s	

FA-12 is used to filter the PID feedback, helping to reduce interference on the feedback but slowing the response of the process closed-loop system.

FA-13 is used to filter the PID output frequency, helping to weaken sudden change of the AC drive output frequency but slowing the response of the process closed-loop system.

FA-15	Proportional gain Kp2		Default	20.0
	Setting Range		0.0 ~ 100.0	
FA-16	Integral time Ti2		Default	2.00s
	Setting Range		0.01s ~ 10.00s	
FA-17	Differential time Td2		Default	0.000s
	Setting Range		0.000s ~ 10.000s	
FA-18	PID parameter switchover condition		Default	0
	Setting Range	0	No switchover	
		1	Switchover via X	
		2	Automatic switchover based on deviation	
		3	Automatic switchover based on running frequency	
FA-19	PID parameter switchover deviation 1		Default	20.0%
	Setting Range		0.0% ~ FA-20	
FA-20	PID parameter switchover deviation 2		Default	80.0%
	Setting Range		FA-19 ~ 100.0%	

In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process.

These parameters are used for switchover between two groups of PID parameters. Regulator parameters FA-15 to FA-17 are set in the same way as FA-05 to FA-07.

The switchover can be implemented either via a X terminal or automatically implemented based on the deviation.

If you select switchover via a X terminal, the X must be allocated with function 43 “PID parameter switchover”. If the X is OFF, group 1 (FA-05 to FA-07) is selected. If the X is ON, group 2 (FA-15 to FA-17) is selected.

If you select automatic switchover, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of FA-19, group 1 is selected. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of FA-20, group 2 is selected. When the deviation is between FA-19 and FA-20, the PID parameters are the linear interpolated value of the two groups of parameter values.

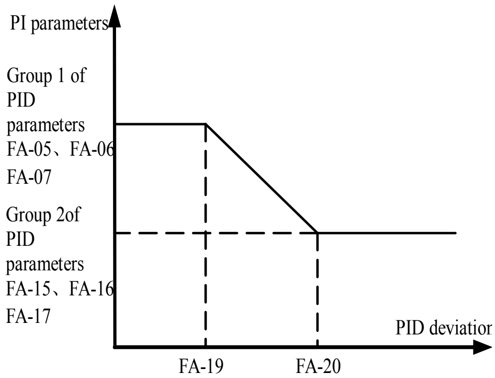


Figure 6-37 PID parameters switchover

FA-21	PID initial value	Default	0.0%
	Setting Range	0.0% ~ 100.0%	
FA-22	PID initial value holding time	Default	0.00s
	Setting Range	0.00s ~ 650.00s	

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (FA-21) and lasts the time set in FA-22.

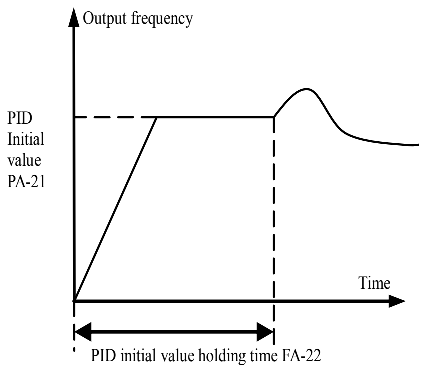


Figure 6-38 PID initial value function

FA-23	Maximum deviation between two PID outputs in forward direction	Default	1.0%
	Setting Range	0.0% ~ 100.0%	
FA-24	Maximum deviation between two PID outputs in reverse direction	Default	1.0%
	Setting Range	0.0% ~ 100.0%	

This function is used to limit the deviation between two PID outputs (2ms per PID output) to suppress the rapid change of PID output and stabilize the running of the AC drive.

FA-23 and FA-24 respectively correspond to the maximum absolute value of the output deviation in forward direction and in reverse direction.

FA-25	PID integral property		Default	00
	Setting Range	Unit's digit	Integral separated	
		0	Invalid	
		1	Valid	
		Ten's digit	Whether to stop integral operation when the output reaches the limit	
		0	Continue integral operation	
		1	Stop integral operation	

Integral separated:

If it is set to valid, the PID integral operation stops when the X allocated with function 22 “PID integral pause” is ON. In this case, only proportional and differential operations take effect.

If it is set to invalid, integral separated remains invalid no matter whether the X allocated with function 22 “PID integral pause” is ON or not.

Whether to stop integral operation when the output reaches the limit:

If “stop integral operation” is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

FA-26	Detection value of PID feedback loss	Default	0.0%
	Setting Range	0.0%: No judging feedback loss 0.1% ~ 100.0%	
FA-27	Detection time of PID feedback loss	Default	0.0s
	Setting Range	0.0s ~ 20.0s	

These parameters are used to judge whether PID feedback is lost.

If the PID feedback is smaller than the value of FA-26 and the lasting time exceeds the value of FA-27, the AC drive reports Err31 and acts according to the selected fault protection action.

FA-28	PID operation at stop		Default	0
	Setting Range	0	No PID operation at stop	
		1	PID operation at stop	

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the AC drive stops.

Group FB: Swing Frequency, Fixed Length and Count

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure.

The swing amplitude is set in FB-00 and FB-01. When FB-01 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect.

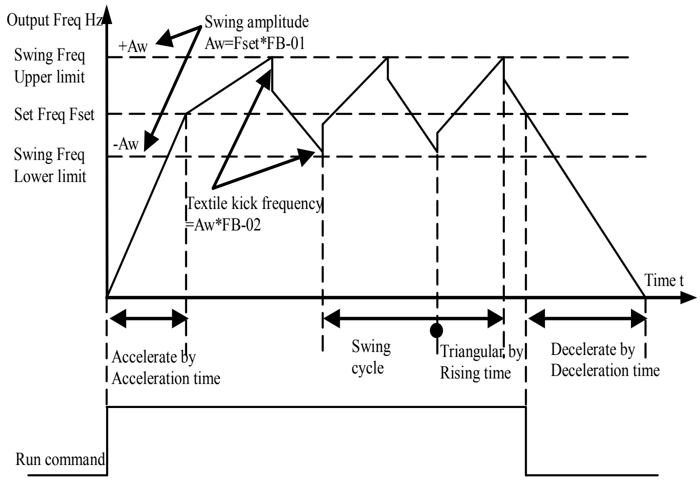


Figure 6-39 Swing frequency control

FB-00	Swing frequency setting mode		Default	0
	Setting Range	0	Relative to the central frequency	
		1	Relative to the maximum frequency	

This parameter is used to select the base value of the swing amplitude.

0:Relative to the central frequency (F0-07 frequency source selection)

It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

1: Relative to the maximum frequency (F0-10 maximum output frequency)

It is fixed swing amplitude system. The swing amplitude is fixed.

FB-01	Swing frequency amplitude	Default	0.0%
	Setting Range	0.0% ~ 100.0%	
FB-02	Jump frequency amplitude	Default	0.0%
	Setting Range	0.0% ~ 50.0%	

This parameter is used to determine the swing amplitude and jump frequency amplitude.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

If relative to the central frequency (FB-00=0), the actual swing amplitude AW is the calculation result of F0-07 (Frequency source selection) multiplied by FB-01.

If relative to the maximum frequency (FB-00=1), the actual swing amplitude AW is the calculation result of F0-10 (Maximum frequency) multiplied by FB-01.

Jump frequency =Swing amplitude AW*FB-02 (Jump frequency amplitude).

If relative to the central frequency (FB-00=0), the jump frequency is a variable value.

If relative to the maximum frequency (FB-00=1), the jump frequency is a fixed value.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

FB-03	Swing frequency cycle	Default	10.0s
	Setting Range	0.0s ~ 3000.0s	
FB-04	Triangular wave rising time coefficient	Default	50.0%
	Setting Range	0.0% ~ 100.0%	

FB-03 specifies the time of a complete swing frequency cycle.

FB-04 specifies the time percentage of triangular wave rising time to FB-03.

Triangular wave rising time =FB-03 (Swing frequency cycle) * FB-04 (Triangular wave rising time coefficient, unit:s)

Triangular wave falling time =FB-03 (Swing frequency cycle) * (1 - FB-04 Triangular wave rising time coefficient, unit:s)

FB-05	Set length	Default	1000m
	Setting Range	0m ~ 65535m	

FB-06	Actual length	Default	0m
	Setting Range	0m ~ 65535m	
FB-07	Number of pulses per meter	Default	100.0
	Setting Range	0.1 ~ 6553.5	

The preceding parameters are used for fixed length control.

The length information is collected by the X terminal. FB-06 (Actual length) is calculated by dividing the number of pulses collected by the X terminal by FB-07 (Number of pulses each meter).

When the actual length FB-06 exceeds the set length in FB-05, the DO terminal allocated with function 10 (Length reached) becomes ON.

During the fixed length control, the length reset operation can be performed via the X terminal allocated with function 28. For details, see the descriptions of F4-00 to F4-09.

Allocate corresponding X terminal with function 27 (Length count input) in applications. If the pulse frequency is high, X5 must be used.

FB-08	Set count value	Default	1000
	Setting Range	1 ~ 65535	
FB-09	Designated count value	Default	1000
	Setting Range	1 ~ 65535	

The count value needs to be collected by X terminal. Allocate the corresponding X terminal with functions 25 (Counter input) in applications. If the pulse frequency is high, X5 must be used.

When the count value reaches the set count value (FB-08), the DO terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the counting value reaches the designated counting value (FB-09), the DO terminal allocated with function 9 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached.

FB-09 should be equal to or smaller than FB-08.

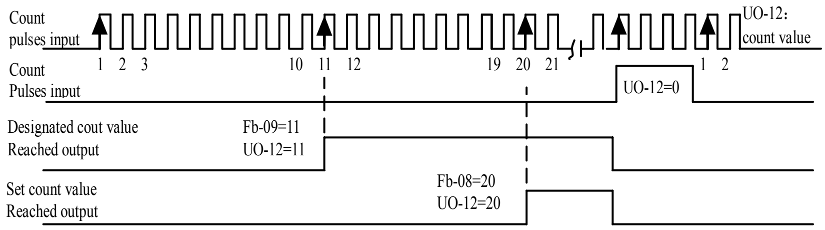


Figure 6-40 Reaching the set count value and designated count value

Group FC: Multi-Reference and Simple PLC Function

The H8 multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

The simple PLC function is different from the H8 user programmable function. Simple PLC can only complete simple combination of multi-reference, while the user programmable function is more practical. For details, see the descriptions of group A7.

FC-00	Reference 0	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-00	Reference 1	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-02	Reference 2	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-03	Reference 3	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-04	Reference 4	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-05	Reference 5	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-06	Reference 6	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-07	Reference 7	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-08	Reference 8	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-09	Reference 9	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-10	Reference 10	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-11	Reference 11	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-12	Reference 12	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-13	Reference 13	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	

FC-14	Reference 14	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
FC-15	Reference 15	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	

Multi-reference can be the setting source of frequency, V/F separated voltage and process PID. The multi-reference is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

Multi-reference can be switched over based on different states of X terminals. For details, see the descriptions of group F4.

FC-16	Simple PLC running mode		Default	0
	Setting Range	0	Stop after the AC drive runs one cycle	
		1	Keep final values after the AC drive runs one cycle	
		2	Repeat after the AC drive runs one cycle	

0: Stop after the AC drive runs one cycle

The AC drive stops after running one cycle, and will not start up until receiving another command.

1: Keep final values after the AC drive runs one cycle

The AC drive keeps the final running frequency and direction after running one cycle.

2: Repeat after the AC drive runs one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command,

Simple PLC can be either the frequency source or V/F separated voltage source.

When simple PLC is used as the frequency source, whether parameter values of FC-00 to FC-15 are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

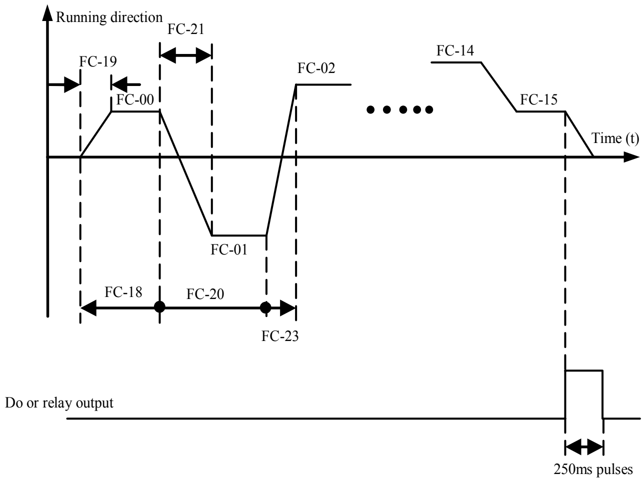


Figure 6-41 Simple PLC when used as frequency source

<table>
<tr><td rowspan="7">FC-17</td><td colspan="2">Simple PLC retentive selection</td><td>Default</td><td>00</td></tr>
<tr><td rowspan="6">Setting Range</td><td>Unit's digit</td><td colspan="2">Retentive upon power failure</td></tr>
<tr><td>0</td><td colspan="2">No</td></tr>
<tr><td>1</td><td colspan="2">Yes</td></tr>
<tr><td>Ten's digit</td><td colspan="2">Retentive upon stop</td></tr>
<tr><td>0</td><td colspan="2">No</td></tr>
<tr><td>1</td><td colspan="2">Yes</td></tr>
</table>

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

<table>
<tr><td rowspan="2">FC-18</td><td>Running time of simple PLC reference 0</td><td>Default</td><td>0.0s (h)</td></tr>
<tr><td>Setting Range</td><td colspan="2">0.0s (h) ~ 6553.5s (h)</td></tr>
<tr><td rowspan="2">FC-19</td><td>Acceleration/Deceleration time of simple PLC reference 0</td><td>Default</td><td>0</td></tr>
<tr><td>Setting Range</td><td colspan="2">0 ~ 3</td></tr>
<tr><td rowspan="2">FC-20</td><td>Running time of simple PLC reference 1</td><td>Default</td><td>0.0s (h)</td></tr>
<tr><td>Setting Range</td><td colspan="2">0.0s (h) ~ 6553.5s (h)</td></tr>
</table>

FC-21	Acceleration/Deceleration time of simple PLC reference 1	Default	0
	Setting Range	0 ~ 3	
FC-22	Running time of simple PLC reference 2	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-23	Acceleration/Deceleration time of simple PLC reference 2	Default	0
	Setting Range	0 ~ 3	
FC-24	Running time of simple PLC reference 3	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-25	Acceleration/Deceleration time of simple PLC reference 3	Default	0
	Setting Range	0 ~ 3	
FC-26	Running time of simple PLC reference 4	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-27	Acceleration/Deceleration time of simple PLC reference 4	Default	0
	Setting Range	0 ~ 3	
FC-28	Running time of simple PLC reference 5	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-29	Acceleration/Deceleration time of simple PLC reference 5	Default	0
	Setting Range	0 ~ 3	
FC-30	Running time of simple PLC reference 6	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-31	Acceleration/Deceleration time of simple PLC reference 6	Default	0
	Setting Range	0 ~ 3	
FC-32	Running time of simple PLC reference 7	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-33	Acceleration/Deceleration time of simple PLC reference 7	Default	0
	Setting Range	0 ~ 3	
FC-34	Running time of simple PLC reference 8	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	

FC-35	Acceleration/Deceleration time of simple PLC reference 8	Default	0
	Setting Range	0 ~ 3	
FC-36	Running time of simple PLC reference 9	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-37	Acceleration/Deceleration time of simple PLC reference 9	Default	0
	Setting Range	0 ~ 3	
FC-38	Running time of simple PLC reference 10	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-39	Acceleration/Deceleration time of simple PLC reference 10	Default	0
	Setting Range	0 ~ 3	
FC-40	Running time of simple PLC reference 11	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-41	Acceleration/Deceleration time of simple PLC reference 11	Default	0
	Setting Range	0 ~ 3	
FC-42	Running time of simple PLC reference 12	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-43	Acceleration/Deceleration time of simple PLC reference 12	Default	0
	Setting Range	0 ~ 3	
FC-44	Running time of simple PLC reference 13	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-45	Acceleration/Deceleration time of simple PLC reference 13	Default	0
	Setting Range	0 ~ 3	
FC-46	Running time of simple PLC reference 14	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	
FC-47	Acceleration/Deceleration time of simple PLC reference 14	Default	0
	Setting Range	0 ~ 3	
FC-48	Running time of simple PLC reference 15	Default	0.0s (h)
	Setting Range	0.0s (h) ~ 6553.5s (h)	

FC-49	Acceleration/Deceleration time of simple PLC reference 15		Default	0
	Setting Range		0 ~ 3	
FC-50	The unit of simple PLC running time		Default	0
	Setting Range	0	s (second)	
		1	h (hour)	
FC-51	Reference 0 source		Default	0
	Setting Range	0	Set by FC-00	
		1	AI1	
		2	AI2	
		3	AI3	
		4	Pulse setting	
		5	PID	
		6	Set by preset frequency (F0-08) modified via terminal UP/DOWN	

It determines the setting channel of reference 0. You can perform convenient switchover between the setting channels. When multi-reference or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.

Group FD: User-defined Parameters

Please refer to "H8" series of communication protocols.

Group FE: User defined Function Codes

FE-00	User-defined function code 0	Default	U3-17
	Setting Range	F0.00 ~ FP.xx, A0.00 ~ Ax.xx, U0.00 ~ U0.xx , U3.00 ~ U3.xx	
FE-01	User-defined function code 1	Default	U3-16
	Setting Range	Same as FE-00	
FE-02	User-defined function code 2	Default	F0.00
	Setting Range	Same as FE-00	
FE-03	User-defined function code 3	Default	F0.00
	Setting Range	Same as FE-00	
FE-04	User-defined function code 4	Default	F0.00
	Setting Range	Same as FE-00	
FE-05	User-defined function code 5	Default	F0.00
	Setting Range	Same as FE-00	

FE-06	User-defined function code 6	Default	F0.00
	Setting Range	Same as FE-00	
FE-07	User-defined function code 7	Default	F0.00
	Setting Range	Same as FE-00	
FE-08	User-defined function code 8	Default	F0.00
	Setting Range	Same as FE-00	
FE-09	User-defined function code 9	Default	F0.00
	Setting Range	Same as FE-00	
FE-10	User-defined function code 10	Default	F0.00
	Setting Range	Same as FE-00	
FE-11	User-defined function code 11	Default	F0.00
	Setting Range	Same as FE-00	
FE-12	User-defined function code 12	Default	F0.00
	Setting Range	Same as FE-00	
FE-13	User-defined function code 13	Default	F0.00
	Setting Range	Same as FE-00	
FE-14	User-defined function code 14	Default	F0.00
	Setting Range	Same as FE-00	
FE-15	User-defined function code 15	Default	F0.00
	Setting Range	Same as FE-00	
FE-16	User-defined function code 16	Default	F0.00
	Setting Range	Same as FE-00	
FE-17	User-defined function code 17	Default	F0.00
	Setting Range	Same as FE-00	
FE-18	User-defined function code 18	Default	F0.00
	Setting Range	Same as FE-00	
FE-19	User-defined function code 19	Default	F0.00
	Setting Range	Same as FE-00	
FE-20	User-defined function code 20	Default	U0.68
	Setting Range	Same as FE-00	
FE-21	User-defined function code 21	Default	U0.69
	Setting Range	Same as FE-00	
FE-22	User-defined function code 22	Default	F0.00
	Setting Range	Same as FE-00	
FE-23	User-defined function code 23	Default	F0.00
	Setting Range	Same as FE-00	

FE-24	User-defined function code 24	Default	F0.00
	Setting Range	Same as FE-00	
FE-25	User-defined function code 25	Default	F0.00
	Setting Range	Same as FE-00	
FE-26	User-defined function code 26	Default	F0.00
	Setting Range	Same as FE-00	
FE-27	User-defined function code 27	Default	F0.00
	Setting Range	Same as FE-00	
FE-28	User-defined function code 28	Default	F0.00
	Setting Range	Same as FE-00	
FE-29	User-defined function code 29	Default	F0.00
	Setting Range	Same as FE-00	

FE is user-defined parameter group. You can select the required parameters from all H8 functions codes and add them into this group, convenient for view and modification.

Group FE provides a maximum of 30 user-defined parameters. If "FE-00" is displayed, it indicates that group FE is null. After you enter user-defined function code mode, the displayed parameters are defined by FE-00 to FE-31 and the sequence is consistent with that in group FE.

Group FP: User Password

FP-00	User password	Default	0
	Setting Range	0 ~ 65535	

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters. If FP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

FP-01	Restore default settings		Default	0
	Setting Range	0	No operation	
		1	Restore factory settings except motor parameters	
		2	Clear records	
		4	Back up current user parameters	
		501	Restore user backup parameters	

1: Restore factory settings except motor parameters

If FP-01 is set to 1, most function codes are restored to the default settings except motor parameters, frequency reference resolution (F0-22), fault records, accumulative running time (F7-09), accumulative power-on time (F7-13) and accumulative power consumption (F7-14).

2: Clear records

If FP-01 is set to 2, the fault records, accumulative running time (F7-09), accumulative power-on time (F7-13) and accumulative power consumption (F7-14) are cleared.

4: Back up current user parameters

If FP-01 is set to 4, the previous backup user parameters are restored.

501: Restore user backup parameters

If FP-01 is set to 501, the current parameter settings are backed up, helping you to restore the setting if incorrect parameter setting is performed.

FP-02	AC drive parameter display property		Default	11
	Setting Range	Unit's digit	Group U display selection	
		0	Not display	
		1	Display	
		Ten's digit	Group A display selection	
		0	Not display	
		1	Display	
FP-03	Individualized parameter display property		Default	11
	Setting Range	Unit's digit	User-defined parameter display selection	
		0	Not display	
		1	Display	
		Ten's digit	User-modified parameter display selection	
		0	Not display	
		1	Display	

The setting of parameter display mode aims to facilitate you to view different types of parameters based on actual requirements. The H8 provides the following three parameter display modes.

Name	Description
AC drive parameter display	Display function codes of the AC drive in sequence of F0 to FF, A0 to AF and U0 to UF.
User-defined parameter display	Display a maximum of 32 user-defined parameters included in group FE.
User-modified parameter display	Display the parameters that are modified

If one digit of FP-03 is set to 1, you can switch over to different parameter display modes by pressing key QUICK. By default, the AC drive parameter display mode is used.

The display codes of different parameter types are shown in the following table.

Parameter Type	Display Code
AC drive parameter	-bASE
User-defined parameter	-USEr
User-modified parameter	--C--

The H8 provides display of two types of individualized parameters: user-defined parameters and user-modified parameters.

You-defined parameters are included in group FE. You can add a maximum of 32 parameters, convenient for commissioning.

In user-defined parameter mode, symbol "u" is added before the function code. For example, F1-00 is displayed as uF1-00.

You-modified parameters are grouped together, convenient for on-site troubleshooting.

In you-modified parameter mode, symbol "c" is added before the function code. For example, F1-00 is displayed as cF1-00.

FP-04	Parameter modification property		Default	0
	Setting Range	0	modifiable	
		1	Not modifiable	

It is used to set whether the parameters are modifiable to avoid mal-function. If it is set to 0, all parameters are modifiable. If it is set to 1, all parameters can only be viewed.

Group A0: Torque Control and Restricting Parameters

A0-00	Speed/Torque control selection		Default	0
	Setting Range	0	Speed control	
		1	Torque control	

It is used to select the AC drive's control mode: speed control or torque control.

The H8 provides X terminals with two torque related functions, function 29 (Torque control prohibited) and function 46 (Speed control/Torque control switchover). The two X terminals need to be used together with A0-00 to implement speed control/torque control switchover.

If the X terminal allocated with function 46 (Speed control/Torque control switchover) is OFF, the control mode is determined by A0-00. If the X terminal allocated with function 46 is ON, the control mode is reverse to the value of A0-00.

However, if the X terminal with function 29 (Torque control prohibited) is ON, the AC drive is fixed to run in the speed control mode.

A0-01	Torque setting source in torque control		Default	0
	Setting Range	0	Digital setting (A0-03)	
		1	AI1	
		2	AI2	
		3	AI3	
		4	Pulse setting (X5)	
		5	Communication setting	
		6	MIN (AI1, AI2)	
		7	MAX (AI1, AI2)	
A0-03	Torque digital setting in torque control		Default	150.0%
	Setting Range		-200.0% ~ 200.0%	

A0-01 is used to set the torque setting source. There are a total of eight torque setting sources. The torque setting is a relative value. 100.0% corresponds to the AC drive's rated torque. The setting range is -200.0% to 200.0%, indicating the AC drive's maximum torque is twice of the AC drive's rated torque.

If the torque setting is positive, the AC drive rotates in forward direction. If the torque setting is negative, the AC drive rotates in reverse direction.

0: Digital setting (A0-03)

The target torque directly uses the value set in A0-03.

1: AI1

2: AI2

3: AI3

The target torque is decided by analog input. The H8 control board provides two AI terminals (AI1, AI2). Another AI terminal (AI3) is provided by the I/O extension card. AI1 is 0V ~ 10V voltage input, AI2 is 0V ~ 10V voltage input or 4mA ~ 20mA current input decided by jumper J8 on the control board, and AI3 is -10V to +10V voltage input.

The H8 provides five curves indicating the mapping relationship between the input voltage of AI1, AI2 and AI3 and the target frequency, three of which are linear (point-point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes F4-13 to F4-27 and function codes in group A6, and select curves for AI1, AI2 and AI3 in F4-33.

When AI is used as frequency setting source, the corresponding value 100% of voltage/ current input corresponds to the value of A0-03.

4: Pulse setting (X5)

The target torque is set by X5 (high-speed pulse). The pulse setting signal specification is 9V ~ 30V (voltage range) and 0KHz ~ 100KHz (frequency range). The pulse can only be input via X5. The relationship (which is a two-point line) between X5 input pulse frequency and the corresponding value is set in F4-28 to F4-31. The corresponding value 100.0% of pulse input corresponds to the value of A0-03.

5: Communication setting

The target torque is set by means of communication.

If the AC drive is a slave in point-point communication and receives data as torque source, data transmitted by the master is used as the setting value. For details, see the description of group A8.

If PROFIBUS-DP communication is valid and PZD1 is used for torque setting, data transmitted by PDZ1 is directly used as the torque source. The data format is -100.00% to 100.00%. 100% corresponds to the value of A0-03. The data range is-F0-10 to F0-10.

In other conditions, data is given by host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100% corresponds to the value of A0-03. The data range is-F0-10 to F0-10.

For example, when PZD1 (0x1000) is 5000, the value of F0-10 is 50.00Hz; when PZD1 (0x1000) is -5000, the value of -F0-10 is -50.00Hz

The H8 supports four host computer communication protocols: Modbus, PROFIBUS-DP, CANopen and CANlink. They cannot be used simultaneously.

If the communication mode is used, a communication card must be installed. The H8 provides four optional communication cards and you can select one based on actual requirements. If the communication protocol is Modbus, PROFIBUS-DP or CANopen, the corresponding serial communication protocol needs to be selected based on the setting of F0-28.

The CANlink protocol is always valid.

A0-05	Forward maximum frequency in torque control	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency (F0-10)	
A0-06	Reverse maximum frequency in torque control	Default	50.00Hz
	Setting Range	0.00Hz to maximum frequency (F0-10)	

Two parameters are used to set the maximum frequency in forward or reverse rotation in torque control mode. The Acceleration/Deceleration time of the frequency upper limit set by F8-07 and F8-08.

In torque control, if the load torque is smaller than the motor output torque, the motor’s rotational speed will rise continuously. To avoid runaway of the mechanical system, the motor maximum rotating speed must be limited in torque control.

You can implement continuous change of the maximum frequency in torque control dynamically by controlling the frequency upper limit.

A0-07	Acceleration time in torque control	Default	0.00s
	Setting Range	0.00s ~ 65000s	
A0-08	Deceleration time in torque control	Default	0.00s
	Setting Range	0.00s ~ 65000s	

In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. The motor rotational speed may change quickly and this will result in noise or too large mechanical stress. The setting of acceleration/deceleration time in torque control makes the motor rotational speed change softly. However, in applications requiring rapid torque response, set the acceleration/deceleration time in torque control to 0.00s. For example, two AC drives are connected to drive the same load. To balance the load allocation, set one AC drive as master in speed control and the other as slave in torque control. The slave receives the master's output torque as the torque command and must follow the master rapidly. In this case, the acceleration/deceleration time of the slave in torque control is set to 0.0s.

Group A1: Virtual X (VX)/Virtual DO (VDO)

A1-00	VX1 function selection	Default	0
	Setting Range	0 ~ 59	
A1-01	VX2 function selection	Default	0
	Setting Range	0 ~ 59	
A1-02	VX3 function selection	Default	0
	Setting Range	0 ~ 59	
A1-03	VX4 function selection	Default	0
	Setting Range	0 ~ 59	
A1-04	VX5 function selection	Default	0
	Setting Range	0 ~ 59	

VX1 to VX5 have the same functions as X terminals on the control board and can be used for digital input. For more details, see description of F4-00 to F4-09.

A1-05	VX state setting mode		Default	00000
	Setting Range	Unit's digit	VX1	
		0	Decided by state of VDOx	
		1	Decided by A1-06	
		Ten's digit	VX2 (0, 1 same as VX1)	
		Hundred's digit	VX3 (0, 1 same as VX1)	
		Thousand's digit	VX4 (0, 1 same as VX1)	
		Ten thousand's digit	VX5 (0, 1 same as VX1)	

A1-06	VX state selection		Default	00000
	Setting Range	Unit’s digit	VX1	
		0	Invalid	
		1	Valid	
		Ten’s digit	VX2 (0, 1 same as VX1)	
		Hundred’s digit	VX3 (0, 1 same as VX1)	
		Thousand’s digit	VX4 (0, 1 same as VX1)	
		Ten thousand’s digit	VX5 (0, 1 same as VX1)	

Different from X terminals, VX state can be set in two modes, selected in A1-05:

Decided by state of VDOx

Whether the state a VX is valid is determined by the state of the corresponding VDO and VXx is uniquely bound to VDOx (x is between 1 and 5).

For example, to implement the function that the AC drive reports an alarm and stops when the AI1 input exceeds the limit, perform the following setting:

Allocate VX1 with function 44 “User-defined fault 1” (A1-00=44);

Set A1-05 to xxx0;

Allocate VDO1 with function 31 “AI1 input limit exceeded” (A1-11=31).

When the AI1 input exceeds the limit, VDO1 becomes ON. At this moment, VX1 becomes ON and the AC drive receives you-defined fault 1. Then the AC drive reports Err27 and stops.

Decided by A1-06

The VX state is determined by the binary bit of A1-06. For example, to implement the function that the AC drive automatically enters the running state after power-on, perform the following setting:

Allocate VX1 with function 1 “Forward RUN (FWD)” (A1-00=1);

Set A1-05 to xxx1: The state of VX1 is decided by A1-06;

Set A1-06 to xxx1: VX1 is valid;

Set F0-02 to 1: The command source to terminal control;

Set F8-18 to 0: Startup protection is not enabled.

When the AC drive completes initialization after power-on, is detects that VX1 is valid and VX1 is allocated with the function of forward RUN. That is, the AC drive receives the forward RUN command from the terminal. Therefore, the AC drive starts on run in forward direction.

A1-07	Function selection for AI1 used as X	Default	0
	Setting Range	0 ~ 59	

<table>
<tr><td rowspan="2">A1-08</td><td colspan="2">Function selection for AI2 used as X</td><td>Default</td><td>0</td></tr>
<tr><td colspan="2">Setting Range</td><td colspan="2">0 ~ 59</td></tr>
<tr><td rowspan="2">A1-09</td><td colspan="2">Function selection for AI3 used as X</td><td>Default</td><td>0</td></tr>
<tr><td colspan="2">Setting Range</td><td colspan="2">0 ~ 59</td></tr>
<tr><td rowspan="6">A1-10</td><td colspan="2">State selection for AI used as X</td><td>Default</td><td>000</td></tr>
<tr><td rowspan="5">Setting Range</td><td>Unit’s digit</td><td colspan="2">AI1</td></tr>
<tr><td>0</td><td colspan="2">High level valid</td></tr>
<tr><td>1</td><td colspan="2">Low level valid</td></tr>
<tr><td>Ten’s digit</td><td colspan="2">AI2 (0, 1 same as unit’s digit)</td></tr>
<tr><td>Hundred’s digit</td><td colspan="2">AI3 (0, 1 same as unit’s digit)</td></tr>
</table>

The functions of these parameters are to use AI as X. When AI is used as X, the AI state is high level if the AI input voltage is 7V or higher ans is low level if the AI input voltage is 3V or lower. The AI state is hysteresis if the AI input voltage is between 3V and 7V. A1-10 is used to determine whether high level valid or low level valid when AI is used as X.

The setting of AIs (used as X) function is the same as that of Xs. For details, see the descriptions of group F4.

The following figure takes AI input voltage as an example to describe the relationship between AI input voltage and corresponding X state.

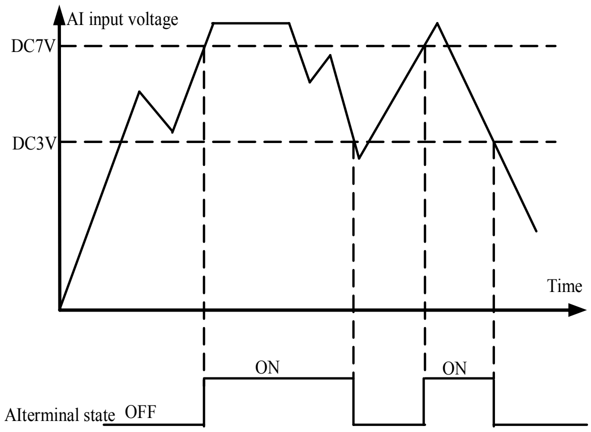


Figure 3-42 Relationship of AI input voltage and corresponding X status

<table>
<tr><td>A1-11</td><td>VDO1 function selection</td><td>Default</td><td>0</td></tr>
<tr><td>A1-0</td><td>Setting Range</td><td colspan="2">0: Short with physical Xx internally
1 ~ 40: Refer to function selection of physical DO in group F5</td></tr>
<tr><td rowspan="2">A1-12</td><td>VDO2 function selection</td><td>Default</td><td>0</td></tr>
<tr><td>Setting Range</td><td colspan="2">Same as A1-11</td></tr>
</table>

A1-13	VDO3 function selection		Default	0
	Setting Range		Same as A1-11	
A1-14	VDO4 function selection		Default	0
	Setting Range		Same as A1-11	
A1-15	VDO5 function selection		Default	0
	Setting Range		Same as A1-11	
A1-16	VDO1 output delay		Default	0.0s
	Setting Range		0.0s ~ 3600.0s	
A1-17	VDO2 output delay		Default	0.0s
	Setting Range		0.0s ~ 3600.0s	
A1-18	VDO3 output delay		Default	0.0s
	Setting Range		0.0s ~ 3600.0s	
A1-19	VDO4 output delay		Default	0.0s
	Setting Range		0.0s ~ 3600.0s	
A1-20	VDO5 output delay		Default	0.0s
	Setting Range		0.0s ~ 3600.0s	
A1-21	VDO state selection		Default	00000
	Setting Range	Unit's digit	VDO1	
		0	Positive logic	
		1	Reverse logic	
		Ten's digit	VDO2 (0, 1 same as unit's digit)	
		Hundred's digit	VDO3 (0, 1 same as unit's digit)	
		Thousand's digit	VDO4 (0, 1 same as unit's digit)	
		Ten thousand's digit	VDO5 (0, 1 same as unit's digit)	

VDO functions are similar to the DO functions on the control board. The VDO can be used together with VXx to implement some simple logic control.

If VDO function is set to 0, the state of VDO1 to VDO5 is determined by the state of X1 to X5 on the control board. In this case, VDOx and Xx are one-to-one mapping relationship.

If VDO function is set to non-0, the function setting and use of VDOx are the same as DO in group F5.

The VDOx state can be set in A1-21. The application examples of VXx involve the use of VDOx, and see the examples for your reference.

Group A2: the Motor 2 Parameters

The H8 can switchover the running among two motors. For the two motors, you can:

Set motor nameplate parameters respectively;

Perform motor parameter auto-tuning respectively;

Select V/F control or vector control respectively;

Set encoder-related parameters respectively;

Set parameters related to V/F control or vector control independently.

Groups A2 respectively correspond to motor 2. Here we just list the parameters of group A2 for reference.

All parameters in group A2 have the same definition and usage as parameters of motor 1. For more details, refer to the descriptions of motor 1 parameters.

A2-00	Motor type selection		Default	0
	Setting Range	0	Common asynchronous motor	
		1	Variable frequency asynchronous motor	
		2	Permanent magnetic synchronous motor	
A2-01	Rated motor power		Default	Model dependent
	Setting Range		0.1KW ~ 1000.0KW	
A2-02	Rated motor voltage		Default	Model dependent
	Setting Range		1V ~ 2000V	
A2-03	Rated motor current		Default	Model dependent
	Setting Range		0.01A ~ 655.35A (AC drive power ≦ 55KW) 0.1A ~ 6553.5A (AC drive power > 55KW)	
A2-04	Rated motor frequency		Default	Model dependent
	Setting Range		0.01Hz to maximum frequency	
A2-05	Rated motor rotational speed		Default	Model dependent
	Setting Range		1rpm ~ 65535rpm	
A2-06	Stator resistance (asynchronous motor)		Default	Model dependent
	Setting Range		0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
A2-07	Rotor resistance (asynchronous motor)		Default	Model dependent
	Setting Range		0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
A2-08	Leakage inductive reactance (asynchronous motor)		Default	Model dependent
	Setting Range		0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	

A2-09	Mutual inductive reactance (asynchronous motor)		Default	Model dependent
	Setting Range		0.1mH ~ 6553.5mH (AC drive power ≦ 55KW) 0.01mH ~ 655.35mH (AC drive power > 55KW)	
A2-10	No-load current (asynchronous motor)		Default	Model dependent
	Setting Range		0.01A to A2-03 (AC drive power ≦ 55KW) 0.1A to A2-03 (AC drive power > 55KW)	
A2-16	Stator resistance (synchronous motor)		Default	Model dependent
	Setting Range		0.001Ω ~ 65.535Ω (AC drive power ≦ 55KW) 0.0001Ω ~ 6.5535Ω (AC drive power > 55KW)	
A2-17	Shaft D inductive (synchronous motor)		Default	Model dependent
	Setting Range		0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	
A2-18	Shaft Q inductive (synchronous motor)		Default	Model dependent
	Setting Range		0.01mH ~ 655.35mH (AC drive power ≦ 55KW) 0.001mH ~ 65.535mH (AC drive power > 55KW)	
A2-20	Back EMF (synchronous motor)		Default	Model dependent
	Setting Range		0.1V ~ 6553.5V	
A2-27	Encoder pulses per revolution		Default	1024
	Setting Range		1 ~ 65535	
A2-28	Encoder type		Default	0
	Setting Range	0	ABZ incremental encoder	
		1	UVW incremental encoder	
		2	Resolver	
		3	SIN/COS encoder	
		4	Wire-saving UVW encoder	
A2-29	Speed feedback PG selection		Default	0
	Setting Range	0	Local PG	
		1	Extension PG	
		2	Pulse setting (X5)	

A2-30	A, B phase sequence of ABZ incremental encoder		Default	0
	Setting Range	0	Forward	
		1	Reserve	
A2-31	Encoder installation angle		Default	0.0°
	Setting Range		0.0° ~ 359.9°	
A2-32	U, V, W phase sequence of UVW encoder		Default	0
	Setting Range	0	Forward	
		1	Reserve	
A2-33	UVW encoder angle offset		Default	0.0°
	Setting Range		0.0° ~ 359.9°	
A2-34	Number of pole pairs of resolver		Default	1
	Setting Range		1 ~ 65535	

Select the encoder type is important, and to set the corresponding parameters and the corresponding expansion card, otherwise it can not be used normally.

A2-36	Encoder wire-break fault detection time		Default	0.0s
	Setting Range		0.0: No action	0.1s ~ 10.0s
A2-37	Auto-tuning selection		Default	0
	Setting Range	0	No auto-tuning	
		1	Asynchronous motor static auto-tuning 1	
		2	Asynchronous motor dynamic auto-tuning	
		3	Asynchronous motor static auto-tuning 2	
		11	Synchronous motor with-load auto-tuning	
		12	Synchronous motor no-load auto-tuning	
A2-38	Speed loop proportional gain 1		Default	30
	Setting Range		1 ~ 100	
A2-39	Speed loop integral time 1		Default	0.50s
	Setting Range		0.01s ~ 10.00s	
A2-40	Switchover frequency 1		Default	5.00Hz
	Setting Range		0.00Hz ~ A2-43	
A2-41	Speed loop proportional gain 2		Default	15
	Setting Range		1 ~ 100	
A2-42	Speed loop integral time 2		Default	1.00s
	Setting Range		0.01s ~ 10.00s	

A2-43	Switchover frequency 2	Default	10.00Hz
	Setting Range	A2-40 to maximum output frequency	
A2-44	Vector control slip gain	Default	100%
	Setting Range	50% ~ 200%	
A2-45	Time constant of speed loop filter	Default	0.050s
	Setting Range	0.000s ~ 1.000s	
A2-46	Vector control over-excitation gain	Default	64
	Setting Range	0 ~ 200	
A2-47	Torque upper limit source in speed control mode	Default	0
	Setting Range	0	A2-48
		1	AI1
		2	AI2
		3	AI3
		4	Pulse setting (X5)
		5	Via communication
		6	MIN (AI1, AI2)
		7	MAX (AI1, AI2)
		1-7 option corresponds to A2-48 digital setting.	
A2-48	Digital setting of torque upper limit in speed control mode	Default	150.0%
	Setting Range	0.0% ~ 200.0%	
A2-49	Torque upper limit source in speed control mode (generator)	Default	0
	Setting Range	0	A2-50
		1	AI1
		2	AI2
		3	AI3
		4	Pulse setting (X5)
		5	Via communication
		6	MIN (AI1, AI2)
		7	MAX (AI1, AI2)
		1-7 option corresponds to A2-50 digital setting.	
A2-50	Digital setting of torque upper limit in speed control mode (generator)	Default	150.0%
	Setting Range	0.0% ~ 200.0%	

A2-51	Excitation adjustment proportional gain		Default	2000
	Setting Range		0 ~ 20000	
A2-52	Excitation adjustment integral gain		Default	1300
	Setting Range		0 ~ 20000	
A2-53	Torque adjustment proportional gain		Default	2000
	Setting Range		0 ~ 20000	
A2-54	Torque adjustment integral gain		Default	1300
	Setting Range		0 ~ 20000	
A2-55	Speed loop integral property		Default	0
	Setting Range		Unit's digit: integral separated 0: Disabled 1: Enabled	
A2-56	Field weakening mode of synchronous motor		Default	0
	Setting Range	0	No field weakening	
		1	Adjustment	
		2	Direct calculation +Adjustment	
A2-57	Field weakening coefficient of synchronous motor		Default	10
	Setting Range		0~ 50	
A2-58	Maximum field weakening current		Default	50.0%
	Setting Range		1% ~ 300.0%	
A2-59	Field weakening automatic adjustment gain		Default	100.0%
	Setting Range		10.0% ~ 500.0%	
A2-60	Field weakening integral multiple		Default	2
	Setting Range		2 ~ 10	
A2-61	Motor 2 control mode		Default	0
	Setting Range	0	Sensor less fux vector control (SVC)	
		1	Closed-loop vector control (FVC)	
		2	Voltage/Frequency (V/F) control	
A2-62	Motor 2 acceleration/deceleration time		Default	0
	Setting Range	0	Same as motor 1	
		1	Acceleration/Deceleration time 1	
		2	Acceleration/Deceleration time 2	

A2-62	Motor 2 acceleration/deceleration time	Default	0
	Setting Range	3	Acceleration/Deceleration time 3
		4	Acceleration/Deceleration time 4
A2-63	Motor 2 torque boost	Default	Model dependent
	Setting Range	0.0%: Automatic torque boost 0.1% ~ 30.0%	
A2-65	Motor 2 oscillation suppression gain	Default	Model dependent
	Setting Range	0 ~ 100	

The following parameters are mainly for the second synchronous motor parameter settings. For more setting information, refer to the descriptions of motor 1 parameters.

A2-66	Synchronous motor output Saturation voltage margin	Default	5%
	Setting Range	1% ~ 100%	
A2-67	synchronous motor initial position angle of the current	Default	80%
	Setting Range	50% ~ 120%	
A2-68	synchronous motor Initial Position angle detection	Default	0
	Setting Range	0：Everytime running detection	
		1：No detection	
		2：The first running detection	
A2-70	Synchronous motor projection machine Rate adjustment gain	Default	100
	Setting Range	50 ~ 500	
A2-71	The maximum ratio of torque to current	Default	0
	Setting Range	0：close 1：open	
A2-73	Adjust the current loop Kp tuning	Default	6
	Setting Range	1 ~ 100	
A2-74	Adjust the current loop Ki tuning	Default	6
	Setting Range	1 ~ 100	
A2-75	Z signal correction	Default	0
	Setting Range	0 ~ 1	

A2-76	SVC speed Filter coefficient stimation	Default	100
	Setting Range	10 ~ 1000	
A2-79	Synchronous motor SVC initial Excitation current limit	Default	30%
	Setting Range	0~ 80.0%	
A2-80	Synchronous motor SVC initial Minimum carrier frequency	Default	2.0K
	Setting Range	0.8K～F0-15	
A2-85	SVC Synchronous motor speed tracking	Default	0
	Setting Range	0:closed 1:open	
A2-86	Zero servo enable	Default	0
	Setting Range	0:closed 1:open	
A2-87	switching frequency	Default	0.3Hz
	Setting Range	0.00Hz～F2-02	
A2-88	Zero servo speed Loop proportional gain	Default	10
	Setting Range	1 ~ 100	
A2-89	Zero servo speed loop integral time	Default	0.5s
	Setting Range	0.01s～10.00s	
A2-90	stopping Prohibit reversal	Default	0
	Setting Range	0:closed 1:open	
A2-91	Stopping angle	Default	0.8°
	Setting Range	0.0°～10.0°	

Group A5: Control Optimization Parameters

A5-00	DPWM switchover frequency upper limit	Default	8.00Hz
	Setting Range	5.00Hz ~ F0-10	

This parameter is valid only for V/F control.

It is used to determine the wave modulation mode in V/F control of asynchronous motor. If the frequency is lower than the value of this parameter, the waveform is 7-segment continuous modulation. If the frequency is higher than the value of this parameter, the waveform is 5-segment intermittent modulation.

The 7-segment continuous modulation causes more loss to switches of the AC drive but smaller current ripple. The 5-segment intermittent modulation causes less loss to switches of the AC drive but larger current ripple. This may lead to motor running instability at high frequency. Do not modify this parameter generally.

For instability of V/F control, refer to parameter F3-11. For loss to AC drive and temperature rise, refer to parameter F0-15.

A5-01	PWM modulation mode		Default	0
	Setting Range	0	Asynchronous modulation	
		1	Synchronous modulation	

This parameter is valid only for V/F control.

Synchronous modulation indicates that the carrier frequency varies linearly with the change of the output frequency, ensuring that the ratio of carrier frequency to output frequency remains unchanged. Synchronous modulation is generally used at high output frequency, which helps improve the output voltage quality.

At low output frequency (100Hz or lower), synchronous modulation is not required. This is because asynchronous modulation is preferred when the ratio of carrier frequency to output frequency is high.

Synchronous modulation takes effect only when the running frequency is higher than 85Hz. If the frequency is lower than 85Hz, asynchronous modulation is always used.

A5-02	Dead-zone compensation mode selection		Default	1
	Setting Range	0	No compensation	
		1	Compensation mode 1	

Generally, you need not modify this parameter. Try to use a different compensation mode only when there is special requirement on the output voltage waveform quality or oscillation occurs on the motor.

A5-03	Random PWM depth		Default	0
	Setting Range	0	Random PWM invalid	
		1 ~ 10	Random PWM depth	

The setting of random PWM depth can make the shrill motor noise softer and reduce the electromagnetic interference. If this parameter is set to 0, random PWM is invalid.

A5-04	Rapid current limit		Default	1
	Setting Range	0	Disabled	
		1	Enabled	

The rapid current limit function can reduce the AC drive's overcurrent faults at maximum, guaranteeing uninterrupted running of the AC drive.

However, long-time rapid current limit may cause the AC drive to overheat , which is not allowed. In this case, the AC drive will report Err40, indicating the AC drive is overloaded and needs to stop.

A5-05	Current detection compensation	Default	5
	Setting Range	0 ~ 100	

It is used to set the AC drive current detection compensation. Too large value may lead to deterioration of control performance. Do not modify it generally.

A5-06	Undervoltage threshold	Default	Model dependent
	Setting Range	200V ~ 2000V	

It is used to set the undervoltage threshold of Err09. The undervoltage threshold 100% of the AC drive of different voltage classes corresponds to different nominal values, as listed in the following table.

Voltage Class	Nominal Value of Undervoltage Threshold
Single-phase 220V	200V
Three-phase 220V	200V
Three-phase 380V	350V
Three-phase 480V	450V

A5-07	SVC optimization mode selection	Default	1
	Setting Range	1	Optimization mode 1
		2	Optimization mode 2

Optimization mode 1: It is used when the requirement on torque control linearity is high.

Optimization mode 2: It is used for the requirement on speed stability is high.

A5-08	Dead-zone time adjustment	Default	150%
	Setting Range	100% ~ 200%	

You can modify the value of this parameter to improve the voltage utilization rate. Too small value may system instability. Do not modify it generally.

A5-09	Overvoltage threshold	Default	Model dependent
	Setting Range	200.0V ~ 2200.0V	

It is used to set the overvoltage threshold of the AC drive. The default values of different voltage classes are listed in the following table:

Voltage Class	Default Overvoltage Threshold
Single-phase 220V	400V
Three-phase 220V	400V
Three-phase 380V	810V

Voltage Class	Default Overvoltage Threshold
Three-phase 480V	890V

Note: The default value is also the upper limit of the AC drive's internal overvoltage protection voltage. The parameter becomes effective only when the setting of A5-09 is lower than the default value. If the setting is higher than the default value, use the default value.

Group A6: AI Curve Setting

A6-00	AI curve 4 minimum input	Default	0.00V
	Setting Range	-10.00V to A6-02	
A6-01	Corresponding setting of AI curve 4 minimum input	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
A6-02	AI curve 4 inflexion 1 input	Default	3.00V
	Setting Range	A6-00 to A6-04	
A6-03	Corresponding setting of AI curve 4 indlexion 1 input	Default	30.0%
	Setting Range	-100.0% ~ 100.0%	
A6-04	AI curve 4 inflexion 2 input	Default	6.00V
	Setting Range	A6-02 to A6-06	
A6-05	Corresponding setting of AI curve 4 indlexion 2 input	Default	60.0%
	Setting Range	-100.0% ~ 100.0%	
A6-06	AI curve 4 maximum input	Default	10.00V
	Setting Range	A6-00 to 10.00V	
A6-07	Corresponding setting of AI curve 4 maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	
A6-08	AI curve 5 minimum input	Default	-10.00V
	Setting Range	-10.00V to A6-10	
A6-09	Corresponding setting of AI curve 5 minimum input	Default	-100.0%
	Setting Range	-100.0% ~ 100.0%	
A6-10	AI curve 5 inflexion 1 input	Default	3.00V
	Setting Range	A6-08 to A6-12	
A6-11	Corresponding setting of AI curve 5 indlexion 1 input	Default	-30.0%
	Setting Range	-100.0% ~ 100.0%	
A6-12	AI curve 5 inflexion 2 input	Default	3.00V
	Setting Range	A6-10 to A6-14	
A6-13	Corresponding setting of AI curve 5 indlexion 2 input	Default	30.0%
	Setting Range	-100.0% ~ 100.0%	

A6-14	AI curve 5 maximum input	Default	10.00V
	Setting Range	A6-14 to 10.00V	
A6-15	Corresponding setting of AI curve 5 maximum input	Default	100.0%
	Setting Range	-100.0% ~ 100.0%	

The function of curve 4 and curve 5 is similar to that curve 1 to curve 3, but curve 1 to curve 3 are lines, and curve 4 and curve 5 are 4-point curves, implementing more flexible corresponding relationship. The schematic diagram of curve 4 and curve 5 is shown in the following figure.

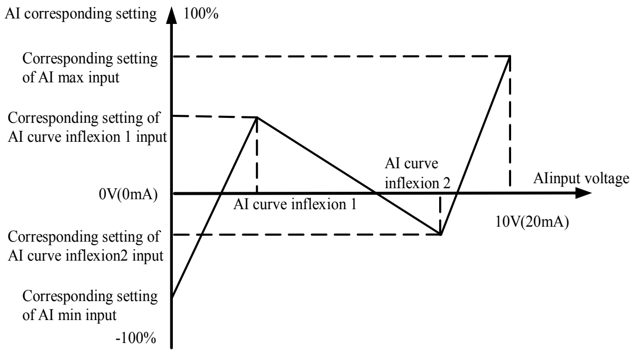


Figure 6-43 Schematic diagram curve 4 and curve 5

When setting curve 4 and curve 5, note that the curve's minimum input voltage, inflexion 1 voltage, inflexion 2 voltage and maximum voltage must be in increment order.

F4-34 (AI curve selection) is used to select curve for AI1 to AI3.

A6-24	Jump point of AI1 input corresponding setting	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
A6-25	Jump amplitude of AI1 input corresponding setting	Default	0.5%
	Setting Range	0.0% ~ 100.0%	
A6-26	Jump point of AI2 input corresponding setting	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
A6-27	Jump amplitude of AI2 input corresponding setting	Default	0.5%
	Setting Range	0.0% ~ 100.0%	
A6-28	Jump point of AI3 input corresponding setting	Default	0.0%
	Setting Range	-100.0% ~ 100.0%	
A6-29	Jump amplitude of AI3 input corresponding setting	Default	0.5%
	Setting Range	0.0% ~ 100.0%	

The AI terminals (AI1 to AI3) of the H8 all support the corresponding setting jump function, which fixes the AI input corresponding setting at the jump point when AI input corresponding setting jumps around the jump range.

For example, AI1 input voltage jumps around 5.00V and the jump range is 4.90V ~ 5.10V. AI1minimum input 0.00V corresponds to 0.0% and maximum input 10.00V corresponds to 100.0%. The detected AI1 input corresponding setting varies between 49.0% and 51.0%. If you set A6-16 to 50.0% and A6-17 to 1.0%, then the obtained AI1 input corresponding setting is fixed to 50.0%, eliminating the fluctuation effect.

Group A7: User Programmable Function

Please refer to "H8" series of User Programmable Function cards.

Group A8: Point-point Communication

<table>
<tr><td rowspan="3">A8-00</td><td colspan="2">Master and slave control function</td><td>Default</td><td>0</td></tr>
<tr><td rowspan="2">Setting Range</td><td>0</td><td colspan="2">Disabled</td></tr>
<tr><td>1</td><td colspan="2">Enabled</td></tr>
</table>

It is used to decide whether to enable point-point communication.

Point-point communication indicates direct communication between two or more H8 AC drives by using CANlink. The master gives target frequency or target torque to one or multiple slaves according to its own frequency or torque signal.

If multiple AC drives are connected by using CANlink cards, the terminal resistor of the CANlink card connected to the end AC drive shall be switched on.

If point-point communication is enabled, the CANlink communication addresses of the AC drives are automatically matched without special setting.

The point-point communication rate is set in Fd-00.

<table>
<tr><td rowspan="3">A8-01</td><td colspan="2">Master and slave selection</td><td>Default</td><td>0</td></tr>
<tr><td rowspan="2">Setting Range</td><td>0</td><td colspan="2">Master</td></tr>
<tr><td>1</td><td colspan="2">Slave</td></tr>
</table>

This parameter is used to determine whether the AC drive is master or slave.

At point-point communication, you only need to set the CANlink communication baud rate.

The communication addresses are allocated automatically based on whether the AC drive is master or slave.

<table>
<tr><td rowspan="3">A8-02</td><td colspan="3">Master and slave interaction</td><td>Default</td><td>011</td></tr>
<tr><td rowspan="2">Setting Range</td><td>0</td><td>NO</td><td colspan="2" rowspan="2">Unit’s digit: Whether the Slave follows the master command
Ten’s digit: Whether sending fault information
Hundred’s digit: Whether alarming if the slave gets offline</td></tr>
<tr><td>1</td><td>Yes</td></tr>
</table>

When A8-01 (Master and slave selection) is set to 1 (Slave) and F0-02 (Command source selection) is set to 2 (Communication control), if A8-02 is set to 1, the salve follows the master to start or stop.

If the ten's digit of the slave is set to 1, the slave sends the fault information to the master if a fault occurs on the slave.

If the hundred's digit of the master is set to 1, the master alarms when the salve gets offline.

A8-03	Message frame selection		Default	0
	Setting Range	0	Master and slave control frame	
		1	Droop control frame	

In the master and slave control mode, set this function code of both the master and slave to 0. The master and salve communicate according to the master and slave control frame.

In the droop control mode, set this function code of both the master and slave to 1. The master and salve communicate according to the droop control frame.

A8-04	Zero offset of received data (torque)	Default	0.00%
	Setting Range	-100.00% ~ 100.00%	
A8-05	Gain of received data (torque)	Default	1.00
	Setting Range	-10.00 ~ 10.00	

These two parameters are used to adjust data received from the master and define the torque reference relationship between the master and the slave.

If “b” expresses he zero offset of received data, “k” expresses the gain, and “y” expresses the actually used data. The actually used data can be obtained based on the formula:

$$y = kx + b$$

The value y ranges from -100.00% to 100.00%.

A8-06	Point-point communication interruption detection time	Default	1.0s
	Setting Range	0.0s ~ 10.0s	

It is used to set the point-point communication interruption time at which this fault is detected. If it is set to 0, it indicates no detection.

A8-07	Master data sending cycle at Point-point communication	Default	0.001s
	Setting Range	0.001s ~ 10.000s	

It is used to set the data sending cycle of the master in point-point communication.

A8-08	Zero offset of received data (frequency)	Default	0.00%
	Setting Range	-100.00% ~ 100.00%	
A8-09	Gain of received data (frequency)	Default	1.00
	Setting Range	-10.00 ~ 10.00	

These two parameters are used to adjust data received from the master and define the frequency reference relationship between the master and the slave.

If "b" expresses the zero offset of received data, "k" expresses the gain, and "y" expresses the actually used data. The actually used data can be obtained based on the formula:

$$y = kx + b$$

The value y ranges from -100.00% to 100.00%.

A8-11	Window width	Default	0.50Hz
	Setting Range	0.20 ~ 10Hz	

This parameter is valid only for the master and slave control mode. Modify the setting to ensure synchronization of the master and slave speed within the window width.

Group AC: AI/AO Correction

AC-00	AI1 measured voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-01	AI1 display voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-02	AI1 measured voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-03	AI1 display voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-04	AI2 measured voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-05	AI2 display voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-06	AI2 measured voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-07	AI2 display voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-08	AI3 measured voltage 1	Default	Factory corrected
	Setting Range	-9.999V ~ 10.000V	
AC-09	AI3 display voltage 1	Default	Factory corrected
	Setting Range	-9.999V ~ 10.000V	
AC-10	AI3 measured voltage 2	Default	Factory corrected
	Setting Range	-9.999V ~ 10.000V	
AC-11	AI1 display voltage 2	Default	Factory corrected
	Setting Range	-9.999V ~ 10.000V	

These parameters are used to correct the AI to eliminate the impact of AI zero offset and gain.

They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. Generally, you need not perform correction in the applications.

Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter. Displayed voltage indicates the voltage display value sampled by the AC drive. For details, refer to U0-21, U0-22 and U0-23.

During correction, send two voltage values to each AI terminal, and save the measured values and displayed values to the function codes AC-00 to AC-11. Then the AC drive will automatically perform AI zero offset and gain correction.

If the input voltage and the actual voltage sampled by the AC drive are inconsistent, perform correction on site. Take AI1 as an example. The on-site correction is as follows:

Send a voltage signal (approximately 2V) to AI1;

Measure the AI1 voltage and save it to AC-00;

View the displayed value of U0-21 and save the value to AC-01;

Send a voltage signal (approximately 8V) to AI1;

Measure AI1 voltage and save it to AC-02;

View the displayed value of U0-21 and save the value to AC-03.

At correction of AI2 and AI3, the actually sampled voltage is respectively queried in U0-22 and U0-23.For AI1 and AI2, 2V and 8V are suggested as the correction voltages. For AI3, -8V and 8V are suggested.

AC-12	AO1 target voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-13	AO1 measured voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-14	AO1 target voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-15	AO1 measured voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-16	AO2 target voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-17	AO2 measured voltage 1	Default	Factory corrected
	Setting Range	0.500V ~ 4.000V	
AC-18	AO2 target voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	

AC-19	AO2 measured voltage 2	Default	Factory corrected
	Setting Range	6.000V ~ 9.999V	
AC-20	AI2 measured current 1	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-21	AI2 sampling current 1	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-22	AI2 measured current 2	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-23	AI2 sampling current 2	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-24	AO1 ideal current 1	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-25	AO1 sampling current 1	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-26	AO1 ideal current 2	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	
AC-27	AO1 sampling current 2	Default	Factory corrected
	Setting Range	0.000mA ~ 20.000mA	

These parameters are used to correct the AO.

They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. You need not perform correction in the applications.

Target voltage indicates the theoretical output voltage of the AC drive. Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter.

7

EMC

Chapter 7 EMC

7.1 Definition of Terms

(1) EMC

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems. In other words, EMC includes two aspects: The electromagnetic interference generated by a device or system must be restricted within a certain limit; the device or system must have sufficient immunity to the electromagnetic interference in the environment.

(2) First environment

Environment that includes domestic premises, it also includes establishments directly connected without intermediate transformers to a low-voltage power supply network which supplies buildings used for domestic purposes.

(3) Second environment

Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes.

(4) Category C1 AC drive

Power Drive System (PDS) of rated voltage less than 1000V, intended for use in the first environment.

(5) Category C2 AC drive

PDS of rated voltage less than 1000V, which is neither a plug in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by a professional.

(6) Category C3 AC drive

PDS of rated voltage less than 1000V, intended for use in the second environment and not intended for use in the first environment.

(7) Category C4 AC drive

PDS of rated voltage equal to or above 1000V, or rated current equal to or above 400A, or intended for use in complex systems in the second environment.

7.2 Introduction to EMC Standard

7.2.1 EMC Standard

The H8 series AC drive satisfies the requirements of standard EN61800-3: 2004 Category C2. The AC drives are applied to both the first environment and the second environment.

7.2.2 Installation Environment

The system manufacture using the AC drive is responsible for compliance of the system with the European EMC directive. Based on the application of the system, the integrator must ensure that the system complies with standard EN61800-3: 2004 Category C2, C3 or C4.

The system (machinery or appliance) installed with the AC drive must also have the CE mark. The system integrator is responsible for compliance of the system with the EMC directive and standard EN61800-3: 2004 Category C2.

WARNING
If applied in the first environment, the AC drive may generate radio interference. Besides the CE compliance described in this chapter, users must take measures to avoid such interference, if necessary.

7.3 Selection of Peripheral EMC Devices

7.3.1 Installation of EMC Input Filter on Power Input Side

An EMC filter installed between the AC drive and the power supply can not only restrict the interference of electromagnetic noise in the surrounding environment on the AC drive, but also prevents the interference from the AC drive on the surrounding equipment.

The H8 series AC drive satisfies the requirements of category C2 only with an EMC filter installed on the power input side. The installation precautions are as follows:

(1) Strictly comply with the ratings when using the EMC filter. The EMC filter is category I electric apparatus, and therefore, the metal housing ground of the filter should be in good contact with the metal ground of the installation cabinet on a large area, and requires good conductive continuity. Otherwise, it will result in electric shock or poor EMC effect.

(2) The ground of the EMC filter and the PE conductor of the AC drive must be tied to the same common ground. Otherwise, the EMC effect will be affected seriously.

(3) The EMC filter should be installed as closely as possible to the power input side of the AC drive.

7.3.2 Installation of AC Input Reactor on Power Input Side

An AC input reactor is installed to eliminate the harmonics of the input current. As an optional device, the reactor can be installed externally to meet strict requirements of an application environment for harmonics. The following table lists the recommended manufacturers and models of input reactors.

7.3.3 Installation of AC Output Reactor on Power Output Side

Whether to install an AC output rector on the power output side is dependent on the actual situation. The cable connecting the AC drive and the motor should not be too long; capacitance enlarges when an over-long cable is used and thus high-harmonics current may be easily generated.
If the length of the output cable is equal to or greater than the value in the following table, install an AC output reactor on the power output side of the AC drive.

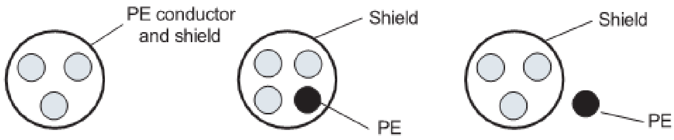
Table 7-1 Recommended manufacturer and models of AC output reactors

AC Drive Power (KW)	Rated Voltage (V)	Cable Length Threshold (m)
4	200 ~ 500	50
5.5	200 ~ 500	70
7.5	200 ~ 500	100
11	200 ~ 500	110
15	200 ~ 500	125
18.5	200 ~ 500	135
22	200 ~ 500	150
≧30	280 ~ 690	150

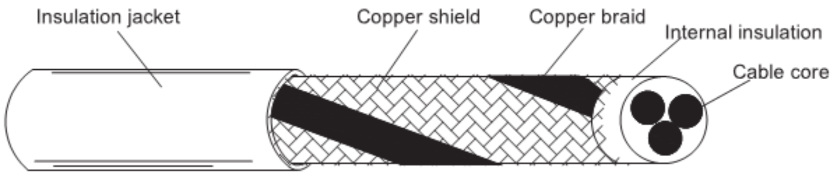
7.4 Shielded Cable

7.4.1 Requirements for Shielded Cable

The shielded cable must be used to satisfy the EMC requirements of CE marking. Shielded cables are classified into three-conductor cable and four-conductor cable. If conductivity of the cable shield is not sufficient, add an independent PE cable, or use a four-conductor cable, of which one phase conductor is PE cable.
The three-conductor cable and four-conductor cable are shown in the following figure.



To suppress emission and conduction of the radio frequency interference effectively, the shield of the shielded cable is cooper braid. The braided density of the cooper braid should be greater than 90% to enhance the shielding efficiency and conductivity, as shown in the following figure.



The installation precautions are as follows:

1) Symmetrical shielded cable is recommended. The four-conductor shielded cable can also be used as an input cable.

2) The motor cable and PE shielded conducting wire (twisted shielded) should be as short as possible to reduce electromagnetic radiation and external stray current and capacitive current of the cable. If the motor cable is over 100 meters long, an output filter or reactor is required.

3) It is recommended that all control cables be shielded.

4) It is recommended that a shielded cable be used as the output power cable of the AC drive; the cable shield must be well grounded. For devices suffering from interference, shielded twisted pair (STP) cable is recommended as the lead wire and the cable shield must be well grounded.

7.4.2 Cabling Requirements

1) the motor cables must be laid far away from other cables. The motor cables of several AC drives can be laid side by side.

2) It is recommended that the motor cables, power input cables and control cables be laid in different ducts. To avoid electromagnetic interference caused by rapid change of the output voltage of the AC drive, the motor cables and other cables must not be laid side by for a long distance.

3) If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Other cables must not run across the AC drive.

4) The power input and output cables of the AC drive and weak-current signal cables (such as control cable) should be laid vertically (if possible) rather than in parallel.

5) The cable ducts must be in good connection and well grounded. Aluminium ducts can be used to improve electric potential.
6) The filter, AC drive and motor should be connected to the system (machinery or appliance) properly, with spraying protection at the installation part and conductive metal in full contact.

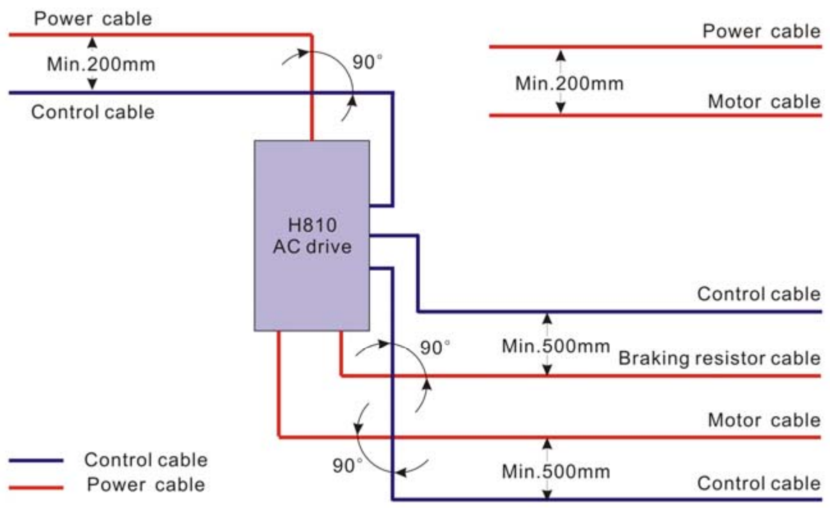


Figure 7-1 Cabling diagram

7.5 Solutions to Current leakage

The output of the AC drive is high-speed pulse voltage, producing high-frequency leakage current during running of the AC drive. To prevent electric shock and even a fire caused by current leakage, it is necessary to install a residual current circuit-breaker for the AC drive.
Each AC drive produces more than 100 mA leakage current. Therefore, the sensitivity current of the residual current circuit-breaker must be above 100 mA. High-frequency pulse interference may cause the circuit-breaker to malfunction, and thus the residual current circuit-breaker must have the high-frequency filtering function.
If multiple AC drives are required, each AC drive must be installed with a circuit-breaker.
The factors that influence the leakage current are as follows:

- AC drive capacity
- Carrier frequency
- Type and length of motor cable
- EMI filter

When the leakage current causes the circuit-breaker to act, you should:

- Increase the sensitivity current of the circuit-breaker.

- Replace the circuit-breaker with a new one with high-frequency suppression function.
- Reduce the carrier frequency.
- Shorten the length of the output cable.
- Install a current leakage suppression device.

7.6 Solutions to Common EMC Interference Problems

The AC drive generates very strong interference. Although EMC measures are taken, the interference may still exist due to improper cabling or grounding during use. When the AC drive interferes with other devices, adopt the following solutions.

Interference type	Solution
Leakage protection switch tripping	● Connect the motor housing to the PE of the AC drive ● Connect the PE of the AC drive to the PE the mains power supply ● Add a safety capacitor to the power input cable ● Add magnetic rings to the input drive cable
AC drive interference during running	● Connect the motor housing to the PE of the AC drive ● Connect the PE of the AC drive to the PE of the mains voltage ● Add a safety capacitor to the power input cable and wind the cable with magnetic rings. ● Add a safety capacitor to the interfered signal port or wind the signal cable with magnetic rings. ● Connect the equipment to the common ground
Communication interference	● Connect the motor housing the the PE of the AC drive ● Connect the PE of the AC drive to the PE of the mains voltage ● Add a safety capacitor to the power input cable and wind the cable with magnetic rings. ● Add a matching resistor between the communication cable source and the load side. ● Add a common grounding cable besides the communication cable ● Use a shielded cable as the communication cable and connect the cable shield to the common grounding point
I/O interference	● Enlarge the capacitance at the low-speed X. A maximum of 0.11uF capacitance is suggested ● Enlarge the capacitance at the AI. A maximum of 0.22uF is suggested

8

Maintenance and Troubleshooting

Chapter 8 Maintenance and Troubleshooting

8.1 Routing Repair and Maintenance of the H8

8.1.1 Routing Maintenance

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

Routine maintenance involves checking:

1) Whether the motor sounds abnormally during running.

2) Whether the motor vibrates excessively during running.

3) Whether the installation environment of the AC drive changes.

4) Whether the AC drive’s cooling fan works normally.

5) Whether the AC drive overheats

Routine cleaning involves:

1) Keep the AC drive clean all the time.

2) Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.

3) Clear the oil stain on the cooling fan of the AC drive.

8.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

1) Check and clean the air duct periodically.

2) Check whether the screws become loose.

3) Check whether the AC drive is corroded.

4) Check whether the wiring terminals show signs of arcing.

5) Main circuit insulation test

Prompt:

● Before measuring the insulating resistance with megameter (500VDC megameter recommended), disconnect the main circuit from the AC drive.

● Don’t use the insulating resistance meter to test the insulation of the control circuit.

● The high voltage test need not be performed again because it has been completed before delivery.

8.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follow:

Component	Service Life	Possible Damage Reason	Judging Criteria
Fan	2 to 3 years	● Bearing worn ● Blade aging	● Whether there is crack on the balde ● Whether there is abnormal vibration noise upon startup
Electrolytic capacitor	4 to 5 years	● Input power supply in poor quality ● High ambient temperature ● Frequent load jumping ● Electrolytic aging	● Whether there is liquid leakage ● Whether the safe valve has projected ● Measure the static capacitance ● Measure the insulating resistance

Prompt

The standard time of the replacement is when the following conditions are used, and the user can determine the replacement period according to the running time.

●Environmental temperature: the annual average temperature is 30 degrees .

●The load rate: 80%.

●running efficiency: Run less than 20 hours per day.

8.1.4 Storage of the AC Drive

For storage of the AC drive, pay attention to the following two aspects:

1) Pack the AC drive with the original packing box provided by ADTECH.

2) Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

8.2 Warranty Agreement

1) Free warranty only applies to the AC drive itself.

2) ADTECH will provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

3) Reasonable repair expenses will be charged for the damages due to the following causes:

● Improper operation without following the instructions

- Fire, flood or abnormal voltage
- Using the AC drive for non-recommended function

4) The maintenance fee is charged according to ADTECH's uniform standard. If there is an agreement, the agreement prevails.

8.3 Faults and Solutions

The H8 provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is available).

Before contacting ADTECH for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or ADTECH.

Figure 8-1 Solutions to the faults of the H8

Fault Name	Display	Possible Causes	Solutions
Inverter unit protection	Err01	1: The output circuit is grounded or short circuited. 2: The connecting cable of the motor is too long. 3: The module overheats. 4: The internal connections become loose. 5: The main control board is faulty. 6: The drive board is faulty. 7: The inverter module is faulty.	1: Eliminate external faults. 2: Install a reactor or an output filter. 3: Check the air filter and the cooling fan. 4: Connect all cables properly. 5 ~ 7: Contact the agent or ADTECH.
Overcurrent during acceleration	Err02	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration.	1: Eliminate external faults. 2: Perform the motor auto-tuning 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load.

Fault Name	Display	Possible Causes	Solutions
Overcurrent during acceleration	Err02	8: The AC drive model is of too small power class.	8: Select an AC drive of higher power class.
Overcurrent during deceleration	Err03	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The deceleration time is too short. 4: The voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed.	1: Eliminate external faults. 2: Perform the motor auto-tuning 3: Increase the deceleration time. 4: Adjust the voltage to normal range. 5: Remove the added load. 6: Install the braking unit and braking resistor.
Overcurrent at constant speed	Err04	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The voltage is too low. 4: A sudden load is added during operation. 5: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor auto-tuning 3: Adjust the voltage to normal range. 4: Remove the added load. 5: Select an AC drive of higher power class.
Overvoltage during acceleration	Err05	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
Overvoltage during deceleration	Err06	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor.

Fault Name	Display	Possible Causes	Solutions
Overvoltage at constant speed	Err07	1: The input voltage is too high. 2: An external force drives the motor during deceleration.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor.
Control power supply fault	Err08	The input voltage is not within the allowable range.	Adjust the input voltage to the allowable range.
Undervoltage	Err09	1: Instantaneous power failure occurs on the input power supply. 2: The AC drive's input voltage is not within the allowable range. 3: The bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The drive board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2: Adjust the voltage to normal range. 3 ~ 6: Contact the agent or ADTECH.
AC drive overload	Err10	1: The load is too heavy or locked-rotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.
Motor overload	Err11	1: F9-01 is set improperly. 2: The load is too heavy or locked-rotor occurs on the motor. 3: The AC drive model is of too small power class.	1: Set F9-01 correctly. 2: Reduce the load and check the motor and the mechanical condition. 3: Select an AC drive of higher power class.
Power input phase loss	Err12	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightening board is faulty. 4: The main control board is faulty.	1: Eliminate external faults. 2 ~ 4: Contact the agent or ADTECH.
Power output phase loss	Err13	1: The cable connecting the AC drive and the motor is faulty. 2: The AC drive's three-phase outputs are unbalanced when the motor is running.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal.

Fault Name	Display	Possible Causes	Solutions
Power output phase loss	Err13	3: The drive board is faulty. 4: The module is faulty.	3~ 4: Contact the agent or ADTECH.
Module overheat	Err14	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4:Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
External equipment fault	Err15	1: External fault signal is input via X. 2: External fault signal is input via virtual I/O.	Reset the operation.
Communication fault	Err16	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: F0-28 is set improperly. 4: The communication parameters in group FD are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set F0-28 correctly. 4: Set the communication parameters properly.
Contactor fault	Err17	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty contactor.
Current detection fault	Err18	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Motor auto-tuning fault	Err19	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out	1: Set the encoder type correctly based on the actual situation. 2: Check the cable connecting the AC drive and the motor.
Motor auto-tuning fault (Synchronous motor)		1:F2-10 set too small 2: the encoder set error, the rated frequency or the rated speed set fault.	1: Set F0-10 correctly. 2: Check the encoder, the rated frequency or the rated speed setting.

Fault Name	Display	Possible Causes	Solutions
Motor auto-tuning fault (Synchronous motor)	Err19	3: The PG card is not connected or damaged. 4: The encoder type is set improperly. 5: F1-30 set improperly or the load is too heavy or.	3: Check the PG card connecting correctly. 4: Set the encoder type correctly. 5: Shielding error or re-set the encoder phase, and then auto-tuning again. Select an AC drive of higher power class.
Encoder fault		1: The encoder type is incorrect. 2: The cable connection of the encoder is incorrect. 3: The encoder is damaged. 4: The PG card is faulty.	1: Set the encode type correctly based on the actual situation. 2: Eliminate external faults. 3: Replace the damaged encoder. 4: Replace the faulty PG card.
Encoder fault (Synchronous motor)	Err20	Don't reset the fault, View U0-45 corresponding to the following information: 1: U0-45=1, The encoder and the PG card connection is incorrect or the encoder or the PG card is damaged. 2:U0-45=2, UVW signal line may be abnormal, disconnected or damaged. 3: U0-45=3, Z signal is not received or interfered. 4: U0-45=4, UVW signal in the wrong direction, disconnected or damaged. 5: U0-45=5, Z signal is not connected or damaged. 6: U0-45=6, Z signal is disturbed or ABZ signal is disturbed, or the zero position angle is fault. (F1-31) 7: the encoder set error, the rated frequency or the rated speed set fault.	1: Check the encoder or the PG card connecting correctly. 2: Check the encoder or the PG card connecting correctly. 3: Check the PG card connecting correctly, and Simultaneously check the interference source. 4: Check the encoder or the PG card connecting correctly. 5: Check the PG card connecting correctly, and Simultaneously check the interference source. 6: Check the encoder or the PG card connecting correctly, If you modify the value of F1-31 ， so, re-auto-running. 7: Check the encoder, the rated frequency and the rated speed setting.

Fault Name	Display	Possible Causes	Solutions
Encoder fault (Synchronous motor)	Err20	8: U0-45=11, UVW signal is reversed or not be connected. 9: U0-45=12, the encoder or the PG card is damaged, or UVW signal connecting is faulty.	8: Check the encoder and the PG card connecting correctly. 9: Check the encoder or the PG card connecting correctly.
EEPROM read-write fault	Err21	The EEPROM chip is damaged.	Replace the main control board.
AC drive hardware fault	Err22	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on overvoltage. 2: Handle based on overcurrent.
Short circuit to ground	Err23	The motor is short circuited to the ground.	Replace the cable or motor.
Accumulative running time reached	Err26	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function.
User-defined fault 1	Err27	1: The user-defined fault 1 signal is input via X. 2: User-defined fault 1 signal is input via virtual I/O.	Reset the operation.
User-defined fault 2	Err28	1: The user-defined fault 2 signal is input via X. 2: User-defined fault 2 signal is input via virtual I/O.	Reset the operation.
Accumulative power-on time reached	Err29	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Load becoming 0	Err30	The AC drive running current is lower than F9-64.	Check that the load is disconnected or the setting of F9-64 and F9-65 is correct.
PID feedback lost during running	Err31	The PID feedback is lower than the setting of FA-26.	Check the PID feedback signal or set FA-26 to a proper value.
Pulse-by-pulse current limit fault	Err40	1: The load is too heavy or locked-rotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.

Fault Name	Display	Possible Causes	Solutions
Motor switchover fault during running	Err41	Change the selection of the motor via terminal during running of the AC drive.	Perform motor switchover after the AC drive stops.
Too large speed deviation	Err42	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: F9-69 and F9-70 are set incorrectly. 4: The connecting cables between Ac drive output terminal UVW and the motor is faulty	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set F9-69 and F9-70 correctly based on the actual situation. 4:Check the connecting cables between Ac drive output terminal UVW and the motor
Motor over-speed	Err43	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: F9-69 and F9-70 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set F9-69 and F9-70 correctly based on the actual situation.
Motor overheat	Err45	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high.	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation measures.
Initial position fault	Err51	The motor parameters are not set based on the actual situation.	Check that the motor parameters are set correctly and whether the setting of rated current is too small.
Initial position angle fault (Synchronous motor)		1:In SVC mode ,the motor start running before there is no stopping. 2, Power output phase loss. 3, Special motor, the motor inductance value is too large.	1.:Confirm the motor to stop or set F2-25 to 1 or 2. 2,:check the motor drive cables is connected. 3:The F9-72 can be set to 1 shielded this fault

Fault Name	Display	Possible Causes	Solutions
Braking circuit fault	Err60	1, DB port and bus "P+" terminal is short circuit. 2, Braking resistance is short circuit. 3, Braking resistance is damaged. 4, Braking module is abnormal.	1: Check the connecting cables. 2: Check braking resistance correctly. 3: Check braking resistance correctly. 4:Contact the agent or ADTECH.
Braking pipe opening time fault	Err61	The opening time of the braking pipe is greater than the F6-16 setting value.	Investigation of the reasons for the long opening of the braking pipe, and can be set by F6-16 to 0 shielded this fault.

8.4 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.

Table 8-1 Troubleshooting to common faults of the AC drive

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on	1: There is no power supply to the AC drive or the power input to the AC drive is too low. 2: The power supply of the switch on the drive board of the AC drive is faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the drive board and the operation panel breaks.	1: Check the power supply. 2: Check the bus voltage. 3: Re-connect the 8-core and 28-core cables. 4: Contact the agent or ADTECH for technical support..
2	Program version is displayed at power-on	1: The cable between the drive board and the control board is in poor contact. 2: Related components on the control board are damaged. 3: The motor or the motor cable is short circuited to the ground.	1: Re-connect the 8-core and 28-core cables. 2: Contact the agent or ADTECH for technical support.

SN	Fault	Possible Causes	Solutions
2	Program version is displayed at power-on	4: The HALL device is faulty. 5: The power input to the AC drive is too low.	1: Re-connect the 8-core and 28-core cables. 2: Contact the agent or ADTECH for technical support.
3	“Err23” is displayed at power-on	1: The motor or the motor output cable is short- circuited to the ground. 2: The AC drive is damaged.	1: Measure the insulation of the motor and the output cable with a megger. 2: Contact the agent or ADTECH for technical support.
4	The AC drive display is normal upon power-on. But After the AC drive runs and stops immediately	1: The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited.	1: Replace the damaged fan. 2: Eliminate external fault.
5	Err14 (module overheat) fault is reported frequency	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the AC drive are damaged (thermal coupler or others).	1: Reduce the carrier frequency (F0-15). 2: Replace the fan and clean the air filter. 3: Contact the agent or ADTECH for technical support.
6	The motor does not rotate after the AC drive runs	1: Check the motor and the motor cables. 2: The AC drive parameters are set improperly (motor parameters). 3: The cable between the drive board and the control board is in poor contact. 4: The drive board is faulty.	1: Ensure the cable between the AC drive and the motor is normal. 2: Replace the motor or clear mechanical faults. 3: Check and re-set motor parameters.
7	The X terminals are disabled	1: The parameters are set incorrectly. 2: The external signal is incorrect. 3: The jumper bar across V and +24V becomes loose. 4: The control board is faulty.	1: Check and reset the parameters in group F4. 2: Re-connect the external signal cables. 3: Re-conform the jumper

SN	Fault	Possible Causes	Solutions
			bar across V and +24V. 4: Contact the agent or ADTECH for technical support.
SN	Fault	Possible Causes	Solutions
8	The motor speed is always low in FVC mode	1: The encoder is faulty. 2: The encoder cable is connected incorrectly or in poor contact. 3: The PG card is faulty. 4: The drive board is faulty.	1: Replace the encoder and ensure the cabling is proper. 2: Replace the PG card. 3: Contact the agent or ADTECH for technical support.
9	The AC drive reports overcurrent and overvoltage frequency	1: The motor parameter are set improperly. 2: The acceleration/ deceleration time is improper. 3: The load fluctuates.	1: Re-set motor parameters or re-perform the motor auto-tuning. 2: Set proper acceleration/deceleration time. 3: Contact the agent or ADTECH for technical support.
10	Err17 is reported upon power-on or running	The soft startup contactor is not picked up.	1: Check whether the contactor cable is loose. 2: Check whether the contactor is faulty. 3: Check whether power supply of the contactor is faulty. 4: Contact the agent or ADTECH for technical support.

9

Appendix

Appendix A: Examples of application

A.1 Starting or Stopping the AC Drive

A.1.1 Selecting the Start/Stop Command Source

There are three start/stop command sources, namely, operation panel control, terminal control, and communication control. You can select the command source in F0-02.

F0-02	Command source selection		Default: 0	Description
	Setting Range	0	Operation panel control (indicator OFF)	Press FWD or STOP to start or stop the AC drive
		1	Terminal control (indicator ON)	A X terminal needs to be defined as the run/stop terminal
		2	Communication control (indicator blinking)	The Modbus-RTU communication protocol is used

1. Panel start or stop control

After you press FWD, the AC drive starts running (the FWD indicator is ON). After you press STOP when the AC drive is in running state, the AC drive stops running (the FWD indicator is OFF).

2. Terminal start or stop control

This control mode is applicable to scenarios where the DIP switch or electromagnetic button is used to start or stop the application system or scenarios where the dry contact signal is used to start or stop the AC drive.

The switch signal mode is set in F4-11. The input terminal of the start/stop signal is set in F4-00 to F4-09. For details, see the description of F4-11 and F4-00 to F4-09.

Example 1:

To use the XP Switch as the start/stop source, and allocate the forward rotation switch signal to X2 and the reverse rotation switch signal to X4, perform the setting as shown in the following figure.

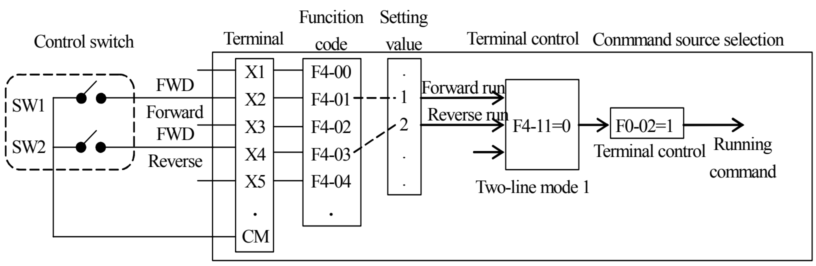


Figure A-1 Setting of using the XP switch of for start/stop

In the preceding figure, when SW1 is ON, the AC drive instructs forward rotation; when SW1 is OFF, the AC drive stops. When SW2 is ON, the AC drive instructs reverse running; when SW2 is OFF, the AC drive stops. If SW1 and SW2 are ON or OFF simultaneously, the AC drive stops.

Example 2:

To use the electromagnetic button as the start/stop source, and allocate the starup signal to X2, stop signal to X3 and reverse rotation signal to X4, perform the setting as shown in the following figure.

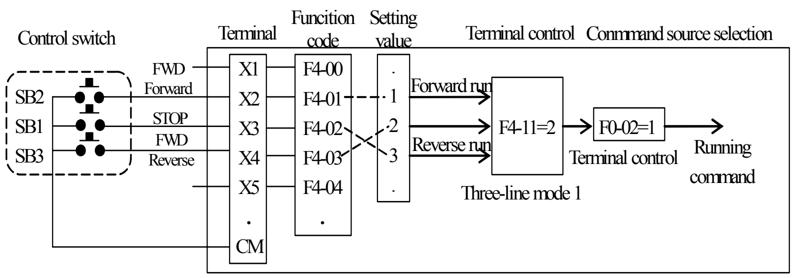


Figure A-2 Setting of using the electromagnetic button for start/stop

In the preceding figure, SB1 must stay ON during normal start and running. The AC drive stops immediately after SB1 becomes OFF. The signals from SB2 and SB3 become valid once they become ON. The running state of the AC drive is determined by the final actions on the three buttons.

3. Communication start/stop control

The most common configuration is when the host computer is used to control running of the AC drive by means of communication, such as the RS485, PROFIBUS-DP, CANlink and CANopen. The H8 interacts with the user programmable card also by means of communication.

Install a matching communication card in the multifunction extension port, and set F0-02 to 2. Then, you can start or stop the AC drive in communication mode. The following figure shows the setting method.

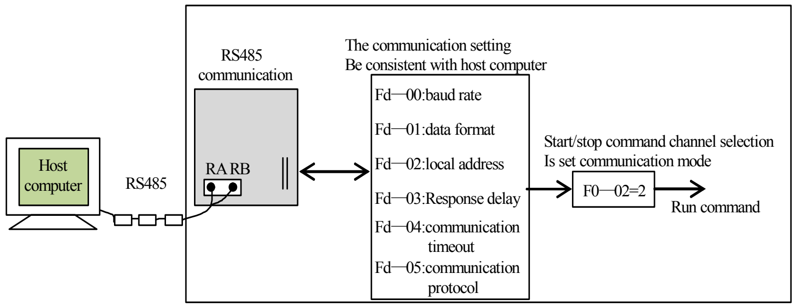


Figure A-3 Communication start/stop control

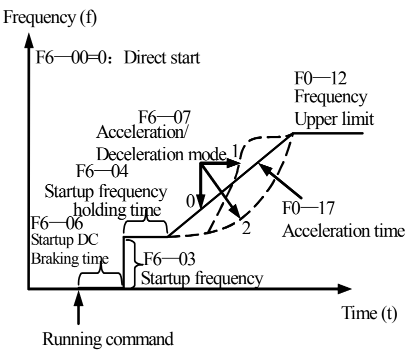
When FD-04 is set to a non-zero number, the function of automatic AC drive stop upon communication timeout is enabled. This prevents uncontrollable AC drive running due to faults of the communication cable or the host computer.

The communication port of the AC drive supports the Modbus-RTU protocol, and the communication is implemented only when the host computer supports the Modbus-RTU master station protocol.

A.1.2 Start mode

The H8 supports three start modes, namely, direct start, rotational speed tracking restart, and pre-excited start (asynchronous motor), set in F6-00.

F6-00=0 (direct start): It is applicable to small-inertia load. The frequency curve in this mode is shown in the following figure. DC braking before the start is applicable to drive of load such as elevator and crane. Startup frequency is applicable to drive with burst start under start torque, such as cement mixer.



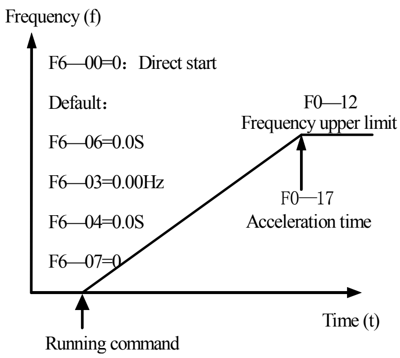


Figure A-4 Frequency curve of direct start

F6-00=1 (Rotational speed tracking restart)

It is applicable to large-inertia load. The frequency curve in this mode is shown in the following figure. If the load motor is still rotating due to the inertia when the AC drive starts, this mode is used to prevent start overcurrent.

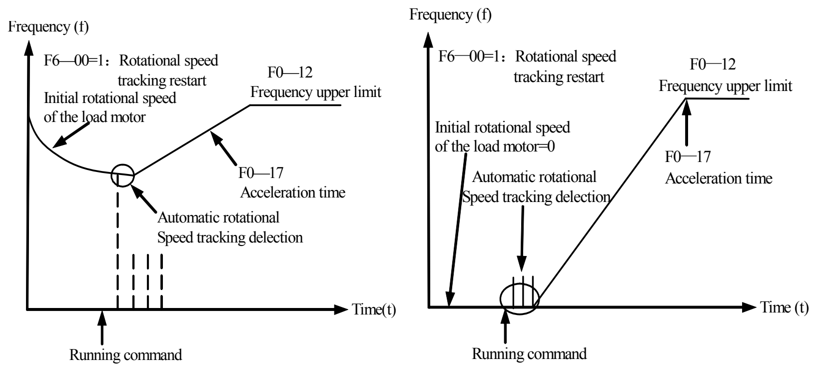


Figure A-5 Frequency curve of rotational speed tracking restart

F6-00=2 (Pre-excited start)

It is applicable only to inductive asynchronous motor. The AC drive performs pre-excitation before start, improving quick response of the motor and meeting the requirements of short acceleration time. The frequency curve in this mode is shown in the following figure.

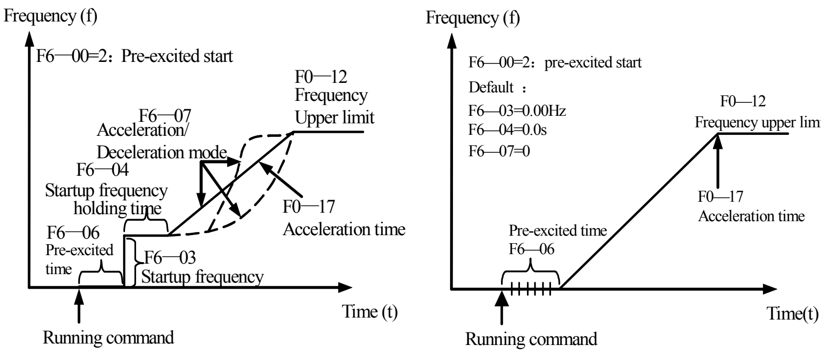


Figure A-6 Frequency curve of pre-excited start

A.1.3 Stop mode

The AC drive supports two stop modes, decelerate to stop and coast to stop, set in F6-10.

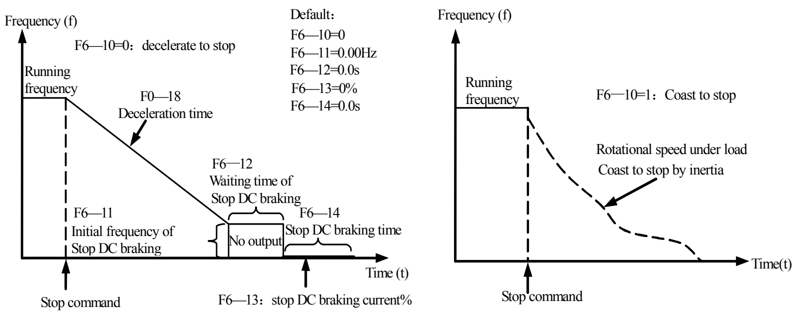


Figure A-7 Diagram of two stop modes

A.1.4 Timing stop

The H8 supports timing stop. This function is enabled by F8-42 and the timing duration is determined by F8-43 and F8-44.

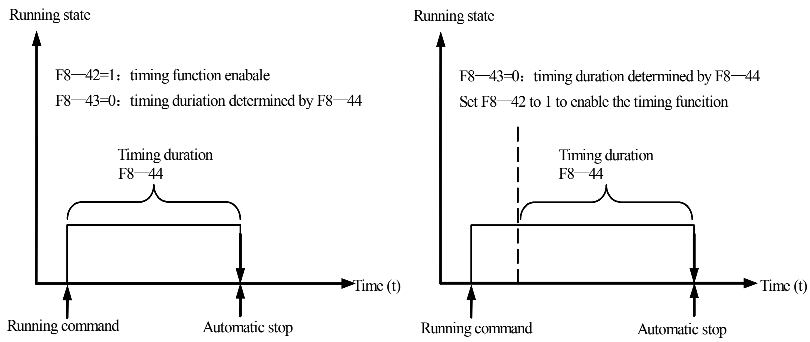


Figure A-8 Setting of the timing stop function

You can set the timing duration by means of analog input (such as potentiometer signal). For details, see the description of F8-43.

A.1.5 JOG running

In certain applications, the AC drive needs to run in low speed temporarily to facilitate equipment test or other commissioning operations. In this case, you can set the AC drive to perform JOG running.

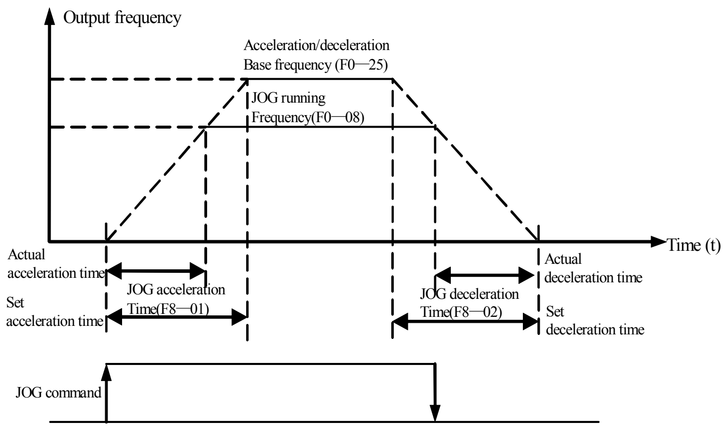


Figure A-9 JOG running

1. Parameter setting and operation of JOG running in operation panel control

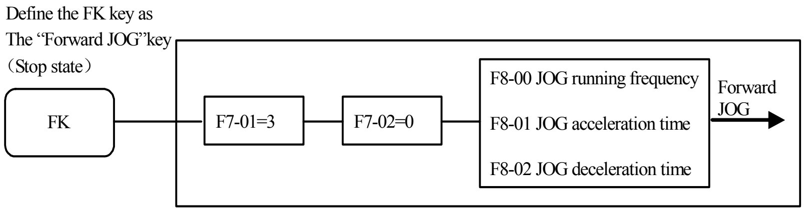


Figure A-10 JOG running in operation panel control

Set the parameters according to the preceding figure. In stop state of the AC drive, hold down FK, and the AC drive starts JOG running. After you release FK, the AC drive decelerates to stop.

To perform reverse JOG, set F7-01 to 4 and F8-13 to 0. Hold down FK and the AC drive starts reverse JOG running.

2. Parameter setting and operation of JOG running in X terminal control

For equipment that requires frequent JOG operations, such as textile machine, it is more convenient to control JOG running by using keys or buttons. To achieve convenient control, perform the setting according to the following figure.

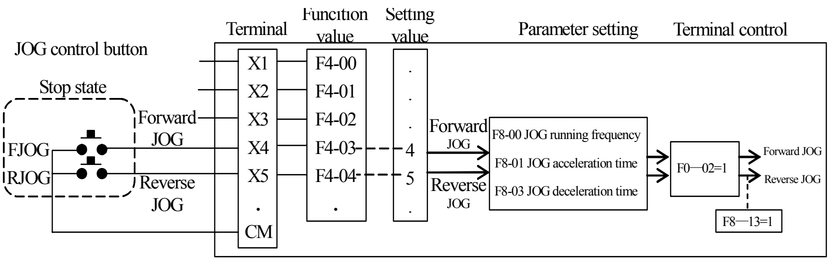


Figure A-11 JOG running in X terminal control

After performing the setting according to the preceding figure, press the FJOG button is stop state of the AC drive. Then, the AC drive starts forward JOG. After you press the FJOG button again, the AC drive decelerates to stop.

A.2 Setting the running frequency

The AC drive provides two frequency sources, namely, main frequency source A and auxiliary frequency source B. You can select one frequency source and switch over between the two sources. You can also perform superposition on the two sources by setting the calculation formula to meet different control requirements of different scenarios.

A.2.1 Frequency setting by the main frequency source

There are nine setting modes of main frequency sources, digital setting (UP/DOWN modification, non-retentive at power failure), digital setting (UP/DOWN modification, retentive at power failure), AI1, AI2, AI3, pulse setting, multi-reference, simple PLC, and communication setting. You can select one in F0-03.

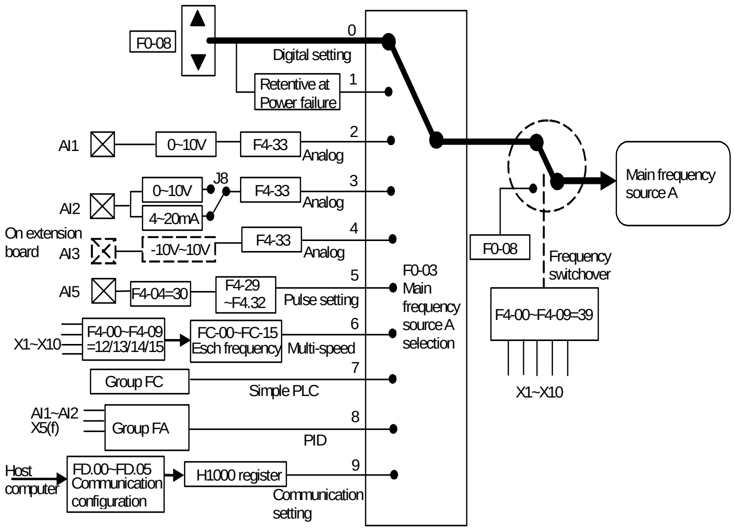


Figure A-12 Frequency set by the main frequency source

According to the preceding figure, the running frequency of the AC drive can be set by means of function codes, manual adjustment, analog input, multi-speed terminal, external feedback signal, internal PID regulator, or the host computer.

Set the corresponding function codes of each frequency setting mode, as shown in the preceding figure.

A.2.2 Frequency setting by the auxiliary frequency source

The frequency setting by the auxiliary frequency source is the same as the frequency setting by the main frequency source. You can set the auxiliary frequency source in F0-04.

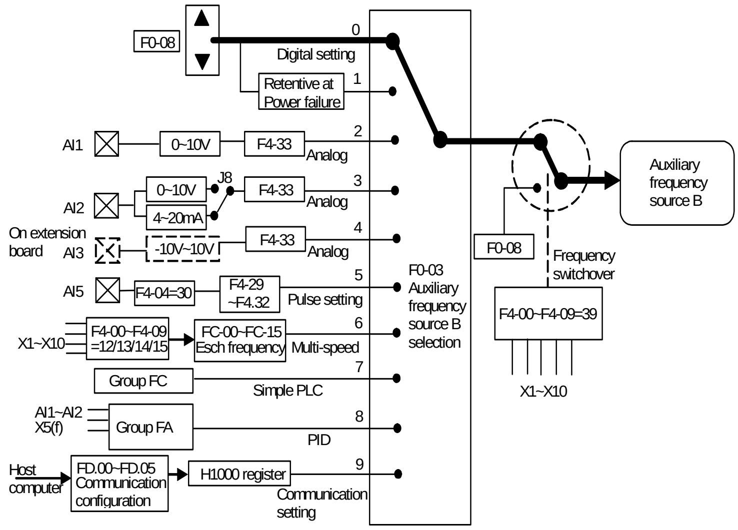


Figure A-13 Frequency set by the auxiliary frequency source

The relationship between the target running frequency and the main frequency source and auxiliary frequency source is set in F0-07, as follows:

Main frequency source A:

The main frequency source is directly used to set the target running frequency.

Auxiliary frequency source B:

The auxiliary frequency source is directly used to set the target running frequency.

A and B operation:

There are four operation methods, namely, A+B, A-B, maximum of A and B, and minimum of A and B.

Frequency switchover:

A X terminal is used to switchover between the preceding three frequency setting channels.

The following figure shows how to set the relationship in F0-07, in which the bold tine indicates the default setting.

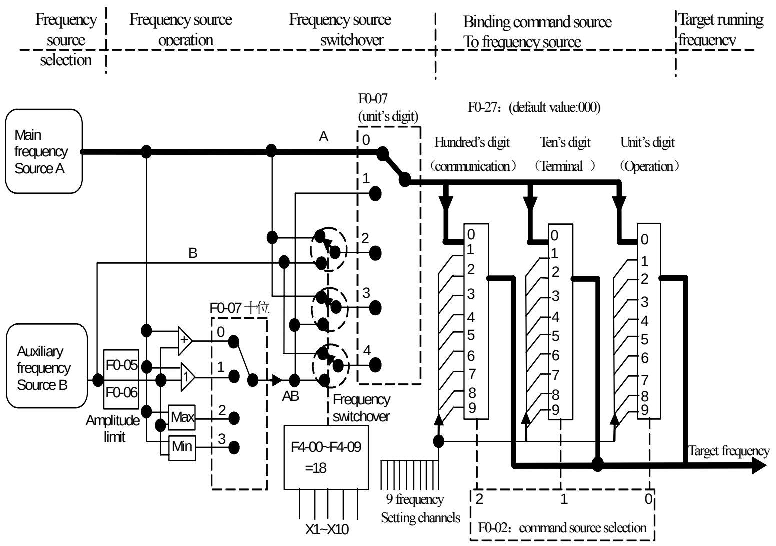


Figure A-14 Relationship between the target running frequency and main and auxiliary frequency sources

The operation between the main frequency source and the auxiliary frequency source can be used for closed-loop speed control. For example, using the main frequency source for setting the required frequency and the auxiliary frequency source for automatic adjustment, in conjunction with switchover performed by the external X terminal signal, the required closed-loop control can be implemented.

A.2.3 Binding command source to frequency source

The three command sources can be separately bound to frequency sources, as shown in figure 4-19. When the specified command source (F0-02) is bound to a frequency source (corresponding digit in the value of F0-27), the frequency is determined by the frequency setting channel set in F0-27. In this case, both main and auxiliary frequency sources are ineffective.

A.2.4 AI as the frequency source

The AI terminal can be used as the frequency source. The H8 provides two AI terminals (AI1 and AI2) on the control board, and the optional I/O extension card provides another AI terminal (AI3).

The following figures show how to use the AI as the frequency source.

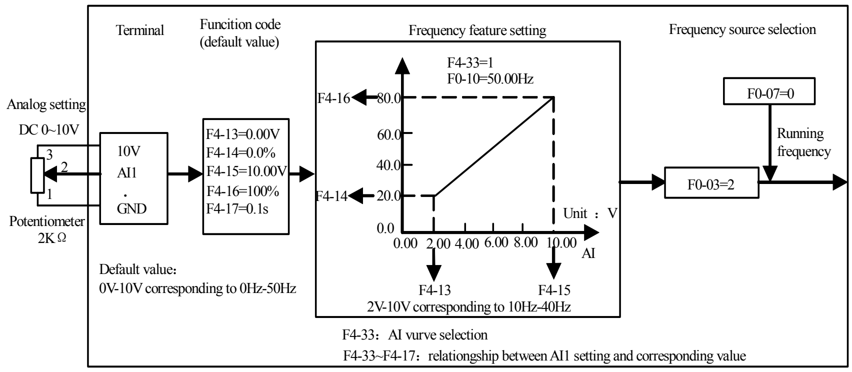


Figure A-15 Voltage input of AI1 connected to the potentionmeter as the frequency source

(1 ~ 10V corresponding to 10 ~ 40Hz)

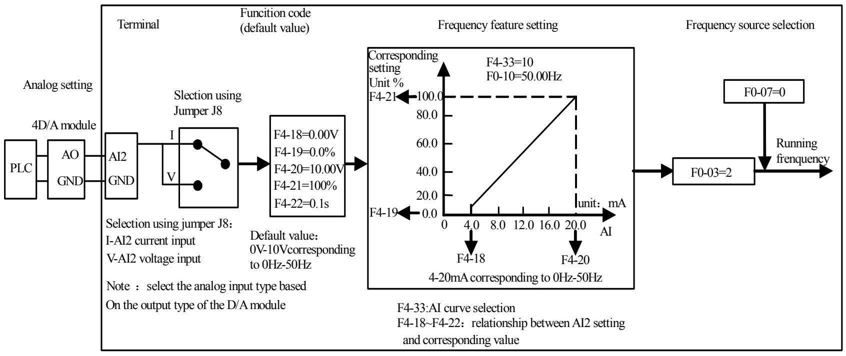


Figure A-16 Current input of AI2 connected to 4DA module of the PLC as the frequency source

(4 ~ 20mA corresponding to 0 ~ 50Hz)

Note:

1) H8 provides two AI terminal (AI1 and AI2) on the control board, and the optional I/O extension card provides another AI terminal (AI3).

2) AI1 provides 0 ~ 10V voltage input. AI2 provides 0 ~ 10V voltage input or 4-20mA current input, determined by jumper J8 on the control board. AI3 provides -10V to +10V bipolar voltage input.

3) When AI is used as the frequency source, 100% of the voltage or current input corresponding setting corresponds to the maximum frequency in F0-10.

4) When the temperature transmitter is used for analog setting, it must be connected to AI3 on the I/O extension card.

5) H8 provides five corresponding relationship curves, which can be selected in F4-33. The input values and corresponding settings of each cure are set in F4-13 to F4-27 and group A6.

A.2.5 Pulse setting as the frequency source

In many scenarios, pulse input is used as the frequency source. The specifications of pulse signals are: voltage 9 ~ 30V, frequency 0 ~ 100KHz.

Only X5can be used for pulse input. The relationship between pulse input from X5 and the corresponding setting is set in F4-28 to F4-31. The relationship is a two-point line, and 100% of pulse input corresponding setting corresponds to the maximum frequency of F0-10, as shown in figure A-17.

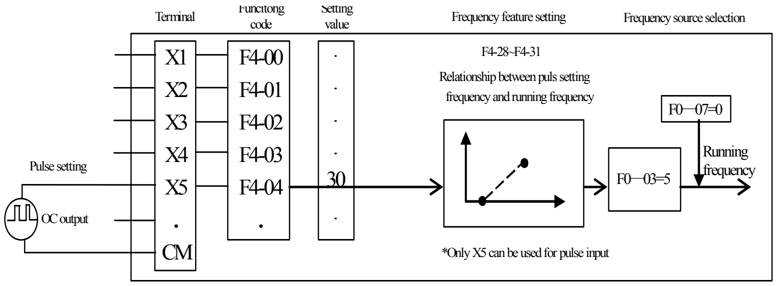


Figure A-17 Pulse setting as the frequency source

A.2.6 Frequency closed-loop control

The H8 has a built-in PID regulator. Together with the frequency sources, the PID regulator can implement automatic adjustment of progress control, such as constant temperature, constant pressure, and tension control.

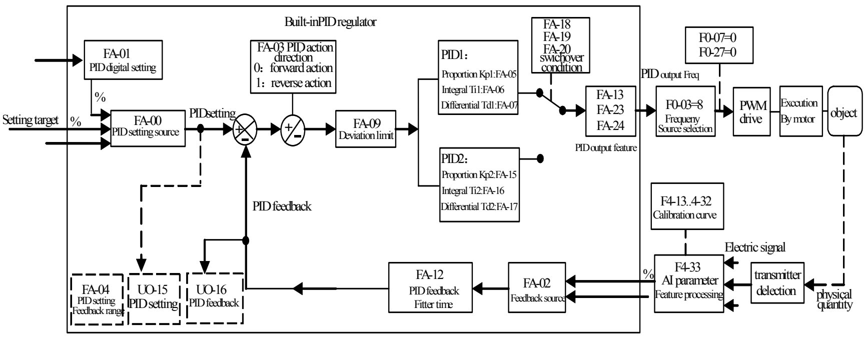


Figure A-18 Automatic adjustment by PID regulator

When PID frequency closed-loop control is implemented, F0-03 (Main frequency source X selection) must be set to 8 (PID). The PID-related parameters are set in group FA, as shown in figure A-18.

The H8 has two built-in equivalent PID calculating units. You can set the features, such as adjustment speed and accuracy, for the two units separately based on the actual conditions. Switchover between the two units can be implemented automatically or by means of an external X terminal.

A.2.7 Swing mode

For the textile and chemical fiber processing equipment, the swing function improves the uniform density of traversing and winding, as shown in figure A-19. The function is set in FB-00 to FB-04. For details, see the description of these function codes.

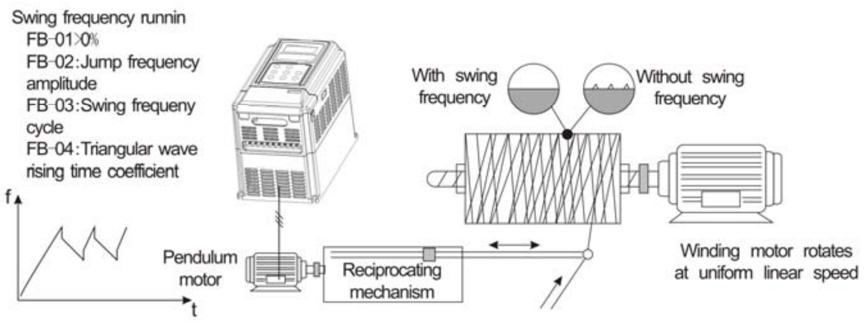


Figure A-19 Swing function

A.2.8 Multi-speed mode

In scenarios where the running frequency of the AC drive need not be adjusted continuously and only several frequencies are required, the multi-speed control can be used. The H8 supports a maximum of 16 running frequencies, which are implemented by state combinations of four X terminals. Set the function codes corresponding to X terminals to a value among 12 to 15, and then the X terminals are specified as the multi-frequency input terminals. The multiple frequencies are set based on the multi-frequency table in group FC. In addition, you need to set F0-03 (Main frequency source A selection) to 6 (Multi-reference). The following figure shows how to set the multi-speed function.

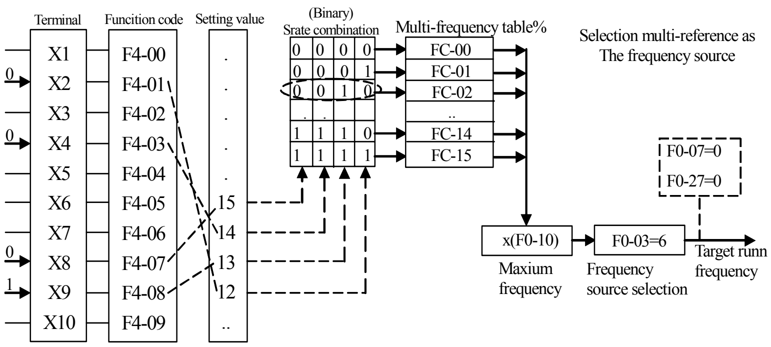


Figure A-20 Setting the multi-speed function

In the preceding figure, X8, X4, X9 and X2 are used as the multi-frequency input terminals, each of which has a bit value. The state combinations of these terminals correspond to multiple frequencies. When (X8, X4, X9, X2)=(0,0,1,0), the state combination value is 2, corresponding to the value set in FC-02. The target running frequency is automatically calculated by FC-02*F0-10.

The H8 supports a maximum of four X terminals to be used as the multi-frequency input terminals. You can also use less than four X terminals, and the empty bit is considered to be 0.

A.2.9 Setting the motor rotating direction

After the AC drive restores the default settings, press FWD to drive the motor to rotate. In this case, the rotating direction is regarded as the forward rotation. If the rotating direction is reverse to the direction required by the equipment, power off the AC drive and exchange any two of the output UVW cables (wait until the main capacitor of the AC drive is completely discharged).

In some applications where both forward rotation and reverse rotation are required, enable the reverse control (F8-13=0, default value) and meanwhile reverse the rotating direction by setting F0-09 to 1. Then press FWD to make the motor rotate in the reverse direction, as shown in the following figure.

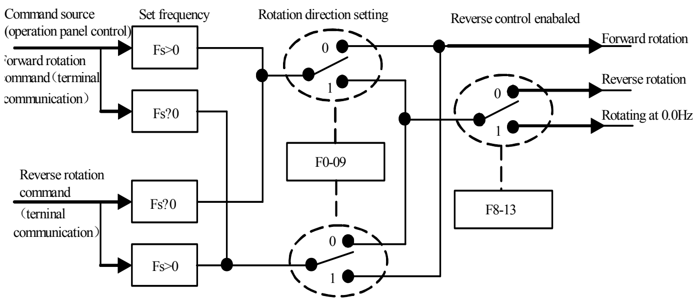


Figure A-21 Reversing the motor rotating direction

If the command source is terminal control and reverse rotation is required, use the default value 0 of F8-13 to enable reverse control.

According to the preceding figure, when the running frequency of the AC drive is set by means of communication (F0-03=9) and reverse control is enabled (F8-13=0), the AC drive instructs the reverse direction if the set frequency Fs is a negative value.

If the give running command is reverse rotation or the set frequency is a negative value, but reverse control is disabled (F8-13=1), the AC drive will run at 0Hz and has no output.

In some applications where reverse rotation is prohibited, do not change the rotating direction by modifying the function codes because the function codes will be restored once the AC drive restores the default settings.

A.2.10 Setting the fixed length control mode

The H8 has the fixed length control function. The length pulses are sampled by the X allocated with function 27 (length count input). The “Actual length” (FB-06) is obtained by dividing the number of pulses sampled by the value of FB-07 (Number of pulsed per meter). If the actual length is larger than the “Set length” (FB-05), the multifunctional DO terminal becomes ON.

In the process of fixed length control, the length can be reset by means of the X terminal allocated with function 28 (length reset). The related setting is shown in the following figure.

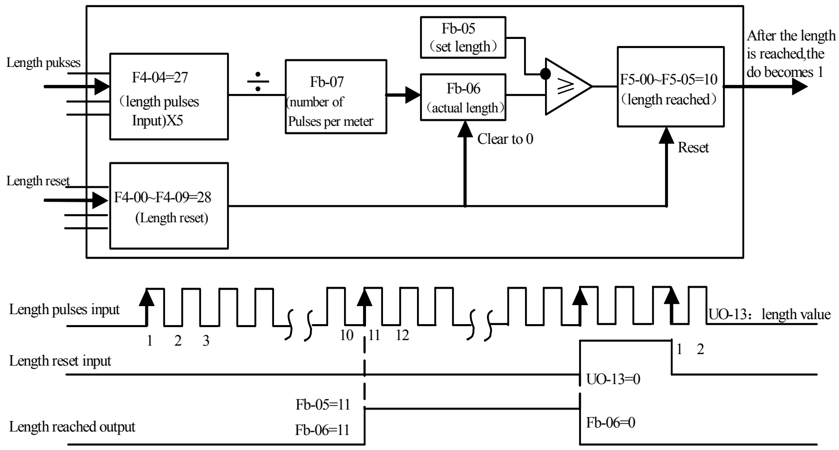


Figure A-22 Function code setting for fixed length control

Note:

In the fixed length control mode, the direction cannot be identified and only the length shall be calculated based on the number of pulses.

Only X5 can be allocated with the function “Length count input”.

An automatic stop system can be implemented if the length reached signal output by the DO is feedback to the AC drive input terminal with the stop function.

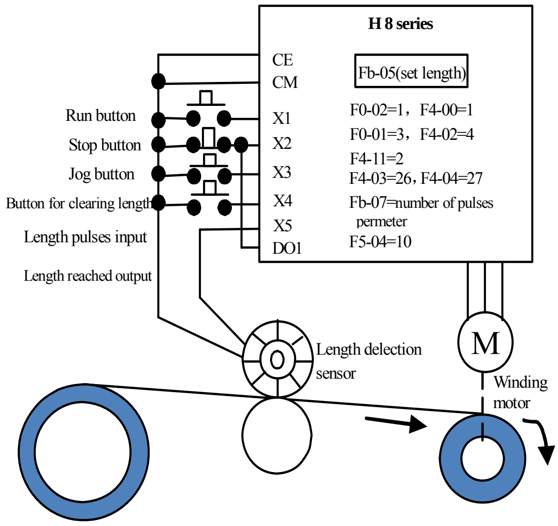


Figure A-23 Common application example of the fixed length control function

A.2.11 Use of the counting function

The count value needs to be collected by the X terminal that is allocated with function 25. When the count value reaches FB-08 (Set count value), the DO terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the count value reaches FB-09 (Designated count value), the DO terminal allocated with function 9 (Designated count value reached) becomes ON. The counter continues to count until “Set count value” is reached.

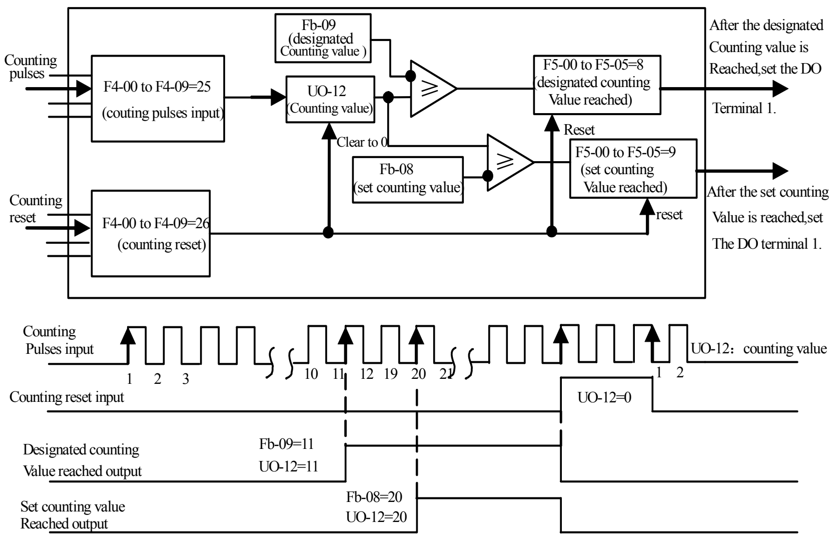


Figure A-24 Parameter setting in the counting mode

Note: FB-09 (Designated count value) must not be greater than FB-08 (Set count value).
X5 must be used when the pulse frequency is high.
The DO terminal that is allocated with function 9 (Designated count value reached) and the DO terminal that is allocated with function 8 (Set count value reached) must be the same.
In the RUN/STOP state of the AC drive, the counter will not stop until “Set count value” is reached.
The count value is retentive at power failure.
An automatic stop system can be implemented if the signal output by the DO terminal with the function (Count value reached) is feedback to the X terminal of the AC drive with stop function.

A.3 Setting and auto-tuning of motor parameters

A.3.1 Motor parameters to be set

When the AC drive runs in the vector control mode (F0-01=0 or 1), accurate motor parameters are required to ensure desired driver performance and running efficiency. This is extremely different from the V/F control (F0-01=2).
Motor parameters (motor 1 by default) that need to be set are listed in the following table.

Parameter	Description	Remark
F1-00	Motor type	Asynchronous motor, variable-frequency asynchronous motor, synchronous motor
F1-01 to F1-05	Rated motor power, Rated motor voltage, Rated motor current, Rated motor frequency, Rated motor rotational speed	Model parameters, manual input
F1-06 to F1-20	Motor internal equivalent stator resistance, inductive reactance and rotor inductance	Auto-tuning parameters
F1-27 to F1-34	Encoder parameters (these parameter need to be set in the vector control mode with sensor)	Encoder parameters

For complicated application system with multiple motors, the parameters of motors 2 are listed in the following table.

Parameter	Description	Remark
A2-00	Motor type	Asynchronous motor, variable-frequency asynchronous motor, synchronous motor

Parameter	Description	Remark
A2-01 to A2-05	Rated motor power, Rated motor voltage, Rated motor current, Rated motor frequency, Rated motor rotational speed	Model parameters, manual input
A2-06 to A2-20	Motor internal equivalent stator resistance, inductive reactance and rotor inductance	Auto-tuning parameters
A2-27 to A2-34	Encoder parameters (these parameter need to be set in the vector control mode with sensor)	Encoder parameters

A.3.2 Motor auto-tuning

To obtain the motor parameters, the AC drive can perform dynamic auto-tuning or static auto-tuning. For the asynchronous motor that cannot be disconnected from the load, you can input the motor parameters of the same model that was successfully auto-tuned before.

Auto-tuning	Application	Result
No-load dynamic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) can be disconnected from the load	Best
With-load dynamic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) cannot be disconnected from the load.	OK
Static auto-tuning 1	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load and dynamic auto-tuning is not allowed. F1-09 and F1-10 are not auto-tuning.	Good
Static auto-tuning 2	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load and dynamic auto-tuning is not allowed.	OK
Manual input	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load. Input the motor parameters of the same model that was successfully auto-tuned before into function codes F1-00 to F1-10.	OK

The following motor auto-tuning description takes motor 1 as an example. The auto-tuning of motor 2 is the same and only the function codes are change correspondingly.

The process of motor auto-tuning is as follows:

1) If the motor can be disconnected from the load, disconnect the motor from the load

mechanically after power-off so that the motor can run without load.

2) After power-on, set F0-02 (Command source selection) to 0 (Operation panel control).

3) Input the motor nameplate parameters (such as F1-00 to F1-05) correctly and input the following parameters based on the actually selected motor.

Motor	Parameter
Motor 1	F1-00: Motor type selection F1-01: Rated motor power F1-02: Rated motor voltage F1-03: Rated motor current F1-04: Rated motor frequency F1-05: Rated motor rotational speed
Motor 2	A2-00 to A2-05, defined the same as F1-00 to F1-05

4) For asynchronous motor, set F1-37 (Auto-tuning selection) to 3 (Asynchronous motor complete auto-tuning). For motors 2, the corresponding function code is A2-37. Press ENTER on the operation panel. The operation panel displays:

Then press FWD on the operation panel. The AC drive will drive the motor to accelerate/ decelerate and run in the forward/reverse direction, and the RUN indicator is ON. The auto-tuning lasts approximately 2 minutes. When the preceding display information disappears and the operation panel returns to normal parameter display status, it indicates that the auto-tuning is complete.

The AC drive will automatically calculate the following motor parameters:

Motor	Parameter
Motor 1	F1-06: Stator resistance (asynchronous motor) F1-07: Rotor resistance (asynchronous motor) F1-08: Leakage inductive reactance (asynchronous motor) F1-09: Mutual inductive reactance (asynchronous motor) F1-10: No-load current (asynchronous motor)
Motor 2	A2-06 to A2-10, defined the same as F1-06 to F1-10

If the motor cannot be disconnected from the load, set F1-37 (auto-tuning selection) to 3 (asynchronous motor dynamic auto-tuning 2) and then press FWD on the operation panel. The motor auto-tuning starts.

Note:

In the synchronous motor system driven by H8, and encoder for signal feedback is required. Therefore, you need to set the encoder parameters correctly before the auto-tuning. During the synchronous motor auto-tuning, the synchronous motor must rotate, and the best auto-tuning mode is no-load dynamic auto-tuning. If it is not allowed, you can perform with-load dynamic auto-tuning.

A.3.3 Setting and switchover of multiple groups of motor parameters

The AC drive supports switchover between two groups of motor parameters, namely, groups F1, F2 (motor 1 parameters and encoder parameters) and group A2 (motor 2 parameters).
You can select the current effective motor parameter group by means of function code F0-24 or X terminals with functions 41 and 42. When the X terminals with functions 41 and 42 become ON, they are privileged and the setting of F0-24 becomes invalid.

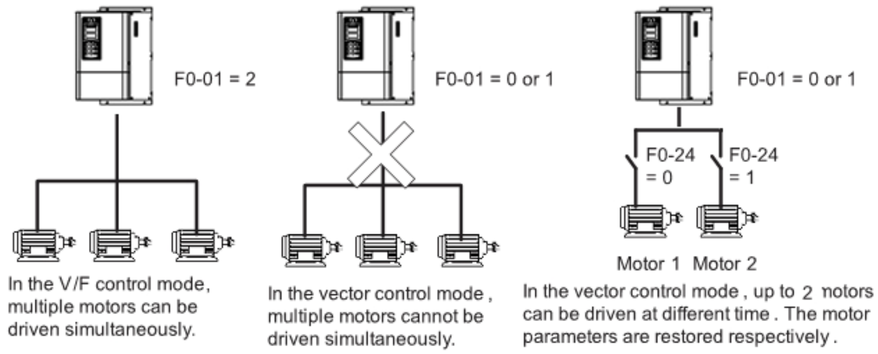


Figure A-25 Driving multiple motors

A.4 Use of X terminals

The control board provides five X terminals X1 to X5. You can obtain another X terminals X6 to X10 by installing an I/O extension card.
The internal hardware of X terminals are configured with 24VDC power supply for detection. You can input a signal to a X terminal of the AC drive only by shorting the X terminal and COM.
By default, F4-38=0000 and F4-39=0000. When a X terminal is shorted to COM, it is active (logic 1). When a X terminal is not shorted to COM, it is inactive (logic 0).
You can change the X terminal active mode. That is, a X terminal is inactive (logic 0) when being shorted with COM, and active (logic 1) when being not shorted to COM. In this case, it is necessary to change the corresponding bit in F4-38 and F4-39 (these two parameters respectively specifying the active mode setting of X1 to X5 and X6 to X10) to 1.
The AC drive also provides F4-10 (X filter time) for the X signal to improve the anti-interference level. For X1 to X3, the AC drive provides the X signal delay function, convenient for some applications requiring delay.

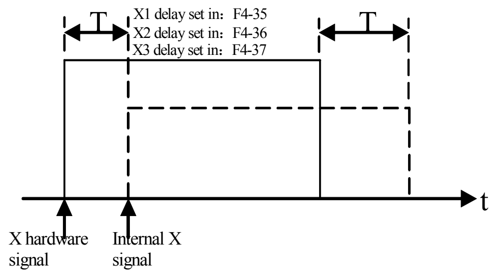


Figure A-26 The X signal delay function

The preceding ten X terminals can be defined in function codes F4-00 to F4-09. Each X can be allocated with their respective function from the 50 functions. For details, see descriptions of F4-00 to F4-09.

The hardware design allows only X5 to receive high-speed pulse signal. If high-speed pulse count is required, use X5.

A.5 Use of DO terminals

The control board provides three DO terminals, namely FM, DO1 and A/B/C. FM and DO1 are transistor outputs and can drive 24 VDC low-voltage circuit; A/B/C is relay output, and can drive 250VAC control circuit.

You can obtain another two terminals A1/C1 and A2/C2 by installing an I/O extension card. A1/C1 and A2/C2 are relay output.

You can define the function of the DO terminals by setting F5-01 and F5-05 to indicate the running state and alarm information of the AC drive. There are a total of 40 functions. For details, see the descriptions of group F5.

Terminal	Corresponding Function Code	Output Feature Description
FM-CE	F5-06 when F5-00=0	Transistor, able to output high-speed pulses 10Hz to 100KHz; drive capacity: 24VDC, 50mA
	F5-01 when F5-00=1	Transistor; drive capacity: 24VDC, 50mA
A-B-C	F5-02	Relay; dive capacity: 250VAC, 3A
A1-C1	F5-03	Extension card, relay; drive capacity:250VAC, 3A
DO1-CE	F5-04	Transistor; drive capacity: 24VDC, 50mA
A2-C2	F5-05	Extension card, relay; drive capacity: 250VAC, 3A

When F5-00=0, the FM terminal is high-speed pulse output. The frequency of output pulses indicates the value of the internal running parameters. The greater the value is, the higher the output pulse frequency is. The 100% value corresponds to 100KHz. The property of the indicated internal parameter is defined by F5-06.

A.6 Use of AI terminals

The AC drive supports a total of three AI terminals, among which AI1 and AI2 are provided on the control board and AI3 is provided on the extension card.

Terminal	Input signal characteristic
AI1-GND	It receives the signal of 0 ~ 10VDC.
AI2-GND	If J8 is connected to the position with "V" mark, it receives the signal of 0 ~ 10VDC. If J8 is connected to the position with "I" mark, it receives the signal of 4 ~ 20mA.
AI3-GND	It is provided on the extension card and receives the signal of -10 to +10VDC.

As external voltage/current signal, AI is used for frequency source setting, torque setting, voltage setting at V/F separation, and PID setting or feedback. The corresponding relationship of the voltage or current and actual setting or feedback is defined by F4-13 to F4-27.

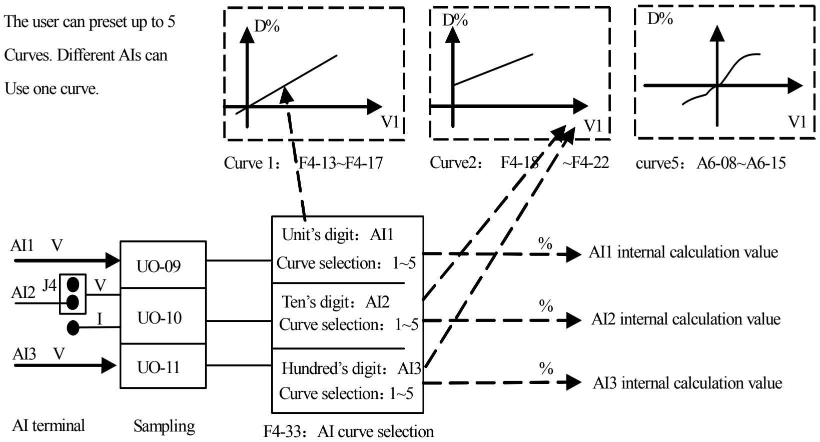


Figure A-27 Defining corresponding relationship of the voltage or current and actual setting or feedback

The sampling of AI terminals can be queried in U0-09 to U0-11. The calculation value is for internal subsequent calculation and cannot be directly read by the user.

A.7 Use of AO terminals

The AC drive supports a total of two AO terminals, among which AO1 is provided by the control board and AO2 is provided on the extension card.

Terminal	Output Signal Characteristic
AO1-GND	If J5 is connected to the position with "V" mark, it outputs the signal of 0 ~ 10VDC. If J5 is connected to the position with "I" mark, it outputs the signal of 0 ~ 20mA.
AO2-GND	It is provided on the extension card and outputs the signal of 0 ~ 10VDC.

AO1 and AO2 can be used to indicate the internal running parameters in the analog mode.

The property of indicated parameters can be defined by F5-07 and F5-08.
The designated running parameters can be rectified before output. The rectification feature is Y = kX + b, among which “X” indicates the running parameters to be output, and “k” and “b” of AO1 can be set by F5-10 and F5-11.

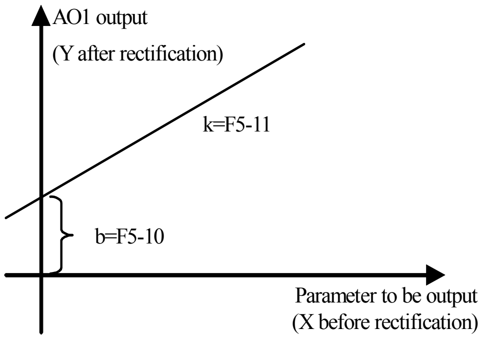


Figure A-28 analog output rectification feature

A.8 Use of the PG terminals

The closed-loop vector control with sensor (F0-01=1) helps to improve the speed stability accuracy of the AC drive. In this case, it is necessary to install an encoder for the motor. Signals from the encoder are feedback to the AC drive through the PG card. The H8 provides PG cards of four different types of signal features.
The AC drive supports four types of encoder, differential encoder, UVW encoder (wire-saving UVW encoder), resolver, open-collector encoder.
The setting of encoder parameters varies with the actually used encoder type. Here takes motor 1 parameters as an example for description.
For the differential encoder, set F1-27 (Encoder pulses per revolution) and set F1-28 to 0 (ABZ incremental encoder).
For the UVW encoder, set F1-27 (Encoder pulses per revolution) and set F1-28 to 1 (UVW incremental encoder).
For the resolver, set F1-28 to 2 (Resolver).
For the open-collector encoder, set F1-27 (Encoder pulses per revolution) and set F1-28 to 0 (ABZ incremental encoder).
For the wire-saving UVW encoder, set F1-27 (Encoder pulses per revolution) and set F1-28 to 4 (Wire-saving UVW encoder).

A.9 Use of serial communication

When communication mode RS485, Profibus-DP or CANopen are adopted, you need to install a corresponding extension card on the H8 series AC drive, and set F0-28 correctly according to the used communication protocol type. CAN-link is enabled by default and you need not select it.

For the configuration of hardware communication parameters for the communication port, see group FD. Set the communication rate and data format to consistent with those of the host computer, which is the precondition of normal communication.

The H8 serial port itself supports the Modbus RTU slave communication protocol. You can query or modify the AC drive's function codes, query various running state parameters, and send running command and running frequency to the AC drive from the host computer through the serial port.

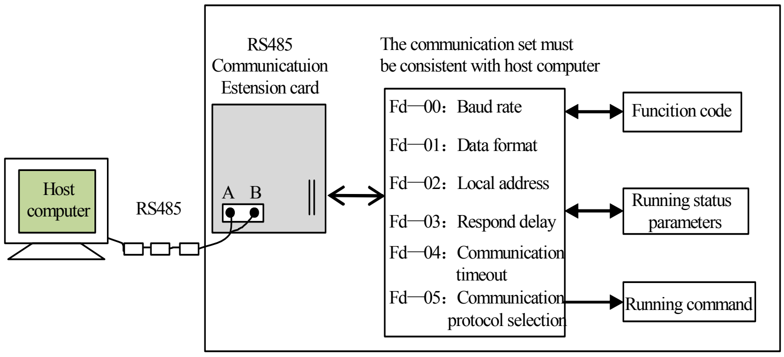


Figure A-27 Communication control mode of the AC drive

The H8 arranges the function codes, running state parameters and running commands in the "register parameter address" mode. The host computer can define the protocol of communication data interaction.

Appendix B Use of Multifunctional Extension Interfaces

The extension card and functions are described in the following table:

Table B-1 The extension detailed description

Name	Model	Function	Remark
I/O extension card 1	H8IO1	It extends five Xs, an analog voltage input AI3 (isolation analog), two relay output, and an AO2.	Applied to all models
CANlink communication extension card	H8CAN1	CANlink communication card	Applied to all models
CANopen communication extension card	H8CAN2	CANopen communication card	Applied to all models
Differential encoder interface card	H8PG1	Differential encoder interface card requiring 5V power supply	Applied to all models

B.1 Multifunctional programmable I/O extension card (H8IO1)

1. H8I01 was ADTECH launched the multifunctional programmable I/O extension card; it is matching with the H8 AC drive. It consists of the following resources:

Table B-2 Description of the terminal

Project	Specifications	Description
Input terminal	5 digital signal input	X6~X10
	1 analog voltage signal input	Support voltage (-10V ~ +10V) input signal
Output terminal	2 relay signal output	A1~C2;A2~C2
	1 analog signal input	AO2

2. Mechanical installation and control terminal function description

1) Installation, appearance, control terminal function definition, jumper respectively see Appendix A .

Please disassembly or assembly after the AC drive power-off. Extended installation of small size expansion card and alignment of I/O inverter control board card interface and a positioning hole. Small box must external, and big box can Built-in.

2) Description of control terminal function

Table B-3 Description of the terminal function

Type	Terminal symbol	Terminal name	Functions
Analog input	AI3-GND	Analog input terminals 3	1. Input voltage range: DC -10V ~ 10V 2.select by expansion card jumper J2 for voltage or current output.
The function of digital input terminal	X6-V	Digital input 6	1. Optocoupler isolation, and compatible with bipolar input. 2. Input impedance: 2.4KΩ 3. Level input voltage range: 9 ~ 30V
	X7-V	Digital input 7	
	X8-V	Digital input 8	
	X9-V	Digital input 9	
	X10-V	Digital input 10	
Analog output	AO2-GND	Analog output 2	Output voltage specification: 0V ~ 10V Output current specification: 0mA ~ 20Ma select by expansion card jumper J3 for voltage or current output.
Relay output (RELAY 2)	A1-C1	Normally open terminal	Contact driving ability: AC 250V, 3A, COSφ=0.4 DC 30V, 1A
Relay output (RELAY 3)	A2-C2	Normally open terminal	

B.2 CANlink communication expansion card (H8CAN1) instructions

1. Summary

CANlink communication card research and development is in order to CANlink communication.

2. Mechanical installation and control terminal function description

Please disassembly or assembly after the AC drive power-off. Extended installation of small size expansion card expansion card and alignment of ac drive inverter control board card interface and a positioning hole. Small box must external, and big box can Built-in.

1) Description of the terminal function

Table B-4 Description of the terminal function

Type	Terminal symbol	Terminal name	Functions
CANlink communication	CANH/CANL	Communication interface terminal	CAN communication input terminals
	COM	CAN Communication power supply	

2) Jumper description

Table B-5 Jumper description

J2	Jumper position	Terminal resistance
	Short circuit pin 2, pin 3	No(default factory)
	Short circuit pin 1, pin 2	Connect terminal resistance

In the use of CANlink communication, if at the end of the inverter, it should be connected to terminal resistance (jumper J2).

If connecting line is longer, it is recommended shielded twisted pair cable shielding layer received each node of the com terminal, avoid because of the node reference plane caused inconsistent communication is not stable;

If CAN bus is too long and unstable communications, so, proposes to reduce the use of baud rate.

In connection, pay attention to the relationship of communication distance and baud rate. in following table:

Baud rate/kbps	CAN length/m
1000	30
500	90
250	210
125	500
100	560
50	1000

Note: The communication distance and the baud rate relationship is can bus node number is less than 32 nodes measured reliably communicating data, when the number of nodes is greater than 32, the length of the CAN bus will have certain derating.

B.3 CANopen communication expansion card (H8CAN2) instructions

1. Summary

CANopen communication card research and development is in order to CANopen communication, features are as follows:

1) Support the Heartbeat protocol; report the current status to the master station from the station regularly.

2) Support emergency object.

3) SOD only supports the acceleration transmission mechanism, at most 4 bytes of data.

4) Support the switch setting the slave station numbers (1 ~ 127) and CAN baud rate (125Kbps, 250Kbps, 500Kbps, 1Mbps).

5) H8CAN2 based on the DS-301 CiA standard CANopen interface, the device is described in accordance with DSP-410 CiA, all the values and parameters can be obtained

by the object dictionary (OD).

2. Hardware features:

The interface cards are industrial level design, CAN interface with magnetic coupling isolation module, so that it can be used in harsh environment;

The bus line with lightning protection design, so that it uses safe and reliable;

The product uses the terminal resistance jump (J2) design.

Through the external dial switch can set ID communication node, baud rate.

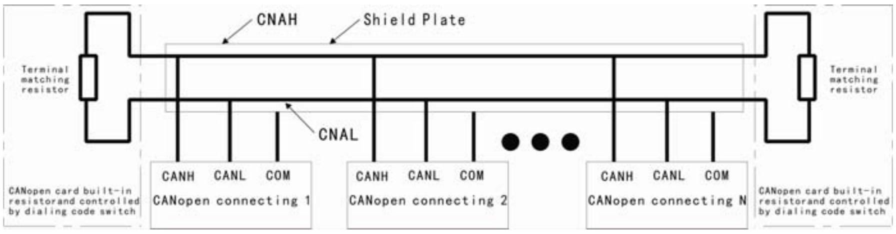
1) Description of the terminal function

Table B-6 Description of the terminal function

Type	Terminal symbol	Terminal name	Functions
CANopen communication	CANH	Communication interface terminal positive	CAN communication input terminals, and Connect control board terminal RA
	CANL	Communication interface terminal Negative	CAN communication input terminals, and Connect control board terminal RB

Note: The CAN bus connection is recommended with a shielded twisted pair and the ends of the bus are respectively connected with two 120Ω matched resistors to prevent the signal reflection, and the shielding layer is generally used for single point reliable grounding.

The CAN bus connection topology as shown following:



2) Jumper description

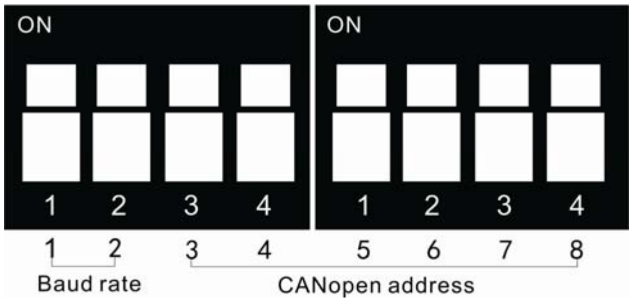
Table B-7 Jumper description

J2	Jumper position	Terminal resistance
	Short circuit pin 2, pin 3	No
	Short circuit pin 1, pin 2	Connect terminal resistance

The H8CAN2 communication card are matched resistor terminal, through jumper settings used, it is recommended to set in the network topology at both ends using terminal resistance, It can be set by the jumper J2.

3) Code definition

The H8CAN2 communication card on the 8 dip switch is used for setting the baud rate of CAN bus communication and communication equipment. The dial switch numbers as shown the following table, the 1, 2 position for setting the baud rate, from 3 to 8 position for setting the CANopen address.



Actual code							
ON S1				ON S2			
1	2	3	4	1	2	3	4
Bit definition							
1	2	3	4	5	6	7	8

Table B-8 Dial description of the CANopen card

NO.	Function	Description		
1 ~ 2	CAN bus baud rate	Bit 1	Bit 2	Baud rate
		0	0	125kb/s
		0	1	250kb/s
		1	0	500kb/s
		1	1	1000kb/s
3 ~ 8	CANopen Network ID	6 bit binary consist of 64 address, range: 0 ~ 63 Address Switch setting 000 0000 007 0111 03F 111111		

Note: Pull down the switch position 1, contrary to the 0.

Appendix C: The Encoder Expansion Card Instructions

1. Summary

H8 series is equipped with a variety of common encoder expansion card as an option to use, is the frequency converter for closed-loop vector control must options. According to the encoder output to selected corresponding PG card, as following table:

Accessories	Description	Others
H8PG1	The differential input PG card, without frequency output	Terminal wiring
H8PG3	UVW differential input PG card, without frequency output	DB Female Socket
H8PG4	Rotary transformer PG card	DB Female Socket
H8PG5	OC input PG card, with 1:1 frequency output	Terminal wiring

2. Control terminal function description

- Please disassembly or assembly of the PG card that after the AC drive power-off.
- Control board connected to extended card through the soft line.
- For more details, please read the full description of PGX card.

Table C-1 Terminal signal definition

Differential input PG card (H8PG1)		
H8PG1 Specifications		
User Interface		Terminal connected by soft line
Power supply		+5VDC
Frequency dividing output		1:1
Maximum rate		500KHz
Input differential signal amplitude		≦ 7V
H8PG1 Terminal signal definition		
Serial number	Grade	Description
1	A+	Encoder output signal A is Positive
2	A-	Encoder output signal A is Negative
3	B+	Encoder output signal B is Positive
4	B-	Encoder output signal B is Negative
5	Z+	Encoder output signal Z is Positive
6	Z-	Encoder output signal Z is Negative
7	5V	The 5V/10mA power supply to provide foreign
8	COM	Power ground
9	PE	Shielding terminal

Appendix D: Modbus Communication Protocol of the H8 Series

H8 series AC drive provides RS485 communication interface, and supports Modbus-RTU slave protocol. Users can realize centralized control, set the Run command via the communication protocol converter, modify or read function code parameters, read the work status and fault information, such as the inverter via a computer or PLC.

D.1 Agreement

The serial communication protocol defines the information content of the serial communication transmission and use format. These include: host polling (or broadcast) format; Host encoding method, including: actions required function code, data transmission and error checking. Response from the machine also uses the same structure, including: action recognition, return data and error checking. If an error occurs during the slave receive information, or the host requested action can not be completed, it will organize an error message as a response back to the host.

1. Application mode

Inverter access RS485 with “single master multi-slave” PC/PLC control network as communication from the machine.

2. Bus structure

1) Hardware Interface

810TX1 RS485 expansion card to be inserted in the drive hardware.

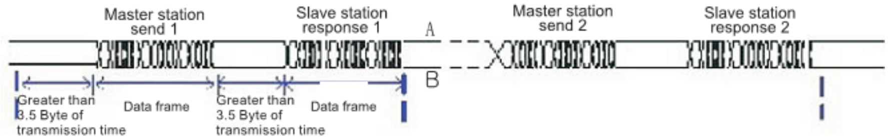
2) Topology

Single master multi-slave system. Each network has a unique communications device slave address, which has a communication device as a host (usually flat PC host computer,PLC, HMI, etc.), initiate communication parameters for the slave to read or write operation, other equipment for communications from the machine, the response of the host machine inquiry or communication operations. There can be only only one device to send data at the same time, while the other devices in the receiving state.

Settings range from machine addresses from 1 to 247, 0 is broadcast communications address. Network slave address must be unique.

3) Communication transmission

Asynchronous serial, half-duplex transmission mode. Asynchronous serial data communication process, in the form of packets sent once a frame of data, MODBUS-RTU protocol agreement, when no data communications data line idle time is greater than the transmission time 3.5 Byte, indicating a new starting communication frame.

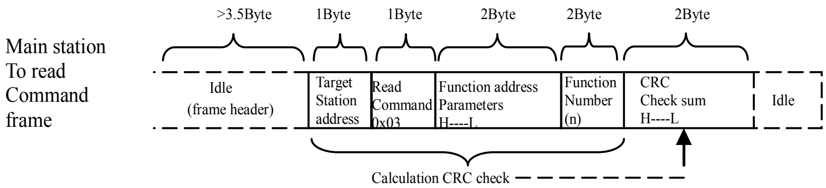


H8 series AC drive built-in communication protocols is Modbus-RTU slave protocol, responds to the host “Query/Command”, or make the appropriate action based on the host’s “inquiry/order” and communication data response.

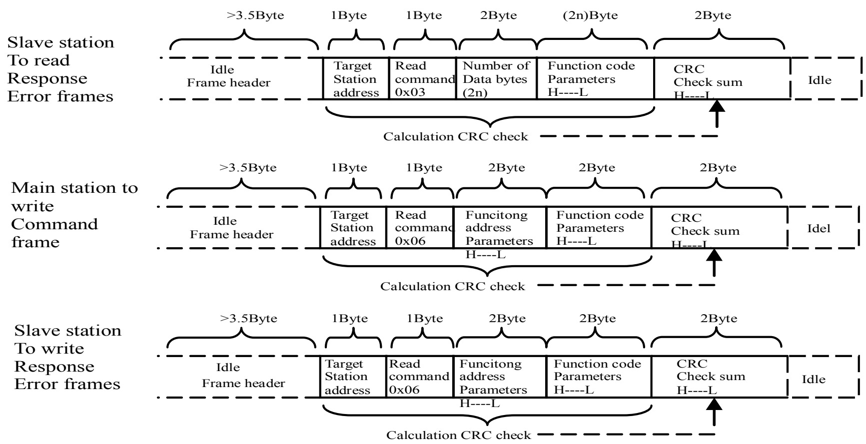
The host can refer to a personal computer (PC), industrial control equipment or programmable logic controller (PLC) and other host both a slave to communicate individually, but also for all the lower slaves released broadcast information. For a single host access “Query/Command”, response frame is needed from slave to hos; For broadcast information sent by the host, no feedback needed from the machine to host.

D.2 Communication data structure

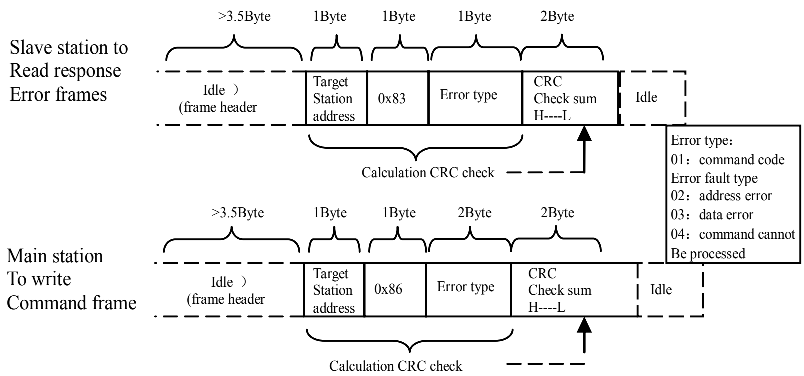
As follows the Modbus protocol communication data format of the H8 series AC drive, only support “Word” type parameters to read or write, the corresponding communication read operation command is 0x03; write operation command is 0x06, do not support the bytes or bits read and write operations:



In theory, the host computer can read several function code continuous (i.e. The n up to 12), but be careful not to cross the last function cede in this function code group, otherwise it will answer wrong.



If the slave machine detects the communication frame error, or other reasons lead to read and write is not successful, will respond to the error frames.



Data frame field description:

Frame header (START)	Greater than 3.5 characters of transmission time idle
Slave address (ADR)	Communication address range: 1 ~ 247; 0 = broadcast address
Command code (CMD)	03: Read slave machine parameters; 06: Write slave machine parameters
Function code address H	Parameter address within the inverter, 16 hexadecimal representation; divided into function code and non functional code (such as running parameters, the run command etc.) parameters, see address definition. When transmitting, high byte first, low byte in the post.
Function code address L	
Function code number H	The frame reading function code number, it's 1 indicate read one function code. When transmitting, high byte fist, low byte in the post. This agreement is only rewrite one function code, there is no such field.
Function code number L	

Data H	Response data, or to be written data, to the transmission of high byte first, low byte in the post.
Data L	
CRC CHK high	Detection value: CRC 16 checksum value. When transmitting, high byte first, low byte in the post. The calculation method see this section CRC check description.
CRC CHK low	
END	3.5 characters

CRC check mode:

CRC (Cyclical Redundancy Check) using the RTU frame format, message includes error detection based on domain CRC method. CRC domain is detection the whole message content. The CRC domain is two bytes, including 16 bit binary value. It consists of transmission equipment calculation after adding to the message. The receiving equipment to calculate again the message CRC, and compared with the CRC domain of the received value, if the two CRC values are not equal, the transmission error.

First, The CRC Register is deposited 0xFFFF, and then call a procedure processing for 8 consecutive bytes in message and the current value of the in register. Only the 8 Bit data for each character is effectively to CRC, the start bit and stop bit and parity bits are invalid.

CRC is produced in the process, each of the 8 characters are separate and register contents is exclusive OR (XOR), the lowest effective direction to move, the highest effective bit to 0 filling. LSB was extracted to detect, if LSB is 1, the register alone and preset value XOR, if LSB is 0, not to. The whole process was repeated 8 times. In the last one (eighth) is completed. The next 8 bits is alone again and the current value of the register XOR. The final value of the register, is all message bytes are implementation after for CRC value.

When CRC is added to the message, low byte first join, then the high byte.

CRC simple function as follows:

```
unsigned int crc_chk_value（unsigned char *data_value,unsigned char length）
{
        unsigned int crc_value=0xFFFF；
        Int i;
        while（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）;
}
```

The definition of communication parameters address

Read and write functional code parameters

(Some function code is not changed, only for manufacturers to use or monitoring use).

D.3 Function code parameter address labeling regulations

The function code group number and label for parameter address said rules:

High byte: F0 to FF (Group F), A0 to AF (Group A), 70 to 7F (Group U)

Low byte: 00 to FF

For example: If you need to scope the function code F3-12, the function code access address is 0xF30C.

Note:

Group F: neither can read, nor can change the parameters.

Group U: only read, can't change the parameter.

When the AC drive at the running state, some parameters can not be changed; and some parameters regardless of AC drive at what state, can not be changed; change the function code parameters, but also pay attention to the range of the parameters, units, and related instructions.

Function code group	Communication access address	Communication to modify the RAM address code
Group F0 to FE	0xF000 ~ 0xFEFF	0x000 ~ 0x0EFF
Group A0 to AC	0xA000 ~ 0xACFF	0x4000 ~ 0x4CFF
Group U0	0x7000 ~ 0x70FF	

Note that, because the EEPROM frequently is stored, will reduce the service life of the EEPROM, so some function code need not stored in the communication mode, only need to change the value in the RAM.

If set of group F parameters to achieve this function, as long as of the function code address high F into 0 can be achieved.

If set of group A parameters to achieve this function, as long as of the function code address high A into 4 can be achieved.

As following is representation of the corresponding function code address:

High byte: 00 to 0F (Group F), 10 ~ 4F (Group A)

Low byte: 00 to FF

Example:

The function code F3-12 is not stored in the EEPROM, the address is 030C;
The function code A0-05 is not stored in the EEPROM address, expressed as 4005;
The address that can only be written RAM, can’t be read operation, read, is invalid.
For all parameters, can also achieve the function using the command code 07H.
Stop/Run parameters:

Address	Description	Address	Description
1000H	Communication setting (Ten hexadecimal) -10000 ~ 10000	1010H	PID setting
1001H	Running frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC stage
1003H	Output voltage	1013H	PULSE input frequency, unit 0.01KHz
1004H	Output current	1014H	Feedback speed, unit 0.1Hz
1005H	Output power	1015H	Remaining running time
1006H	Output torque	1016H	AI1 voltage before correction
1007H	Running speed	1017H	AI2 voltage before correction
1008H	X state	1018H	AI3 voltage before correction
1009H	DO state	1019H	Linear speed
100AH	AI1 voltage	101AH	Accumulative power-on time
100BH	AI2 voltage	101BH	Accumulative running time
100CH	AI3 voltage	101CH	PULSE input frequency, unit 1Hz
100DH	Count input value	101DH	Communication setting value
100EH	Length input value	101EH	Actual feedback speed
100FH	Load speed	101FH	Main frequency A
--	--	1020H	Auxiliary frequency B

Note:

Communication setting value is percentage relative value, 10000 corresponding to 100%, -10000 and corresponding to -100.00%.

The frequency dimension data, the percentage is relative to the maximum frequency (F0-10) percentage, of torque dimensional data, the percentage of is F2-10, A2-48(torque upper limit digital set, respectively corresponding to the 1 and 2 motor).

The control command input to the inverter: (ROM)

Command address	Command function
2000H	0001: Forward run
	0002: Reverse run
	0003: Forward JOG

Command address	Command function
2000H	0004: Reverse JOG
	0005: Coast to stop
	0006: Deceleration stop
	0007: Fault reset (RESET)

Read the AC drive state: (ROM)

State address	State function
3000H	0001: Forward run
	0002: Reverse run
	0003: Stop

Parameters lock password verification:

(If the return is 8888H,so that is the password verification through)

Password address	Input password
1F00H	******

Digital output terminal control: (RAM)

Command address	Content
2001H	BIT0: DO1 output control
	BIT1: RELAY 3 output control
	BIT2: RELAY 1 output control
	BIT3: RELAY 2 output control
	BIT4: FMR output control
	BIT5: VDO1
	BIT6: VDO2
	BIT7: VDO3
	BIT8: VDO4
	BIT9: VDO5

Analog output AO1 control: (RAM)

Command address	Content
2002H	0 to 7FFF indicates 0% to 100%

Analog output AO2 control (RAM)

Command address	Content
2003H	0 to 7FFF indicates 0% to 100%

PULSE output control:(RAM)

Name	Model
I/O extension card 1	H8IO1

AC drive fault description

AC drive fault address	AC drive fault description	
I/O extension card 1	0000：No fault 0001：Reserved 0002 ： Overcurrent during acceleration 0003 ： Overcurrent during deceleration 0004：Overcurrent at constant speed 0005 ： Overvoltage during acceleration 0006 ： Overvoltage during deceleration 0007：Overvoltage at constant speed 0008：Buffer resistance overload 0009：Undervoltage 000A：AC drive overload 000B：Motor overload 000C：Power input phase loss 000D：Power output phase loss 000E：Module overheat 000F：External equipment fault 0010：Communication fault 0011：Contactor fault 0012：Current detection fault 0013：Motor auto-tuning fault	0014：Encoder / PG card fault 0015：EEPROM read-write fault 0016：AC drive hardware fault 0017：Short circuit to ground 0018：Reserved 0019：Reserved 001A：Accumulative running time reached 001B: User-defined fault 1 001C: User-defined fault 2 001D: Accumulative power-on time reached 001E：Load becoming 0 001F：PID feedback lost during running 0028：With-wave current limit fault 0029：Motor switchover fault during running 002A: Too large speed deviation 002B：Motor over-speed 002D：Motor overheat 005A：Encoder srtting fault 005B：No connecting encoder 005C：Initial position fault 005E：Speed feedback fault

D.4 Group FD: Communication parameters

FD-00	Baud rate	Default	6005
	Setting range	Unit digit: MODBUS Baud rate	
		0: 300BPs 1: 600BPs 2: 1200BPs 3: 2400BPs 4: 4800BPs	5: 9600BPs 6: 19200BPs 7: 38400BPs 8: 57600BPs 9: 115200BPs

This parameter is used for setting the rate of data transmission between the host computer and the AC drive. Note, the host computer and the AC drive set baud rate must be consistent, otherwise, communication cannot be. Baud rate, the faster the speed of communication.

FD-01	Data format	Default	0
	Setting range	0: No check, data format <8, N, 2> 1: Even parity check, data format <8, E, 1> 2: Odd parity check, data format <8, O, 1> 3: No check, data format <8, N, 1>	

The host computer and the AC drive set data format must be consistent, otherwise, communication cannot be.

FD-02	Local address	Default	1
	Setting range	1 ~ 247;	0: Broadcast address

When the address of the machine is set to 0, which is the broadcast address, the realization of host computer broadcast function.

The address of the machine is unique (except the broadcast address), which is the base of the host computer and AC drive of point-point communication.

FD-03	Response delay	Default	2ms
	Setting range	0 ~ 20ms	

Response delay: Refers to the data receiving end of the AC drive, to host computer sends data interval. If the response delay is less than the system processing time, take system processing time as the standard for response delay. If the response delay is more than the system processing time, after the data completion of systems processing, delay to wait, until the response delay time come to send data to the host computer.

FD-04	Communication timeout	Default	0.0s
	Setting range	0.0s: Invalid	0.1s ~ 60.0s

When the function code is set to 0s, communication timeout parameter is invalid.

When the function code set to the valid value, if a communication and the next communication to interval of time beyond communication timeout, the system will report communication fault error (Err16). Under normal circumstances, set it to null. If at the system of continuous communication, set this parameters, can monitor the communication status.

FD-05	Communication protocol selection	Default	0
	Setting range	0: Non-standard MODBUS protocol 1: Standard MODBUS protocol	

FD-05=1: Select the standard MODBUS protocol.

FD-05=0: The read command, the slave machine returns bytes number more than the standard Modbus protocol a byte. For details, see this agreement “5 communication data structure”.

FD-05	Communication reading current resolution	Default	0
	Setting range	0: 0.01A 1: 0.1A	

Used to determine communication reading current which the current value output unit.

Appendix E: Communication Data Address Define

H8 series frequency converter supports Mondbus, CANlink, CANopen, ProfiBus-DP four communication protocol, point-point communication belongs to the CANopen protocols are derived. The PC can realize the control, monitoring and functional parameters of converter modify view operation through these communication protocols.

H8 series of communications data can be divided into function code data, non functional code data (including the run command, operating status, operating parameters, alarm information etc.).

E.1 H8 series function code data

Function code data is an important parameter setting for AC drive, based on CFC710 only group F function parameters, H8 increased the group A function parameters, as follows:

H8 series function code data	Group F (RAM)	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, FA, FB, FC, FD, FE, FF
	Group A (RAM)	A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, AF

Function code data address is defined as follows:

1. Reading code data for communication

For the F0 ~ FF, A0 ~ AF group function code data, the communication address high sixteen bits directly into the functional group number, the lower sixteen bits directly into function code in the function of the group number, for example:

The F0-16 function parameters, the communication address is F010H, where F0H represents the group F0 function parameters, 10H represents the function code in the function of the group number sixteen 16 band data format.

The AC-08 function parameters, the communication address is AC08, where ACH represents the group AC function parameters, 08H represents the function code in the function of the group number sixteen 8 band data format.

2. Writing function code data for communication

For group F0 ~ FF function code data, the communication address high of sixteen bits, according to whether the write to EEPROM, distinguish 00 ~ 0F or F0 ~ FF, the lower sixteen bits directly into function code in the function of the the group number, for example:

Write to function parameter F0-16

If don’t need to write to EEPROM, the communication address is 0010H

If write to the EEPROM, the communication address is F010H

For group A0 ~ AF function code data, the communication address high of sixteen bits, according to whether need to write EEPROM, distinguish 40 ~ 4F or A0 ~ AF, the lower sixteen bits directly into function code in the function of the group number, for example:
Write to function parameter AC-08
If don't need to write to EEPROM, the communication address is 4C08H
If write to the EEPROM, the communication address is AC08H

E.2 H8 series of non functional code data

H8 series of non functional code data	State data (read only)	Group U monitoring parameters, AC drive fault description, the running state for AC drive
	Control parameters (write only)	Control command, communication setting value, digital output terminal control, analog output AO1 control and AO2 control, pulse (FMP) output control, parameter initialization

1. State data
State data is divided into group U monitoring parameters, the AC drive fault description and running state
Group U parameter monitoring parameters
Group U monitoring data description see Chapter 5, Chapter 6 described, defines its address is as follows:
U0 ~ UF, the high sixteen bit 70 ~ 7F of communication address, low sixteen bit is monitoring parameters in the group for number, for example:
U0-11, the communication address is 700BH
The AC drive fault description:
Communication read inverter fault description, fixed 8000H of communication address, reading the address data by host computer, can access the current inverter fault code, fault code description see definition for fifth chapter F9-14 code.
Operation state of inverter:
Communication read operation state of frequency converter, the fixed 3000H of communication address, reading the address data by host computer, can access the current inverter operation status information, defined as follows:

The AC drive operation status communication address	Read status definition
3000H	1: Forward run
	2: Reverse run
	3: Stop

2. Control parameters:

The control parameters are divided into control commands, digital output terminal control, analog output AO1 control and AO2 control, the pulse (FMP) output control.

Control command

In the F0-02 (running command) selected 2: communication control, the host computer through the communication address, can be used to start and stop commands to control the AC drive, control commands are defined as follows:

Command function of control command communication address	Command function
2000H	1: Forward run
	2: Reverse run
	3: Forward JOG
	4: Reverse JOG
	5: Coast to stop
	6: Deceleration stop
	7: Fault reset (RESET)

Communication settings

Communication setting major users of H8 series frequency setting, torque upper limit source, VF separation voltage source, PID setting source, PID given feedback source and so on selection is communication of the given data. The communication address is 1000H, host computer setting the communication address value, its data is in the range of -10000 ~ 10000, corresponding to -100.00% ~ 100.00%.

Digital output terminal control

When the digital output terminal function is selected as 20: communication control, the host computer through the communication address, can realize the control of the AC drive digital output terminal, defined as follows:

Digital output terminal control communication address	Command function
2001H	BIT0: DO1 output control BIT1: RELAY 3 output control BIT2: RELAY 1 output control BIT3: RELAY 2 output control BIT4: FMR output control BIT5: VDO1 BIT6: VDO2 BIT7: VDO3 BIT8: VDO4 BIT9: VDO5

The analog output AO1, AO2, FMP control of high speed pulse output.

When the analog output AO1, AO2, high speed pulse output FMP output function is selected as 12: communication setting, host computer through the communication address, can be achieved on the AC drive analog, output control of high speed pulse, defined as follows:

<table>
<tr><th colspan="2">Output control communication address</th><th>Command contents</th></tr>
<tr><td>AO1</td><td>2002H</td><td rowspan="3">0 ~ 7FFF is indicates 0% ~ 100%</td></tr>
<tr><td>AO2</td><td>2003H</td></tr>
<tr><td>FMP</td><td>2004H</td></tr>
</table>

Parameter initialization

When the need to achieve parameter initialization operation for the AC drive through the host computer, need to use this function.

If the FP-00 (user password) is not 0, you first need to verify the code through communication, check after, in 30 seconds, the host computer for parameter initialization.

The user password checking communication address is 1F00H, directly to the correct user password write to this address, can complete the password verification.

Communication parameter initialization address for 1F01H, defines the data as follows:

<table>
<tr><th>Parameter initialization for communication address</th><th>Command contents</th></tr>
<tr><td rowspan="4">1F01H</td><td>1: Restore factory parameters</td></tr>
<tr><td>2: Clearly record information</td></tr>
<tr><td>4: Recovery for User backup parameter</td></tr>
<tr><td>501: Backup current user parameter</td></tr>
</table>

Appendix F: Selection and Dimensions

F.1 Physical Dimensions of External Operation Panel

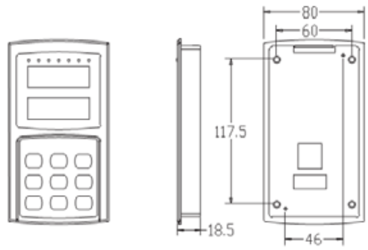


Figure F-1 Physical dimensions of external operation panel

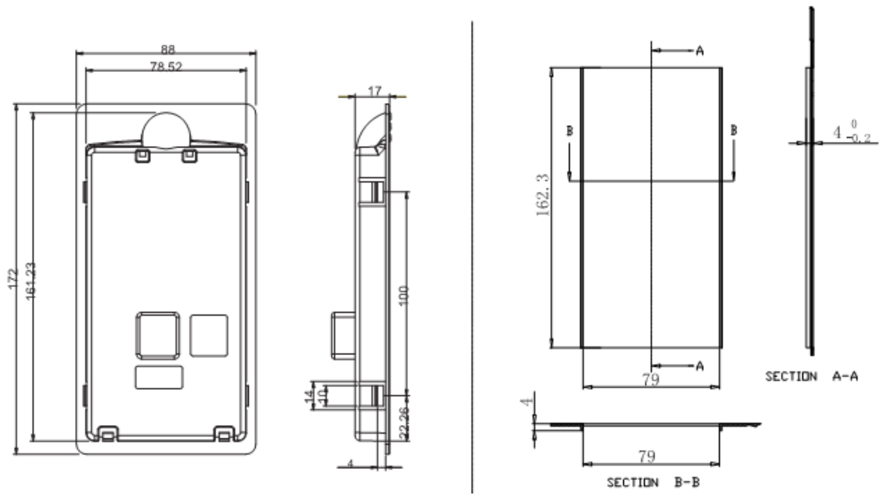


Figure F-2 Keyboard tray size (left) and keyboard hole size (right)

F.2 Peripheral electrical components selection

Table F-1 Selection of Electrical components

Model	Power of motor (KW)	control Loop of wire (mm²）	Main loop of wire （mm²）	MCCB （A）	AC contactor （A）
2S0004	0.4	0.5	0.75	6	9
2S0007	0.75	0.5	1.5	10	9
2S0015	1.5	0.5	2.5	16	12
2S0022	2.2	0.5	4	20	18
2T0004	0.4	0.5	0.75	6	9

Model	Power of motor (KW)	control Loop of wire (mm²)	Main loop of wire (mm²)	MCCB (A)	AC contactor (A)
2T0007	0.75	0.5	1.5	10	9
2T0015	1.5	0.5	2.5	16	12
2T0022	2.2	0.5	4	20	18
2T0040	4.0	0.75	6	32	25
2T0055	5.5	0.75	10	50	38
2T0075	7.5	0.75	10	63	50
2T0110	11	0.75	16	100	80
2T0150	15	0.75	25	125	95
2T0185	18.5	1.0	25	125	115
2T0220	22	1.0	25	160	150
2T0300	30	1.0	35	200	170
2T0370	37	1.0	50	250	205
2T0450	45	1.0	70	250	245
2T0550	55	1.0	70	315	300
2T0750	75	1.0	120	400	410
4T0007	0.75	0.5	1	6	9
4T0015	1.5	0.5	1.5	10	9
4T0022	2.2	0.5	2.5	10	9
4T0040	4.0	0.5	4	16	12
4T0055	5.5	0.75	4	25	18
4T0075	7.5	0.75	6	32	25
4T0110	11	0.75	6	50	40
4T0150	15	0.75	10	63	50
4T0185	18.5	1.0	10	100	60
4T0220	22	1.0	16	100	80
4T0300	30	1.0	25	125	95
4T0370	37	1.0	25	160	115
4T0450	45	1.0	35	160	150
4T0550	55	1.0	50	200	170
4T0750	75	1.0	70	250	245
4T0900	90	1.0	70	315	300
4T1100	110	1.0	95	400	300

Model	Power of motor (KW)	control Loop of wire (mm²)	Main loop of wire (mm²)	MCCB (A)	AC contactor (A)
4T1320	132	1.0	150	400	410
4T1600	160	1.0	185	600	475
4T1850	185	1.0	185	630	500
4T2000	200	1.0	240	630	580
4T2200	220	1.0	300	800	630
4T2500	250	1.0	300	800	700
4T2800	280	1.0	185*2	1000	780
4T3150	315	1.0	400	1000	900
4T3550	355	1.0	400	1250	960
4T4000	400	1.0	240*2	1250	1000
4T4500	450	1.0	185*4	1500	1250

Note:

1. The cable in this table size is selected according to the standard of the copper wire, If the use of aluminum core wire then need another calculation;

1. In this table, the breaker is selected according to 1.8 times of the rated current, and the contactor is selected at 1.5 times of the rated current. The user can choose according to the actual usage.

F.3 Selection of Braking Unit and Braking Resistor

F.3.1 Physical Dimensions of External DC Reactor

The motor and load’s regenerative energy is almost completely consumed on the braking resistor when braking. According to the formula:

$$U * U/R = Pb$$

U refers to the braking voltage at system stable braking.

Different systems select different braking voltages. The 380VAC system usually selects 700V braking voltage.

Pb refers to the braking power.

F.3.2 Selection of Power of Braking resistor

In theory, the power of the braking resistor is consistent with the braking power. But in consideration that the de-rating is 70%, you can calculate the power of the braking resistor according to the formula 0.7 * Pr = Pb * D.

“Pr” refers to the power of resistor.

"D" refers to the braking frequency (percentage of the regenerative process to the whole working process).

Application	Elevator	Winding and unwinding	Centrifuge	Occasional braking load	General application
Braking Frequency	20% ~ 30%	20% ~ 30%	50% ~ 60%	5%	10%

In the following Table F-2 provides data for reference. You can select different resistance and power based on actual needs. However, the resistance must not be lower than the recommended value. The power may be higher than the recommended value.

The braking resistor model is dependent on the generation power of the motor in the actual system and is also related to the system inertia, deceleration time and potential energy load. For systems with high inertia, and/or rapid deceleration times, or frequent braking sequences, the braking resistor with higher power and lower resistance value should be selected.

Table F-2 Recommended values of braking resistor

Model	Braking Unit	Recommended Power			Recommended Resistance (Ω)
		ED=10%	ED=20%	ED=40%	
2S0007	Standard	100W	200W	300W	300
2S0015	Standard	200W	400W	600W	150
2S0022	Standard	300W	500W	1000W	100
4T0007	Standard	100W	200W	300W	600
4T0015	Standard	200W	400W	600W	300
4T0022	Standard	300W	500W	1000W	200
4T0040	Standard	400W	800W	1600W	100
4T0055	Standard	600W	1100W	2200W	85
4T0075	Standard	800W	1500W	3000W	60
4T0110	Standard	1000W	2000W	4000W	47
4T0150	Standard	1500W	3000W	6000W	38
4T0185	Optional	2000W	4000W	8000W	32～25
4T0220	Optional	2500W	5000W	10KW	26～21
4T0300	Optional	3000W	6000W	12KW	20
4T0370	Optional	4000W	8000W	16KW	18
4T0450	Optional	5000W	10KW	18KW	17～10
4T0550	Optional	6000W	12KW	24KW	16～8
4T0750	Optional	8000W	15KW	30KW	8～6

Model	Braking Unit	Recommended Power			Recommended Resistance (Ω)
		ED=10%	ED=20%	ED=40%	
4T0900	Optional	12KW	18KW	36KW	6
4T1100	Optional	12KW	24KW	48KW	6
4T1320	Optional	18KW	30KW	54KW	6～4
4T1600	Optional	18KW	36KW	66KW	4
4T1850	Optional	18KW	36KW	72KW	4
4T2000	Optional	24KW	48KW	78KW	4～3
4T2200	Optional	24KW	48KW	84KW	4～3
4T2500	Optional	24KW	48KW	102KW	3
4T2800	Optional	30KW	60KW	120KW	3
4T3150	Optional	30KW	66KW	126KW	3
4T3550	Optional	36KW	72KW	144KW	2.5
4T4000	Optional	42KW	84KW	168KW	2.5
4T4500	Optional	48KW	90KW	180KW	2

In the table, the matching values are 100% configuration of braking torques in the braking; the actual use should be based on the brake condition. If the brake is still not obvious, please appropriately reduce the braking resistor, at the same time by the proportion of braking resistor power level.

ED: brake usage rate, ED%= braking time / braking cycle =T1/T2*100%, 10% applicable to ordinary mechanical loads, 20% applicable to a medium large inertia of the mechanical equipment, 40% for to hoist heavy load.

Note: The braking resistor Power resistor is that the braking resistor working gap estimates, when the braking resistor continuous working time longer (more than 5 seconds), should be appropriate to increase the resistor braking power level.

Warranty Agreement

1. The warranty period of the product is 18 months (refer to the barcode on the equipment). During the warranty period, if the product fails or is damaged under the condition of normal use by following the instructions, ADTECH will be responsible for free maintenance.
2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:

A. Improper use or repair/modification without prior permission

B. Fire, flood, abnormal voltage, other disaster and secondary disaster

C. Hardware damage caused by dropping or transportation after procurement

D. Improper operation

E. Trouble out of the equipment (for example, external device)

3. If there is any failure or damage to the product, please correctly fill out the Product Warranty Card in detail.
4. The maintenance fee is charged according to the latest Maintenance Price List of ADTECH.
5. The Product Warranty Card is not re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance.
6. If there is any problem during the service, contact ADTECH's agent or ADTECH directly.
7. This agreement shall be interpreted by Shenzhen ADTECH Electric Technologies CO., LTD.

ADTECH (SHENZHEN) TECHNOLOGY CO., LTD.

Revision: V1.0