Professional AC Drive Manufacturer

EC590

Series AC Drive

User Manual V2.2

ZHEJIANG EACN ELECTRONIC TECHNOLOGY CO.,LTD

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1.Introduction

Thank you for using the EC590 series general vector control AC drive developed by ZHEJIANG EACON Electronic Technology Co.,Ltd.

EC590 series can provide control of asynchronous motors and permanent magnet synchronous motors at the same time.Significantly improved in terms of ease of use, installation space, maintainability, etc., can further optimize the customer's experience.

This manual describes the matters relevant to the installation, parameters setting, abnormality diagnosis and solution, and the daily maintenance of the AC drive that need attention of the users. In order to ensure the correct installation and operation of the motor drive, give full play to its superior performance, please carefully read this manual before the installation, properly keep it and give it to the machine users.

Contact our agents or customer service center if you have problems during the use. We will serve you wholeheartedly.

The instructions are subject to change, without notice, due to the upgrade of our products.

1.1 Safety Precautions

In order to ensure your personal and equipment safety, please read this manual carefully before using the AC drive.

Warning signs and meanings

The following marks are used in this manual to indicate that it is an important part of safety. Failure to observe these precautions may result in personal injury or death, damage to the product and associated systems.

Danger!	Indicates that failure to comply with the notice will result in death, severe personal injury or serious property damage.
Warning!	Indicates that failure to comply with the notice will result in personal injury or damage to the product and associated systems.
Notice!	Tips for special attention when using this product.

Operational qualification

AC drive is a precise electric and electronic product, thus for the safety of the operators and the equipment, please ensure that the installation and parameters adjustment is done by professional motor Engineers.

Safety guidance

Safety rules and warning signs are proposed for the personal safety of operators, and measures are taken to prevent operators from personal injury and damage to the product and associated systems. Please read this manual carefully before use, and operate in strict accordance with the safety rules and warning signs in the manual.

Danger!

1. The power supply must be turned off when laying the wires.
2. When the AC power supply is cut off but the indicator light of the manipulator of AC drive is still on, there is still high voltage in the AC drive which is very dangerous, please do not touch the interior circuit and components.
3. Do not modify the interior components or circuit of AC drive by yourselves.
4. Never connect the main circuit output terminals U, V, and W directly to the AC main circuit power supply as this will damage the drive.
5. The terminal of AC drive must be grounded correctly.6. This series of AC drives can't be used for the occasions related to personal safety, e.g. the life maintaining equipment.

Warning!

1. Please do not test the voltage resistance of the interior components of the drive, as the semiconductor of the drive is easy to be punctured and damaged by high voltage.
2. The circuit board of the drive has CMOS IC which is extremely easy to be damaged by static electricity, thus please do not touch the circuit board with your hand before taking anti-static electricity measures.
3. Even if the motor is inactive, the main loop terminal of the drive may still have dangerous high voltage.
4. Only the qualified motor professionals can install the drive, lay the wire, repair and maintain the drive.

Notice!

1. When certain functions of the drive are set, the motor may immedia-
   tely start after the power input.
2. Please choose a safe place to install the AC drive to avoid the high
   temperature, direct sunlight, humidity and splash of water drops.
3. Please prevent the children or irrelevant people against being close
   to the AC drive.
4. The AC drive can only be used in the places recognized by our company,
   and the usage in an environment not recognized by our company may lead
   to fire, gas explosion or electrification.
5. When the wire between the AC drive and the motor is too long, the
   interlayer insulation of the motor may be damaged, please use the
   special AC motor for AC drive, or add a reactor between the drive and
   the motor to prevent the AC motor from being burned due to the damage
   of insulation.
6. The rated voltage of the power system for the drive can't be higher
   than ±15% of the rated voltage of product, and the current can't be
   over 5000A RMS (The current of 40HP (30kW) type or above can't be over
   10000A RMS).

1.2 Technical Specifications

	Item	Specifications	
Standard functions	Maximum frequency	0.00 – 500.00 Hz	
	Carrier frequency	0.5 – 16 kHz The carrier frequency is automatically adjusted based on the load features.	
	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.025%	
	Control mode	Sensorless flux vector control (SVC) Voltage/Frequency (V/F) control	
	Startup torque	G type: 0.5 Hz/150% (SVC); 0 Hz/180% (FVC) P type: 0.5 Hz/100%	
	Speed range	1:100(SVC)	1:1000
	Speed stability accuracy	±0.5%(SVC)	±0.02%
	Overload capacity	G type: 60s for 150% of the rated current, 3s for 180% of the rated current P type: 60s for 120% of the rated current, 3s for 150% of the rated current	
	Torque 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	
	Acceleration and deceleration mode	Straight-line ramp or S-curve ramp Four groups of acceleration/deceleration time with the range of 0.0 – 6500.0s	
	DC braking	DC braking frequency: 0.00 Hz to maximum frequency Braking time: 0.0 – 100.0s Braking action current value: 0.0% – 150.0%	
	JOG control	JOG frequency range: 0.00 – maximum frequency JOG acceleration/deceleration time: 0.0 – 6500.0s	
	Simple PIC/Multiple preset speeds	It implements up to 16 speeds via the simple PLC function.	
	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 duringthe running process so as to avoid frequent tripping due to overvoltage/overcurrent.	
	High-speed current limiting function	Minimize over-current fault and protect normal operation of AC drive.	
	Torque limit and control	It can limit the torque automatically and prevent fre-quent over current tripping during the running process. Torque control can be implemented in the CLVC mode.	

Item		Specifications
Individua-lized functions	High performance	Control of asynchronous motor and synchronous motor are implemented through the high-performance current vector control technology.
	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.
	Rapid current limit	It helps to avoid frequent overcurrent faults of the AC drive.
	Timing control	Time range: 0.0 – 6500.0 minutes
	Multiple communication protocols	It supports Modbus.
RUN	Running command source	Operation panel Control terminals Serial communication port You can perform switchover between these sources in various ways.
	Frequency source	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.
	Auxiliary frequency source	There are ten auxiliary frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis.
	Input terminal	Standard: 8 digital input (S) terminals, one of which supports up to 50kHz high-speed pulse input 3 analog input (AI) terminals, two of which only supports 0 – 10 V voltage input and the other supports 0 – 10 V voltage input or 0 – 20 mA current input
	Output terminal	Standard 1 high-speed pulse output terminal (open-collector) that supports 0 – 50 kHz square wave signal output 2 digital output (Y) terminal 2 relay output terminal 2 analog output (AO) terminal that supports 0 – 20 mA current output or 0 – 10 V 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.

Item		Specifications
Protec-tion mode	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, over-voltage protection, undervoltage protection, overheat protection and overload protection
Environ-ment	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 (0.6g)
	Storage temperature	-20℃ ~ +60℃
	IP level	IP20
	Pollution degree	PD2

2.Read below information before use

2.1 Delivery Inspection

Every EC590 AC drive has pass by strict quality management before delivery, and been packed to enhance its collision resistance. The customer should immediately inspect the following inspection steps after unpacking the AC drive.

◆ Check whether the AC drive is damaged during the transportation.

◆ Check whether the type and model of the AC drive are consistent with the information on the package.

For any inconsistency between the received product and your order, or any problem of the product, please contact with our agents or distributors that sold you the product.

Description of the label of package

① Trademark of product
② Name of product
③ Serial number of production control
④ Barcode
⑤ AC drive Model
⑥ Input power Spec.
⑦ Output power Spec.
⑧ Output frequency Range
⑨ Protection grade version of mainboard
⑩ LED manipulator
⑪ LCD manipulator
⑫ Interior brake unit
⑬ Specification of 220V voltage
⑭ Specification of 380V voltage
⑮ Dimensions of exterior package, total weight

EACON

FREQUENCY INVERTER

P/N:59001500224   S/N: BC001

59001500224BC001

MODEL : 5901D5G2D2P43A
INPUT : 3PH380-480V50/60Hz
OUTPUT G:3PH0-Vin   4.2 A   150%/1min
        P:3PH0-Vin   5.6 A   120%/1min
Freq.Range : 0.10-500.00Hz
CHASSIS/IP20   VER:4.02
■ Led keypad V :4.02   □ 220-240V
□ Lcd keypad V :4.01   ■ 380-480V
SIZE: 225mm x 170mm x 215mm WG:1.4kg

ZHEJIANG EACON ELECTRONIC TECHNOLOGY CO.,LTD

Notice!

The black squares of 10-14 are the configurations of the AC drive.

Description of the label of AC drive

MODEL:EC5904D0G05D5P43A

① MODEL: EC5904D0G05D5P43A
② INPUT: 3PH 380-480V 50-60Hz
③ OUTPUT: 3PH 0-Vin 0.1-320Hz
      4kW 9.4A 150%/1min
      5.5kW 10.5A 120%/1min

④
⑤ 59004000554AIG666
Manufacturer: ZHEJING EACN ELECTRONIC TECHNOLOGY CO.,LTD

① AC drive Model
② Input power Spec.
③ Output power Spec.
④ Barcode
⑤ Serial number of production control

Description of Model

EC   59   04D0G05D5P   43   A

Structure version

Voltage : 23 represents three-phase 200V
          43 represents three-phase 400V

Capacity specification of AC drive
04D0G represents 4.0kW constant torque
05D5P represents 5.5kW variable torque

Serial number: EC590

Abbreviation of "EACON"

Description of Serial number

P/N 59 0040 0055 4 A IG 666

Sequence number
Years
Voltage class
Structure version
P power range
G power range
Series number

2.2 Transport

This product is a precise device, please handle it with care during the transport, prevent it from severe collision.

2.3 Storage

This product must be in the packing box before installation. If it won't be used for a period, in order to keep it within the warranty of our company and for the future maintenance, the following matters must be paid attention to for the storage:

√The product must be put in a dust-free and dry place.
√The temperature of the storage place must be -20℃～+60℃.
√The relative humidity of the storage place must be 0%～95% without frost.
√Avoid putting the product in an environment with corrosive gas or liquid.
√It is better to put the product on a shelf or stand with a proper package.

Notice!

1. Even if the humidity meets the requirements of the criterion, if the temperature changes quickly, moisture condensation or icing may also happen, thus the product should not be stored in such place.
2. Do not put the product directly on the ground, but on a proper stand. If the surrounding environment is very bad, desiccant should be put in the packing bag.
3. When the storage period is longer than 3 months, the surrounding temperature should not exceed 30℃ , because the electrolytic condenser is stored with power off, and it will easily degrade if the temperature is high.
4. When the AC drive is installed in the installation or control panel but isn't used, especially in the construction sites or the wet places with lots of dust, the AC drive should be removed and put in a proper environment satisfying the storage requirements mentioned above.
5. The electrolytic condenser is easy to degrade with power off for a long term. Please do not store the electrolytic condenser with power off for more than one year.

2.4 Considerations for choices of AC drives

1. Use large capacity above 600 kva electric current transformer and capacitor into phase, voltage input side surge current is too large, that could undermine the input side of AC drives. At the moment the input side must be installed an AC reactor, in addition to reduce the current, and improve the effect of the input power.
2. To actuate the special AC drive or one AC drive actuate several motors, the total rated current of the motor 1.25 times can't exceed the rated current of the AC drive. It is very careful to choose the AC drive.

3. When the AC drive actuate the motor, the startup, the accelerate and decelerate are limited by the rated current of the AC drive. The starting torque is small(commercial power directly start 6 times when start current, when the AC drive starting, the starting current can't exceed two times), so when the AC drive use for high torque place(For example Elevator, Blender, Machine tool ect), the AC drive must increase one or two grade. The optimal way is increasing one grade of the motor and the AC drive at the same time.
4. To consider that when the AC drive break down and stop the output, the stop mode for the motor and the mechanical equipment, if they need sudden stop that must install the mechanical brake.

2.5 Note for parameter setting

1. Because of the highest speed for the digital operation can reach to 400Hz, so when it use in the highest speed place, it can use the speed limit function limit the output frequency.
2. When the DC braking voltage and the braking time setting too highly, that may cause the motor overheating.
3. The time for the motor accelerate and decelerate is decided by the motor rated torque、 load torque、 load inertia ect.
4. When the antistall (STALL) act in the accelerate and decelerate, please extend the accelerate and decelerate time. If the accelerate and decelerate must be very fast, and also the inertia load is very big, the AC drive can't speed up or stop the motor in requirement time, that must install the braking resistance(only can shorten the deceleration time) or increase the grade of the motor and the AC drive at the same time.

3. Mechanical and Electrical Installation

3.1 Installation Environment

Item	Requirements
Cooling and ventilation	Install the AC drive on a backplate, and ensure there is sufficient space around the enclosure to allow for efficient heat dissipation.
Mounting location	Ensure the mounting location is: ●Away from direct sunlight ●In an area where humidity is 95% RH or less with no condensation ●Protected against corrosive, combustible or explosive gases and vapours ●Free from oil, dirt, dust or metallic powders.
Vibration	Ensure the mounting location is not affected by levels of vibration that exceeds 0.6 g. Avoid installing the enclosure near punching machines or other mechanical machinery that generates high levels of vibration or mechanical shock.
Protective	The AC drive must be installed in a nonconbustible cabinet that provides effective electrical and mechanical protection for CE requirements. Installation must conform to local and regional laws and regulations, and to relevant IEC requirements.

3.2 Conditions for Installation

(a)　　　　　　　　　　　(b)
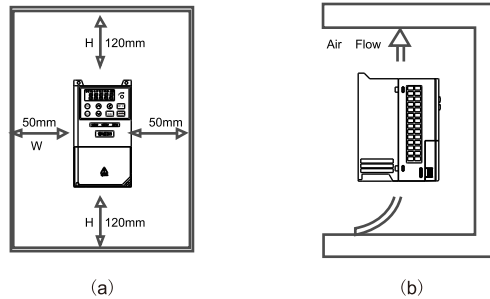
■ The AC drive shall be installed vertically with screws, and shall not be installed upside down, obliquely or horizontally on a firm structure.
■When the AC drive is running, it will generate heat. To ensure that the cooling air path is as shown in figure (b). There is a certain space in the design, and the heat generated will be emitted upward; therefore, do not install it under the heat-resistant equipment.
■When the AC drive is running, the temperature of the heat sink will rise to nearly 90 ℃. There for, the mounting surface on the back of the AC drive must be made of materials that can withstand higher temperature.

■When the AC drive is installed in the control panel, ventilation and heat dissipation shall be considered to ensure that the ambient temperature of the AC drive does not exceed the specification value. Do not install the AC drive in the airtight box with poor ventilation and heat dissipation.
■When installing multiple AC drives in the same control panel, it is reco- mmended to install them horizontally side by side in order to reduce the thermal impact on each other. If it has to be installed up and down, the par- tition board must be set to reduce the impact of heat generated at the lower part on the upper part.

Notice!

1、Do not let all kinds of fibers, paper, wood chips (chips) or metal fragments and other foreign matters enter the AC drive or adhere to the cooling fan.
2、Installed on structures that will not burn, such as metal, or fire accidents may occur.

3.3 Installation dimension of AC drive

A Structure
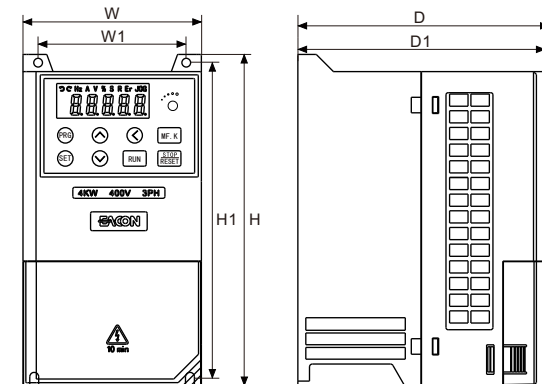
B Structure
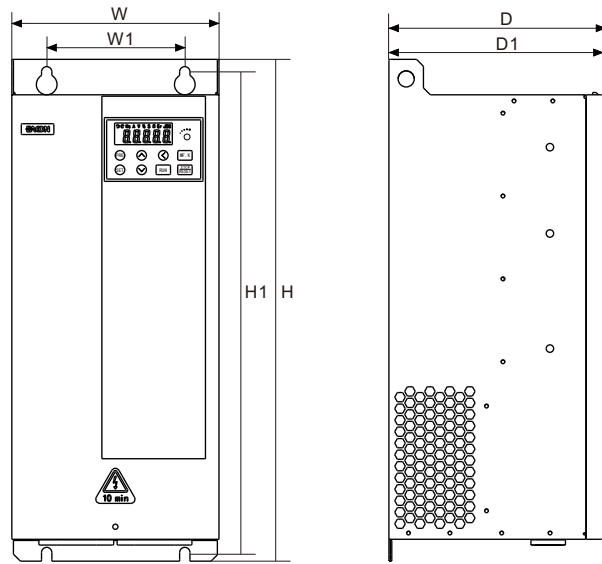
Installation hole size of pull-out keyboard on operation panel:
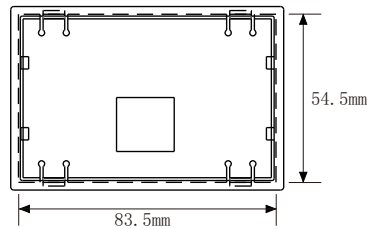
54.5mm

83.5mm

Sheet metal installation hole size:
83.5mm*54.5mm

220V Class

Structure	Power (Kw)	W (mm)	W1	H	H1	D	D1	Installation Hole
A Structure	0.75kW	92	76	171	160	130	127	φ4.5
	1.5kW							
	2.2kW							

380V Class

Structure	Power (Kw)	W (mm)	W1	H	H1	D	D1	Installation Hole
A Structure	0.75kW	92	76	171	160	130	127	Φ4.5
	1.5kW							
	2.2kW							
	4.0kW							
	5.5kW	126	115	186	175	158	155	Φ4.5
	7.5kW	146	131	256	243	174	171	Φ6
	11kW							
	15kW	170	151	320	305	198	195	Φ6
	18.5kW							
B Structure	22kW	180	120	436	418	189	186	Φ9
	30kW							
	37kW	180	120	489	470	196	194	Φ9
	45kW	180	120	519	500	221	218	Φ9
	55kW	250	170	626	601	281	278	φ11
	75kW							
	90kW	300	170	687	662	282	280	φ11
	110kW							
	132kW	300	220	796	771	302	299	Φ11
	160kW							
	200kW	300	236	835	800	511	499	Φ13
	220kW							
	250kW							
	280kW							

3.4 Instruction for Wire Layout

　　After removing the upper cover, the connection terminal strips are exposed, check whether the terminals of main loops and control loops are marked explicitly and pay attention to the following instructions during connection, do not make improper connections.

3.5 Basic Wire Layout

■ The power supply must be connected with the terminals of the main loops of AC drive R/L1, S/L2, T/L3. If the power supply is improperly connected with other terminals, the AC drive will be damaged. Besides, check whether the voltage/current of the power supply is within the allowable range indicated on the nameplate.

■The grounding terminals must be grounded well, on the one hand it can prevent electric shock or fire, and on the other hand it can reduce the noise interference.

■ Connect the terminals with wires, ensure the high reliability of the connection.

■After finishing the wire layout, check the following things:
    1. Are all the connections correct?
    2. Is there any connection left out?
    3. Is there any short circuit or line-to-ground short circuit between the terminals and the connecting wires?

When the power is on, if the connections need to be changed, first the power supply should be turned off, and the filter capacitor of the DC part of the loop will need some time to discharge electricity. The work only can begin after the completion of electricity discharge. Besides, because of the residual voltage, sparks may be generated when there is a short circuit, thus it's better to conduct the work under voltage-free conditions.

Notice!

1. Grounding wire must be connected, or electric shock or fire may happen.
2. The wiring work should be done by the professional technicians.
3. Start the work after confirming that the power is OFF or electric shock may happen.

Basic Wire Layout Graph

The wires of AC drive can be divided into main loop and control loop. Users can open the upper cover and see the terminals of main loop and control loop. Users must lay the wires according to the figure below to ensure the accuracy of connections.

Notice!

1. Grounding wire must be connected, or electric shock or fire may happen.
2. The wiring work should be done by the professional technicians.
3. Start the work after confirming that the power is OFF or electric shock may happen.

3.6 Standard wiring diagram

Note:1. The function descriptions in brackets are the factory value of AC drive;
2. Opticalcoupler isolation, compatible ambipolarity input;
3. Input impedance: 2.4kΩ;
4. Voltage range at electrical level input: 9V~30V.

Note: 1. Maximum output current of 10V port: 10mA, resistance range of potentiometer: 1KΩ~5KΩ;
2. Input voltage range of AI1 port: DC 0V~10V, input impedance: 22KΩ;
3. AI2 port determines voltage or current input by F4-40 function parameter, input range: (0V~10V)/(0/4mA~20mA); input impedance: 22KΩ for voltage input, 500Ω for current input.

Note:Maximum output of Y1 port: AC250V/3A, DC24V/5A;
Maximum output of Y3/Y4 port: DC24V/50mA.

Note: The voltage or current output of A01 port is determined by P5-23 function parameters, The voltage or current output of A02 port is determined by P5-24 function parameters, and the output range is (0V~10V)/(0mA~20mA).

Legend: 1. Symbol ◉ represents the main circuit terminal;
2. Symbol ○ represents control circuit terminal.

Note：

1. There is no PB terminal for 45kW and above;

2. The bias voltage of S1~S6 ports can be selected from the internal power supply (24V port) of the inverter, or the external power supply (PLC port), and the factory default 24V port and the PLC port are short-circuited;

3. The S5 port is constrained by the functional parameter F4-04 and can be used as a high-speed pulse input channel, with a maximum input frequency of 50KHz;

4. The Y4 port is constrained by the functional parameter F5-00, and can be used as a high-speed pulse output channel with a maximum output frequency of 50KHz; when used as an open-collector output, Same specification as Y3 terminal.

3.7 System Wiring Diagram
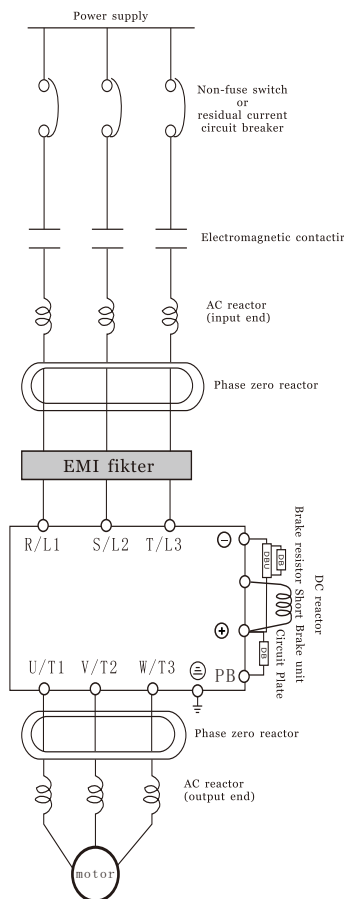
Power supply	Please use the power supply in accordance with the rated specification in the usage manual
Non-fuse switch or residual current circuit breaker	The input current may be heavy when the power is turned on. Adopt a proper non-fuse switch or residual current circuit breaker.
Electromagnetic contactor	Please do not use the electromagnetic contactor as the power switch of AC drive, since it will shorten the service life of AC drive.
AC reactor (input end)	When the output capacity is over 1000kVA, it is recommended to add an AC reactor to improve the functional factor. The distance of wires should be within 10m.
Phase zeror eactor	Used for reducing the radiation interference, especially in the places with audio devices, and at the same time reducing the interference of input end and output ends as well. The effective range is AM wave band-10MHZ.
DC reactor	Improve power factor and reduce AC pulse of DC bus.
EMI filter	Used for reducing electromagnetic interference. Please refer to the appendix.
Brake resistor	Used for shortening the decelerating time of motor. Please refer to the appendix.
AC reactor (output end)	The length of motor wires will influence the magnitude of the reflection wave on the motor end. When the engine wires are longer than 20m, it is recommended to install the AC reactor. Please refer to the appendix.

3.8 Main circuit terminal distribution

1）0.75kW~4kW main circuit terminal：
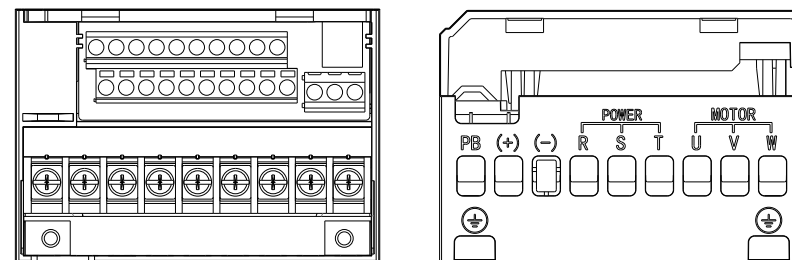
Terminal division figure 1

2）4kW~5.5kW main circuit terminal：
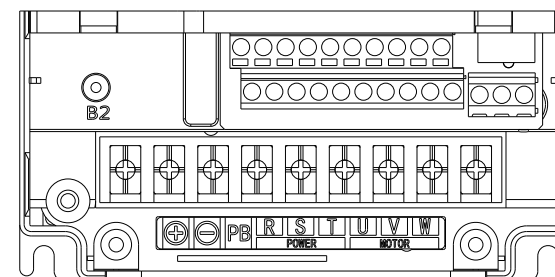
Terminal division figure 2

3）7.5kW~18.5kW main circuit terminal：
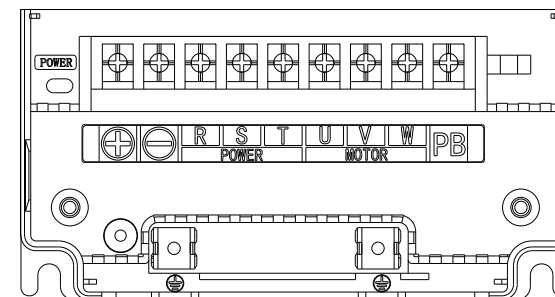
Terminal division figure 3

4）22kW~37kW main circuit terminal：
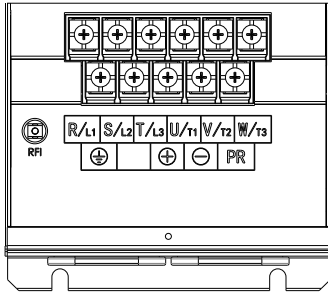
Terminal division figure 4

5）45kW~110kW main circuit terminal：
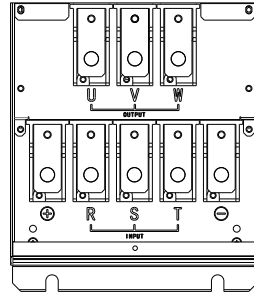
Terminal division figure 5

6）132kW~160kW main circuit terminal：
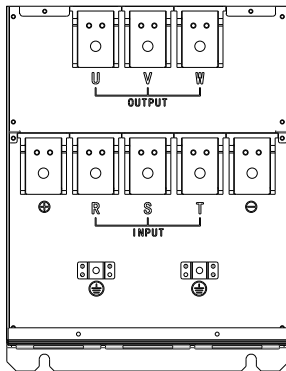
Terminal division figure 6

7）200kW~280kW main circuit terminal：
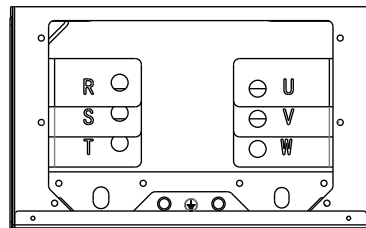
Terminal division figure 7

3.9 Main Circuit Connection Functions

Terminal	Type	Function Description
R/L1 S/L2 T/L3	Main circuit power supply input	Input end of commercial power supply
U/T1 V/T2 W/T3	AC drive output terminal	AC driver output connected with 3-phase induction motor.
PB	External braking resistorconnection	≤37kW with braking component which is connected to terminal ⊕, PB. To improve the brake moment of force, an external braking resistor is needed.
⊕　　⊖	Braking unit or Dc Input connection	1: Machinery ≥45kW without built-in braking unit component. To improve braking power, external braking unit and braking resistor is necessary (both are optional). 2: DC input terminal;
⏚	Grounding terminal	For safety and small noise, AC drive's ground terminal EG should be well grounded.

General precautions for main loop wiring:

■Please do not connect the AC with the output terminal (U/T1, V/T2 and W/T3) of AC drive; otherwise it may cause AC drive damage.

■Ensure that the screws of the main loop terminals are tightened to prevent the sparks caused by the loose screw due to vibration.

■The wires of main loop and those of control loop must be separated to avoid misoperation. If an intersection is needed, make them intersect with a right angle.

■ Please use isolated cable and conduit, and connect with the two ends of the shielding layer or conduit with ground.

■If the installation place of the AC drive is extremely sensitive to interference, please add an RFI filter in a place with a distance from the AC drive as close as possible. The lower the carrier frequency of PWM is, the less the interference there will be.

■ When the AC drive is equipped with a residual current circuit breaker for the protection against electric leakage, please select the ones with action current over 200mA and action time over 0.1s to avoid the misoperation of residual current circuit breaker.

■ The AC drive, motor and wires will cause noise interference. Pay attention to the surrounding sensors, and check whether there is misoperation of the equipment to prevent the accidents.

Description of the power supply input terminals of the main loop (R/L1 S/L2 T /L3)

■Ascertain the voltage of power supply and the maximum current that can supply.

■Main loop terminal R/L1, S/L2, T/L3 is connecting to a three-phase AC power through the circuit (wiring) protection with circuit breakers or earth leakage protection circuit breakers, without considering phase sequence connection.

■To cut off power and avoid accident when AC drive protection power is on, electromagnetic contactor to connecting to the circuit is necessary. (The two ends of the electromagnetic contactor should be equipped with R-C surge absorber).

■ Don't use main loop ON/OFF switch to start and stop AC drive. Use loop control terminal FWD, REV or RUN/STOP button on the control panel to start and stop AC drive. If you must use main power supply ON/OFF switch to start and stop, do it no more than 1 time within one hour.

■Do not connect the 3-phase power supply machine with the single-phase power supply.

Output terminals of AC drive(U/T1. V/T2. W/T3)

■ Connect AC drive output terminal to 3 phase motor according to correct phase order. If motor rotates in wrong direction, change any 2 phase of U,V,W.

Forward running
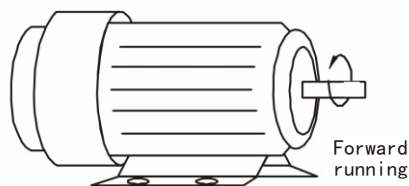
■The output terminal of AC drive can't be connected to the inlet phase capacitor or surge absorber. If the wires are very long, it should be connected with the AC reactor on the output end.

■There is high frequency current in the extra long wire between motor and AC drive. This may cause AC drive over flow and stop. Besides, long wire increase leaking current, this leads to poor precision of current value. AC drive≤3.7KW choose wire less than 20 meters to motor, less than 50 meters for AC drive over 3.7 KW. If the wire is very long a wave filter connected to the output side AC reactor is necessary.

■Used insulation strengthened motor.

Grounding terminals of AC drive (EG)

■For safety and noise reduction, the grounding terminals of AC drive should be well grounded.

■The grounding wire of AC drive can't be grounded together with the machines with heavy current load e.g. the electric welding machine and high power motor, they should be grounded separately instead.

■In order to prevent electric shock and fire, the external metal grounding wires of electric equipment should be wide and short, and connected to the special grounding terminals of the AC drive system.

■If there is more than one AC motor speed controller connecting with the ground, Please make sure that is does not form grounding loop, shown as the following figures:

The best   Fair   Error
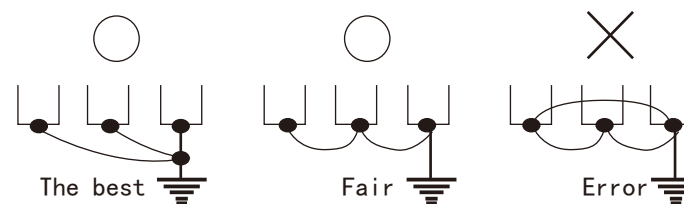
The connection terminals of the external brake resistor [⊕ ,PB] and the connection terminals of the brake unit [⊖, ⊕]

Brake resistor/unit(optional component)
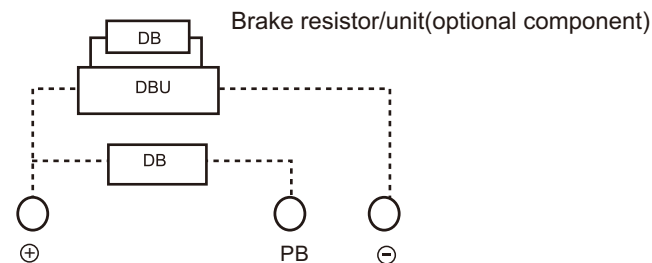
3.10 AC drive control terminal connections

Type	Terminal	Name	Function Description
Power supply	10V-GND	External+10V power supply	Provide +10V power supply for external unit, maximum output current: 10mA Generally, it provides power supply to external potentiometer with resistance range of 1kΩ.～5kΩ.
	24V-COM	External+24V power supply	Provide +24V power supply to external unit, generally, it provides power supply to S/Y terminals and external sensors. Maximum output current: 100mA
	PLC	Input terminal of external power supply	Connect to +24V by default when S1～S6 need to be driven by external signal, PLC needs to be connected to external power supply and be disconnected from +24V power supply terminal.
Analog input	AI1-GND	Analog input termianl 1	1. Input voltage range: DC 0V～10V 2. Impedance: 22kΩ
	AI2-GND	Analog input termianl 2	1. Input range: DC 0V～10V/4mA-20mA, decided by selection of F4-40. 2. Impedance: 22kΩ (voltage input)，500Ω (current input)
Digital input	S1-COM	Digital input 1	1. Optocoupler coupling isolation, compatible with dual polarity input 2. Impedance: 2.4kΩ 3. Voltage range for level input: 9V-30V 4. S5 can be used for high-speed pulse input. Maximum input frequency: 50kHz
	S2-COM	Digital input 2	
	S3-COM	Digital input 3	
	S4-COM	Digital input 4	
	S5-COM	Digital input 5	
	S6-COM	Digital input 6	
Analog output	AO1-GND	Analog output terminal 1	Voltage or current output of AO1 is decided by F5-23. Voltage or current output of AO2 is decided by F5-24. Output voltage range: 0V～10V Output current range: 0mA～20mA
	AO2-GND	Analog output terminal 2	
Digital output	Y3-YC	Trnsistor digital output 3	1.Optocoupler coupling isolation, dual polarity open collector output: 2.Output voltage range: 0～24 V 3.Output current range: 0～50 mA 4.Y4 is limited by F5-00 "HY function enable". As high-speed pulse output, the maximum frequency is 1000 kHz. When output as open collector, the specification is the same as Y3. 5.It's disconnected by default at the factory. If you need to connect, you can short-circuit YC and COM by yourself.
	Y4-YC	Trnsistor digital output 4/ High-speed pulse output	
	Y1A/Y1B/ Y1C	Relay digital output 1	Contact driving capacity: 250Vac, 3A, COSØ=0.4. 30Vdc, 1A
Communi-cation	DA, DB	RS485 interface	1. Standard RS485 communication interface;

(10V,AI1,AI2,keyboard potentiometer, GND)

■The connection with analog signal is especially easy to be influenced by the interference of external noise, thus the wire should be as short as possible (less than 20m), and shielding wire should be used. The outer wire mesh of the shielding wire should be basically grounded, but if the inducing noise is very loud, it is better to connect it to the FC terminal.

■For the need of using contact in this circuit, the double-fork contact which can process weak signals should be used. Besides, the terminal FC should not adopt contact control.

■While connecting with the external analog signal follower, sometimes the interference caused by the analog signal follower or the AC drive will lead to misoperation, in such conditions, the capacitor and the magnetic core of ferrite may be conncted to the external analog follower, as shown below:

Go through in-phase and encirle 3 loops or above

AI1,AI2,keyboard potentiometer

GND

Ferrite magnetic ring
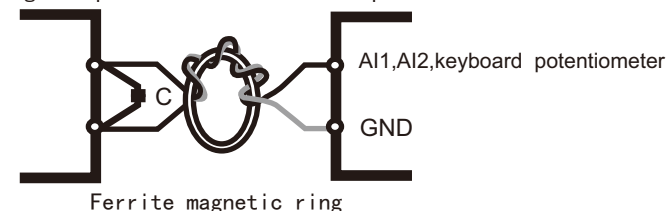
Input terminals of contact (S1~S6)

■While controlling the input of contacts, in order to prevent bad contact, the contacts that have high reliability for the contact with weak signals should be used.

Output terminals of transistor (Y3,Y4)

■The polarity of the external power supply should be correctly connected.
■While connecting the control relay, the surge absorber should be connected with the two ends of field coil. Please ensure that the polarity is correctly connected.

Others

■It's best to use the shielding wires as control wires, the isolation network divested segment before the terminals should not be exposed.
■The wires of control terminals should keep away from the wires of the main loop, or misoperation may be caused due to noise interference. If an intersection is needed, make them intersect with a right angle.
■Generally the control wires don't have good insulation. If the insulation layer is broken due to some reason, high voltage may enter the control circuit (control panel), leading to circuit damage, equipment accidents or personal Danger.
■The control wires in the AC drive should be fixed properly to prevent them from the direct contact with the charge-carrying part of the main circuit (e.g. the terminal strips of the main circuit).

4.Basic operation and commissioning

4.1LED keyboard panel appearance and operation process

8 segment digital tube LED operation panel by five and ten leds, it can display the running condition of AC drives, running direction, alarm, forecasting warning information, panel/remote instruction, monitoring data, I/O status, the parameters of the function of data set, etc.

The panel is detachable and isolated from the input potentiometer. The panel is allowed to be removed during operation, but it is not recommended to do so when running in relation to the panel, such as panel control running/stopping and setting the frequency.

4.1.1 LED operation panel

Note: The built-in keyboard has no panel potentiometer, but the pull-out keyboard includes it.
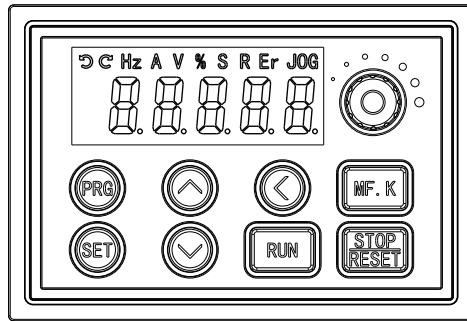
4.1.2 Description of LED operation panel indicators

Indicator	Description	Indicator	Description
↺	Motor reverse rotation	%	Monitoring interface for percentage display
↻	Motor forward rotation	S	Motor speed unit
Hz	Monitoring interface is frequency	Er	AC drive has failure
A	Monitoring interface is current	JOG	JOG state
V	Monitoring interface is voltage	R	Command source indicator 1.The light is on: Local control 2.Light off: Panel control 3.Flashing Light: Remote control

4.1.3 Digital display code comparison table

Text Content	0	1	2	3	4	5	6	7	8	9	A	B	C	D
LED Display	0	1	2	3	4	5	6	7	8	9	A	b	C	d
Text Content	E	F	G	H	I	K	O	P	R	S	T	U	V	Y
LED Display	E	F	G	H	I	t	o	P	r	S	r	U	U	y

4.1.4 Description of Keys on the LED operation panel

Key	Name	Function
PRG	Programming key	Level 1 main menu entry or exit.
SET	Confirm key	Enter the menu interface step by step; Set parameters
∧	Incremental key	Increment of data or function code.
∨	Decrement key	Decrement of data or function code.
<	Shift key	In the shutdown display and operation display interface, the display parameters can be selected cyclically. When modifying a parameter, you can select the modification bit of it.
RUN	Running key	In the keyboard operation mode, it is used to run the operation.
STOP RESET	Stop/Reset	In the running state, press this key to stop; In the fault alarm state, press this key to reset; Its characteristics are constrained by function F7-02.
MF. K	Multi functional key	Select function switching according to F7-01, which can be defined as source, or fast direction switching.
◎	Potentiometer	Increase and decrease of figures

4.1.5 LED Operating Panel Menu Structure

The drive operating panel has three levels of menu:

1.Level I - function parameter group
2.Level II - function parameter
3.Level III - function parameter value

Structure of three levels of menu
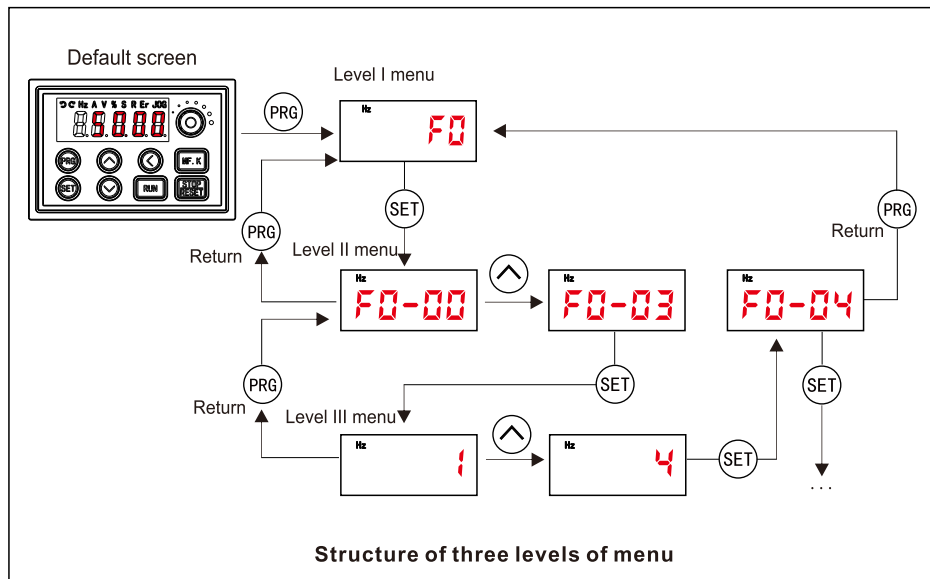
● The following example shows how to modify F3-02 from 10.00 Hz to 15.00 Hz.
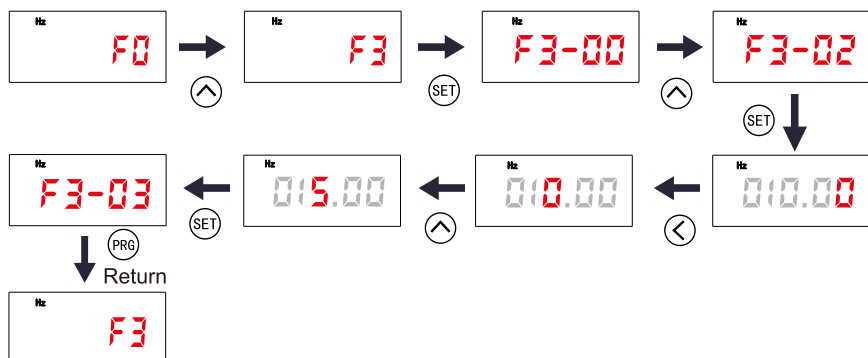
Press (SET) from a Level III menu to:

1.Save the parameter value you have set.

2.Return to Level II menu, and then.

3.Select the next function parameter.

Press (PRG) from a Level III menu to:

1. Return to Level II menu without saving the parameter value, and remain at the current function code.

■ Unmodifiable

ParametersWhen operating in Level III menus, if the parameter does not include a flashing digit, then it is not possible to modify that parameter. There are two possible reasons for this:

1.The function parameter you have selected is read-only.

This is because:The display is showing the AC drive model.The display is showing an actual parameter detected by the system.The display is showing a running record parameter.

2.The displayed function parameter cannot be modified while the AC drive is in the RUNNING status. You can modify these types of parameter only when the AC drive is in the STOP status.

4.1.6 Parameters composition

Function Code Group	Description	Parameter description
F0 to FP	Basic parameters	Running command, frequency command, motor parameter, control mode, AI/AO characteristic correction, optimization control and other parameters.
A0 to AC		
U0	Monitoring parameters	Inverter basic monitoring parameter group.

Before viewing the parameters with the operation panel, you must first set the parameter FP-02(function parameter group display selection) to ensure that the parameter group to be viewed is in the display state.

Function Code	Function definition	Setting Range	Parameter description
FP-02	Function parameter group display selection	BIT0: Group U 0: Not displayed 1: Displayed BIT1: Group A 0: Not displayed 1: Displayed	It is used to control whether the parameters of group A and group U are displayed.

4.1.7 Query of status parameters

In the stop or running state, use the key ⓒ on the operation panel to switch each byte of the parameters F7-03, F7-04 and F7-05, and multiple state parameters can be displayed.

There are 32 running state parameters in the running state, and the parameters F7-03 (running display parameter 1) and F7-04 (running display parameter 2) select whether the corresponding parameter of each bit is displayed according to the binary bit. There are 13 stop state parameters in the stop state, and the parameter F7-05 (stop display parameter) selects whether the corresponding parameter of each bit is displayed according to the binary bit.

View the parameters in the running state through the panel: running frequency, bus voltage, output voltage, output current, output power, and PID settings.

1. According to the corresponding relationship between each byte in parameter F7-03 (running display parameter 1) and the above parameters, set the corresponding bit to 1.

2. Convert the binary number to hexadecimal and set it in F7-03. The keyboard setting value is displayed as H.001F.

3. Use the key ⓒ on the operation panel to switch each byte of F7-03 to check the value of the relevant parameters. The settings are as shown in the following figure:

High															Low
F7−03	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Hex	0				0				1				F			
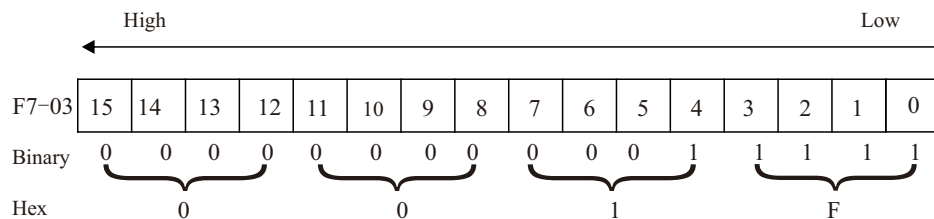
The viewing methods of other states are the same as those of F7-03. The corresponding relationship of status parameters in each byte of F7-03, F7-04 and F7-05 is as follows:

Function Code	Function definition	Default	Setting Range	Parameter description
F7-03	LED display running parameters 1	1F	0000~FFFF	0000 to FFFF BIT0:Running frequency 1(Hz) BIT1:Set frequency(Hz) BIT2:Bus voltage(V) BIT3:Output voltage(V) BIT4:Output current(A) BIT5:Output power(kW) BIT6:Output torque 1(%)
F7-03	LED display running parameters 1	1F	0000~FFFF	BIT7:S state BIT 8:Y state BIT9:AI1 voltage(V) BIT10:AI2 voltage(V) BIT11:Keyboard potentiometer voltage(V) BIT12:Count value BIT 13:Length value BIT14:Load speed display BIT15:PID reference
F7-04	LED display running parameters 2	0	0000~FFFF	0000 to FFFF BIT0:PID feedback BIT1:PLC stage BIT2:Pulse reference(kHz) BIT3:Running frequency 2(Hz) BIT4:Remaining running time BIT5:AI1 voltage before correction(V) BIT6:AI2 voltage before correction(V) BIT7:Keyboard potentiometer voltage before correction BIT8:Linear speed BIT9:currentpower-on time(h) BIT10:currentpower running time(Min) BIT11:Pulse reference(Hz) BIT12:Communication reference BIT13:Enceder feedback speed(Hz) BIT14:Main frequency X display(Hz) BIT15:Auxiliary frequency Y display(Hz)
F7-05	Display stop parameter	33	0000~FFFF	0000 to FFFF BIT0:Frequency reference(Hz) BIT1:Bus voltage BIT2:S state BIT3:Y state BIT4:AI1 voltage(V) BIT5:AI2 voltage(V) BIT6:Keyboard potentiometer voltage BIT7:Count value BIT8:Length value BIT9:PLC stage BIT10:Load speed BIT11:PID reference BIT12:Pulse reference (kHz)

4.2 Check and Test before Operation

The following matters should be paid attention before the operation:

■ Check if wire connection is correct. Confirm AC drive output terminal U, V, W is not connected to POWER and the ground terminal E(G) is grounded well.

■ Confirm there is no short circuit within every terminal and electricity naked part.

■ Confirm all terminals connection and joints are tight and not loose.

■ Ensure that the motor isn't connected with loaded machine.

■ Before turning the power on, ensure that all the switches are in the disconnected state to guarantee that the AC drive won't start or operate abnormally when the power is on.

■ The power supply can only be turned on after the upper cover is installed.

■ It is forbidden to operate the switch with wet hand.

■ Display of the keypad panel (no indication of faults)

■ The cooling fan installed in the AC drive should work normally.

4.3 Running way

There are many running ways showed in "Chapter 4 CONTROL PANEL AND OPE-RATION" and Chapter5 "FUNCTION DATA ILLUSTRATION".Choose the best operation way according to actual need and running regulations. The common running ways are listed on figure.

Running way	Frequency setting	Running order
Key panel operation	Keyboard keys select or panel adjustment potentiometer	Press RUN or STOP/RESET to START and STOP
Remote Control	Potentiometer or simulated voltage current	Input joint terminal S1-COM、 terminal S2-COM
Remote communication control method	Communication	Communication

4.4 Test Run

Refer to 4.2 inspection and preparation before operation and confirm that there is no abnormality, and then test operation can be carried out. When the product leaves the factory, it is set to the keyboard operation mode.

1. After the power supply is on, confirm that the LED displays the frequency 0.00Hz.

2. Use the key to set low frequency around 5Hza

3.Press RUN or STOP/RESET to start and to low down and stop.

4.Check the following before running:

Check whether the rotation of motor is correct.

Check whether the rotation of motor is steady (without abnormal noise or vibration).

Check whether the acceleration / deceleration are steady.

If there is no abnormality, perform the test run with frequency increased.

If no abnormality happens in the test run above, the formal operation can be started.

Notice!

If there is any abnormal phenomena occured , stop AC drive immediately. Consult "fault diagnosis"to find the problem. When AC drive stops, terminal L1/R1, L2/S, L3/T is still with power if main circuit is not switched off.

Any touch onto terminal U, V, W will be shocked. Besides, wave filter capacitor is still full of charging voltage and need certain period of time to discharge, if main circuit power is off. Touch inner AC drive circuit only after power and the DC circuit voltage tested by DC circuit voltage meter is below safety voltage.

5.Function parameters description

5.1　Start/Stop Command Source

Three control methods are available:

● Operating panel (keypad & display)

● Terminal I/O control

● Serial communication

You can select the required control mode in function parameter F0-02.

Function Code	Parameter Name	Setting Range	Default
F0-02	Command source selection	0：Operating panel（LED off） 1：Terminal（LED on） 2：Serial communication（LED flashing）	0

● F0-02 = 0: Operating panel (keypad & display) (The LOCAL/REMOT indicator is off.)

The RUN commands are given by pressing keys RUN and STOP/RESET on the operating panel.

　– Press RUN to start the AC Drive.

　– Press STOP/RESET to stop the AC Drive.

For details on operating panel, refer to "Chapter 4 operation panel (keyboard display)"

● F0-02 = 1: Terminal I/O control (The LOCAL/REMOT indicator is on.)

The terminal I/O control mode applies to installations where the Start and Stop signals come from:

　– A SP switch or electromagnetic button

　– A dry contact signal source
Commands are given by using multi-functional input terminals with functions such as FWD, REV, JOGF and JOGR.

For details on terminal I/O control, see "5.1.1 terminal I/O control "

● F0-02 = 2: Serial comms (The LOCAL/REMOT indicator is flashing.)

The available serial communication options is Modbus .

For details on serial communication, see "5.1.2 serial communication "

5.1.1 Terminal Control

F4-11 defines the four terminal I/O control modes, in which the drive running is controlled by S terminals.

Function Code	Parameter Name	Setting Range	Default
F4-11	Terminal control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0

Figure5-1 Four terminal control modes
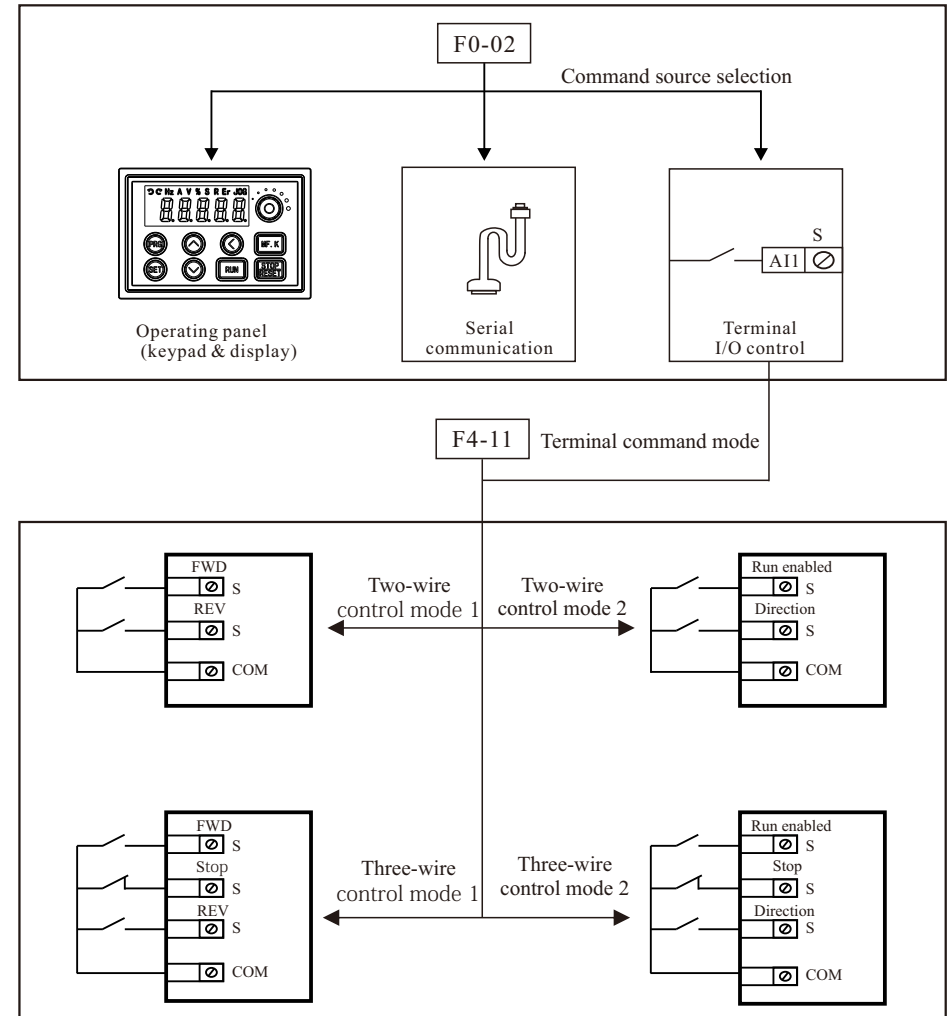
The following example takes S1, S2 and S3 to describe how to control the AC drive via S terminals.

■　F4-11 = 0: Two-wire Control Mode 1

　　It is the most commonly used two-wire control mode. Allocate S1 with forward run function and S2 with reverse run function. You need to connect forward run switch to S1 and reverse run switch to S2. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
F0-02	Command source selection	1	Terminal I/O control
F4-11	Terminal I/O control mode	0	Two-wire control mode 1
F4-00	S1 function selection	1	Forward RUN (FWD)
F4-01	S2 function selection	2	Reverse RUN (REV)

In this mode,

● 　When K1 is closed, motor rotates in forward direction. When K1 is open, motor stops.

● 　When K2 is closed, motor rotates in reverse direction. When K2 is open, motor stops.

● 　When K1 and K2 are both open or closed simultaneously, motor stops.

Figure 5-2 Two-wire 1 sequence wiring diagram
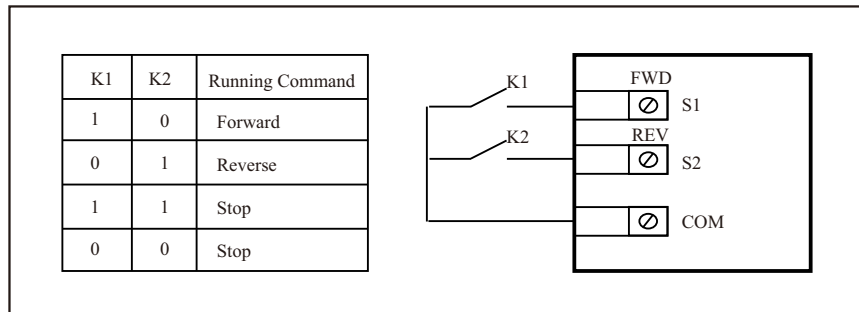
■　F4-11 = 1: Two-wire Control Mode 2

　　In this mode, S1 is RUN enabled terminal, and S2 determines running direction. Allocate S1 for RUN enabled function and S2 for running direction.

The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
F0-02	Command source selection	1	Terminal I/O control
F4-11	Terminal I/O control mode	1	Two-wire control mode 2
F4-00	S1 function selection	1	Forward RUN (FWD)
F4-01	S2 function selection	2	Reverse RUN (REV)

In this mode,

● 　When K1 is closed, motor rotates in forward direction with K2 open.

● 　When K1 is closed, motor rotates in reverse direction with K2 closed.

● 　When K1 is open, motor stops no matter whether K2 is open or closed.

Figure 5-3 Three-wire 1 sequence wiring diagram
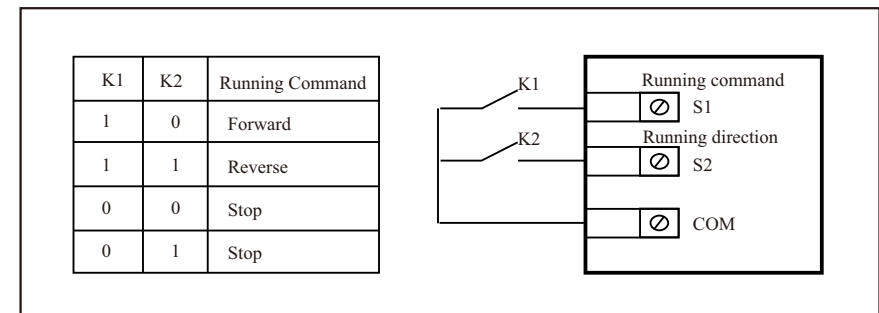
■　F4-11 = 2: Three-wire Control Mode 1

　　In this mode, S3 is three-wire control terminal. S1 is set for forward run function and S2 is set for reverse run function. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
F0-02	Command source selection	1	Terminal I/O control
F4-11	Terminal I/O control mode	2	Three-wire control mode 1
F4-00	S1 function selection	1	Forward RUN (FWD)
F4-01	S2 function selection	2	Reverse RUN (REV)
F4-01	S3 function selection	3	Three wire control

K3 is a normally-closed button and K1 and K2 are normally-open buttons.

● K3 must remain closed during START sequence and during normal RUN operation.

● Motor nstops immediately when K3 opens.

● Signals from SW1 and K2 are valid only with K3 closed.

● On normal condition (K3 closed), after you press downK1, motor rotates in forward direct-

ion. After you press down K2, motor rotates in reverse directio.

Figure 5-4 Three-wire 1 sequence wiring diagram
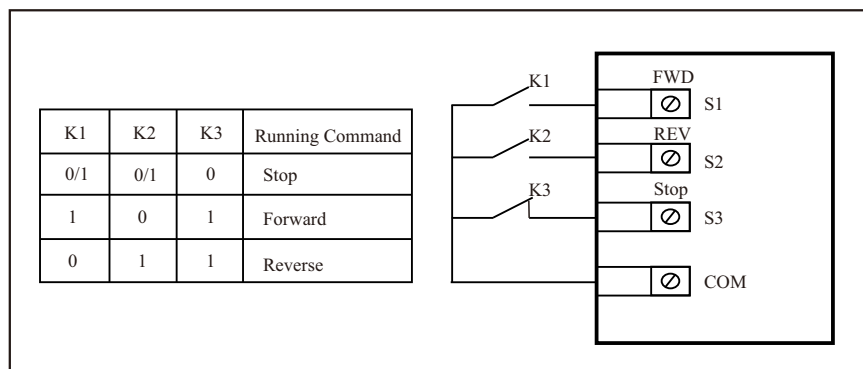
■ F4-11 = 3: Three-wire Control Mode 2

In this mode, S3 is three-wire control command terminal. S1 determines whether the RUN command is enabled and S2 determines running direction.

The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
F0-02	Command source selection	1	Terminal I/O control
F4-11	Terminal I/O control mode	3	Three-wire control mode 2
F4-00	S1 function selection	1	Forward RUN (FWD)
F4-01	S2 function selection	2	Reverse RUN (REV)
F4-01	S3 function selection	3	Three wire control

K3 is a normally-closed button and K1 and K2 are normally-open buttons.

● K3 must remain closed during start sequence and during normal run operation.

● Motor stops immediately when K3 opens.

● Signals from SW1 and K2 are valid only with K3 closed.

● On normal condition (K3 closed), after you press down K1, motor rotates in forward direction with K2 open. Motor rotates in reverse direction with K2 closed.

Figure 5-5 Three-wire 1 sequence wiring diagram
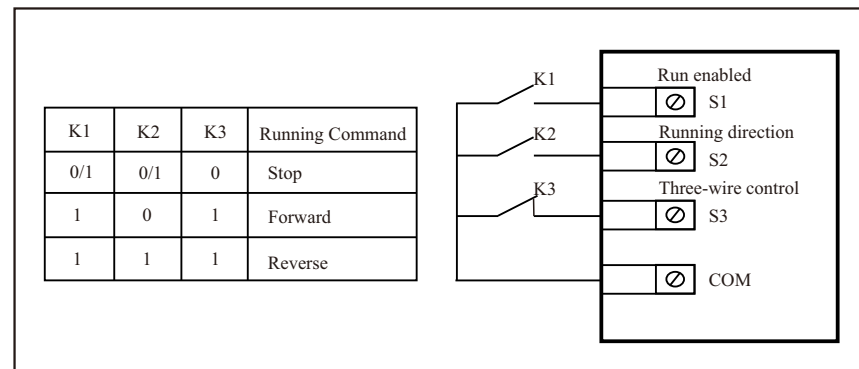
5.1.2 Serial Communication

We have the serial communications Modbus .

Function Code	Parameter Name	Setting Range	Default
F0-28	Serial port communication protocol	0: Modbus protocol	0

When the AC drive is controlled via serial communication, the host computer must send write command to the AC drive. Here takes the Modbus protocol as an example to describe process of giving run command via communication.

To make the drive run in reverse direction, the host computer sends the write command 01 06 20 00 00 02 03 CB (hexadecimal). In the command,

● 01H (settable): AC drive address
● 06H: write command
● 2000H: communication address

● 02H: reverse run
● 03CBH: CRC check

Master Command		Slave Response	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
Parameter address high bits	20H	Parameter address high bits	20H
Parameter address low bits	00H	Parameter address low bits	00H
Data content high bits	00H	Data content high bits	00H
Data content low bits	02H	Data content low bits	02H
CRC high bits	03H	CRC high bits	03H
CRC low bits	CBH	CRC low bits	CBH

5.2 Set Frequency Reference

The AC drive provides the following four methods to output the required frequency reference:

● Main frequency reference
● Auxiliary frequency reference
● Main & auxiliary calculation
● Command source + frequency reference setting channel

5.2.1 Set Main Frequency Reference

Main frequency reference has nine setting channels.

F0-03 selects a required channel to set the main frequency reference, described in the following figure.

Function Code	Parameter Name	Setting Range	Default
F0-03	Main frequency reference setting channel selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID reference 9: Communication setting 10:Pull out keyboard potentiometer is valid (applicable to version above 3.00)	0

■ Digital Setting (Non-retentive at Power Down)

The initial value of frequency reference is F0-08(Preset frequency). You can modify frequency reference by pressing ⋀ and ⋁ on the operating panel (or using the UP/YWN function of input terminals).When the AC drive is powered on again, frequency reference continues from the value of F0-08.

■ Digital Setting (Retentive at Power Down)

The initial value of frequency reference is F0-08 (Preset frequency). You can change frequency reference by pressing ⋀ and ⋁ on the operating panel (or using the UP/YWN function of input terminals).When the AC drive is powered on again, frequency reference continues from where it last reached.

Function Code	Parameter Name	Setting Range	Default
F0-08	Preset frequency	0.00 to max. frequency (F0-10)	50.00 Hz
F0-10	Max. Frequency	50.00 to 500.00 Hz	50.00 Hz

Note	F0-23 (Retentive selection of digital setting frequency upon stop) determines whether to save frequency reference selection by pressing ⋀ and ⋁ or via the up/down function when the AC drive stops. It is not the same as F0-03 = 0 or 1, which determines whether to retain the setting on power-off.

Function Code	Parameter Name	Setting Range	Default
F0-23	Retentive selection of digital setting frequency upon stop	0: Not retentive 1: Retentive	1

F0-23 is valid only when frequency reference setting channel is digital setting.

● F0-23 = 0: Non-retentiveThe AC drive resumes frequency reference to the value set in F0-08 at stop. Frequency reference continues from the value of F0-08 at next power-on.

● F0-23 = 1: retentive The AC drive retains the frequency reference that was last reached at stop. Frequency reference continues from the retained value at next power-on.For example, F0-08 is set to 40 Hz and you increase it to 45 Hz by pressing ⋀ . If F0-23 = 0, The drive resumes frequency reference to 40 Hz after stop. If F0-23 = 1, frequency reference remains at 45 Hz after stop.

■   Analog InputAI1 (0 to 10 V voltage input)AI2 (0 to 10 V voltage input or 0 to 20 mA current input, by F4-40)Keyboard potentiometer (-10 to 10 V voltage input)Frequency reference is entered from an analog input (AI) terminal. To input frequency reference from an AI terminal, do as follows:

Step 1: Set AI curve.

The AC drive provides five curves to indicate mapping relationship between the input voltage entered from AI1, AI2 or Keyboard potentiometer and target frequency. Three of the curves have a linear (point-point) correspondence, and two have four-point correspondence. You can set curves via parameters F4-13 to F4-27 and parameters in group A6, and select curves for AI1, AI2 and Keyboard potentiometer in F4-33.Here takes AI curve 1 as an example to describe how to set AI curve. AI curve 1 is set by F4-13 to F4-16.

Figure 5-6 Set AI curve 1
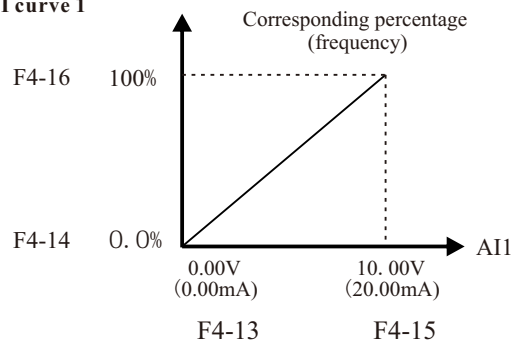
F4-13 to F4-16: These five parameters set relationship between analog input and corresponding percentage.

●   When analog input voltage exceeds the value of F4-15, the AC drive uses the maximum value.

●   When analog input voltage is below the value of F4-13, the AC drive uses the minimum value or 0.0%, determined by the setting of F4-34.

Function Code	Parameter Name	Setting Range	Default
F4-13	AI curve 1 min. Input	0.00 V to F4-15	0.00 V
F0-10	Corresponding percentage of AI curve 1 min. Input	−100.00% to 100.0%	0.0%
F4-15	AI curve 1 max. Input	F4-13 to 10.00 V	10.00 V
F4-16	Corresponding percentage of AI curve 1 max. Input	−100.00% to 100.0%	100.0%

Note	When an AI terminal is used for input of frequency reference, 100% of voltage/current input corresponds to the value of F0-10 (max. frequency). If analog input is current, 1 mA current is equal to 0.5 V voltage.

F4-18 to F4-21 and F4-3 to F4-26 define AI curve 2 and AI curve 3, respectively. AI curve 2 and AI curve 3 have the same function and usage as AI curve 1 does. Refer to step 1 : set AI curve.

Figure 5-7 Set AI curve 2
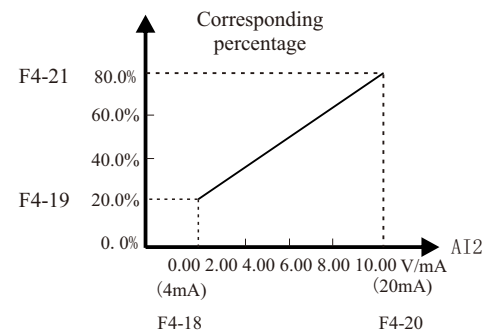
Function Code	Parameter Name	Setting Range	Default
F4-18	AI curve 2 min. Input	0.00 V to F4-20	0.00 V
F4-19	Corresponding percentage of AI curve 2 min. Input	−100.00% to 100.0%	0.0%
F4-20	Ai2 curve max. Input	F4-18 to 10.00 V	10.00 V
F4-21	Corresponding percentage of AI curve 2 max. Input	−100.00% to 100.0%	100.0%
F4-23	AI curve 3 min. Input	0.00 V to F4-25	0.00 V
F4-24	Corresponding percentage of AI curve 3 min. Input	−100.00% to 100.0%	0.0%
F4-25	AI curve 3 max. Input	F4-23 to 10.00 V	10.00 V
F4-26	Corresponding percentage of AI curve 3 max. Input	−100.00% to 100.0%	100.0%

A6-00 to A6-15 define AI curve 4 and AI curve 5, which have the similar function of AI curve 1 to AI curve 3. AI curve 1 to AI curve 3 are linear correspondence and AI curve 4 and AI curve 5 are four-point correspondence.

Figure 5-8 Set AI curve 4 and AI curve 5

AI corresponding
percentage

100%

Corresponding
percebtage of
AI max. Input

Corresponding
percentage
of AI curve
inflexion 1 input

0V (0mA)

AI curve
inflexion 2

AI input
voltage

AI curve
inflexion 1

10V(20mA)

0 V （0 mA）

Corresponding
percentage of
AI curve
inflexion 2
input

−100%

Corresponding
percentage of AI
min. Input
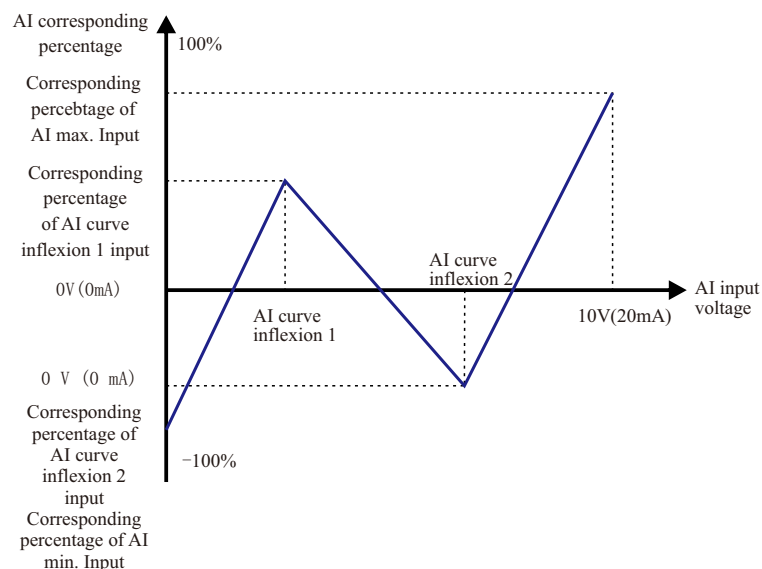
Note	When setting AI curve 4 and AI curve 5, curve min. input, inflexion 1 voltage, inflexion 2 voltage and curve max. input increase successively.

Function Code	Parameter Name	Setting Range	Default
A6-00	AI curve 4 min. Input	−10.00 V to A6-02	0.00 V
A6-01	Corresponding percentage of AI curve 4 min. Input	−100.00% to 100.0%	0.0%
A6-02	AI curve 4 inflexion 1 input	A6-00 to A6-04	3.00 V
A6-03	Corresponding percentage of AI curve 4 inflexion 1 input	−100.00% to 100.0%	30.0%
A6-04	AI curve 4 inflexion 1 input	A6-02 to A6-06	6.00 V
A6-05	Corresponding percentage of AI curve 4 inflexion 1 input	−100.00% to 100.0%	60.0%
A6-06	AI curve 4 max. Input	A6-06 to 10.00 V	10.00 V
A6-07	Corresponding percentage of AI curve 4 max. Input	−100.00% to 100.0%	100.0%
A6-08	AI curve 5 min. Input	−10.00 V to A6-10	0.00 V
A6-09	Corresponding percentage of AI curve 5 min. Input	−100.00% to 100.0%	0.0%
A6-10	AI curve 5 inflexion 1 input	A6-08 to A6-12	3.00 V

A6-11	Corresponding percentage of AI curve 5 inflexion 1 input	−100.00% to 100.0%	30.0%
A6-12	AI curve 5 inflexion 1 input	A6-10 to A6-14	6.00 V
A6-13	Corresponding percentage of AI curve 5 inflexion 1 input	−100.00% to 100.0%	60.0%
A6-14	AI curve 5 max. Input	A6-14 to 10.00 V	10.00 V
A6-15	Corresponding percentage of AI curve 5 max. Input	−100.00% to 100.0%	100.0%
A6-16	Pull-out keyboard potentiometer minimum input	0.00V to A6-18	0.50V
A6-17	Corresponding setting of minimum input of keyboard potentiometer	−100.00% to 100.0%	0.0%
A6-18	Pull-out keyboard potentiometer maximum input	A6-13 to 10.00V	10.00V
A6-19	Corresponding setting of maxiimum input of keyboard potentiometer	−100.00% to 100.0%	100.0%

F4-33 selects curve of AI1, AI2 and Keyboard potentiometer from the five curves, respectively. Curve 1, curve 2 and curve 3 are 2-point curves, set in group F4. Curve 4 and curve 5 are 4-point curves, set in group A6.

The drive provides two AI terminals (AI1, AI2). An extra AI terminal (Keyboard potentiometer) is provided by the I/O extension card.

Function Code	Parameter Name	Setting Range	Default
F4-33	AI curve selection	Curve 1 (2 points, see 4-13~F4-16) Curve 2 (2 points, see F4-18~F4-21) Curve 3 (2 points, see F4-23~F4-26) Curve 4 (4 points, see A6-00~A6-07) Curve 5 (4 points, see A6-08~A6-15) Units position: AI1 curve selection Tens position: AI2 curve selection Hundreds position: Keyboard potentiometer curve selection	321
F4-17	AI1 filter time	0.00s to 10.00s	0.10s
F4-22	AI2 filter time	0.00s to 10.00s	0.10s
F4-27	Keyboard potentiometer filter time	0.00s to 10.00s	0.10s

F4-17, F4-22 and F4-27 set AI software filter time. If analog input is liable to interference, increase this parameter to stabilize detected analog input. But too large a setting slows response of analog detection. Set it correctly based on actual conditions.

■　Pulse Reference (S5)Frequency reference is input by means of S5 (high-speed pulse). Signal specification of pulse reference is 9 to 30 V (voltage range) and 0 to 100 kHz (frequency range). The corresponding value 100% of pulse reference corresponds to the value of F0-10 (max. frequency).

Note	Main frequency reference set via pulse reference and pulse output of the Y4 terminal (F5-00 = 1) cannot be used simultaneously.

F4-28 to F4-32 set relationship between pulse input (from S5 only) and corresponding percentage. It has the same function and usage as AI curve 1 does.

Function Code	Parameter Name	Setting Range	Default
F4-28	Pulse min. Input	0.00 kHz to F4-30	0.00 kHz
F4-29	Corresponding percentage of pulse min. Input	−100.00% to 100.0%	0.0%
F4-30	Pulse max. Input	F4-28 to 50.00 kHz	50.00 kHz
F4-31	Corresponding percentage of pulse max. Input	−100.00% to 100.0%	100.0%
F4-32	Pulse filter time	0.00s to 10.00s	0.10s

Figure 5-9 Pulse input at S5 to control frequency reference
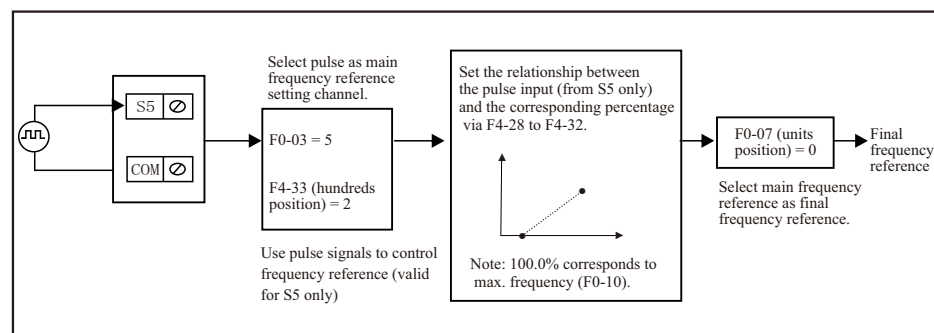
■　Multi-referenceMulti-reference is a relative value and is a percentage of F0-10 (max. Frequency). Whether the setting is positive or negative determines drive running direction. If negative, it indicates that the AC drive runs in reverse direction.Multiple frequency references are set in group FC, as listed in the following table.

Function Code	Parameter Name	Setting Range	Default
FC-00	Reference 0	−100.00% to 100.0%	0.0%
FC-01	Reference 1	−100.00% to 100.0%	0.0%
FC-02	Reference 2	−100.00% to 100.0%	0.0%
FC-03	Reference 3	−100.00% to 100.0%	0.0%
FC-04	Reference 4	−100.00% to 100.0%	0.0%
FC-05	Reference 5	−100.00% to 100.0%	0.0%
FC-06	Reference 6	−100.00% to 100.0%	0.0%
FC-07	Reference 7	−100.00% to 100.0%	0.0%
FC-08	Reference 8	−100.00% to 100.0%	0.0%
FC-09	Reference 9	−100.00% to 100.0%	0.0%
FC-10	Reference 10	−100.00% to 100.0%	0.0%
FC-11	Reference 11	−100.00% to 100.0%	0.0%
FC-12	Reference 12	−100.00% to 100.0%	0.0%
FC-13	Reference 13	−100.00% to 100.0%	0.0%
FC-14	Reference 14	−100.00% to 100.0%	0.0%
FC-15	Reference 15	−100.00% to 100.0%	0.0%

In multi-reference mode, combinations of different S terminal states correspond to different frequency references. The AC drive supports a maximum of 16 references implemented by 16 state combinations of four S terminals (allocated with functions 12 to 15) in Group FC.

If a S terminal is used for the multi-reference function, you need to set related parameters in group F4.

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

K4	K3	K2	K1	Reference Setting	Corresponding Pr.
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

When the frequency source is selected as multi-speed, 100% of the function code FC-00~FC-15 corresponds to the maximum frequency F0-10.

Besides multi-speed function, the multi-reference can be also used as PID reference source or voltage source for V/F separation.

Function description of acceleration and deceleration time selection terminal:

Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameters
OFF	OFF	Acceleration time 1	F0-17、F0-18
OFF	ON	Acceleration time 2	F8-03、F8-04
ON	OFF	Acceleration time 3	F8-05、F8-06
ON	ON	Acceleration time 4	F8-07、F8-08

■ Simple PLCWhen simple PLC is used to control frequency reference, the AC drive running frequency can be selected from any of the 16 frequency reference set points.

You can set holding time and acceleration/deceleration time of 16 frequency references in FC-18 to FC-49.

Function Code	Parameter Name	Setting Range	Default
FC-18	Running time of simple PLC reference 0	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-19	Acceleration/deceleration time of simple PLC reference 0	0 to 3	0
FC-20	Running time of simple PLC reference 1	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-21	Acceleration/deceleration time of simple PLC reference 1	0 to 3	0
FC-22	Running time of simple PLC reference 2	0.0s (h) to 6553.5s (h)	0.0s (h)

FC-23	Acceleration/deceleration time of simple PLC reference 2	0 to 3	0
FC-24	Running time of simple PLC reference 3	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-25	Acceleration/deceleration time of simple PLC reference 3	0 to 3	0
FC-26	Running time of simple PLC reference 4	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-27	Acceleration/deceleration time of simple PLC reference 4	0 to 3	0
FC-28	Running time of simple PLC reference 5	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-29	Acceleration/deceleration time of simple PLC reference 5	0 to 3	0
FC-30	Running time of simple PLC reference 6	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-31	Acceleration/deceleration time of simple PLC reference 6	0 to 3	0
FC-32	Running time of simple PLC reference 7	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-33	Acceleration/deceleration time of simple PLC reference 7	0 to 3	0
FC-34	Running time of simple PLC reference 8	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-35	Acceleration/deceleration time of simple PLC reference 8	0 to 3	0
FC-36	Running time of simple PLC reference 9	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-37	Acceleration/deceleration time of simple PLC reference 9	0 to 3	0
FC-38	Running time of simple PLC reference 10	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-39	Acceleration/deceleration time of simple PLC reference 10	0 to 3	0
FC-40	Running time of simple PLC reference 11	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-41	Acceleration/deceleration time of simple PLC reference 11	0 to 3	0
FC-42	Running time of simple PLC reference 12	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-43	Acceleration/deceleration time of simple PLC reference 12	0 to 3	0
FC-44	Running time of simple PLC reference 13	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-45	Acceleration/deceleration time of simple PLC reference 13	0 to 3	0
FC-46	Running time of simple PLC reference 14	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-47	Acceleration/deceleration time of simple PLC reference 14	0 to 3	0

Function Code	Parameter Name	Setting Range	Default
FC-48	Running time of simple PLC reference 15	0.0s (h) to 6553.5s (h)	0.0s (h)
FC-49	Acceleration/deceleration time of simple PLC reference 15	0 to 3	0

FC-16 determines the simple PLC running mode.

Function Code	Parameter Name	Setting Range	Default
FC-16	Simple PLC running mode	0: Stop after running one cycle 1: Keep final values after running one cycle 2: Repeat after running one cycle	0

● FC-16 = 0: Stop after running one cycle

The AC drive stops after running one cycle, and will not start until it receives a new RUN command.

● FC-16 = 1: Keep final values after running one cycle

The AC drive keeps final running frequency and direction after running one cycle.

● FC-16 = 2: Repeat after running one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving stop command.

FC-17 determines whether the running data is retentive at power down or at stop.

If retentive, the running data is memorized at power down or at stop and the AC drive will continue to run from the memorized data at next power-on.

If not retentive, the AC drive runs from the first simple PLC reference at next power-on.

Function Code	Parameter Name	Setting Range	Default
FC-17	Simple PLC retentive selection	BIT0:Retentive at power down 0: Not retentive 1: Retentive BIT1 : Retentive at stop 0: Not retentive at stop 1: Retentive at stop	00

FC-50 sets running time unit in simple PLC mode. FC-51 selects the setting channel of reference 0.

Function Code	Parameter Name	Setting Range	Default
FC-50	Time unit of simple PLC running	0: s (second) 1: h (hour)	0

Function Code	Parameter Name	Setting Range	Default
FC-51	Reference 0 source	0: Set by FC-00 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference 5: PID 6: Set by preset frequency (F0-08), modified via terminal UP/DOWN	0

Note	Simple PLC can be either frequency reference setting channel or voltage reference setting channel for V/F separation.

■ PID ReferenceThe PID (Proportional + Integral + Derivative) function uses system feedback for closed-loop control of variables such as flow, pressure, temperature, and so on.

The purpose of PID control is to keep the drive output as close as possible to a desired reference via PID adjustment.

● Proportional gain (Kp1)

A large value tends to reduce present error, but too large setting will cause system oscillation.

● Integral time (Ti1)

The shorter the integral time is, the faster the error will be predicted. But too short setting will cause overshoot or system oscillation.

● Derivative time (Td1)The longer the derivative time is, the faster the system will respond to the error. But too longer setting will cause vibration.
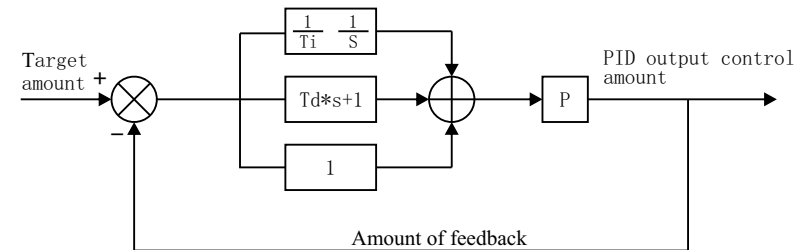
Function Code	Parameter Name	Setting Range	Default
FA-00	PID reference setting channel	0: Set by FA-01 (PID digital setting) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference (S5) 5: Communication reference 6: Multi-reference	0
FA-01	PID digital setting	0.0% to 100.0%	50.0%
FA-02	PID feedback setting channel	0:AI1 1:AI2 2:Keyboard potentiometer 3:AI1-AI2 4:Pulse reference (S5) 5: Communication reference 6: AI1 + AI2 7: Max. (|AI1|, |AI2|) 8: Min. (|AI1|, |AI2|)	0
FA-03	PID operation direction	0: Forward 1: Reverse	0
FA-04	PID reference and feedback range	0 to 65535	1000
FA-05	Proportional gain Kp1	0.0 to 100.0	20.0
FA-06	Integral time Ti1	0.01s to 10.00s	2.00s
FA-07	Differential time Td1	0.000s to 10.000s	0.000s

FA-00 and FA-01 set input channel of PID reference. PID reference is a relative value and ranges from 0.0% to 100.0%.

FA-02 sets PID feedback channel. PID feedback is a relative value and ranges from 0.0% to 100.0%.

FA-03 sets direction of PID operation. It is influenced by S function 35 "PID operation direction reverse".

● FA-03 = 0: ForwardWhen PID feedback is smaller than PID reference, the AC drive increases output frequency. The winding tension control requires forward PID operation.

● FA-03 = 1: ReverseWhen PID feedback is smaller than PID reference, the AC drive decreases output frequency. The unwinding tension control requires reverse PID operation.

FA-04: It is a non-dimensional parameter and is used for calculating display of PID reference (U0-15) and PID feedback (U0-16).

● U0-15 = PID reference (percentage) x FA-04
● U0-16 = PID feedback (percentage) x FA-04

For example, if FA-04 is set to 2000 and PID reference is 100.0%, display of PID reference (U0-15) is 2000.

Function Code	Parameter Name	Setting Range	Default
FA-08	PID output limit in reverse direction	0.00 Hz to max. frequency	0.00Hz

FA-08: In some applications a high PID output in reverse direction may introduce adverse reactions and so a limit need to be applied".

● When frequency reference setting channel is purely PID reference, FA-08 limits the output in reverse direction.

● When frequency reference setting channel is main frequency reference + PID reference, FA-08 limits the calculation result in reverse direction.

Function Code	Parameter Name	Setting Range	Default
FA-09	PID error limit	0.0% to 100.0%	0.0%

FA-09: This function helps to make the AC drive output accurate and stable.

Function Code	Parameter Name	Setting Range	Default
FA-10	PID differential limit	0.00% to 100.00%	0.10%

FA-10 applies a limit to PID differential output as a large output can cause excessive system oscillation.

Function Code	Parameter Name	Setting Range	Default
FA-11	PID reference change time	0.00s to 650.00s	0.00s

FA-11 sets time it takes PID reference to change from 0.0% to 100.0%. PID reference changes linearly based on the time set in this parameter, reducing negative impact of sudden PID reference change.

Function Code	Parameter Name	Setting Range	Default
FA-12	PID feedback filter time	0.00s to 60.00s	0.00s
FA-13	PID output filter time	0.00s to 60.00s	0.00s

FA-12 filters the PID feedback, which helps to lower interference on PID feedback but slows system response performance.

FA-13 filters the PID output frequency, which helps to drop off mutation of the AC drive output frequency but slows system response performance.

Function Code	Parameter Name	Setting Range	Default
FA-15	Proportional gain Kp2	0.0 to 100.0	20.0
FA-16	Integral time Ti2	0.01s to 10.00s	2.00s
FA-17	Differential time Td2	0.000s to 10.000s	0.000s
FA-18	PID parameter switchover condition	0: No switchover 1: Switchover via S 2: Auto switchover based on PID error 3: Auto switchover based on running frequency	0
FA-19	PID error 1 for auto switchover	0.0% to FA-20	20.0%
FA-20	PID error 2 for auto switchover	FA-19 to 100.0%	80.0%

FA-15 to FA-20: On some applications, switchover to another set of PID parameters may be required to fine tune the overall performance as load conditions can vary during the different machine cycles.

Switchover can be implemented via a S terminal or automatically implemented according to PID error level.

Figure 5-10 Switchover of two groups of PID parameters
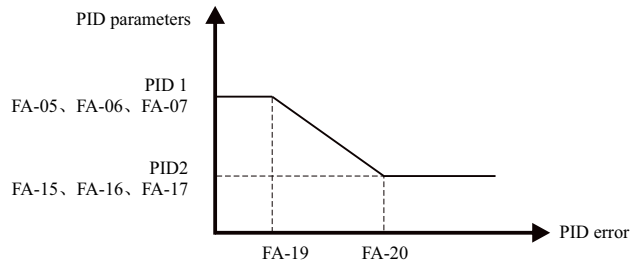
Function Code	Parameter Name	Setting Range	Default
FA-21	PID initial value	0.0% to 100.0%	0.0%
FA-22	PID initial value active time	0.00s to 650.00s	0.00s

FA-21 and FA-22: When the AC drive starts, the PID function turns active only after PID output is fixed at PID initial value (FA-21) for time set in FA-22.

Figure5-11 The PID initial value function
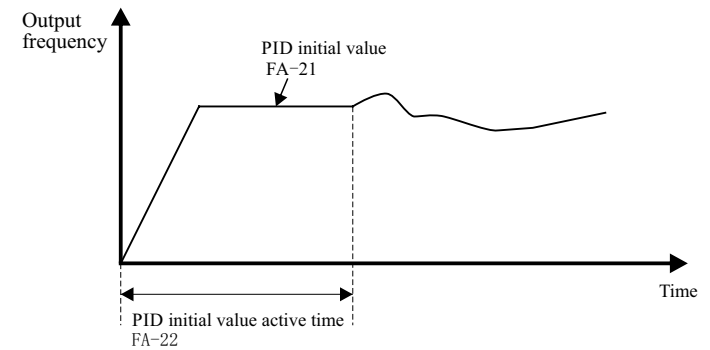
Function Code	Parameter Name	Setting Range	Default
FA-25	PID integral property	BIT0: Integral separation 0: Disabled　　　1: Enabled BIT1: Whether to stop integral operation when the PID output reaches the limit 0: Continue integral operation 1: Stop integral operation	00

FA-25 determines whether to enable integral separation function and whether to stop integral operation when PID output reaches limit.

If integral separation is enabled, when a S set for function 38 "PID integral disabled" is on, the integral operation becomes disabled. At this moment, only the P gain and derivative time take effect. If integral separation is disabled, no matter whether the S set for function 38 "PID integral disabled" is on, integral separation is inactive.

Function Code	Parameter Name	Setting Range	Default
FA-26	Detection level of PID feedback loss	0.0%: No detection 0.1% to 100.0%	0.0%
FA-27	Detection time of PID feedback loss	0.0s to 20.0s	0.0s

FA-26 and FA-27 define the PID feedback loss detection function. When PID feedback is smaller than the value set in FA-26 for time set in FA-27, AC drive detects Err31 and acts as selected in ten thousands position in F9-49.

Function Code	Parameter Name	Setting Range	Default
FA-28	Selection of PID operation at stop	0: Stop and do not operate 1： Compute shut down	0

FA-28: This function parameter determines whether to continue PID operation when the AC drive stops.

■　Serial Comms.

We have the serial communications Modbus

Function Code	Parameter Name	Setting Range	Default
F0-28	Serial port communication protocol	0: Modbus protocol	0

To set frequency reference to 10000, host computer sends write command 01 06 10 00 27 10 97 36 (hexadecimal). In the command,

● 01H (settable): AC drive address

● 06H: write command

● 1000H: frequency reference address

● 2710H: frequency reference (converted into decimal 10000)

● 9736H: CRC check

Master Command		Slave Response	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
Parameter address high bits	10H	Parameter address high bits	10H
Parameter address low bits	00H	Parameter address low bits	00H
Data content high bits	27H	Data content high bits	27H
Data content low bits	10H	Data content low bits	10H
CRC high bits	97H	CRC high bits	97H
CRC low bits	36H	CRC low bits	36H

Note	Frequency reference range set via communication is -10000 to 10000, corresponding to -100.00% to 100.00%. ● -100.00% corresponds to negative max. frequency. ● 0.00% corresponds to min. frequency. ● 100.00% corresponds to max. Frequency. Suppose that F0-10 = 50 Hz, if frequency reference in the write command is 2710, converted into decimal 10000. The input frequency reference is 50 x 100% = 50 Hz.

5.2.2 Setting Auxiliary Frequency Reference

Auxiliary frequency reference has the same nine setting modes as main frequency reference does. F0-04 selects a proper channel to set auxiliary frequency reference.

Function Code	Parameter Name	Setting Range	Default
F0-04	Main frequency reference setting channel selection	0： Digital setting (revised value is not cleared after power off) 1: Digital setting (revised value is cleared after power off) 2： AI1　　　　　　3： AI2 4: Keyboard potentiometer 5: Pulse setting (S5) 6: Multi−reference　　7: Simple PLC 8: PID reference 9: Communication setting	0

5.2.3　Main & Auxiliary Calculation

You can set relationship between final frequency reference and main frequency reference & auxiliary frequency reference in F0-07.

● Use main frequency reference as final frequency reference.

● Use auxiliary frequency reference as final frequency reference.

● Use main & auxiliary calculation as final frequency reference.

● Final frequency reference is switched over between main and auxiliary, between main and main & auxiliary calculation, and between auxiliary and main & auxiliary calculation through a S set for function 18 (Frequency reference setting channel switchover).

Function Code	Parameter Name	Setting Range	Default
F0-07	Final Frequency reference setting selection	Ones： Frequency reference selection 0： Main frequency reference 1： Main and auxiliary calculation（based on tens position） 2： Switchover between main and auxiliary 3： Switchover between main and "main & auxiliary calculation" 4： Switchover between auxiliary and "main & auxiliary calculation" 5.Any non-0 value of the main and auxiliary channel is valid, main channel first. Tens： main and auxiliary calculation formula 0： Main + auxiliary 1： Main − auxiliary 2： Max. （main, auxiliary） 3： Min. （main, auxiliary）	00
F0-05	Base value of range of auxiliary frequency reference for main and auxiliary calculation	0: Relative to maximum frequency 1: Relative to main frequency reference	0
F0-06	Range of auxiliary frequency reference for main and auxiliary calculation	0% to 150%	100%

When main frequency reference and auxiliary frequency reference are used for calculation (final frequency reference is set by "main and auxiliary calculation"), pay attention to the following aspects:

● If auxiliary frequency reference is digital setting, preset frequency (F0-08) does not take effect. You can directly adjust auxiliary frequency reference by pressing keys $\wedge$ and $\vee$ on the operating panel (or using the UP/YWN function of input terminals) based on main frequency reference.

● If auxiliary frequency reference is set via analog input (AI1, AI2 and Keyboard potentiometer) or pulse reference, 100% of the input corresponds to range of the auxiliary frequency reference (set in F0-05 and F0-06). This is valid for main and auxiliary calculation.

● Main frequency reference and auxiliary frequency reference must not use the same setting channel. That is, F0-03 and F0-04 cannot be set to the same value.

● Main & auxiliary calculation can be used for closed-loop speed control. An example of this is to use main frequency reference to set a required frequency reference and to use auxiliary frequency reference for automatic adjustment. Closed-loop control is implemented when this method is used with switchover performed by an external S terminal signal.

5.2.4　Command Source + Frequency Reference Setting Channel

When a command source + frequency reference setting channel is used to control final frequency reference, both main and auxiliary frequency reference setting channels (F0-03 and F0-04) become ineffective.

Function Code	Parameter Name	Setting Range	Default
F0-27	Command source + frequency source	BIT 0： operating panel （keypad & display） 0： No function 1： Digital setting 2： AI1　　　　　　　3： AI2 4： Keyboard potentiometer 5： Pulse reference （S5） 6： Multi−reference 7： Simple PLC　　　　8： PID reference 9： Serial communication BIT 1： terminal control + frequency reference setting channel BIT 2： serial communication + frequency reference setting channel BIT 3： automatic operation + frequency reference setting channel	0000

5.2.5 Frequency Reference Limit

Function Code	Parameter Name	Setting Range	Default
F0-10	Max. Frequency	50.00 to 500.00 Hz	50.00 Hz
F0-11	Setting channel of frequency upper limit	0: Set by F0-12 1: AI1 2: AI2 3: Keyboard potentiometer 4: PULSE reference (S5) 5: Communication reference	0
F0-12	Frequency reference upper limit	0.00 Hz to maximum frequency (F0-10)	50.00Hz
F0-14	Frequency reference upper limit	0.00 Hz to F0-12 (Frequency reference upper limit)	0.00Hz

● F0-12: The motor is not allowed to run at frequency reference above the setting in this function parameter.

● F0-14: The motor is not allowed to run at frequency reference below the setting in this function parameter.

● F0-10: It limits max. output frequency of the AC drive.

● F0-11: It selects setting channel of frequency reference upper limit.

5.2.6 Running Mode When Frequency Reference Below Lower Limit

Function Code	Parameter Name	Setting Range	Default
F8-14	Running mode when frequency reference lower than frequency lower limit	0: Run at frequency reference lower limit 1: Stop 2: Run at zero speed	1

F8-14: This function parameter sets the drive running mode when frequency reference is lower than frequency lower limit.

● F8-14 = 0: The motor runs at frequency reference lower limit.

● F8-14 = 1: The motor stops and the RUN indicator on the operation panel becomes off.

● F8-14 = 2: The motor runs at 0 Hz and the RUN indicator on the operation panel is on.

5.3 Start/Stop the AC Drive

5.3.1 Start Mode

You can set start mode of the AC drive in F6-00, direct start, catching a spinning motor and pre-excited start .

Related function parameters are listed as follows:

Function Code	Parameter Name	Setting Range	Default
F6-00	Start mode	0: Direct start 1: Catching a spinning motor 2: Pre-excited start	0
F6-01	Mode of catching a spinning motor	0: From stop frequency 1: From zero speed 2: From max. Frequency	0
F6-02	Speed of catching a spinning motor	1 to 100	20
F6-03	Start frequency	0.00 to 10.00 Hz	0.00 Hz
F6-04	Start frequency holding time	0.0s to 100.0s	0.0s
F6-05	DC injection braking 1 level /Pre-excitation level	0% to 100%	0%
F6-06	DC injection braking 1 active time /Pre-excitation active time	0.0s to 100.0s	0.0s

■ F6-00 = 0: Direct Start

It is applicable to most small-inertia loads, as shown in Figure 5-12(1).

Start frequency is applicable to drive equipment which requires startup torque, such as cement mixer, as shown in Figure 5-13 (2).

The DC injection braking function is applicable to drive load such as elevator and crane, as shown in Figure 5-14 (3).

Figure 5-12(1) Sequence of direct start
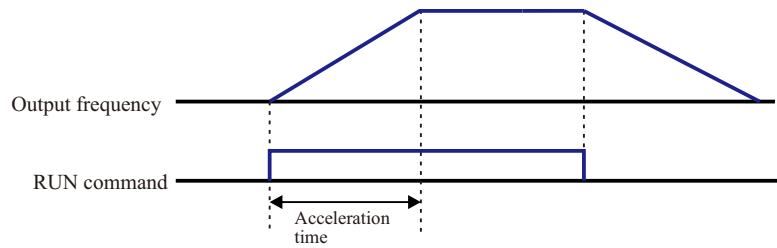
Figure 5-13(2) Sequence of start with start frequency
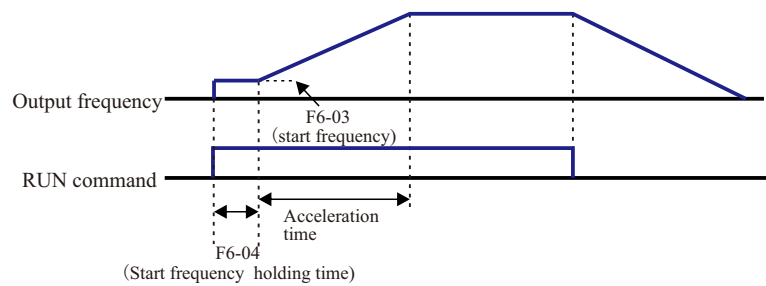
Figure 5-13(3) Sequence of start with DC injection braking
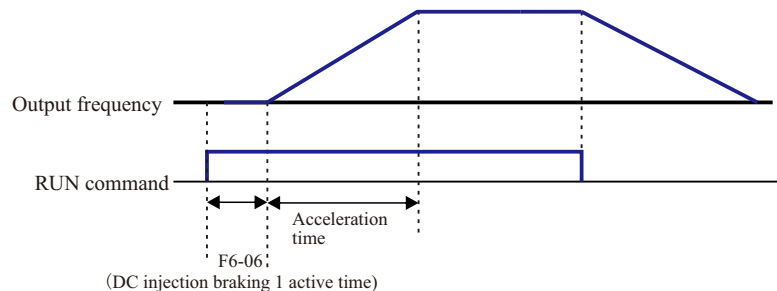
■　F6-00 = 1: Catching a Spinning Motor

　　To catch a spinning motor, the AC drive detects speed and direction of spinning motor, and then starts to run from the spinning motor frequency. In this start mode, ensure that motor parameters in group F1 are set correctly.

Figure 5-14 Catching a spinning motor
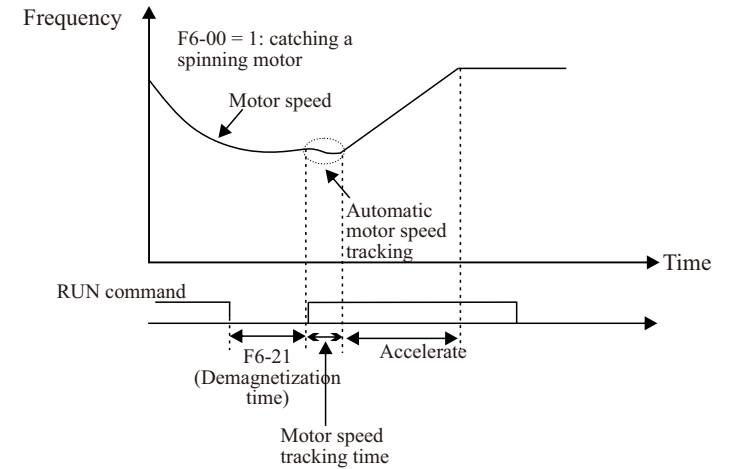
■　F6-00 = 2: Pre-excited Start

　　It is valid only for asynchronous motor and used for building magnetic field before motor running. For pre-excited current and pre-excited time, see " F 6 - 0 5 " and " F 6 - 0 6 " .

　　– If pre-excited time is 0, the AC drive cancels pre-excitation and starts to run from start frequency.

　　– If pre-excited time is not 0, the AC drive pre-excites first and then starts to run, improving motor dynamic response.

5.3.2 Stop Mode

You can set the stop mode of the AC drive in F6-10, decelerate to stop and coast to stop. The related function parameters are listed as follows:

Function Code	Parameter Name	Setting Range	Default
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0
F6-11	DC injection braking 2 start frequency	0.00 Hz to maximum frequency	0.00 Hz
F6-12	DC injection braking 2 delay time	0.0 to 36.0s	0.0s
F6-13	DC injection braking 2 level	0% to 100%	0%
F6-14	DC injection braking 2 active time	0.0s to 36.0s	0.0s

F6-11: The AC drive starts DC injection braking when the running frequency decreases to the value set in this parameter in the process of deceleration to stop.

F6-12: When the running frequency decreases to the value set in F6-11, the AC drive stops output for a period of time and then starts DC injection braking. This prevents the occurrence of fault such as overcurrent caused by direct DC injection braking at high speed.

F6-13: It has the following two different base values.

● 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.

5.3.3 Acceleration/Deceleration Time and S-curve Setting

Acceleration time indicates time required by the AC drive to accelerate from 0 Hz to acceleration/deceleration time base frequency (F0-25).

Deceleration time indicates time required by the AC drive to decelerate from acceleration/deceleration time base frequency (F0-25) to 0 Hz.

Figure 5-15 Acceleration/Deceleration time
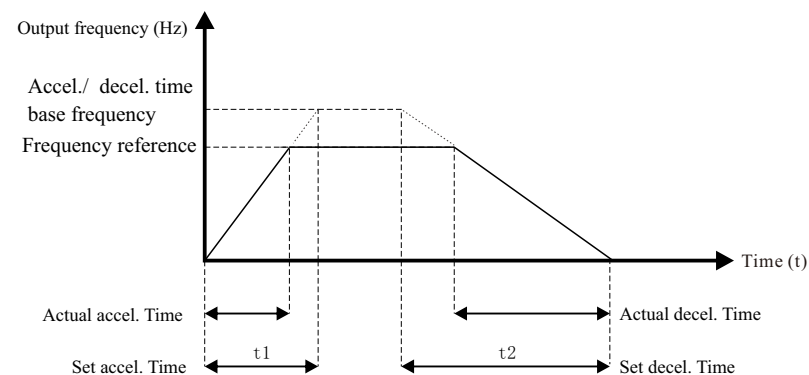
The AC drive provides totally four groups of acceleration/deceleration time for selection. You can perform switchover by using a S terminal.

● Group 1: F0-17, F0-18
● Group 2: F8-03, F8-04
● Group 3: F8-05, F8-06
● Group 4: F8-07, F8-08

The function parameters related acceleration/deceleration time are as follows:

Function Code	Parameter Name	Setting Range	Default
F0-17	Acceleration time 1	0.00 to 650.00s (F0-19 = 2) 0.0 to 6500.0s (F0-19 = 1) 0 to 65000s (F0-19 = 0)	Model dependent
F0-18	Deceleration time 1		Model dependent
F8-03	Acceleration time 2	0.00 to 650.00s (F0-19 = 2) 0.0 to 6500.0s (F0-19 = 1) 0 to 65000s (F0-19 = 0)	Model dependent
F8-04	Deceleration time 2		Model dependent
F8-05	Acceleration time 3		Model dependent
F8-06	Deceleration time 3		Model dependent
F8-07	Deceleration time 4		Model dependent

Function Code	Parameter Name	Setting Range	Default
F8-08	Deceleration time 4	0.00 to 650.00s (F0-19 = 2) 0.0 to 6500.0s (F0-19 = 1) 0 to 65000s (F0-19 = 0)	Model dependent
F0-19	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1
F0-25	Acceleration/Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0
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%

F6-07 sets acceleration/deceleration mode.

- F6-07 = 0: Linear acceleration/deceleration

Output frequency increases or decreases linearly. The drive provides four groups of acceleration/deceleration time, selected via F4-00 to F4-05.

- F6-07 = 1: Static S-curve acceleration/deceleration

Output frequency increases or decreases along S curve on the condition that target frequency is fixed. This mode is applied to applications where soft start or stop is required, such as elevator and conveyor belt.

- F6-07 = 2: Dynamic S-curve acceleration/deceleration

Output frequency increases or decreases along S curve on the condition that target frequency is changing at real time. This mode is applicable to applications requiring supreme riding comfort and fast response.

F6-08 and F6-09 define time proportion of start segment and end segment of S-curve acceleration/deceleration, respectively. They must satisfy F6-08 + F6-09 ≤ 100.0%.

5.4 Motor Auto-tuning

You can obtain parameters of controlled motor through motor auto-tuning.

Motor auto-tuning methods are static auto-tuning 1, static auto-tuning 2 and dynamic auto-tuning. You can select a proper auto-tuning method in F1-37.

Function Code	Parameter Name	Setting Range	Default
F1-37	Motor auto-tuning method selection	0: No auto-tuning 1: Static auto-tuning 1 2: Dynamic auto-tuning 3: Static auto-tuning 2	0

- F1-37 = 0: Motor auto-tuning is not performed.
- F1-37 = 1: Only stator resistance, rotor resistance and leakage inductance are obtained through static auto-tuning 1.
- F1-37 = 2: All motor parameters are obtained through dynamic auto-tuning. If the AC drive is in FVC mode, you must make clear of encoder parameters (F1-27 to F1-34).
- F1-37 = 3: All motor parameters are obtained through static auto-tuning 2.

The three motor auto-tuning methods are compared as follows:

Auto-tuning Method	Application	Default
Static auto-tuning 1	It is applied to applications where motor cannot be disconnected from load and dynamic auto-tuning is not allowed.	OK
Dynamic auto-tuning	It is applied to applications where motor can be disconnected from load.	Best
Static auto-tuning 2	It is applied to applications where the motor cannot be disconnected from the load and dynamic auto-tuning is not allowed.	Better

Related parameters are described as follows:

Function Code	Parameter Name	Setting Range	Default
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	Model dependent
F1-01	Rated motor power	0.1 to 1000.0 kW	Model dependent
F1-02	Rated motor voltage	1 to 2000 V	Model dependent

Function Code	Parameter Name	Setting Range	Default
F1-03	Rated motor current	0.01 to 655.35 A (AC drive power ≤ 55 kW) 0.1 to 6553.5 A (AC drive power > 55 kW)	Model dependent
F1-04	Rated motor frequency	0.01 Hz to max. frequency	Model dependent
F1-05	Rated motor speed	1 to 65535 RPM	Model dependent

F1-00 to F1-05 are motor nameplate parameters. Set them correctly according to motor name-plate to ensure accurate motor auto-tuning result. Advantages of V/F, SVC or FVC can be obtained only after correct motor parameters are applied.

Function Code	Parameter Name	Setting Range	Default
F1-06	Stator resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Model dependent
F1-07	Rotor resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Model dependent
F1-08	Leakage inductive reactance	0.01 to 655.35 mH (AC drive power ≤ 55 kW) 0.001 to 65.535 mH (AC drive power > 55 kW)	Model dependent
F1-09	Mutual inductive reactance	0.1 to 6553.5 mH (AC drive power ≤ 55 kW) 0.01 to 655.35 mH (AC drive power > 55 kW)	Model dependent
F1-10	No-load current	0.01 to F1-03 (AC drive power ≤ 55 kW) 0.1 to F1-03 (AC drive power > 55 kW)	Model dependent

F1-06 to F1-10: These function parameters are asynchronous motor parameters and can be ob-tained through motor auto-tuning. Only F1-06 to F1-08 can be obtained through static auto-tuning. F1-06 to F1-10 as well as F1-30 (A/B phase sequence of ABZ incremental encoder) can be obtained through dynamic auto-tuning.

If motor auto-tuning cannot be performed on site, set these parameters according to data provided by motor manufacturer.

5.5 Control Performance

5.5.1 V/F Curve

■ Linear, Multi-point and Square V/F Curve

Function Code	Parameter Name	Setting Range	Default
F3-00	V/F curve setting	0: Linear 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%: automatic torque boost 0.1% to 30%	Model dependent
F3-02	Cut-off frequency of torque boost	0.00 Hz to max. frequency	50.00 Hz
F3-03	Multi-point V/F frequency 1	0.00 Hz to F3-05	0.00 Hz
F3-04	Multi-point V/F voltage 1	0.0% to 100.0%	0.0%
F3-05	Multi-point V/F frequency 2	F3-03 to F3-07	0.00 Hz
F3-06	Multi-point V/F voltage 2	0.0% to 100.0%	0.0%
F3-07	Multi-point V/F frequency 3	F3-05 to rated motor frequency (F1-04)	0.00 Hz
F3-08	Multi-point V/F voltage 3	0.0% to 100.0%	0.0%

1. General constant-torque linear V/F curve

Figure 5-16 General constant-torque linear V/F curve
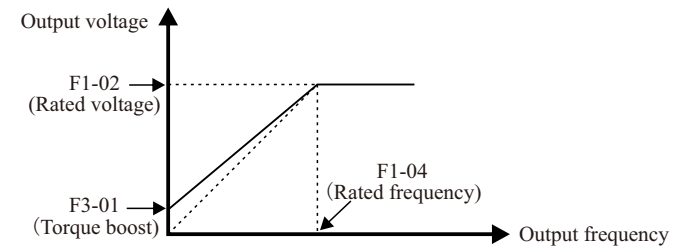
Output voltage and output frequency change linearly when below rated frequency. It is applic-able to general mechanical drive applications such as conveyors where the load torque is constant against the speed range.

2. User-defined Multi-point V/F curve

Figure 5-17 User-defined Multi-point V/F curve
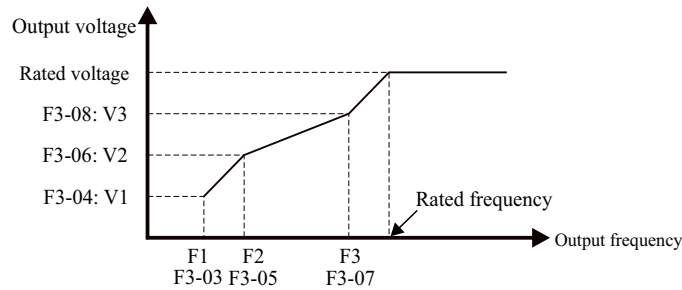
F3-03 to F3-08 define multi-point V/F curve.

You must set multi-point V/F curve based on motor's load characteristic. The three voltage points and frequency points must satisfy: V1 < V2 < V3, f1 < f2 < f3. When you set F1 (F3-03), F2 (F3-05) and F3 (F3-07), set F3-07 first, then F3-05 and finally F3-03.

3. Variable-torque Square V/F curve

Figure 5-18 User-defined Multi-point V/F curve
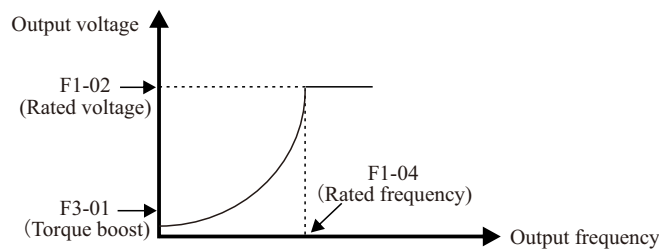
Output voltage and output frequency change according to square curve when below rated fre-quency. It is applicable to applications such as centrifugal fans where the load is inversely proport-ional to the speed.

■ V/F Separation Curve

Function Code	Parameter Name	Setting Range	Default
F3-13	Voltage source for V/F separation	0：Set by F3-14 1：AI1 2：AI2 3：Keyboard potentiometer 4：Pulse reference（S5） 5：Multi−reference 6：Simple PLC 7：PID reference 8：Communication reference Note：100.0% corresponds to the rated motor voltage	0
F3-14	Digital setting of voltage for V/F separation	0 V to rated motor voltage	0 V
F3-15	Voltage rise time of V/F separation	0.0s to 1000.0s	0.0s
F3-16	Voltage decline time of V/F separation	0.0s to 1000.0s	0.0s
F3-17	Stop mode selection for V/F separation	0: Frequency and voltage declining to 0 independently 1: Frequency declining after voltage declines to 0	0

Voltage rise time of V/F separation indicates time required by voltage to rise from 0 to rated motor voltage.

Voltage decline time of V/F separation indicates time required by voltage to decline from rated motor voltage to 0.

Figure 5-19 V/F separation
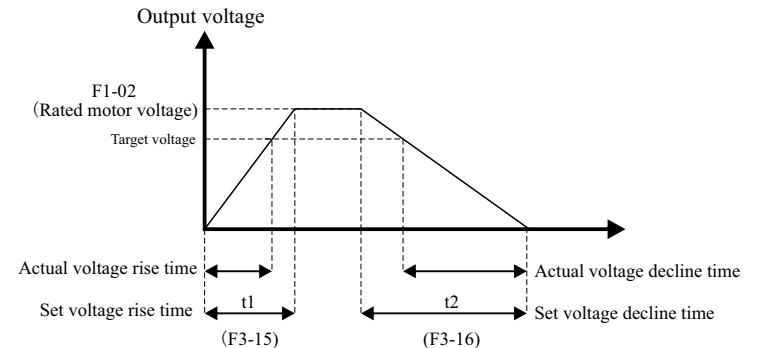
5.5.2 Torque Boost

The torque compensation function compensates for insufficient torque production at low frequency.

Function Code	Parameter Name	Setting Range	Default
F3-01	Torque boost	0.0%: No torque boost 0.1% to 30%	Model dependent
F3-02	Cut-off frequency of torque boost	0.00 Hz to max. frequency	50.00 Hz

F3-01 compensates for insufficient torque production by boosting output voltage of the AC drive.

But very large setting will result in motor overheat and AC drive overcurrent.

- On starting a heavy load and insufficient torque is experienced, increase the torque boost in F3-01.
- Decrease this parameter on light loads to avoid overheating the motor.

F3-02 sets the cutoff frequency. The torque boost function is disengaged when the output frequency exceeds the cutoff point.

5.5.3 Current Limit Control

When output current exceeds the value set in F3-18 during acceleration, constant running or deceleration, current limit is enabled and output frequency starts to drop. Until output current recovers below the current limit level, output frequency starts to rise to target frequency again.

Figure 5-20 Current limit
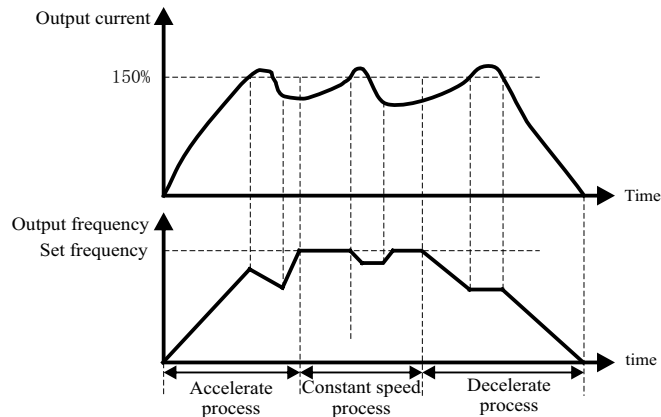
Function Code	Parameter Name	Setting Range	Default
F3-18	Current limit level	50% to 200%	Model dependent
F3-19	Current limit selection	0: Disabled 1: Enabled	1
F3-20	Current limit gain	0 to 100	20
F3-21	Compensation factor of speed multiplying current limit	50% to 200%	0

In high frequency area, motor drive current is small. Bigger motor speed dip is caused by current limit level compared with below rated frequency. To improve motor running characteristic, you can lower current limit level above rated frequency.

The current limit function above rated frequency helps to improve acceleration performance in the applications, such as centrifuge, where high running frequency and several times of field weakening are required, and load inertia is large.

The current limit level above rated frequency = (fs/fn) x k x LimitCur.

- fs: running frequency
- fn: rated motor frequency
- k: compensation factor of speed multiplying current limit level (F3-21)
- LimitCur: current limit level (F3-18)

Figure5-21 Current limit above rated frequency

Note	● Current limit level 150% indicates 1.5 times of rated current of the AC drive. ● For high-power motor with carrier frequency below 2 kHz, lower the current limit level. This is because the overcurrent fast prevention function is enabled in advance of the current limit function due to increase of pulsating current, which will result in insufficient torque output.

5.5.4 Voltage Limit and Braking Unit Applied Voltage

When bus voltage rises above the value set in F3-22, the motor becomes regenerative. This function prevents overvoltage trips by adjusting the output frequency to extend deceleration time in this case.

If actual deceleration time cannot satisfy the requirement, increase the value of F3-10 (V/F over-excitation gain) adequately.

Function Code	Parameter Name	Setting Range	Default
F3-22	Voltage limit	650 to 800 V	770.0V
F3-23	Voltage limit selection	0: Disabled 1: Enabled	1
F3-24	Frequency gain for voltage limit	0 to 100	30
F3-25	Voltage gain for voltage limit	0 to 100	30
F3-26	Frequency rise threshold during voltage limit	0 to 50 Hz	5 Hz
F9-08	Braking unit applied voltage	650 to 800 V	760.0V
F3-10	V/F over-excitation gain	0 to 200	64
F3-11	V/F oscillation suppression gain	0 to 100	40
F9-03	Overvoltage protection gain	0 (no overvoltage stall) to 100	30
F9-04	Overvoltage protection voltage	650 to 800 V	770 V

Note	When using braking resistor, braking unit or energy feedback unit, pay attention to the following aspects: ● Set F3-10 (V/F over-excitation gain) to 0. Otherwise, too large current may occur during drive running. ● Set F3-23 (overvoltage suppression selection) to 0 (disabled). Otherwise, the deceleration time may become longer.

5.5.5 Speed Loop

Function Code	Parameter Name	Setting Range	Default
F2-00	Speed loop proportional gain 1	0 to 100	30
F2-01	Speed loop integral time 1	0.01 to 10.00s	0.50s
F2-02	Switchover frequency 1	0.00 to F2-05	5.00 Hz
F2-03	Speed loop proportional gain 2	0 to 100	20
F2-04	Speed loop integral time 2	0.01 to 10.00s	1.00s
F2-05	Switchover frequency 2	F2-02 to max. Frequency	10.00 Hz

F2-00 to F2-05 are speed loop PI parameters.

● If running frequency ≤ F2-02 (Switchover frequency 1), PI parameters are F2-00 and F2-01.

● If running frequency ≥ F2-05 (Switchover frequency 2), PI parameters are F2-03 and F2-04.

● If running frequency is between F2-02 and F2-05, PI parameters are obtained from linear switchover between two groups of PI parameters, as shown in Figure 5-22.

Figure 5-22 Speed loop PI parameters
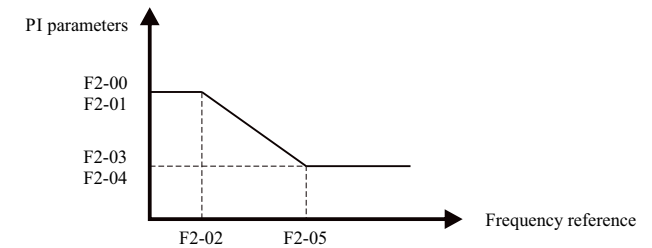
To improve the system response, increase the proportional gain or reduce the integral time. Remember to increase proportional gain first to ensure that the system does not oscillate, and then reduce integral time to ensure that the system has quick response and small overshoot.

Note	Incorrect PI setting may cause large speed overshoots and a fast falling speed drop may cause an overvoltage on the DC bus.

5.5.6 SVC/FVC Slip Compensation Gain

Function Code	Parameter Name	Setting Range	Default
F2-06	SVC/FVC slip compensation gain	50% to 200%	100%

This function improves control performance in SVC/FVC (F0-01 = 0/1).

For FVC (F0-01 = 1), it can adjust output current of the AC drive. Decrease this parameter gradually when a large rating AC drive is controlling a lightly loaded motor. Adjustment of this parameter is not required normally.

5.5.7 SVC Speed Feedback Stability

Function Code	Parameter Name	Setting Range	Default
F2-07	Speed feedback filter time in SVC	0.000s to 1.000s	0.015s

This parameter takes effect only when F0-01 = 0. You can improve motor stability by increasing F2-07. Be aware that this may slow dynamic response. Decreasing it will obtain quick system response but may lead to motor oscillation. Adjustment of this parameter is not required normally.

5.5.8 Torque Limit

The torque limit function can be used to limit torque to protect the system. The torque limit can be either set by parameters in group F2 or by parameters in group A0.

Output torque must be limited when the AC drive is in speed control or in torque control (determined by A0-00) in FVC (F0-01 = 1). Torque limit varies with control mode.

Function Code	Parameter Name	Setting Range	Default
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0

This function parameter determines whether the AC drive is in speed control or torque control.

The AC drive has two digital input functions related to torque control, function 29 "Torque control prohibited" and function 46 "Speed control/Torque control". The two functions must be used together with parameter A0-00 to implement switchover between speed control and torque control.

- When function 46 is enabled, the control mode is determined by setting of A0-00.
- When function 46 is disabled, the control mode is reverse to setting of A0-00.
- When function 29 is enabled, the AC drive always run in speed control no matter whether function 46 is enabled or disabled.

■ Setting Torque Limit in Speed Control

Function Code	Parameter Name	Setting Range	Default
F2-09	Torque limit source in speed control	0: P2-10 function code setting 1: AI1　2: AI2 3:Keyboard potentiometer 4: Pulse setting (S5) 5: Communication setting 6：MIN(AI1,AI2)　7：MAX(AI1,AI2) The full scale of 1–7 corresponds to F2–10.	0
F2-10	Digital setting of torque limit in speed control	0.0% to 200.0%	150.0%
F2-11	Torque limit source in speed control (regenerative)	0：F2–10（electrical or regenerative） 1: AI1　2: AI2　3:Keyboard potentiometer 4：Pulse reference 5：Communication reference 6：MIN（AI1，AI2） 7：MAX（AI1，AI2） 8：F2–12 The full scale of 1–7 corresponds to F2–12.	20
F2-12	Digital setting of torque limit in speed control regenerative)	0.0% to 200.0%	150.0%

This function parameter restricts output torque of the AC drive in speed control. The torque limits are defined by F2-09 to F2-12.

When F2-11 is set to 0, the motoring state and regenerative state are not distinguished. The torque limit is defined by F2-10.

When F2-11 is set to 1 to 8, the motoring state and regenerative state are distinguished. In motoring state, full range of torque limit is set by F2-010. In regenerative state, full range of torque limit is set by F2-12.

Figure 5-23 Speed loop PI parameters
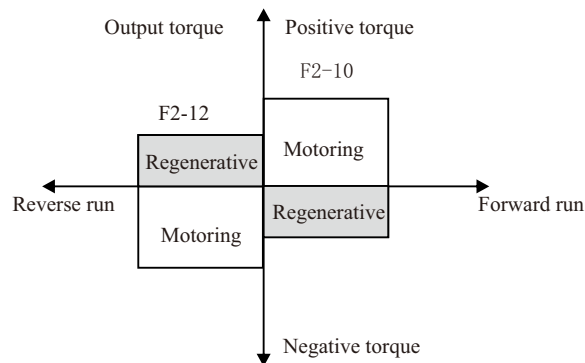
Function Code	Parameter Name	Setting Range	Default
F2-22	Regenerative power limit selection	0: Disabled 1: Enabled in the whole process	0

■   Setting Torque Limit in Torque Control

Function Code	Parameter Name	Setting Range	Default
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0
A0-01	Torque reference source in torque control	0: Set by A0-03 (Torque digital setting in torque control) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference（S5） 5: Communication reference 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) The full scale of 1-7 corresponds to A0-03.	0
A0-03	Torque digital setting in torque control	−200.0% to 200.0%	150.0%

These two function parameters select channel of setting torque reference in torque control.

Torque reference is a relative value. 100.0% corresponds to rated AC drive torque (can be viewed in U0-06). When torque reference is a positive value, the AC drive runs in forward direction. When torque reference is a negative value, the AC drive runs in reverse direction.

Function Code	Parameter Name	Setting Range	Default
A0-05	Forward max. frequency in torque control	0.00 Hz to max. frequency	50.00 Hz
A0-06	Reverse max. frequency in torque control	0.00 Hz to max. frequency	50.00 Hz

These function parameters set maximum frequency of the AC drive in forward and reverse directions in torque control.

Motor speed will rise continuously if load torque is smaller than motor output torque. This function limits motor speed in torque control to prevent runaway.

Function Code	Parameter Name	Setting Range	Default
A0-07	Acceleration time in torque control	0.00s to 65000s	0.00s
A0-08	Deceleration time in torque control	0.00s to 65000s	0.00s

These function parameters set acceleration/deceleration time in torque control to implement smooth change of motor speed. This helps to prevent problems such as big noise or too large mechanical stress caused by quick change of motor speed.

But in applications where rapid torque response is required, for example, two motors are used to drive the same load, you need to set these two parameters to 0.00s.

For example, two motors drive the same load. To balance the load level of the two motors, set one drive as master in speed control and set the other as slave in torque control.

The slave will follow output torque of the master as its torque reference, which requires quick response to the master output torque. In this case, set acceleration/deceleration time of the slave in torque control to 0.00s.

5.5.9 Current Loop

Function Code	Parameter Name	Setting Range	Default
F2-13	Excitation adjustment proportional gain	0 to 60000	2000
F2-14	Excitation adjustment integral gain	0 to 60000	1300
F2-15	Torque adjustment proportional gain	0 to 60000	2000
F2-16	Torque adjustment integral gain	0 to 60000	1300

These function parameters are vector control current loop PI parameters. They are obtained from motor auto-tuning. Adjustment of these parameter is not required normally.

The dimension of current loop integral regulator is integral gain rather than integral time. Very large current loop PI gain may lead to control loop oscillation. When current oscillation or torque fluctuation is great, decrease the proportional gain or integral gain.

5.5.10 Improving Field Weakening Area Performance

Function Code	Parameter Name	Setting Range	Default
A5-05	Voltage over modulation coefficient	100 to 110	105

This parameter indicates boost capacity of maximum voltage of the AC drive. Increasing A5-05 will improve max. loading capacity in motor field weakening area. Be aware that this may lead to an increase in motor current ripple and an increase in motor heating.

Decreasing it will reduce motor current ripple and motor heating. Be aware that this will lower max. loading capacity in motor field weakening area. Adjustment of this parameter is not required normally.

Function Code	Parameter Name	Setting Range	Default
F2-21	Max. torque coefficient of field weakening area	50% to 200%	100%

This parameter takes effect only when the motor runs above the rated motor frequency.

When the motor need rapidly accelerate to twice of rated motor frequency but actual acceleration time is very long, decrease the setting of F2-21 adequately.

When the motor runs above twice of rated motor frequency and speed dip is very large after a load is added, increase the setting of F2-21 adequately. Adjustment of this parameter is not required normally.

5.5.11 Auxiliary Control

Function Code	Parameter Name	Setting Range	Default
A5-00	DPWM switchover frequency upper limit	0.00 to max. frequency	8.00 Hz

Increasing this parameter to the max. frequency will reduce motor audible noise.

Function Code	Parameter Name	Setting Range	Default
A5-01	PWM modulation pattern	0: Asynchronous modulation 1: Synchronous modulation	0

When the output current oscillates or large current harmonics occur, set A5-01 = 1.

Function Code	Parameter Name	Setting Range	Default
A5-03	Random PWM depth	0: Random PWM invalid 1 to 10	0

This parameter helps to lower motor audible noise and reduce electromagnetic interference.

5.6 Protections

5.6.1 Motor Overload Protection

Function Code	Parameter Name	Setting Range	Default
F9-00	Motor overload protection	0: Disabled 1: Enabled	1
F9-01	Motor overload protection gain	0.20 to 10.00	1.00
F9-02	Motor overload pre-warning coefficient	50% to 100%	80%

The AC drive has the motor overload pending function that reminds of motor overload in advance through digital output function 6.

On the condition that F9-01 = 1.00 and F9-02 = 80%, when motor running current reaches 145% of rated motor current and motor runs at this level for 80% x 6 = 4.8 minutes, Y terminal or fault relay outputs the motor overload pending signal.

When F9-02 = 100%, the motor overload pending and the motor overload protection are performed simultaneously.

5.6.2 Phase Loss Protection

Function Code	Parameter Name	Setting Range	Default
F9-12	Input phase loss/contactor protection	0: Disabled 1: Enabled BIT0: Input phase loss protection BIT1 : Contactor protection	11

This function parameter determines whether to perform input phase loss or pre-charge relay protection.

Function Code	Parameter Name	Setting Range	Default
F9-13	Output phase loss protection	0: Disabled 1: Enabled BIT0: Output phase loss protection BIT1 : Output phase loss protection before running	01

BIT 0: It determines whether to perform output phase loss protection. If protection is disabled but power output phase loss occurs, the AC drive does not detect the fault. At this moment, actual current is larger than the current displayed on the operating panel.

BIT 1: It takes about several seconds to detect output phase loss during running. In low-frequency running application or application where risks exist in start with phase loss, set this position to 1. In applications which have strict requirements on start time, set this position to 0.

5.6.3 Fault Reset

Function Code	Parameter Name	Setting Range	Default
F9-09	Auto reset times	0 to 20	0

This function parameter sets permissible times of auto fault reset. If reset times exceed the value set in this parameter, the AC drive will keep fault status.

Note	● Undervoltage (Err09) is reset automatically when bus voltage recovers to normal. It is not included in auto reset times. ● Short-circuit to ground (Err23) cannot be reset automatically or manually. It can only be reset after power down.

Function Code	Parameter Name	Setting Range	Default
F9-10	Selection of Y action during auto reset	0: Not act 1: Act	0

This function parameter decides whether digital output terminal set for fault output acts during the fault reset.

Function Code	Parameter Name	Setting Range	Default
F9-11	Delay of auto reset	0.1s to 100.0s	1.0s

This function parameter sets the delay of auto reset after the AC drive detects a fault.

5.6.4 Fault Protection Action Selection

Function Code	Parameter Name	Setting Range	Default
F9-47	Fault protection action selection 1	BIT0:Motor overload (Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:Input phase loss (Err12) BIT2 : Output phase loss (Err13) BIT3 : Thousands: External fault (Err15) BIT4 : Communication fault (Err16)	00000

Function Code	Parameter Name	Setting Range	Default
F9-48	Fault protection action selection 2	BIT0:Encoder fault (Err20) 0: Coast to stop BIT1:EEPROM read-write fault (Err21) 0: Coast to stop 1: Stop according to the stop mode BIT2:Reserve BIT3:Motor overheat (Err45) BIT4:Accumulative running time reached(Err26)	00000
F9-48	Fault protection action selection 3	BIT0:User-defined fault 1 (Err27) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:User-defined fault 2 (Err28) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT2:Accumulative power-on time reached (Err29) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT3:Load lost (Err30) 0: Coast to stop 1: Deceleration to stop 2: Continue to run at 7% of rated motor frequency and restore to the frequency reference if the load recovers BIT4:PID feedback lost during running (Err31) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	00000
F9-50	Fault protection action selection 4	BIT0:Too large speed feedback error (Err42) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:Motor overspeed (Err43) BIT2:Initial position fault (Err51)	00000

These function parameters set action mode of the AC drive at occurrence of fault.

0: Coast to stop

The AC drive displays Err** and directly stops.

1: Stop according to the stop mode

The AC drive displays A** and stops according to stop mode. After stop, the AC drive displays Err**.

2: Continue to run

The AC drive continues to run and displays A**. The running frequency is set in F9-54.

Function Code	Parameter Name	Setting Range	Default
F9-54	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0
F9-55	Backup frequency upon fault	0.0% to 100.0% (100.0% corresponds to F0-10.)	100.0%

These function parameters define running frequency of the AC drive when "Continue to run" is selected at occurrence of fault.

5.6.5 Motor Overheat Protection

Function Code	Parameter Name	Setting Range	Default
F9-56	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0
F9-57	Motor overheat protection threshold	0°C to 200°C	110°C
F9-58	Motor overheat pre-warning threshold	0°C to 200°C	90°C

A motor temperature sensor can be connected to Keyboard potentiometer and PGND on extension I/O card. This input is used by the drive for motor overheat protection.

When input signal reaches the value set in F9-57, the AC drive detects Err25 and acts as selected in thousands position in F9-48. When input signal reaches the value set in F9-58, digital output terminal set for function 39 becomes on.

The drive supports both PT100 and PT1000. Make sure to set sensor type correctly. You can view motor temperature in U0-34.

5.5.6 Power Dip Ride-through

The power dip ride-through function ensures the system to run continuously at occurrence of momentary power loss.

When an instantaneous power loss occurs, the AC drive compensates DC bus voltage reduction with real-time energy feedback by reducing output frequency, preventing the AC drive from stopping due to undervoltage.

- F9-59 = 1: It is applicable to large-inertia applications such as fan, water pump and centrifuge
- F9-59 = 2: It is applicable to the textile industry.

Figure 5-23 Power dip ride-through
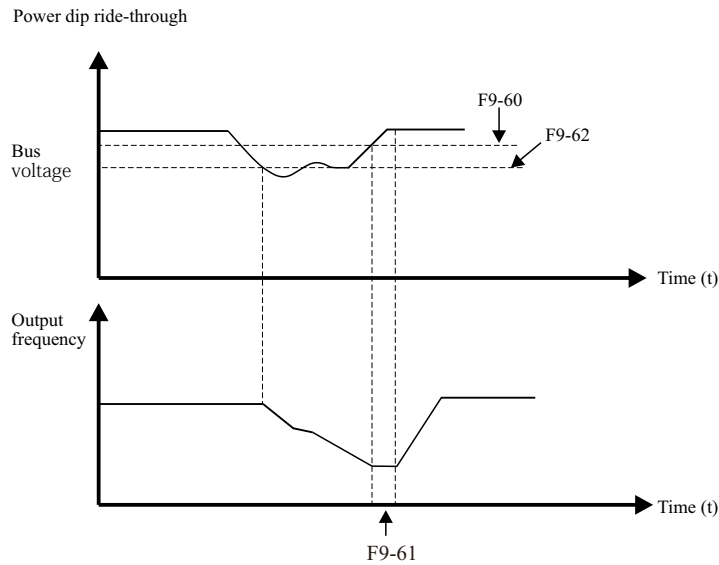
Function Code	Parameter Name	Setting Range	Default
F9-59	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0
F9-60	Threshold of power dip ride-through function disabled	80% to 100%	85%

Function Code	Parameter Name	Setting Range	Default
F9-61	Judging time of bus voltage recovering from power dip	0.00s to 100.00s	0.50s
F9-62	Threshold of power dip ride-through function enabled	60.0% to100.0% (standard bus voltage)	80.0%
F9-71	Power dip ride-through gain Kp	0 to 100	40
F9-72	Power dip ride-through integral coefficient	0 to 100	30
F9-73	Deceleration time of power dip ride-through	0.0s to 300.0s	20.0s

Note	• In bus voltage constant control, when line voltage recovers, the AC drive accelerates to target frequency. • In deceleration to stop mode, when line voltage recovers, the AC drive continues to decelerate to 0 Hz and stops. The AC drive will not be started until it receives RUN command again.

5.6.7 Load Lost Protection

Function Code	Parameter Name	Setting Range	Default
F9-63	Load lost protection	0: Disabled 1: Enabled	0
F9-64	Load lost detection level	0.0% to 100.0% (rated motor current)	10.0%
F9-65	Load lost detection time	0.0s to 60.0s	1.0s

These function parameters define the load lost protection function.

When output current of the AC drive falls below detection level (F9-64) for longer than time set in F9-65, the AC drive automatically reduces output frequency to 7% of rated frequency. Once load recovers during protection, the AC drive accelerates to frequency reference.

5.6.8 Overspeed Protection

Function Code	Parameter Name	Setting Range	Default
F9-67	Overspeed detection level	0.0% to 50.0% (max. frequency)	20.0%
F9-68	Overspeed detection time	0.0s: Not detected 0.1 to 60.0s	1.0s

These function parameters define motor overspeed detection that is effective only for vector control with speed sensor.

When detected motor speed exceeds maximum frequency and the excess is larger than the value of F9-67 for longer than time set in F9-68, the AC drive detects Err43 and acts as selected in the tens position in F9-50.

If F9-68 is set to 0, motor overspeed detection is disabled.

5.6.9 Speed Error Protection

Function Code	Parameter Name	Setting Range	Default
F9-69	Detection level of speed error	0.0% to 50.0% (max. frequency)	20.0%
F9-70	Detection time of speed error	0.0s: Not detected 0.1 to 60.0s	5.0s

This function is effective only for vector control with speed sensor.

When detected motor speed is different from frequency reference and the difference is larger than the value of F9-69 for longer than the time set in F9-70, the AC drive detects Err42 and acts as selected in the units position in F9-50.

5.6.10 Undervoltage & Overvoltage Threshold and Overcurrent Fast Prevention

Function Code	Parameter Name	Setting Range	Default
A5-06	Undervoltage threshold	210 to 420 V	350 V
A5-09	Overvoltage threshold	200.0V to 2500.0V	Model dependent
A5-04	Overcurrent fast prevention	0: Disabled 1: Enabled	1

When DC bus voltage exceeds the setting of A5-06/A5-09, the AC drive detects Err09/Err05–Err07.

It is suggested that overcurrent fast prevention is disabled (A5-04 = 0) in hoist applications such as crane.

5.6.11 Output Overcurrent Protection

This is to provide overcurrent protection for the AC drive.

If the drive's output current is equal to or smaller than the value set in F8-36 and the duration exceeds the value set in F8-37, digital output terminal set for function 36 becomes on.

Function Code	Parameter Name	Setting Range	Default
F8-36	Output overcurrent threshold	0.0% (no detection) 0.1% to 300.0% (rated motor current)	200.0%
F8-37	Output overcurrent detection delay	0.01s to 600.00s	0.00s

5.7 Monitoring

The monitoring function enables you to view AC drive state in LED display area on the operation panel. You can monitor AC drive status in the following two ways:

● View F7-03, F7-04 and F7-05 by pressing ⓒ on the operation panel.

● View parameters in group U0 via the operation panel

■ View F7-03, F7-04 and F7-05 by Pressing the Shift KeyA maximum of 32 parameters in the running status can be viewed in F7-03 and F7-04. The display starts from the lowest bit of F7-03. A total of 13 parameters in the stop can be viewed in F7-05.

If a parameter needs to be displayed during running, set corresponding bit to 1, convert the binary number to hexadecimal equivalent, and set related parameter to hexadecimal number. For example, to view running frequency, bus voltage, output voltage, output current, output power and PID reference, do as follows:

● Set bit 0, bit 2, bit 3, bit 4, bit 5 and bit 15 of F7-03 to 1 and convert binary number 1000 0000 00 11 1101 to equivalent hexadecimal number 803D.

High															Low

F7−03	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
Hex		8				0				3				D		
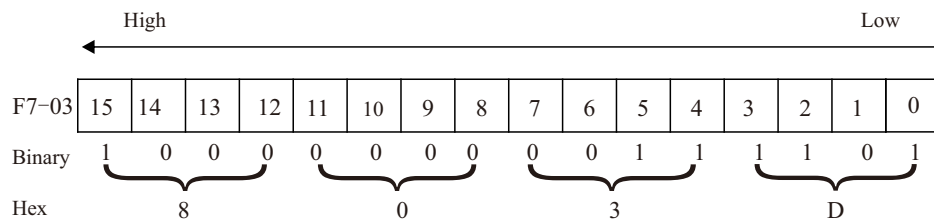
● Press the **SET** key on the operation panel.

The operation panel displays **F7-04** .

● Press the **PRG** key twice on the operation panel.

The display of the operation panel starts from bit 0 (the lowest bit) in F7-03.

● Press the ⓒ key to view the running frequency, bus voltage, output voltage, output current, output power and the PID reference.

You can view the other parameters in the same way.

Conversion of numbers

The following table tells you how to convert a binary number into the hexadecimal equivalent.

Binary	1111	1110	1101	1100	1011	1010	1001	1000	0111	0110	0101	0100	0011	0010	0001	0000
Decimal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Hex	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

Every four binary digits from right to left corresponds to a hexadecimal digit. If the highest binary digit is 0, fill up it with 0. Then convert the binary number into decimal equivalent and then convert the decimal number into hexadecimal equivalent.

For example, the binary number is 011 1101 1111 1001. The highest binary digit is 0 and you need to fill up it with 0. The complete binary number is 0011 1101 1111 1001. According to the preceding table, the hexadecimal equivalent is 3DF9.

Function Code	Function definition	Default	Setting Range	Parameter description
F7-03	LED display running parameters 1	1F	0000~FFFF	0000 to FFFF BIT0:Running frequency 1(Hz) BIT1:Set frequency(Hz) BIT2:Bus voltage(V) BIT3:Output voltage(V) BIT4:Output current(A) BIT5:Output power(kW) BIT6:Output torque 1(%) BIT7:S state BIT 8:Y state BIT9:AI1 voltage(V) BIT10:AI2 voltage(V) BIT11:Keyboard potentiometer voltage(V) BIT12:Count value BIT 13:Length value BIT14:Load speed display BIT15:PID reference If a parameter needs to be displayed during running, set corresponding bit to 1, and set F7-03 to hexadecimal equivalent.

Function Code	Function definition	Default	Setting Range	Parameter description
F7-04	LED display running parameters 2	0	0000~FFFF	0000 to FFFF BIT0:PID feedback BIT1:PLC stage BIT2:Pulse reference(kHz) BIT3:Running frequency 2(Hz) BIT4:Remaining running time BIT5:AI1 voltage before correction(V) BIT6:AI2 voltage before correction(V) BIT7:Keyboard potentiometer voltage before correction BIT8:Linear speed BIT9:currentpower-on time(h) BIT10:currentpower running time(Min) BIT11:Pulse reference(Hz) BIT12:Communication reference BIT13:Enceder feedback speed(Hz) BIT14:Main frequency X display(Hz) BIT15:Auxiliary frequency Y display(Hz) If a parameter needs to be displayed during running, set corresponding bit to 1, and set F7-04 to hexadecimal equivalent.
F7-05	Display stop parameter	33	0000~FFFF	0000 to FFFF BIT0:Frequency reference(Hz) BIT1:Bus voltage BIT2:S state BIT3:Y state BIT4:AI1 voltage(V) BIT5:AI2 voltage(V) BIT6:Keyboard potentiometer voltage BIT7:Count value BIT8:Length value BIT9:PLC stage BIT10:Load speed BIT11:PID reference BIT12:Pulse reference (kHz) If a parameter needs to be displayed during running, set corresponding bit to 1, and set F7-05 to hexadecimal equivalent.

Note	● Once the AC drive is re-powered on after power down, the display includes the selected parameters before power down by default. ● If parameters to be monitored cannot be found in F7-03, F7-04 and F7-05, view them in group U0.

■ View Parameters in Group U0

You can view parameter values by using operation panel, convenient for on-site commissioning, or from the host computer by means of communication (address: 0x7000-0x7044).

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

Function Code	Parameter Name	Display Range
U0-00	Running frequency	0.00 to 500.00 Hz
U0-01	Frequency reference	0.00 to 500.0 Hz
U0-02	Bus voltage	0.0 to 3000.0 V
U0-03	Output voltage	0 to 1140 V
U0-04	Output current	0.00 to 655.35 A (AC drive power ≤ 55 kW) 0.0 to 6553.5 A (AC drive power > 55 kW)
U0-05	Output power	0 to 32767
U0-06	Output torque	−200.0% to 200.0%
U0-07	S state	0 to 32767

U0-07: It displays state of S terminals. After the value is converted into a binary number, each bit corresponds to a S. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and S is described in the following table:

7	6	5	4	3	2	1	0
S8	S7	S6	S5	S4	S3	S2	S1

15	14	13	12	11	10	9	8
-	VS5	VS4	VS3	VS2	VS1	S10	S9

Function Code	Parameter Name	Display Range
U0-08	Y state	0 to 1023

U0-08: It displays state of Y terminals. After the value is converted into a binary number, each bit corresponds to a Y. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and S is described in the following table.

7	6	5	4	3	2	1	0
VY3	VY2	VY1	Y2	Y1	Relay 2	Relay 1	Y3

15	14	13	12	11	10	9	8
–	–	–	–	–	–	VY5	VY4

Function Code	Parameter Name	Display Range
U0-10	AI2 voltage (V)/current (mA)	0.00 to 10.57 V 0.00 to 20.00 mA
U0-14	Load speed display	0 to rated motor speed
U0-15	PID reference	0 to 65535
U0-16	PID feedback	0 to 65535
U0-18	Pulse reference	0.00 to 100.00 kHz
U0-19	Feedback speed	-320.00 to 320.00 Hz -500.0 to 500.0 Hz

U0-19: It displays actual output frequency of the AC drive.

The tens position of F7-12 (Number of decimal places for load speed display) determines the number of decimal places of U0-19/U0-29.

● If the tens position is set to 2, the display range is -320.00 to 320.00 Hz.
● If the tens position is set to 1, the display range is -500.0 to 500.0 Hz.

Function Code	Parameter Name	Display Range
U0-20	Remaining running time	0.0 to 6500.0 min

U0-20: It displays remaining running time during drive timing running.

Function Code	Parameter Name	Display Range
U0-21	AI1 voltage before correction	0.00 to 10.57 V
U0-22	AI2 voltage (V)/ current (mA) before correction	0.00 to 10.57 V 0.00 to 20.00 mA
U0-23	AI3 voltage before correction	-10.57 to 10.57 V

U0-21 to U0-23: They display sampled AI input voltage (before correction). Actually used AI input voltage after correction are displayed in U0-09, U0-10 and U0-11.

Function Code	Parameter Name	Display Range
U0-24	Motor speed	0 to rated motor speed

U0-24: It displays linear speed of S5 used for high-speed pulse sampling. The unit is meter/minute. Linear speed is obtained according to actual number of pulses sampled per minute and FB-07 (Number of pulses per meter).

Function Code	Parameter Name	Display Range
U0-27	Pulse reference	0 to 65535 Hz

U0-27: It displays S5 high-speed pulse sampling frequency, in minimum unit of 1 Hz. It is the same as U0-18, except for difference in units.

Function Code	Parameter Name	Display Range
U0-28	Communication reference	−100.00% to 100.00%

U0-28: It displays data written by means of communication address 0x1000.

Function Code	Parameter Name	Display Range
U0-29	Encoder speed feedback	−320.00 to 320.00 Hz -500.0 to 500.0 Hz

U0-29: It displays motor running frequency measured by encoder.

The tens position of F7-12 (Number of decimal places for load speed display) determines the number of decimal places of U0-19/U0-29.

- If the tens position is set to 2, the display range is -320.00 to 320.00 Hz.
- If the tens position is set to 1, the display range is -500.0 to 500.0 Hz.

Function Code	Parameter Name	Display Range
U0-30	Main frequency reference	0.00 to 500.00 Hz
U0-31	Auxiliary frequency reference	0.00 to 500.00 Hz
U0-34	Motor temperature	0°C to 200°C
U0-35	Target torque	−200.0% to 200.0%
U0-36	Resolver position	0 to 4095
U0-37	Power factor angle	-
U0-38	ABZ position	0 to 65535

U0-38: It displays phase A and B pulse counting of current ABZ or UVW encoder. This value is four times the number of pulses that encoder runs. For example, if the display is 4000, actual number of pulses that encoder runs is 4000/4 = 1000.

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

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

Function Code	Parameter Name	Display Range
U0-39	Target voltage upon V/F separation	0 V to rated motor voltage
U0-40	Output voltage upon V/F separation	0 V to rated motor voltage

U0-39 and U0-40: They display target output voltage and current actual output voltage in V/F separation status.

Function Code	Parameter Name	Display Range
U0-41	S state display	–
U0-42	Y state display	–
U0-43	S set for function state display 1	-
U0-44	S set for function state display 2	-
U0-45	Fault information	0 to 51
U0-58	Phase Z counting	0 to 65535

U0-44: It displays whether S terminals set for functions 41 to 59 are active. 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: It displays phase Z counting of current ABZ or UVW encoder. The value increases or decreases by 1 every time encoder rotates one revolution forwardly or reversely. You can check whether installation of encoder is normal by viewing U0-58.

Function Code	Parameter Name	Display Range
U0-59	Frequency Reference	−100.00% to 100.00%
U0-60	Running frequency	−100.00% to 100.00%
U0-61	AC drive state	0 to 65535

U0-61: It displays the drive state. The data format is listed in the following table:

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

Function Code	Parameter Name	Display Range
U0-62	Current fault code	0 to 99
U0-63	Sending value of point-point communication	−100.00% to 100.00%
U0-64	Number of slaves	0 to 63
U0-65	Torque upper limit	−200.0% to 200.0%

5.8 Process Control

5.8.1 Fixed Length Control

Function Code	Parameter Name	Setting Range	Default
FB-05	Set length	0 to 65535 m	1000 m
FB-06	Actual length	0 to 65535 m	0m
FB-07	Number of pulses per meter	0.1 to 6553.5	100.0

Function Code	Parameter Name	Setting Range	Description
F4-04	S5 function selection	27	Length pulses counting input
Any of F4-00 to F4-05	Sx function selection	28	Length reset
Any of F5-00 to F5-04	Yx function selection	10	Length reached

Note	● Only length can be calculated according the number of pulses but rotation direction will not be obtained in fixed length control. ● An automatic stop system can be implementing by connecting output length reached signal of relay to the stop input terminal.

In the following figure, actual length is a monitored value.

Actual length (FB-06) = Number of pulses sampled by S is divided by FB-07 (Number of pulses each meter).

When actual length reaches the value set in FB-05, digital output terminal set for function 10 "Length reached" becomes on. Length reset can be implemented via S terminal set for function 28 "Length reset".

Figure 5-24 Fixed length control
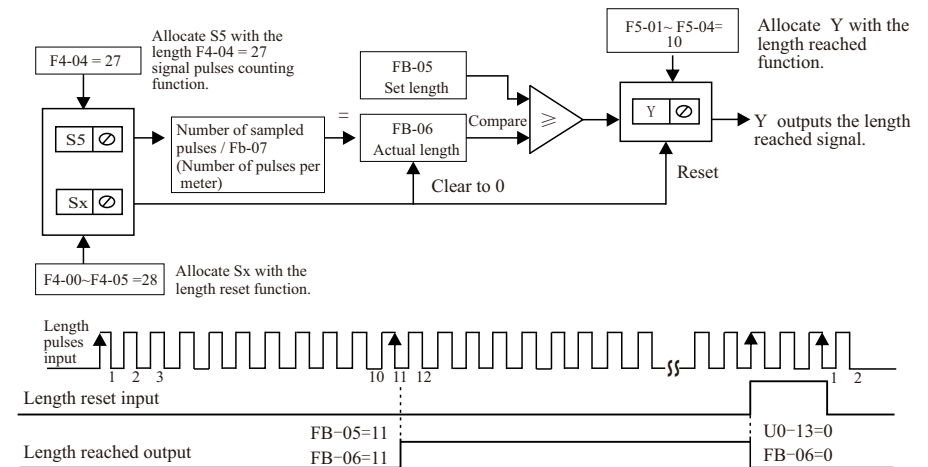
5.8.2 Counting

The drive has the counting function. The sampling S terminal must be set for function 25 "Counter input ". For high pulse frequency, use terminal S5.

Function Code	Parameter Name	Setting Range	Default
FB-08	Set count value	1 to 65535	1000
FB-09	Designated count value	1 to 65535	1000

Function Code	Parameter Name	Setting Range	Description
Any of F4-00 to F4-05	Sx function selection	25	Counter input
Any of F4-00 to F4-05	Sx function selection	26	Counting reset
Any of F5-00 to F5-04	Yx function selection	8	Set counting value reached
Any of F5-00 to F5-04	Yx function selection	9	Designated counting value reached

Note	●For high pulse frequency, use terminal S5. ●You cannot allocate "Set counting value reached" function and "Designated counting value reached" function to the same Y terminal. ●The counter keeps counting in the drive running/stop status. It stops counting until the set counting value is reached. ●The counting value is retentive at power down. ●An automatic stop system can be implementing by connecting the output counting value reached signal of Y to the stop input terminal.

5.8.3 Motor 2 Parameters

The drive supports driving two motors at different time. For the two motors, you can:

●Set motor nameplate parameters respectively

●Perform motor 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

You can select the desired motor parameter group in F0-24 or via a S terminal

1. Select the desired motor parameter group in F0-24.

Function Code	Parameter Name	Setting Range	Default
F0-24	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0

2. Select the desired motor parameter group via a S terminal.

Set any S (F4-00 to F4-09) for function 41 "Motor selection". If the S is inactive, motor parameter group 1 is selected. If the S is active, motor parameter group 2 is selected.

Function Code	Parameter Name	Setting Range	Description
Any of F4-00 to F4-05	Sx function selection	41	Motor selection

Note	● If any of F4-00 to F4-05 is set for function 41 "Motor selection", S terminal overrides F0-24. If none of F4-00 to F4-09 is set for function 41 "Motor selection", motor selection is determined by F0-24. ● Switchover of two groups of motor parameters is prohibited during drive running. Otherwise, the drive detects Err41.

Function Code	Parameter Name	Setting Range	Default
A2-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0
A2-01	Rated motor power	0.1 to 1000.0 kW	Model dependent
A2-02	Rated motor voltage	1 to 2000 V	Model dependent
A2-03	Rated motor current	0.01 to 655.35 A (AC drive power ≤ 55 kW) 0.1 to 6553.5 A (AC drive power > 55 kW)	Model dependent
A2-04	Rated motor frequency	0.01 to max. frequency	Model dependent
A2-05	Rated motor speed	1 to 65535rpm	Model dependent
A2-06	Stator resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Model dependent
A2-07	Rotor resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Model dependent
A2-08	Leakage inductive reactance	0.01 to 655.35 mH (AC drive power ≤ 55 kW) 0.001 to 65.535 mH (AC drive power > 55 kW)	Model dependent
A2-09	Mutual inductive reactance	0.1 to 6553.5 mH (AC drive power ≤ 55 kW) 0.01 to 655.35 mH (AC drive power > 55 kW)	Model dependent
A2-10	No-load current	0.01 to A2-03 (AC drive power ≤ 55 kW) 0.1 to A2-03 (AC drive power > 55 kW)	Model dependent

Function Code	Parameter Name	Setting Range	Default
A2-27	Encoder pulses per revolution	1 to 65535	1024
A2-28	Encoder type	0 to 2	0
A2-29	Speed feedback PG selection	0 to 2	0
A2-30	A/B phase sequence of ABZ incremental encoder	0 to 1	0
A2-31	Encoder installation angle	0.0 to 359.9°	0.0°
A2-34	Number of pole pairs of resolver	1 to 65535	1
A2-37	Auto-tuning selection	0 to 3	0

5.8.4 User Programmable Card

1.Set whether user programmable card is valid.

Function Code	Parameter Name	Setting Range	Default
A7-00	User programmable function selection	0: Disabled 1: Enabled	0

2. Set AI3 and AO2 function on user programmable card.

Function Code	Parameter Name	Setting Range	Default
A7-02	User programmable card A1/A0 function selection	0: Keyboard potentiometer (voltage input), AO2 (voltage output) 1: Keyboard potentiometer (voltage input), AO2 (current output) 2: Keyboard potentiometer (current input), AO2 (voltage output)	0

Function Code	Parameter Name	Setting Range	Default
A7-02	User programmable card A1/A0 function selection	3: Keyboard potentiometer (current input), AO2 (current output) 4: Keyboard potentiometer (PTC input), AO2 (voltage output) 5: Keyboard potentiometer (PTC input), AO2 (current output) 6: Keyboard potentiometer (PT100 input), AO2 (voltage output) 7: Keyboard potentiometer (PT100 input), AO2 (current output)	0

3. Set the AC drive output signals

When A7-00 = 1 (user programmable card is enabled), you can set control source of output terminals (Y4R, relay, Y1, Y4P and AO1) of the AC drive in A7-01.

When an output terminal is controlled by PLC program, output of terminal is determined by setting of corresponding function parameter A7-03/A7-04/A7-05.

You can implement control of output terminal via PLC program by modifying A7-03/A7-04/A7-05.

Function Code	Parameter Name	Setting Range	Default
A7-01	Control board output terminal control mode selection	0: AC drive control 1:User programmable card control BIT0: Y4R (Y4 used as digital output) BIT1: Relay (Y1A-Y1B-Y1C) BIT2: Y1 BIT3: Y4P (Y4 used as pulse control) BIT4: AO1	0
A7-03	PLC program controls the FMP output	0.0% to 100.0%	0.0%
A7-04	PLC program controls the AO1 output	0.0% to 100.0%	0.0%
A7-05	Selection of PLC program controlling digital output	Binary setting BIT0:Y4R BIT1: Relay 1 BIT2: Y	000

The base value of A7-03 is F5-09 (Max. FMP output frequency). The base value of A7-04 is 10 V (voltage output) or 20 mA (current output).

4. Set running command

When F0-02 = 2 (the command source is communication) and A7-00 = 1 (the user programmable card is enabled), drive running is controlled by setting of A7-08.

You can implement control of the AC drive via PLC program by operating corresponding D component.

Function Code	Parameter Name	Setting Range	Default
A7-08	Setting running command via the user programmable card	0 to 7 0: No command 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Coast to stop 6: Decelerate to stop 7: Fault reset	0

5. Set frequency reference

When frequency reference setting channel is communication and A7-00 = 1 (user programmable card is enabled), frequency reference of the AC drive is determined by setting of A7-06.

You can implement control of frequency reference of AC drive via PLC program by operating corresponding D component.

Function Code	Parameter Name	Setting Range	Default
A7-06	Setting frequency reference via the user programmable card	−100.00% to 100.00%	0.00%

The base value of this parameter is F0-10 (Max. Frequency).

6. Set torque reference.

When torque reference setting channel is communication and A7-00 = 1 (user programmable card is enabled), torque reference of the AC drive is determined by setting of A7-07.

You can implement control of torque reference of AC drive via PLC program by operating corresponding D component.

Function Code	Parameter Name	Setting Range	Default
A7-07	Setting torque reference via the user programmable card	−200.0% to 200.0%	0.0%

The base value of this parameter is rated motor torque.

7. Set user-defined faults.

When A7-00 = 1 (user programmable card is enabled), you can set user defined faults Err80 to Err89 by operating corresponding D component to change setting of A7-09 in the range of 80 to 89.

Function Code	Parameter Name	Setting Range	Default
A7-09	Setting torque reference via the user programmable card	0: No fault 80 to 89: User defined fault code	0

If setting of A7-09 is out of 80 to 89, the setting will not take effect.

5.8.5 Master and Slave Control

The master and slave control is designed for multi-drive application, where system is driven by multiple AC drives and motor shafts are coupled by gear, chain or conveyor belt.

The load is averagely allocated to AC drives in master and slave control. The external control signal need be connected to the master only, and the master controls the slaves via communication.

The master must be in speed control and the slaves follow the torque or speed reference of the master.

● When motor shafts are connected rigidly by chain or gear, the slaves must work in torque control to remove speed difference amongst drives.

● When motor shafts are connected flexibly, the slaves must work in speed control because slight speed difference amongst AC drives is allowed.

When master and slaves are in speed control, droop rate must be used. Figure 5-25 Rigid/Flexible connection of the master and slave

Rigid connection of the master and slave
• The master is in speed control.
• The slave follows the torque reference of the master.

External control signal

Main power

Master and slave connection

Monitoring of the slave faults

Main power

Flexible connection of the master and slave
The master is in speed control.
The slave follows the speed reference of the master.

External control signal

Main power

Monitoring of the slave faults

Master and slave connection

Main power
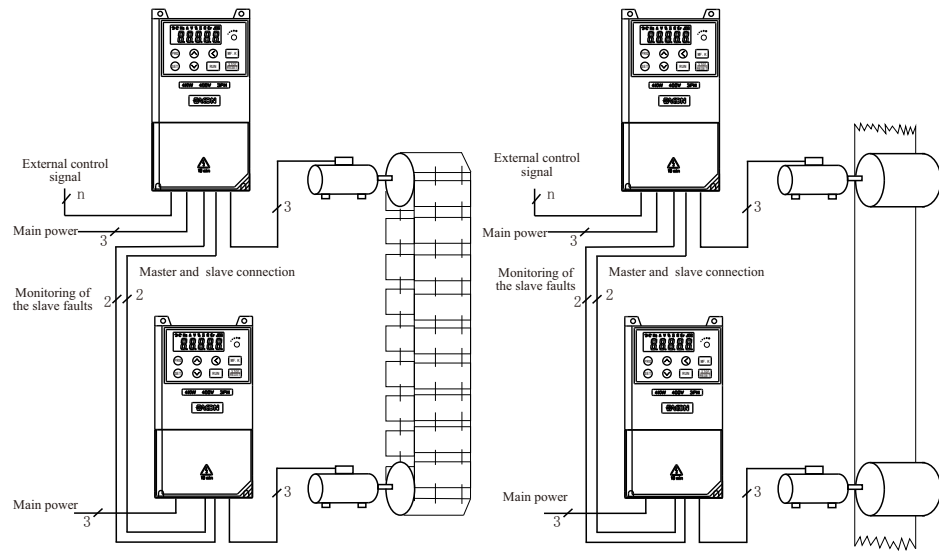
CAUTION	To avoid control conflict, please: ●Connect all the external control signals to the master only. ●Do not use the operating panel or the field bus to control the slave .

■　InstallationFigure 5-26 Connection of the master and slaves
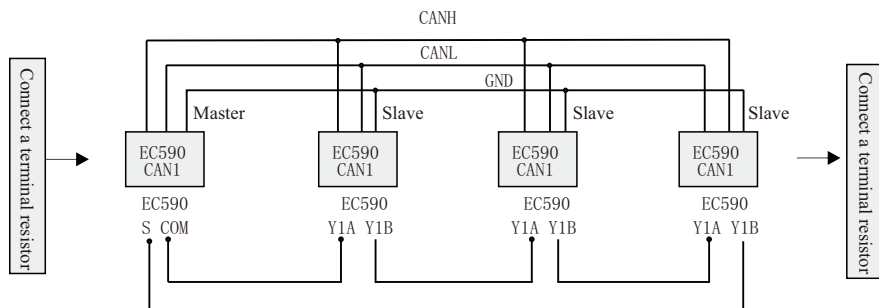
■　Parameter Setting

●　Rigid connectionFor master in speed control, perform the following settings. Note that only setting of F2-10 can be modified.

Function Code	Parameter Name	Setting Range	Setting
FD-00	Baud rate	0000 to 6039	Keep the same setting of thousands position of this parameter for the master and slave.
A8-00	Point-point communication	0: Disabled 1: Enabled	1
A8-01	Master or slave selection	0: Master 1: Slave	0
F0-10	Max. Frequency	5.00 to 500.00 Hz	50.00 Hz Keep the same setting of this parameter for the master and slave.
F2-10	Digital setting of torque upper limit in speed control mode	0.0% to 200.0%	130%

For slave in torque control, perform the following settings. Note that only setting of F2-10 can be modified, and setting of A0-03 must be consistent with that of F2-10 for the master.

Function Code	Parameter Name	Setting Range	Setting
FD-00	Baud rate	0000 to 6039	Keep the same setting of thousands position of this parameter for the master and slave.
A8-00	Point-point communication	0: Disabled 1: Enabled	1
A8-01	Master or slave selection	0: Master 1: Slave	0
A8-02	Selection of action of the slave in point-point communication	000 to 111 0: No 1: Yes BIT0：whether to follow master's command BIT1：whether to send fault information to master when a fault occurs	011

Function Code	Parameter Name	Setting Range	Setting
A8-02	Selection of action of the slave in point-point communication	BIT2：whether to alarm when it becomes off-line	011
A8-03	The slave received data	0: Output frequency 1: Frequency reference	0
A8-11	Window width	0.20 to 10.00 Hz	0.5 Hz
F0-10	Max. Frequency	5.00 to 500.00 Hz	50.00 Hz Keep the same setting of this parameter for the master and slave.
F8-07	Acceleration time 4	0.0s to 6500.0s	0.0s
F8-08	Deceleration time 4	0.0s to 6500.0s	0.0s
F0-02	Command source selection	0: Operating panel (keypad & display) 1: Terminal I/O control 2: Serial comms.	2
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	1
A0-01	Torque reference source in torque control	0: Set by A0-03 1: AI1 2: AI2 3: keyboard pointer 4: Pulse reference (S5) 5: Serial comms. 6: MIN (AI1, AI2) 7: MAX (AI1, AI2)	0
A0-03	Torque digital setting in torque control	−200.0% to 200.0%	130%
A0-07	Acceleration time in torque control	0.00s to 65000s	0.00s
A0-08	Deceleration time in torque control	0.00s to 65000s	0.00s

Note	● Do not set start frequency in torque control. Otherwise, larger rush-in current results at start. ● Reduce setting of A8-11 of the slave in master and slave control but the setting must be larger than 0.20 Hz. Meanwhile, if deceleration time is very short, increase setting of A8-11 properly. The larger the setting of A8-11 is, the weaker window effect will be obtained.

Set initial value to half of rated motor slip. You can obtain rated motor slip according to the following formulas:

Number of pole pairs of motor (take an integer) = (60 x rated motor frequency)/rated motor speed

Synchronous motor speed = (60 x rated motor frequency)/number of pole pairs of motor

Rated motor slip = (synchronous motor speed - rated motor speed)/synchronous motor speed x rated motor frequency

● Flexible connection

For the master in speed control, perform the following settings. Note that only the setting of F8-15 can be modified.

Function Code	Parameter Name	Setting Range	Setting
FD-00	Baud rate	0000 to 6039	Keep the same setting of thousands position of this parameter for the master and slave.
A8-00	Point-point communication	0: Disabled 1: Enabled	1
A8-01	Master or slave selection	0: Master 1: Slave	0
F0-10	Max. Frequency	5.00 to 500.00 Hz	50.00 Hz Keep the same setting of this parameter for the master and slave.
F8-15	Droop rate	0.00 to 10.00 Hz	1.00 Hz
F0-17	Acceleration time 1	0.0 to 6500.0s	Keep the same setting of this parameter for the master and slave.

F0-18	Deceleration time 1	0.0 to 6500.0s	Keep the same setting of this parameter for the master and slave.

For slave in speed control, perform the following settings. Note that only setting of F8-15 can be modified.

Function Code	Parameter Name	Setting Range	Setting
FD-00	Baud rate	0000 to 6039	Keep the same setting of thousands position of this parameter for the master and slave.
A8-00	Point-point communication	0: Disabled 1: Enabled	1
A8-01	Master or slave selection	0: Master 1: Slave	1
A8-02	Selection of action of the slave in point-point communication	000 to 111 0: No 1: Yes BIT0：whether to follow master's command BIT1：whether to send fault information to master when a fault occurs BIT2：whether to alarm when it becomes off-line	011
A8-03	The slave received data	0: Output frequency 1: Frequency reference	0
F0-02	Command source selection	0: Operating panel control (keypad & display) 1: Terminal I/O control 2: Serial comms.	2
F0-03	Main frequency reference setting channel selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI1 3: AI2 4: Keyboard pointer	9

F0-03	Main frequency reference setting channel selection	5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID reference 9: Communication setting 10.Pull out keyboard potentiometer is valid (applicable to version above 3.00)	9
F0-10	Max. Frequency	5.00 to 500.00 Hz	50.00 Hz Keep the same setting of this parameter for the master and slave.
F0-17	Acceleration time 1	0.0 to 6500.0s	Keep the same setting of this parameter for the master and slave.
F0-18	Deceleration time 1	0.0 to 6500.0s	Keep the same setting of this parameter for the master and slave.
F8-15	Droop rate	0.00 to 10.00 Hz	1.00 Hz
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0

Droop Control

The droop control function aims at balancing the load level of two motors that drive the same load. This function is required only when both master and slave are in speed control.

A proper droop rate is gradually obtained during drive running. Therefore, do not set F8-15 to a very large value. Otherwise, steady speed will decline obviously when load is very large. You must set this parameter in both master and slave.

Figure 5-27 Relationship between droop rate and output torque
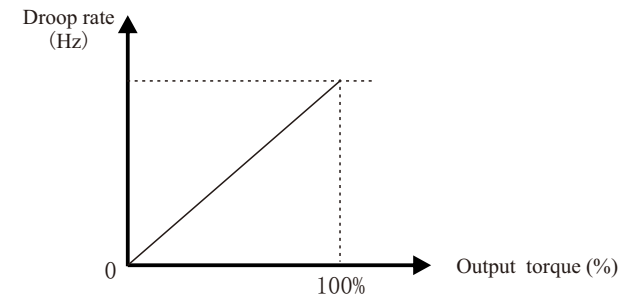
● Droop speed = rated motor frequency x output torque x droop rate

● Actual AC drive frequency = frequency reference - droop speed

Suppose that F8-15 is set to 10%, rated motor frequency is 50 Hz, and output torque is 50%.

Actual drive frequency = 50 Hz – 50 x 50% x (1.00/10) = 47.5 Hz.

Function Code	Parameter Name	Setting Range	Default
A8-00	Point-point communication	0: Disabled 1: Enabled	0

This function parameter determines whether to enable point-point communication.

Function Code	Parameter Name	Setting Range	Default
A8-01	Master or slave selection	0: Master 1: Slave	0

This function parameter determines whether the AC drive is master or slave.

Function Code	Parameter Name	Setting Range	Default
A8-02	Selection of action of the slave in point-point communication	0: No 1: Yes BIT0: whether to follow master's command BIT1: whether to send fault information to master when a fault occurs BIT2: whether to alarm when it becomes off-line	011

When AC drive is the slave (A8-01 = 1) in serial comms. control (F0-02 = 2), this function determines whether it follows the master to run/stop, whether it sends fault information to the master when a fault occurs, and whether it alarms when it becomes offline.

Function Code	Parameter Name	Setting Range	Default
A8-03	The slave received data	0: Output frequency 1: Frequency reference	0

● A8-03 = 0: If F8-15 ≠ 0, the master sends its frequency after droop control to the slave. It is applicable to droop control or speed synchronization control (slave in speed control). In load sharing control (slave in torque control), the master sends its output frequency to the slave. In this case, ensure F8-15 =0.

● A8-03 = 1: The master sends its frequency reference to the slave.

Function Code	Parameter Name	Setting Range	Default
A8-04	Zero offset of received data	−100.00 to 100.00	0.00
A8-05	Gain of received data	-10.00 to 10.00	1.00

These two function parameters correct received data. When A0-00 = 0, they correct frequency reference. When A0-00 = 0, they correct torque reference.

Function Code	Parameter Name	Setting Range	Default
A8-06	Point-point communication interruption detection time	0.0s to 10.0s	1.0s

This function parameter sets time required to detect communication interruption of the master or slave. To disable the detection function, set this parameter to 0.

Function Code	Parameter Name	Setting Range	Default
A8-07	Master data sending cycle in point-point communication	0.001s to 10.000s	0.001s

This function parameter sets data sending cycle of the master in point-point communication.

Function Code	Parameter Name	Setting Range	Default
A8-11	Window width	0.20 to 10.00 Hz	0.5 Hz

This function parameter is effective only for the master and slave control mode. Modify the setting to ensure synchronization of the master and slave speed within window width.

5.9 Control Circuit Terminals

5.9.1 Function of S Terminals

Function Code	Parameter Name	Setting Range	Default
F4-00	S1 function selection	0 to 59	1
F4-01	S2 function selection	0 to 59	4
F4-02	S3 function selection	0 to 59	9
F4-03	S4 function selection	0 to 59	12
F4-04	S5 function selection	0 to 59	13
F4-05	S6 function selection	0 to 59	0

The functions of digital input terminals are described in the following figure.

Value	Function	Description
0	No function	Set reserved terminals to 0 to avoid malfunction.
1	Forward run (FWD)	The S terminals selecting these two functions control forward and reverse running of the AC drive.
2	Reverser run (REV)	
3	Three-wire control	The S terminal set for this function determines three-wire control mode of the AC drive.
4	Forward jog (FJOG)	FJOG indicates forward jog running, and RJOG indicates reverse jog running. Jog frequency, jog acceleration time and jog deceleration time are described respectively in F8-00, F8-01 and F8-02.
5	Reverse jog (RJOG)	

Value	Function	Description
6	Terminal UP	The terminals selecting these two functions are used for increment and decrement when frequency reference is input via external S terminal, or when frequency source is digital setting.
7	Terminal YWN	
8	Coast to stop	When terminal set for this function becomes on, the drive shuts off output and the stop process of motor is not controlled by the drive. It means the same as coast to stop described in F6-10.
9	Fault reset (RESET)	You can perform fault reset via S terminal set for this function. It is the same as function of the RESET key on the operation panel. Remote fault reset is implemented by this function.
10	RUN disabled	When the terminal set for this function becomes on, the AC drive decelerates to stop and retains all running parameters, such as PLC, wobble and PID parameters. Once the terminal becomes off, the AC drive resumes the running status before stop.
11	External fault NO input	When terminal set for this function becomes on, the drive detects ERR15 and performs fault protection.
12	Multi-reference terminal 1	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 four states of these two terminals.
17	Terminal 1 for acceleration/ deceleration time selection	
18	Frequency reference setting channel switchover	The terminal set for this function is used to perform switchover between two frequency reference setting channels according to setting in F0-07.

Value	Function	Description
19	UP and YWN setting clear (terminal, operation panel)	If the frequency source is digital setting, the terminal set for this function is used to clear the modification by using the UP/YWN function or the increment/decrement key on the operation panel, restoring the frequency reference to the value of F0-08.
20	Command source switchover 1	If command source is terminal control (F0-02 = 1), this terminal is used to perform switchover between terminal control and operation panel control. If command source is communication control (F0-02 = 2), this terminal is used to perform switchover between communication control and operation panel control.
21	Acceleration/ Deceleration prohibited	This function ensures the AC drive to maintain current frequency output without being affected by external signals (except STOP command).
22	PID disabled	This function disables the PID function. The AC drive maintains current frequency output without supporting PID adjustment of frequency reference.
23	PLC state reset	When the simple PLC function is enabled again after it was disabled in execution process, this function restores original state of simple PLC for the AC drive
24	Wobble disabled	When terminal set for this function becomes on, the wobble function becomes disabled and the drive outputs center frequency.
25	Counter input	Terminal set for this function is used to count pulses.
26	Counter reset	Terminal set for this function is used to clear counter.
27	Length signal pulses count	Terminal set for this function is used to count pulses of the length signal.
28	Length reset	The terminal set for this function is used to clear length.
29	Torque control prohibited	When the terminal set for this function becomes on, torque control is disabled and the AC drive enters speed control.
30	Pulse input as frequency reference valid only for S5)	S5 is used for pulse input as frequency reference.

Value	Function	Description
31	Reserved	–
32	Immediate DC injection braking	Once the terminal set for this function becomes on, the AC drive directly switches over to DC injection braking state.
33	External fault NC input	Once terminal set for this function becomes on, the AC drive detects ERR15 and stops.
34	Frequency modification enabled	When terminal set for this function becomes on, the AC drive responds to frequency modification.
35	PID operation direction reverse	When terminal set for this function becomes on, PID operation direction is reversed to direction set in FA-03.
36	External stop 1	In operation panel control, the terminal set for this function can be used to stop the AC drive, equivalent to function of the STOP key on the operation panel.
37	Command source switchover 2	Terminal set for this function is used to perform switchover between terminal control and communication control. If command source is terminal control, the AC drive switches over to communication control after the terminal becomes ON.
38	PID integral disabled	When terminal set for this function becomes on, the integral function becomes disabled. However, the proportional and differentiation functions are still effective.
39	Switchover between main frequency reference and preset frequency	Terminal set for this function is used to count pulses of the length signal.
40	Switchover between auxiliary frequency reference and preset frequency	When terminal set for this function becomes on, frequency reference is replaced by preset frequency set in F0-08.
41	Motor selection	Switchover between motor 1 and motor 2 can be implemented through two state combinations of terminal set for this function.
42	Reserved	–
43	PID parameter switchover	If PID parameters switchover is done via S terminal (FA-18 = 1), PID parameters are FA-05 to FA-07 when terminal set for this function becomes off; PID parameters are FA-15 to FA-17 when terminal set for this function becomes on.

Value	Function	Description
44	User-defined fault 1	If terminals selecting these two functions become on, the AC drive detects Err27 and Err28 respectively, and performs fault protection based on setting of F9-49.
45	User-defined fault 2	
46	Speed control/Torque control	This function enables the AC drive to switch over between speed control and torque control. When terminal set for this function becomes off, the AC drive runs in the mode set in A0-00. When terminal set for this function becomes on, the AC drive switches over to the other control mode.
47	Emergency stop (ES)	When the ES terminal becomes on, the AC drive decelerates based on the setting of F8-55 (deceleration time for emergency stop). If F8-55 = 0 in V/F control, the AC drive decelerates based on the setting of F0-19 (Acceleration/Deceleration time unit). The AC drive will not operate when the ES terminal is ON even if the terminal receiving RUN command is ON. In this case, to make the AC drive operate again, turn off the terminal receiving RUN command and then turn it on.
48	External stop 2	This function enables the AC drive to decelerate to stop in any control mode (operation panel, terminal or communication). In this case, the deceleration time is deceleration time 4.
49	Deceleration DC injection braking	When terminal set for this function becomes on, the AC drive decelerates to DC injection braking 2 frequency threshold and then switches over to DC injection braking state.
50	Clear running time this time	When terminal set for this function becomes on, current running time of the AC drive is cleared. This function must be supported by F8-42 and F8-53.
51	Two-wire control/ Three-wire control	This function enables the AC drive to switch over between two-wire control and three-wire control. If F4-11 is set to two-wire control mode 1, the AC drive switches over to three-wire control mode 1 when terminal set for this function becomes on.
52	Reverse running prohibited	When terminal set for this function becomes on, reverse running of the AC drive is prohibited. It is the same as function of F8-13.
53 to 59	Reserved	–

Function Code	Parameter Name	Setting Range	Default
F4-35	S1 delay	0.0s to 3600.0s	0.0s
F4-36	S2 delay	0.0s to 3600.0s	0.0s
F4-37	S3 delay	0.0s to 3600.0s	0.0s

When state of S terminals changes, these three function parameters set delay time of the change. Now the drive supports delay function on S1, S2 and S3 only.

Function Code	Parameter Name	Setting Range	Default
F4-38	S active mode selection 1	0: High level active 1: Low level active BIT0：S1 active mode BIT1：S2 active mode BIT2：S3 active mode BIT3：S4 active mode BIT4：S5 active mode	00000
F4-39	S active mode selection 2	0: High level active 1: Low level active BIT0：S6 active mode BIT1：S7 active mode BIT2：S8 active mode BIT3：S9 active mode BIT4：S10 active mode	00000

These two function parameters set active mode of S terminals.

● 0: High level active

If a high level voltage is applied to S terminal, the S signal will be seen as active. That is, the S terminal becomes active when being connected with COM, and inactive when being disconnected from COM.

● 1: Low level active

If a low level voltage is applied to S terminal, the S signal will be seen as active. That is, the S terminal becomes active when being disconnected from COM, and inactive when being connected with COM.

5.9.2 Function of Y Terminals

The drive provides a digital output (Y) terminal, an analog output (AO) terminal, a relay terminal and an Y4 terminal (either high-speed pulse output or open-collector output).

Extra AO terminal (AO2), relay terminal (relay2) and Y terminal (Y2) are provided by the I/O extension card.

Function Code	Parameter Name	Setting Range	Default
F5-00	Y4 terminal output mode	0: Pulse output (Y4P) 1: Digital output (Y4R)	0

This function parameter is a programmable multiplexing terminal and determines whether Y4 terminal is high-speed pulse output (Y4P) or open-collector output (Y4R). When used for high-speed pulse output, max. output frequency is 100 kHz.

Function Code	Parameter Name	Setting Range	Default
F5-01	Y4R output function selection	0 to 41	0
F5-02	Y1 relay function selection	0 to 41	2
F5-04	Y3 output function selection	0 to 41	1
F5-17	Y4R output delay time	0.0s～3600.0s	0.0s
F5-18	Y1 outputdelay time	0.0s～3600.0s	0.0s
F5-20	Y3 output delay time	0.0s～3600.0s	0.0s
F5-21	Y4 output delay time	0.0s～3600.0s	0.0s
F5-22	Y output terminal valid state selection	0:Positive logic 1:Inverse logic BIT0:Y4R BIT1:Y1 BIT2:− BIT3:Y3 BIT4:Y4	00000

Value	Function	Description
0	No output	Terminal has no function.
1	AC drive running	When the AC drive is running and has output frequency (can be zero), terminal set for this function becomes on.
2	Fault output	When a fault occurs and the AC drive stops due to the fault, terminal set for this function becomes on.
3	Frequency level detection 1 FDT1 output	Refer to descriptions of " F 8 - 1 9 " and "F 8 -20"
4	Frequency reached	Refer to descriptions of " F 8 - 2 1 " .
5	Zero-speed running (no output at stop)	When output frequency is 0 during drive running, terminal set for this function becomes on. When the drive stops, terminal becomes off.
6	Motor overload pending	The AC drive judges motor overload pre-warning according to pre-warning threshold before performing overload protection. If this threshold is exceeded, terminal set for this function becomes on. For motor overload parameters, see descriptions of " F 9 - 0 0 " to " F 9 - 0 2 " .
7	AC drive overload pending	Terminal set for this function becomes on 10s before the AC drive performs overload protection.
8	Set count value reached	Terminal set for this function becomes on when count value reaches the value set in FB-08.
9	Designated count value reached	Terminal set for this function becomes on when count value reaches value set in FB-09.
10	Length reached	Terminal set for this function becomes on when detected actual length exceeds value set in FB-05.
11	PLC cycle completed	Terminal set for this function outputs a pulse signal with width of 250 ms when simple PLC completes one cycle.
12	Accumulative running time reached	Terminal set for this function becomes on when accumulative running time of the AC drive exceeds value set in F8-17.
13	Frequency limited	Terminal set for this function becomes on when frequency reference exceeds frequency upper or lower limit, and output frequency of the AC drive also reaches the upper or lower limit.

Value	Function	Description
14	Torque limited	Terminal set for this function becomes on when the AC drive enters stall protection because output torque reaches toque limit in speed control.
15	Ready for RUN	Terminal set for this function becomes on when the AC drive is ready to drive motor (Power applied to main circuit and control circuit is normal, and no fault is detected).
16	AI1 > AI2	When AI1 input is greater than AI2 input, terminal set for this function becomes on.
17	Frequency upper limit reached	When running frequency reaches frequency upper limit, terminal set for this function becomes on.
18	Frequency lower limit reached (no output at stop)	When running frequency reaches frequency lower limit, terminal set for this function becomes on. When the AC drive is in stop status, terminal set for this function becomes off.
19	Undervoltage	Terminal set for this function becomes on when undervoltage occurs on AC drive.
20	Communication setting	Whether terminal is active or inactive is determined by communi-cation address 0x2001.
21	Reserved	–
22	Reserved	–
23	Zero-speed running 2 (having output at stop)	When output frequency is 0 during drive running, terminal set for this function becomes on. When the drive stops, terminal remains on.
24	Reserved	Terminal set for this function becomes on when accumulative power-on time of the AC drive (F7-13) exceeds value set in F8-16.
25	Frequency level detection 2	Refer to descriptions of " F 8- 28 " and " F 8- 29 "
26	Frequency 1 reached	Refer to descriptions of " F 8- 30 " and " F 8- 31 "
27	Frequency 2 reached	Refer to descriptions of " F 8- 32 " and " F 8- 33 "
28	Current 1 reached	Refer to descriptions of " F 8- 38 " and " F 8- 39 "
29	Current 2 reached	Refer to descriptions of " F 8- 40 " and " F 8- 41 "

Value	Function	Description
30	Timing reached	On the condition that the timing function is enabled (F8-42 = 1), terminal set for this function becomes on when current running time of the AC drive reaches the set time.
31	Ai1 input exceeding limit	Terminal set for this function becomes on when AI1 input is larger than value set in F8-46 (AI1 input voltage upper limit) or smaller than value set in F8-45 (AI1 input voltage lower limit).
32	Load lost	Terminal set for this function becomes on when load gets lost.
33	Reverse running	Terminal set for this function becomes on when the AC drive runs in reverse direction.
34	Zero current	Refer to descriptions of " F 8 - 3 4 " and " F 8 - 3 5 " .
35	IGBT temperature reached	Terminal set for this function becomes on when heatsink temperature of AC Drive IGBT (F7-07) reaches IGBT temperature threshold (F8-47).
36	Output current exceeding limit	Refer to descriptions of " F 8 - 3 6 " and " F 8 - 3 7 " .
37	Frequency lower limit reached (having output at stop)	The terminal set for this function becomes on when the running frequency reaches the frequency lower limit. When the drive stops, the terminal remains on.
38	Alarm output	If a fault occurs on the AC drive and the AC drive continues to run, terminal set for this function outputs an alarm signal.
39	Motor overheat pending	Terminal set for this function becomes on when motor temperature reaches value set in F9-58 (Motor overheat pending threshold). You can view motor temperature by using U0-34.
40	Current running time reached	Terminal set for this function becomes on when current running time of the AC drive exceeds value set in F8-53.
41	Fault output	When a fault occurs on the AC drive (except undervoltage), terminal set for this function becomes on.

5.9.3 Function of VS Terminals

VS terminals have the same functions as S terminals do. They can be used for multi-functional digital inputs.

Function Code	Parameter Name	Setting Range	Default
A1-00	VS1 function selection	0 to 59	0
A1-01	VS2 function selection	0 to 59	0
A1-02	VS3 function selection	0 to 59	0
A1-03	VS4 function selection	0 to 59	0
A1-04	VS5 function selection	0 to 59	0

These function parameters set function to the five virtual S terminals VS1 to VS5, which have the same digital input functions (0 to 59) as ten S terminals do. For more details, see description of " F 4 - 0 0 " to " F 4 - 0 5 ".

Function Code	Parameter Name	Setting Range	Default
A1-05	VS active state setting mode	0: Decided by state of VYx 1: Decided by A1-06 BIT0: VS1 BIT1: VS2 BIT2: VS3 BIT3: VS4 BIT4: VS5	00000
A1-06	Selection of VS active state	0: Invalid 1: Valid BIT0: VS1 BIT1: VS2 BIT2: VS3 BIT3: VS4 BIT4: VS5	00000

These function parameters determine active mode of VS1 to VS5.

VS terminals have the same functions as S terminals do. They can be used for multi-functional digital inputs.

● 0: Decided by state of VYxTo enable the AC drive to detect a fault and stop when input from AI1 input reaches limit, perform the following settings:

– Set A1-00 to 44 to set VS1 for function 44 "User-defined fault 1".

– Set A1-05 to xxx0 to determine VS1 active state by state of VYx.

– Set A1-11 to 31 to set VY1 for function 31 "AI1 input exceeding limit".When input from AI1 reaches limit, VY1 becomes on. Then, VS1 becomes on and the AC drive receives user-defined fault.

● 1: Decided by A1-06To enable the AC drive to automatically enter running status after power-on, perform the following settings:

– Set A1-00 to 1 to set VS1 for function 1 "Forward RUN (FWD)".

– Set A1-05 to xxx1 to determine VS1 active state by state of A1-06.

– Set F0-02 to 1 to use terminal control as command source.

– Set F8-18 to 0 to disable start protection.

After completing initialization at power-on, the AC drive detects that VS1 set for function FWD is active. This means the AC drive receives forward run command from VS1 and starts forward running.

5.9.4 Function of VY Terminals

VY terminals have the same digital output functions (1 to 41) as Y terminals do. The VY can be used together with VSx to implement some simple logic control.

Function Code	Parameter Name	Setting Range	Default
A1-11	VY1 function selection	0: Short with physical Sx internally 1 to 41 (see F5 group physical Y output selection)	0
A1-12	VY2 function selection		0
A1-13	VY1 function selection		0
A1-14	VY2 function selection		0
A1-15	VY2 function selection		0
A1-16	VY1 output delay	0.0s to 3600.0s	0.0s
A1-17	VY2 output delay	0.0s to 3600.0s	0.0s

Function Code	Parameter Name	Setting Range	Default
A1-18	VY3 output delay	0.0s to 3600.0s	0.0s
A1-19	VY4 output delay	0.0s to 3600.0s	0.0s
A1-20	Vy5 output delay	0.0s to 3600.0s	0.0s
A1-21	VY active mode selection	0: Positive logic active 1: Negative logic active BIT0: VY1 BIT1: VY2 BIT2: VY3 BIT3: VY4 BIT4: VY5	00000

5.9.5 Function of the AI Terminals

Function Code	Parameter Name	Setting Range	Default
A1-07	Function selection for AI1 used as S	0 to 59	0
A1-08	Function selection for AI2 used as S	0 to 59	0
A1-09	Function selection for keyboard potentiometer used as S	0 to 59	0
A1-10	Active state selection for AI used as S	0: High level active 1: Low level active BIT0: AI1 BIT1: AI2 BIT2: keyboard potentiometer	000

5.9.6 Function of the AO and Pulse Output Terminals

Function Code	Parameter Name	Setting Range	Default
F5-00	Y4 terminal output mode	0: Pulse output (Y4P) 1: Digital output (Y4R)	0
F5-00	Y4P function selection	0 to 16	0

F5-07	Ao1 function selection	0 to 16	0
F5-08	Ao2 function selection	0 to 16	1

These parameters select the function of the pulse output terminal and the two analog output terminals.

The pulse output frequency range of the Y4P terminal is 0.01 kHz to F5-09 (Max. Y4P output frequency). F5-09 must be set in the range of 0.01 to 100.00 kHz.

The output range of AO1 and AO2 is 0 to 10 V or 0 to 20 mA.

The functions of the three terminals are listed in the following table.

Value	Output Function	Range (Corresponding to 0.0% to 100.0% of Pulse or Analog Output Range)
0	Running frequency	0 to max. Frequency
1	Frequency reference	0 to max. 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	0.01 to 100.00 kHz
7	AI1	0 to 10 V
8	AI2	0 to 10 V (or 0 to 20 mA)
9	Keyboard potentiometer	0 to 10 V
10	Length	0 to max. set length
11	Counting value	0 to max. count value
12	Communication reference	0.0% to 100.0%
13	Motor speed	0 to motor speed corresponding to max. output frequency
14	Output current	0.0 to 1000.0 A

Value	Output Function	Range (Corresponding to 0.0% to 100.0% of Pulse or Analog Output Range)
15	Communication reference	0.0% to 100.0%
16	Motor speed	0 to motor speed corresponding to max. output frequency

Note	Max. value in the range indicates Xmax in the following formulas to calculate AO gain and AO zero offset coefficient.

5.10 Communication

5.10.1 RS485 card and RS485 communication protocol

This part is the content of communication, which is used to control the operation of the inverter, the status of the inverter and the setting of related parameters. Read and write function code parameters (some function codes cannot be changed, only for manufacturers to use or monitor).

Function code parameter address marking rules.

The rules are represented by the function code group number and label as the parameter address:

High byte: F0~FF (group F), A0~AF (group A), 70~7F (group U) low byte: 00~FF

For example: F0-16, the communication address is F010H; among them, F0H represents the parameters of the F0 group, and 10H represents the value of the serial number 16 in the function group converted to hexadecimal;

Note: Group F: neither can read parameters nor change parameters; Group U: can only read, can not change parameters.

Some parameters cannot be changed when the inverter is in the running state; some parameters cannot be changed regardless of the state of the inverter; when changing the function code parameters, pay attention to the range, unit, and related instructions of the parameters.

Parameter group NO.	Communication access adress	Communication to modify the parameter address in RAM
F0 ~ FE	0xF000 ~ 0xFEFF	0x0000 ~ 0x0EFF
A0 ~ AC	0xA000 ~ 0xACFF	0x4000 ~ 0x4CFF
U	0x7000 ~ 0x70FF	–

Note, since the EEPROM is frequently stored, the service life of the EEPROM will be reduced.

Therefore, some parameters do not need to be stored in the communication mode, just change the value in the RAM.

If it is a parameter of group F, to realize this function, just change the high-order F of the parameter address to 0. If it is a group A parameter, to realize this function, just change the high-order A of the parameter address to 4. The corresponding parameter address are expressed as follows:

High byte: 00 ~ 0F (group F), 40 ~ 4F (group A) low byte: 00 ~ FF such as parameter F3-12 is not stored in EEPROM, and the address is 030C parameter A0-05 is not stored in EEPROM, and the address is 4005; this address can only be used for writing to ARM, but not for reading, when reading, it is invalid adress.

Parameter adress	Description	Parameter adress	Description
1000H	Communication setting value (decimal) – 10000 ~ 10000	1010H	PID reference
1001H	Running frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC process
1003H	Output voltage	1013H	Pulse input frequency, unit: 0.01 kHz
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	S input indication	1018H	Keyboard potentiometer voltage before correction
1009H	Y output indication	1019H	Linear speed
100AH	AI1 voltage	101AH	Current power-on time
100BH	AI2 voltage	101BH	Current running time
100CH	Keyboard potentiometer voltage	101CH	Pulse input frequency, unit 1Hz
100DH	Counting value input	101DH	AI1 voltage before correction
100EH	Length value input	101EH	AI2 voltage before correction

Parameter adress	Description	Parameter adress	Description
100FH	Load speed	101FH	Main frequency reference display
–	–	1020H	Auxiliary frequency reference display

Note	● Communication setting value indicates percentage: 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%. ● With regard to frequency, communication reference is a percentage of F0-10 (max. frequency). ● With regard to torque, communication reference is a percentage of F2-10 and A2-48 (corresponding to motor 1 and motor 2, respectively).

Control command input to AC drive (write-only):

Command Word Address	Command Word Function
2000H	0001: Forward run
	0002: Reverse run
	0003: Forward jog
	0004: Reverse jog
	0005: Coast to stop
	0006: Decelerate to stop
	0007: Fault reset

Read AC drive state (read-only):

Command Word Address	Command Word Function
3000H	0001: Forward run
	0002: Reverse run
	0003: Stop

Parameter lock password verification: if the actual password value is returned, it means that the password verification is passed.(If there is no password, that is the password is 0, the check returns 0000H)

Password Address	Password Content
1F00H	*****

Y terminal control (write-only)

Command Address	Command Content
2001H	BIT0: Y1 control BIT1: Y2 control BIT2: RELAY1 control BIT3: RELAY2 control BIT4: Y4R control BIT5: VY1 BIT6: VY2 BIT7: VY3 BIT8: VY4 BIT9: VY5

AO1 control (write-only)

Command Address	Command Content
2002H	0 to 7FFF indicates 0% to 100%.

AO2 control (write-only)

Command Address	Command Content
2003H	0 to 7FFF indicates 0% to 100%.

Pulse output control (write-only)

Command Address	Command Content
2004H	0 to 7FFF indicates 0% to 100%.

AC drive fault description

AC Drive Fault Address	AC Drive Fault Information	
8000H	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 0011: Contactor fault 0012: Current detection fault 0013: Motor auto-tuning fault 0014: Encoder/PG card fault 0015: Parameter read and write fault 0016: AC drive hardware fault 0017: Motor short circuited 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	0008: Buffer resistor overload 0009: Undervoltage 000A: AC drive overload 000B: Motor overload 000C: Power input phase loss 000D: Power output phase loss 000E: IGBT overheat 000F: External fault 0010: Communication fault 001E: Load lost 001F: PID feedback lost during running 0028: Fast current limit timeout 0029: Motor switchover error during running 002A: Too large speed deviation 002B: Motor over-speed 002D: Motor overheat 005A: Incorrect setting of PPR of the encoder 005B: Not connecting the encoder 005C: Initial position error 005E: Speed feedback error

5.10.2 FD Communication Parameter Description

Function Code	Parameter Name	Setting Range	Default
FD-00	Baud rate	BIT0: MODBUS 0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps BIT1: Reserved BIT2: Reserved BIT3: Reserved	5005

This parameter is used to set transmission speed between host computer and AC drive.

Note that baud rate of host computer must be the same as that of AC drive. Otherwise, communication shall fail. The higher baud rate is, the faster communication will be.

Function Code	Parameter Name	Setting Range	Default
FD-01	Modbus data format symbol	0: No check (8,N,2) 1: Even parity check (8,E,1) 2: Odd parity check (8,O,1) 3: No check, data format (8,N,1) (Valid for Modbus)	0

Note that data format of host computer must be the same as that of AC drive. Otherwise, communication shall fail.

Function Code	Parameter Name	Setting Range	Default
FD-02	Local address	0: Broadcast address; 1 to 247 (Valid for Modbus)	1

This parameter is used to set address of AC drive. This address is unique (except broadcast address), which is basis for point-to-point communication between host computer and AC drive.

When local address is set to 0 (that is, broadcast address), AC drive can only receive and execute broadcast commands of host computer, but will not respond to host computer.

Function Code	Parameter Name	Setting Range	Default
FD-03	Modbus response delay	0 to 20 ms (Valid for Modbus)	2

This parameter sets interval between AC drive completing receiving data and AC drive sending data to host computer. If response delay is shorter than system processing time, system processing time shall prevail. If response delay is longer than system processing time, system sends data to host computer only after response delay is up.

Function Code	Parameter Name	Setting Range	Default
FD-04	Serial port communication timeout	0.0: Disabled 0.1 to 60.0s(Valid for Modbus)	0.0

When AC drive does not receive communication signal within time set in this parameter, it detects communication timeout fault (Err16).

When this parameter is set to 0.0s, system does not detect communication timeout.

Generally, this parameter is set to 0.0s. In applications with continuous communication, you can use this parameter to monitor communication status.

Function Code	Parameter Name	Setting Range	Default
FD-05	Modbus communication data format	BIT0: Modbus protocol selection 0: Non-standard Modbus protocol 1: Standard Modbus protocol BIT1: Reserved	31

Function Code	Parameter Name	Setting Range	Default
FD-06	Current resolution read by communication	0: 0.01 A (valid when ≤ 55 kW) 1: 0.1 A	0

This parameter is used to set unit of output current read by communication.

5.11 Auxiliary Function

5.11.1 Jog

Jog is used to test equipment. In jog running, F6-00 must be set to 0 (direct start) and F6-10 must be set to 0 (Decelerate to stop).

Function Code	Parameter Name	Setting Range	Default
F0-25	Acceleration/ Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0
F8-00	Jog frequency reference	0.00 Hz to maximum frequency	2.00 Hz
F8-01	Jog acceleration time	0.0s to 6500.0s	20.0s
F8-02	Jog deceleration time	0.0s to 6500.0s	20.0s

Jog acceleration time indicate time to accelerate from 0 Hz to F0-25.

Jog deceleration time indicate time to decelerate from F0-25 to 0 Hz.

Function Code	Parameter Name	Setting Range	Default
F8-27	Set highest priority to terminal JOG function	0: Disabled 1: Enabled	1

This function parameter determines whether to set the highest priority to terminal JOG function. If this function is enabled and any of F4-00 to F4-05 is set to 4 (forward jog) or 5 (reverse jog) becomes active, the AC drive enters jog running status immediately.

5.11.2 Jump Frequency, FWD/REV Switchover Dead-zone Time, Reverse Run Prohibited

■ Jump Frequency

The frequency jump function enables the AC drive to avoid mechanical resonance point of load. The drive can be set with two separate frequencies. If both are set to 0, the frequency jump function is disabled.

Figure 5-28 Jump frequencyOutput frequency (Hz)
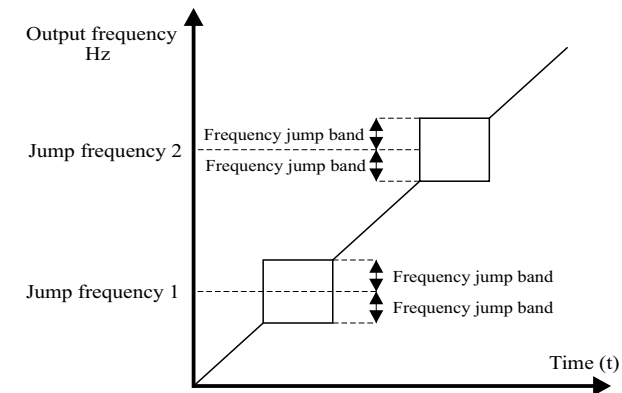
In the preceding figure, when running frequency accelerates to the value that is close to jump frequency during acceleration, the AC drive runs for a period at current frequency reference and then jumps over jump frequency. The jump width is twice of F8-11.

When running frequency decelerates to the value close jump frequency during deceleration, the AC drive runs for a period at current frequency reference and then jumps over jump frequency. The jump width is twice of F8-11.

Function Code	Parameter Name	Setting Range	Default
F8-09	Frequency jump 1	0.00 Hz to max. frequency	0.00 Hz
F8-10	Frequency jump 2	0.00 Hz to max. frequency	0.00 Hz
F8-11	Frequency jump band	0.00 Hz to max. frequency	0.00 Hz
F8-22	Jump frequency function	0: Disabled 1: Enabled	0

■ **FWD/REV Switchover Dead-zone Time**

Figure 5-29 Forward/Reverse run switchover dead-zone time
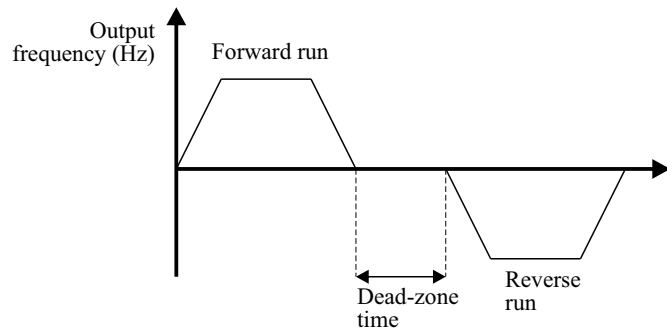
Function Code	Parameter Name	Setting Range	Default
F8-12	Forward/Reverse run switchover dead-zone time	0.0s to 3000.0s	0.0s

■ **Reverse Run Prohibited**

Function Code	Parameter Name	Setting Range	Default
F8-13	Reverse RUN selection	0: Disabled 1: Enabled	0
F0-09	Running direction	0: Run in the default direction (FWD/ REV indicator off) 1: Run in the direction reverse to the default direction (FWD/REV indicator on)	0

Note	The original direction of motor will be resumed after parameter initialization. Do not use this function in applications where changing rotation direction of motor is prohibited after system commissioning is completed.

5.11.3 Frequency Detection (FDT)

This function sets detection values of output frequency and sets hysteresis level for the frequency detection function.

Figure 5-30 Frequency detection

Frequency hysteresis = F8-19 x F8-20
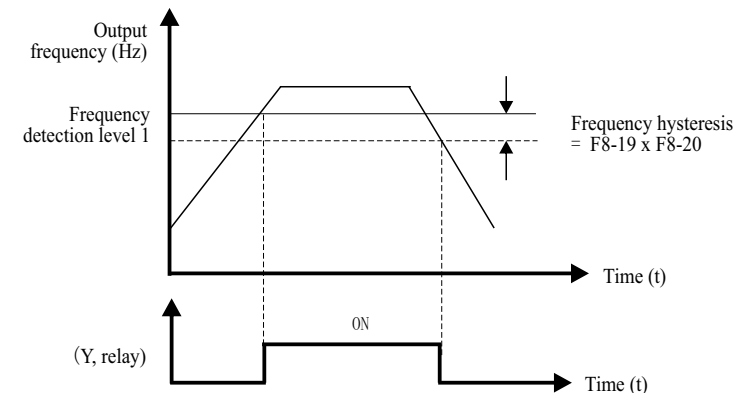
Function Code	Parameter Name	Setting Range	Default
F8-19	Frequency detection value 1	0.00 Hz to max. frequency	50.00 Hz
F8-20	Frequency detection hysteresis 1	0.0% to 100.0%	5.0%
F8-28	Frequency detection value 2	0.00 Hz to max. frequency	50.00 Hz
F8-29	Frequency detection hysteresis 2	0.0% to 100.0%	5.0%

F8-19: It sets detection value for digital output function 3. When running frequency exceeds the detection value, digital output terminal set for function 3 becomes on.

F8-20: It sets hysteresis level for the frequency detection function. It is a percentage of the frequency detection value (F8-19).

5.11.4 Frequency Reference Reached Detection Width

This function sets the detection width of the frequency reference.

Figure 5-31 Frequency reached detection width
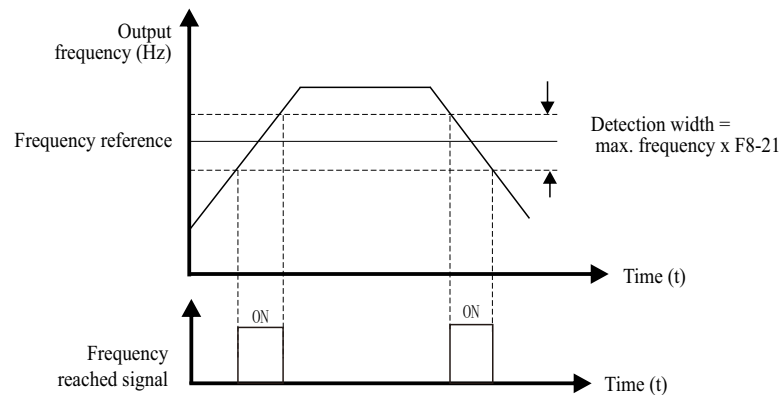
Function Code	Parameter Name	Setting Range	Default
F8-21	Detection width of target frequency reached	0.0% to 100.0%%	0.0%

5.11.5 Acceleration/Deceleration Time Switchover

This function selects acceleration/deceleration time according to running frequency range during drive running. This function is active only when motor 1 is selected and acceleration/deceleration time is not switched over via external S terminal.

During acceleration, if the running frequency is below F8-25, acceleration time 2 is selected. If it is above F8-25, acceleration time 1 is selected.

During deceleration, if the running frequency is above F8-26, deceleration time 1 is selected. If it is below F8-26, deceleration time 2 is selected.

Function Code	Parameter Name	Setting Range	Default
F8-25	Switchover frequency of acceleration time 1 and acceleration time 2	0.00 Hz to max. frequency	0.00 Hz
F8-26	Switchover frequency of deceleration time 1 and deceleration time 2	0.00 to max. frequency	0.00 Hz

5.11.6 Frequency Reached Detection

This function sets the detection value and detection width of frequency reached.
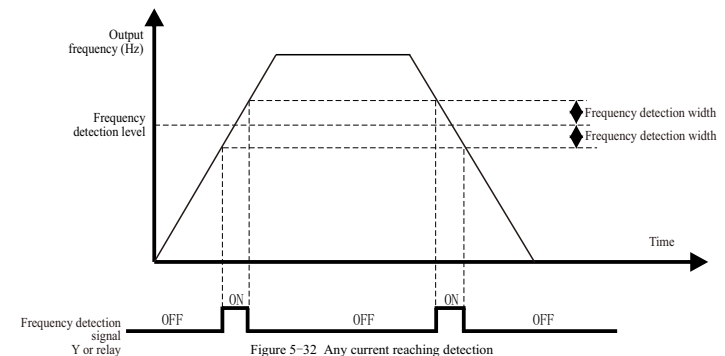
Figure 5-32 Any current reaching detection

The drive provides two groups of frequency detection parameters for the digital output functions 26 and 27. When the output frequency is in the range of the detection width, the digital output terminal set for function 26 or 27 becomes on.

Function Code	Parameter Name	Setting Range	Default
F8-30	Detection of frequency 1	0.00 Hz to max. frequency	50.00 Hz
F8-31	Detection width of frequency 1	0.0% to 100.0% (max. frequency)	0.0%
F8-32	Detection of frequency 2	0.00 Hz to max. frequency	50.00 Hz
F8-33	Detection width of frequency 2	0.0% to 100.0% (max. frequency)	0.0%

5.11.7 Zero Current Detection

If output current of the AC drive is equal to or smaller than the value set in F8-34 and the duration exceeds the value set in F8-35, digital output terminal set for function 34 becomes on.

Figure 5-33 Zero current detection
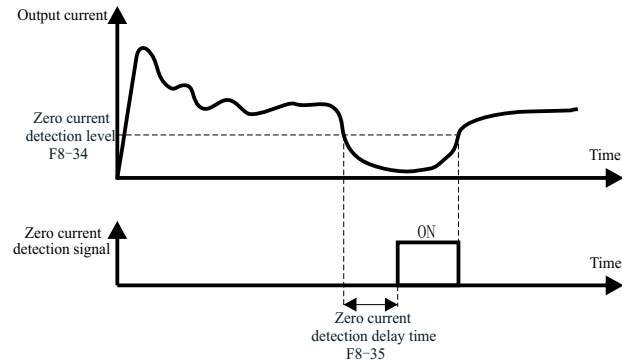
Function Code	Parameter Name	Setting Range	Default
F8-34	Zero current detection level	0.0% to 300.0% (rated motor current)	5.0%
F8-35	Zero current detection delay	0.01s to 600.00s	0.10s

5.11.8 Current Detection

The drive provides two groups of current detection level and width.

If output current of the AC drive reaches the width, digital output terminals set for functions 28 and 29 become on.
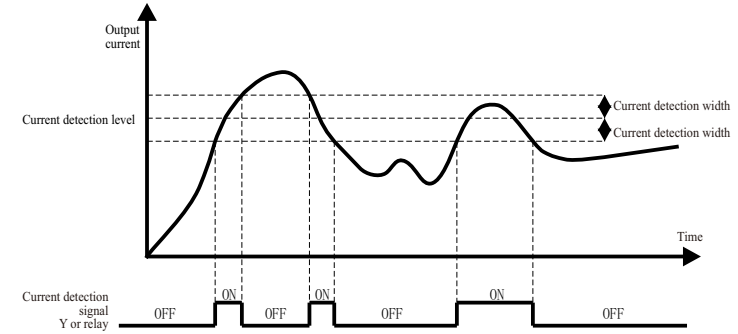
Figure 5-34 Current detection

Function Code	Parameter Name	Setting Range	Default
F8-38	Detection level of current 1	0.0% to 300.0% (rated motor current)	100.0%
F8-39	Detection width of current 1	0.0% to 300.0% (rated motor current)	0.0%
F8-40	Detection level of current 2	0.0% to 300.0% (rated motor current)	100.0%
F8-41	Detection width of current 2	0.0% to 300.0% (rated motor current)	0.0%

5.11.9 Timing Function

Function Code	Parameter Name	Setting Range	Default
F8-42	Timing function	0: Disabled 1: Enabled	0
F8-43	Running time setting channel	0: Set by F8-44 1: AI1 2: AI2 3: Keyboard potentiometer (100% of analog input corresponds to the value of F8-44)	0
F8-44	Running time	0.0 to 6500.0 min	0.0

These function parameters define the timing function of the drive. Once it is enabled, the AC drive starts timing since start. When the set timing running time is reached, the AC drive stops automatically and digital output terminal set for function 30 becomes on.

The AC drive starts timing from 0 again for each start. You can view remaining timing running time in U0-20.

5.11.10 AI1 Input Voltage Upper/Lower Limit

Function Code	Parameter Name	Setting Range	Default
F8-45	AI1 input voltage lower limit	0.00 V to F8-46	3.10 V
F8-46	AI1 input voltage upper limit	F8-45 to 10.00 V	6.80 V

These two function parameters indicate whether AI1 input voltage is in the setting range. If AI1 input is larger than F8-46 or smaller than F8-45, digital output terminal set for function 31 becomes on.

5.11.11 IGBT Temperature

Function Code	Parameter Name	Setting Range	Default
F8-47	IGBT temperature threshold	0°C to 100°C	75°C

This function parameter sets IGBT temperature threshold. When heatsink temperature reaches the value set in F8-47, digital output terminal set for function 35 becomes on.

5.11.12 Cooling Fan

Function Code	Parameter Name	Setting Range	Default
F8-48	Cooling fan working mode	0: Working during drive running 1: Working continuously	0

This function parameter sets working mode of cooling fan.

- F8-48 = 0: Working during runningThe fan works during drive running. When the drive stops, the fan works if heatsink temperature is above 40°C and stops if heatsink temperature is below 40°C.
- F8-48 = 1: Working continuouslyThe fan keeps working after power-on.

5.11.13 Hibernating and Wakeup

The hibernating and wakeup function is used in water supply application. Generally, set wakeup frequency equal to or higher than hibernating frequency. If they are set to 0, the function is disabled.

Function Code	Parameter Name	Setting Range	Default
F8-49	Wakeup frequency	Hibernating frequency (F8-51) to max. frequency (F0-10)	0.00 Hz
F8-50	Wakeup delay time	0.0s to 6500.0s	0.0s
F8-51	Hibernating frequency	0.00 Hz to wakeup frequency (F8-49)	0.00 Hz
F8-52	Hibernating delay time	0.0s to 6500.0s	0.0s

During drive running, when frequency reference is equal to or smaller than F8-51, the AC drive enters hibernating state after delay set in F8-52.

In hibernating state, when frequency reference is equal to or larger than F8-49, the AC drive wakes up after delay set in F8-50.

When frequency reference setting channel is PID reference, whether to perform PID operation in hibernating state is determined by FA-28 (Selection of PID operation at stop).

5.11.14 Running Time Threshold This Time

Function Code	Parameter Name	Setting Range	Default
F8-53	Running time threshold this time	0.0 to 6500.0 min	0.0 min

If running time this time reaches the value set in this parameter, digital output terminal set for

function 40 becomes on, indicating that the running time this time is reached. It is effective only for drive running this time. The previous running time is not added.

5.11.15 Output Power correction

Function Code	Parameter Name	Setting Range	Default
F8-54	Output power correction coefficient	0.00% to 200.0%	100.0%

This function parameter sets output power correction coefficient. When output power (U0-05) is not equal to expected value, perform linear correction via this parameter.

6: Regular inspection and maintenance

6.1 Daily inspection

During power-up and operation, without taking away the cover, check the operation of AC drive with eye survey from outside and confirm that there's nothing abnormal. Usually, check the followings:

■whether the operation performance accord with the regulation
■whether the environment accord with the regulation
■whether keyboard panel display is normal
■whether without abnormal noises, vibrations and abnormal odor
■whether without abnormality such as overheat or change in color

6.2 Periodic Inspection

Before doing the periodic inspection, first stop operation, shut off power supply and take away the cover.

Even when the power supply of the AC drive is shut off, there's still charged voltage on the filter capacitors and it takes some time to discharge.

In order to avoid the danger, be sure to wait until the charge indicator goes out and test with a voltmeter to ensure the voltage is lower than safe value (≤25Vdc) before the operation of inspection.

Notice!

1.For AC drives ≤22kW, wait 5 minutes after shutting down the power, and wait 10 minutes for those ≥ 30kW. Not until the DC voltage between terminals N- and P+ is lower than DC25V could examination operation with cover removed begin.

2.No one other than the appointed operators could perform maintenance and part replacement and other operations.(Metal objects such as watches and rings should be taken off before operat-ion, and use tools with insulation in operation.)

3.Rebuilding the AC drive is absolutely forbidden.

4.Avoid electric shock and facility accident.

List of Periodic Inspection

Inspection cycle	Inspection parts	Inspection item	Inspection method
Daily	Environment	Confirm environment temperature, humidity, vibration and whether there's dust, gas, oil mist and water drops and so on.	With eye survey and apparatus measuring
Daily		Are there any foreign bodies like tools or dangerous goods nearby?	With eye survey
Daily	Voltage	Are voltages of main circuit and control circuit both normal?	Measure with a multi-meter
Daily	Keyboard Display Panel	Is the display clear?	With eye survey
Daily		Is any character missing?	
Half a year	Mechanism Parts	Is there any abnormal sound or vibration?	With eye survey and hearing
Half a year		Are the bolts (fasteners) loose?	Fasten
Half a year		Is there any distortion and damage?	With eye survey
Half a year		Is there color change due to overheat?	With eye survey
Half a year		Is any character missing?	With eye survey
Daily	Main Circuit	Have any bolts been loose and dropped off?	Fasten
Half a year		Is there distortion, crack, to overheat and aging in the machine and insulation? damage or color change due	With eye survey
Half a year		Is it stained with dust or defacement?	With eye survey
Half a year	Main Circuit: Terminals and Wiring	Is there color change and distortion due to overheat in the conductor?	With eye survey and hearing
Half a year		Is there any damage and color change in the wire protection?	With eye survey
Daily		Is there any damage?	With eye survey
Half a year		Is there any looseness between the bolts and the connector?	Fasten
Half a year		Is there any odors and color change?	Smell and hearing
Half a year		Is there color change. damaged and distortion due to corrosion?	With eye survey
Half a year		Is there leakage and distortion of the capacitor?	With eye survey
Daily	Main Circuit: Terminal Block	Is there leakage,color change,crack and shell inflation?	With eye survey
Daily		Has the safety valve loose? Is there significant inflation in the valve?	With eye survey
Daily		Measure static capacity according to the need	Measure with a multi-meter
Daily	Main Circuit: Filter Capacitor	Is there abnormal odor or crackle in the insulator due to overheat?	With eye survey
Daily		Is there any broken wire?	With eye survey, or open the connection at one end and measure with a multimeter

Daily	Main Circuit: Resistor	Is there abnormal noise of vibration or odor?	With hearing, eye survey and smelling
Daily	Main Circuit: Transformer and Reactor	Is there noise of vibration while operating?	With eye survey
Daily		Are the junctions well connected?	With eye survey
Half a year	Main Circuit: Control PCB Connector	Is there abnormal noise or vibration?	With hearing, eye survey and turn with hand (must cut off the power)
Half a year		Are the bolts loose?	Fasten
Half a year		Is there color change due to overheat?	With eye survey
Half a year	Cooling System: Cooling Fans	Is there any blockings or foreign bodies on the radiator and the air inlet and outlet?	With hearing

> **Note!**

Please wipe the polluted areas with chemically neutral cleaning cloth. Sweep the dust with electric cleaner.

7.Faults and Solutions

7.1List of actions to protect

The AC drive itself has the functions of over-voltage, low voltage and over-current alarms and protection. Once a failure occurs, the protective actions will work, the AC drive will stop the output, the abnormal contact will act, and the free operation of motor will stop. Please refer to the abnormality causes and solutions according to the shown abnormality information of AC drive. The abnormality records will be kept in the interior storage unit of AC drive (which can record the latest 4 faults message), and can be read on the digital operation panel or by communication via parameter reading.

Display	Fault name	Possible causes	Solutions
Err02	Overcurrent during acceleration	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 input voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The AC drive model is of too small power class. 9: Subject to external interference.	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 the normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an AC drive of higher power class. 9: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.
Err03	Overcurrent during deceleration	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 input voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed. 7: Subject to external interference.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Increase the deceleration time. 4: Adjust the voltage to the normal range. 5: Remove the added load. 6: Install the braking unit and braking resistor. 7: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.

Display	Fault name	Possible causes	Solutions
Err04	Overcurrent at constant speed	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The input voltage is too low. 4: A sudden load is added during operation. 5: The AC drive model is of too small power class. 6: Subject to external interference.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Adjust the voltage to the normal range. 4: Remove the added load. 5: Select an AC drive of higher power class. 6: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.
Err05	Overvoltage during acceleration	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. 5: Subject to external interference.	1: Adjust the voltage to normal range. 2: Remove the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor. 5: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.
Err06	Overvoltage during deceleration	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. 5: Subject to external interference.	1: Adjust the voltage to normal range. 2: Remove the external force or install a braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor. 5: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.
Err07	Overvoltage at constant speed	1: The input voltage is too high. 2: An external force drives the motor during running. 3: Subject to external interference.	1: Adjust the voltage to the normal range. 2: Remove the external force or install the braking resistor. 3: According to the historical fault records, if the current value at the time of fault is far from reaching the over-current point value, it is necessary to find the interference suorce.
Err08	Control power supply fault	1: The input voltage is not within the allowable range.	1: Adjust the input voltage to the allowable range.
Err09	Undervoltage	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 DC-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 the normal range. 3: Contact technical support. 4: Contact technical support. 5: Contact technical support. 6: Contact technical support.

Err10	AC drive overload	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.
Err11	Motor overload	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 it correctly. 2: Reduce the load and check the motor and the mechanical condition. 3: Select an AC drive of higher power class.
Err12	Power input phase loss	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: Seek technical support. 3: Seek technical support. 4: Seek technical support.
Err13	Power output phase loss	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. 3: The drive board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Seek technical support. 4: Seek technical support.
Err14	Module overheat	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.
Err15	External equipment fault	1: External fault signal is input via S. 2: Input the signal of external fault through virtual IO function.	1: Reset the operation. 2: Reset the operation.
Err16	Communication fault	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: Incorrect setting of communication expansion card F0-28. 4: The communication parameters in group PB are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set the communication expansion cardtypes. 4: Set the communication parameters properly.
Err17	Contactor faul	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.
Err18	Current detection fault	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Err19	Motor auto-tuning fault	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the AC drive and the motor.

Err20	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 encoder type correctly based on the actual situation. 2: Eliminate external faults. 3: Replace the damaged encoder. 4: Replace the faulty PG card.
Err21	EEPROM readwrite fault	1: The EEPROM chip is damaged.	1: Replace the main control panel.
Err22	AC drive hardware fault	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on over-voltage. 2: Handle based on over-current.
Err23	Short circuit to ground	1: The motor is short circuited to the ground.	1: Replace the cable or motor.
Err26	Running time reached	1: Accumulative running time reaches setting.	1: Clear the record through the parameter initialization function.
Err27	User-defined fault 1	1: Input the signal of user-defined fault 1 through multi-function terminal S. 2: Input the signal of user-defined fault 1 through the virtual IO function.	1: Reset the operation. 2: Reset the operation.
Err28	User-defined fault 2	1: Input the signal of user-defined fault 2 through multi-function terminal S. 2: Input the signal of user-defined fault 2 through the virtual IO function.	1: Reset the operation. 2: Reset the operation.
Err29	Power-on time reached	1: Accumulative power-ontime reaches the setting.	1: Clear the record through the parameter initialization function.
Err30	Load becoming 0	1: The AC drive running current is lower than F9-64.	1: Check the load is disconnected or F9-64 and F9-65 is correct.
Err31	PID feedback lost during running	1: The PID feedback is lower than the setting of FA-26.	1: Check the PID feedback signal or set FA-26 to a proper value.
Err40	Pulse-by-pulse current limit fault	1: The load is too heavy or lockedrotor 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 the AC drive of higher power class.
Err41	Switching motor fault during operation	1: During the operation of the AC drive, the current motor selection is changed through the terminal.	1: Switch the motor after shutdown.
Err42	Too large speed deviation	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 autotuning. 3: Set F9-69 and F9-70 correctly based on the actual situation.
Err43	Motor over-speed	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: F9-67 and F9-68 are set incorrectly	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set F9-67 and F9-68 correctly based on the actual situation.

Err45	Motor overheat	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.
Err51	Pole position detection failed	1: The deviation between the motor parameters and the actual value is too large.	1: Reconfirm whether the motor parameters are correct, and focus on whether the rated current is set too small.

7.2 Reset Alarm

■When a failure is detected from EC590, the failure will be shown on the digital manipulator, and the abnormal contact will have output and the motor will slide to stop. Check the failure causes in the list below and take corrective measures.

■If the mentioned inspection and corrective measures can't solve the problem, please directly contact with our company.

■For restart, connect with the resetting input signal or press $\boxed{\frac{STOP}{RESET}}$, or disconnect the power supply of the main loop for one time, to reset the failure status.

■If you want to change the parameters in the failure indication, please press $\boxed{MF.K}$.

$\boxed{\text{Note}}$!

When inputting the right/opposite operation order, the AC drive fails to receive the failure resetting signal. You must cut off the right/opposite operation order first, and then reset.

7.3 The Causes and Solutions for AC drive's faults

Malfunction or fault can be caused by reasons such as ways of operation, setting conditions, environment or the AC drive itself. If these causes are not eliminated or no measures are taken, the drive will end up and unable to operate normally.

(1) Measures against electromagnet noises and induction noises

If there's noise source near the AC drive, the noise may invade the AC drive through radiation or power line and cause faulty actions of control circuit, and even destroy AC drive. Naturally, one solution is to improve noise capability of AC drive, but that's not economic, let alone the limited range of improvement. So it's best to take measures outside it to avoid the interference.

1. Install surge killer on relay or contactor in order to restrain switching surge noises at on and off switching.

2. Try to shorten the wiring of control circuit or program control circuit, and separate it from main circuit wiring.

3. For circuits regulated to use shielded wire for wiring, wiring must comply with the wiring regulations. And if the wiring is too long, an isolation amplifier should be added.

4. The grounding terminal of AC drive should be grounded according to regulations, and the grounding should be separate and not shared with electric welding machine or power devices.

5. Add a noise filter on the input terminal of the AC drive to avoid noise invasion from the power line.

(2) Environment setup measures

AC drive is a device made up of electronic parts, and its admissible environment is described in the specifications in detail. If the regulations cannot be followed, corresponding measures or solutions must be taken.

1. Avoid vibrations, and use vibration-proof pads when necessary.

Make sure that the vibration is under regulation. Because of the effect of vibration on electronic parts equals to mechanical stress, it should not be taken for long or repeatedly, which may cause faults in the AC drive.

2. Avoid corrosive gases and dusty environment, both of which will cause electronic parts rust and bad contact, and what's more, insulation will be decreased due to moisture absorption and cause short circuit accidents. Regular measure is treating with paint and dust-proof, and in strict conditions, inner-pressure suited for clean air or self-protective whole sealing structures are adopted.

3. The temperature of the around environment should be appropriate, the life-span and reliability of electronic parts is affected by both too high and too low temperature. Take semiconductor module for example, once the regulated limit is exceeded, damage will be instant. Therefore, except equipping with cooler and sun-shade to keep the temperature in the regulated range, cleaning and spot check on air filter in the AC drive rack and the angles of cooling fan are also necessary. Besides, the internal microprocessor may stop working under extremely low temperature, space heaters must be equipped in low temperature areas.

4. No damp, and never should dewing occur. When AC drive needs to be left unused for a long time, be careful that dewing may occur as soon as air-conditioning is stopped. It would be best that the cooling device of the electric room has dehumidification function.

(3) Prevent AC drive from interfering other machines

It is common that an AC drive interferes other machines at the same site, and this should be avoided through taking measures or solutions beforehand.

High-order harmonics on the power supply side

When the AC drive is running, there will be high-order harmonics flowing to the power supply and adversely affecting the system. The countermeasures are as follows:

1. Separate the power supply system and set up a dedicated transformer to connect the power to the AC drive.

2. Insert a reactor or filter on the input side of the AC drive to reduce high-order harmonic components as shown in the figure:

3. If there is a phase-in capacitor, a reactor should be connected in series to prevent too much high-harmonic current from flowing in and causing overheating to burn the capacitor.

Series reactor

Phase advance capacitor
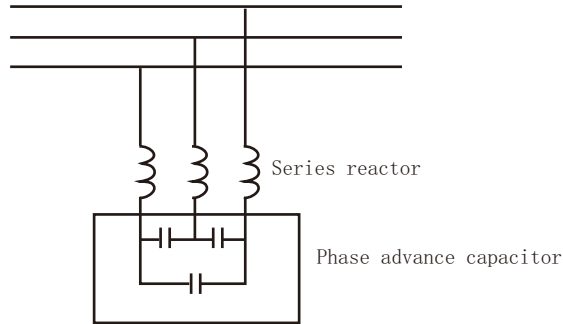
4. Add a reactor or magnetic ring to the output side of the AC drive.

The temperature of the motor rises

When the motor is used for variable speed operation, if the motor is a synchronous ventilation type induction motor, it will have a cooling effect at low speeds. Poor, so overheating may occur. In addition, the waveform output by the AC drive contains high-order harmonics, so copper loss and iron loss are increased.

Check the data for the load status and operating range for reference, and add the following countermeasures when necessary:
1. The motor is changed to an independent power supply ventilation type or the first-level capacity specification is improved.
2. The motor matching is changed to a special motor for AC drive.
3. Limit the operating range and avoid low-speed belt operation.

8. Appendix

8.1 Appendix I: Functional code table

When FP-00 is set to a non-zero value, the parameter protection password is set. In the function parameter mode and user change parameter mode, the parameter menu can only be entered after correctly entering the password. Set FP-00 to 0 to cancel the password.
The parameter menu in user-defined parameter mode is not password protected.
Group F and group A are basic function parameters, and group u is monitoring function parameters.
☆ : It is possible to modify the parameter with the AC drive in the Stop and in the Run status.
★ : It is not possible to modify the parameter with the AC drive in the Run status.
● : The parameter is the actual measured value and cannot be modified.
*: The parameter is a factory parameter and can be set only by the manufacturer.

F0 Standard Parameter group				
Function Code	Parameter Name	Setting Range	Default	Change
F0-00	AC drive G/P selection	1: G (constant torque load) 2: P (fan and pump)	1	★
F0-01	Motor 1 control mode	0: SVC 2: V/F	2	★
F0-02	Running command selection	0: Operating panel (LED off) 1: Terminal (LED on) 2: Serial communication (LED flashing)	0	☆
F0-03	Main frequency reference setting channel selection	0: Digital setting (revised value is not cleared after power off) 1: Digital setting (revised value is cleared after power off) 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting(S5) 6: Multi-reference 7: Simple PLC 8: PID reference 9: Communication setting 10:Pull out keyboard potentiometer is valid (applicable to version above 3.00)	1	★
F0-04	Auxiliary frequency reference setting channel selection	Same as F0-03 (Main frequency reference setting channel selection)	0	★
F0-05	Base value of range of auxiliary frequency reference for main and auxiliary calculation	0: Relative to maximum frequency 1: Relative to main frequency reference	0	☆
F0-06	Range of auxiliary frequency reference for main and auxiliary calculation	0% to 150%	100%	☆
F0-07	Final Frequency reference setting selection	Ones: Frequency reference selection 0: Main frequency reference 1: Main and auxiliary calculation (based on tens position) 2: Switchover between main and auxiliary 3: Switchover between main and "main & auxiliary calculation" 4: Switchover between auxiliary and "main & auxiliary calculation" 5. Any non-0 value of the main and auxiliary channel is valid, main channel first. Tens: main and auxiliary calculation formula 0: Main + auxiliary 1: Main - auxiliary 2: Max. (main, auxiliary) 3: Min. (main, auxiliary)	00	☆

F0-08	Preset frequency	0.00 Hz to F0-10 (Max. frequency)	50.00 Hz	☆
F0-09	Running direction	0: Run in the default direction 1: Run in the direction reverse to the default direction	0	☆
F0-10	Max. frequency	50.00 Hz to 500.00 Hz	50.00Hz	★
F0-11	Setting channel of frequency upper limit	0: Set by F0-12 1: AI1　2: AI2　3: Keyboard potentiometer 4: PULSE reference (S5) 5: Communication reference	0	★
F0-12	Frequency reference upper limit	0.00 Hz to maximum frequency (F0-10)	50.00Hz	☆
F0-13	Frequency reference upper limit offset	0.00 Hz to F0-10 (Max. frequency)	0.00Hz	☆
F0-14	Frequency reference lower limit	0.00 Hz to F0-12 (Frequency reference upper limit)	0.00Hz	☆
F0-15	Carrier frequency	Model dependent	Model dependent	☆
F0-16	Carrier frequency adjusted with load	0: Disabled　　1: Enabled	1	☆
F0-17	Acceleration time 1	0.00s to 650.00s(F0-19 = 2) 0.0s to 6500.0s(F0-19 = 1) 0s to 65000s(F0-19 = 0)	Model dependent	☆
F0-18	Deceleration time 1	0.00s to 650.00s(F0-19 = 2) 0.0s to 6500.0s(F0-19 = 1) 0s to 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 setting channel for main and auxiliary calculation	0.00 Hz to F0-10 (Max. frequency)	0.00 Hz	☆
F0-22	Frequency reference resolution	1: 0.1Hz　　　　2: 0.01 Hz	2	★
F0-23	Retentive of digital setting frequency upon stop	0: Not retentive　1: Retentive	1	☆
F0-24	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	★
F0-25	Acceleration/ Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	★
F0-26	Base frequency for UP/ YWN modification during running	0: Running frequency 1: Frequency reference	0	★
F0-27	Running command + frequency source	Ones: operating panel (keypad & display) 0: No function 1: Digital setting 2: AI1　　　　　　3: AI2 4: Keyboard potentiometer 5: Pulse reference (S5) 6: Multi-reference 7: Simple PLC　　　8: PID reference 9: Serial communication Tens: terminal control + frequency reference setting channel	0000	☆

F0-27	Running command + frequency source	Hundreds: serial communication + frequency reference setting channel Thousands: automatic operation + frequency reference setting channel	0000	☆
F0-28	Serial port communication protocol	0: Modbus protocol	0	★

F1 Motor 1　parameters

Function Code	Parameter Name	Setting Range	Default	Change
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	★
F1-01	Motor rated power	0.1kW～1000.0kW	Model dependent	★
F1-02	Motor rated voltage	0.1V～2000V	Model dependent	★
F1-03	Motor rated current	0.01～655.35A (AC Drive<=55kW) 0.1～6553.5A (AC Drive>55kW)	Model dependent	★
F1-04	Motor rated frequency	0.01Hz～maximum frequency	Model dependent	★
F1-05	Motor rated rotational speed	1rpm～65535rpm	Model dependent	★
F1-06	Stator resistance (asynchronous motor)	0.001Ω～65.535Ω (AC Drive<=55kW) 0.0001Ω～6.5535Ω(AC Drive>55kW)	Auto-tuning parameter	★
F1-07	Rotor resistance (asynchronous motor)		Auto-tuning parameter	★
F1-08	Leakage inductive reactance (asynchronous motor)	0.01mH～655.35mH (AC Drive<=55kW) 0.001mH～65.535mH (AC Drive>55kW)	Auto-tuning parameter	★
F1-09	Mutual inductive reactance (asynchronous motor)		Auto-tuning parameter	★
F1-10	No-load current (asynchronous motor)	0.01A～F1-04 (AC Drive<=55kW) 0.1A～F1-04 (AC Drive>55kW)	Auto-tuning parameter	★
F1-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor partial static auto-tuning 2: Asynchronous motor dynamic auto-tuning 3: Asynchronous motor complete static auto-tuning	0	★

F2 Vector Control Parameters of Motor 1

Function Code	Parameter Name	Setting Range	Default	Change
F2-00	Speed loop proportional gain 1	1～100	30	☆
F2-01	Speed loop integral time 1	0.01～10.00s	0.50s	☆
F2-02	Switchover frequency 1	0.00～F2-05	5.00Hz	☆

F2-03	Speed loop proportional gain 2	1~100	20	☆
F2-04	Speed loop integral time 2	0.01~10.00s	1.00s	☆
F2-05	Switchover frequency 2	F2-02~maximum frequency	10.00Hz	☆
F2-06	Slip compensation factor	50~200%	100%	☆
F2-07	Time constant of SVC speed loop filter	0.000~0.100s	0.015s	☆
F2-09	Torque upper limit source in speed control mode	0: F2-10 function code setting 1: AI1　2: AI2　3:Keyboard potentiometer 4: Pulse setting (S5) 5: Communication setting 6: MIN(AI1, AI2)　7: MAX(AI1, AI2) The full scale of 1-7 corresponds to F2-10.	0	☆
F2-10	Digital setting of torque upper limit	0.0~200.0%	150.0%	☆
F2-11	Torque limit source in speed control (regenerative)	0: F2-10 (electrical or regenerative) 1: AI1　2: AI2　3:Keyboard potentiometer 4: Pulse reference 5: Communication reference 6: MIN(AI1, AI2)　7: MAX(AI1, AI2) 8: F2-12 The full scale of 1-7 corresponds to F2-12.	0	☆
F2-12	Digital setting of torque limit in speed control (regenerative)	0.0%~200.0%	150.0%	☆
F2-13	Excitation adjustment proportional gain	0~60000	2000	☆
F2-14	Excitation adjustment integral gain	0~60000	1300	☆
F2-15	Torque adjustment proportional gain	0~60000	2000	☆
F2-16	Torque adjustment integral gain	0~60000	1300	☆
F2-17	Speed loop integral separation selection	Units:Integral separation 0: Disabled　1: Enabled	0	☆
F2-21	Max. torque coefficient of field weakening area	50~200%	100%	☆
F2-22	Regenerative power limit selection	0: Disabled　1: Enabled	0	☆

F3 V/F Control Parameters

Function Code	Parameter Name	Setting Range	Default	Change
F3-00	V/F curve setting	0: Linear 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%: Automatic torque boost 0.1% to 30.0%	Model dependent	☆
F3-02	Cut-off frequency of torque boost	0.00 Hz to the maximum frequency	50.00Hz	★

F3-03	Multi-point V/F frequency point 1	0.00~F3-05	0.00Hz	★
F3-04	Multi-point V/F voltage point 1	0.0~100.0%	0.0%	★
F3-05	Multi-point V/F frequency point 2	F3-03~F3-07	0.00Hz	★
F3-06	Multi-point V/F voltage point 2	0.0~100.0%	0.0%	★
F3-07	Multi-point V/F frequency point 3	F3-05~rated frequency (F1-04)	0.00Hz	★
F3-08	Multi-point V/F voltage point 3	0.0~100.0%	0.0%	★
F3-09	VF slip compensation	0~200.0%	0.0%	★
F3-10	V/F over-excitation gain	0~200	64	☆
F3-11	V/F oscillation suppression gain	0~100	40	☆
F3-13	Voltage source for V/F separation	0: Set by F3-14 1: AI1　2: AI2　3:Keyboard potentiometer 4: Pulse reference (S5) 5: Multi-reference 6: Simple PLC　7: PID reference 8: Communication reference Note: 100.0% corresponds to the rated motor voltage	0	☆
F3-14	Digital setting of voltage for V/F separation	0 V to rated motor voltage	0V	☆
F3-15	Voltage rise time of V/F separation	0.0s to 1000.0s Note: It is the time used for the voltage increases from 0 V to the rated motor voltage.	0.0s	☆
F3-16	Voltage decline time of V/F separation	0.0s to 1000.0s Note: It is the time used for the voltage increases from 0 V to the rated motor voltage.	0.0s	☆
F3-17	Stop mode selection for V/F separation	0: Frequency and voltage declining to 0 independently 1: Frequency declining after voltage declines to 0	0	☆
F3-18	Current limit level	50%~200%	150%	★
F3-19	Current limit selection	0: Disabled　1: Enabled	1 (Enabled)	★
F3-20	Current limit gain	0~100	20	☆
F3-21	Compensation factor of speed multiplying current limit	50%~200%	50%	★
F3-22	Voltage limit	650.0V~800.0V	770.0V	★
F3-23	Voltage limit selection	0: Disabled　1: Enabled	1 (Enabled)	★
F3-24	Frequency gain for voltage limit	0~100	30	☆
F3-25	Voltage gain for voltage limit	0~100	30	☆
F3-26	Frequency rise threshold during voltage limit	0~50Hz	5Hz	★

F4 Input Terminals

Function Code	Parameter Name	Setting Range	Default	Change
F4-00	S1 terminal function	0: No function 1: Forward RUN (FWD) or running command 2: Reverse RUN (REV) or running direction (Note: F4-11 must be set when F4-00 is set to 1 or 2.) 3: Three-wire control 4: Forward JOG (FJOG) 5: Reverse JOG (RJOG) 6: Terminal UP 7: Terminal YWN 8: Coast to stop	1	★
F4-01	S2 terminal function	9: Fault reset (RESET) 10: RUN pause 11: External fault normally open (NO) input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4	4	★
F4-02	S3 terminal function	16: Terminal 1 for acceleration/ deceleration time selection 17: Terminal 2 for acceleration/ deceleration time selection 18: Frequency source switchover 19: UP and YWN setting clear (terminal, operating panel) 20: Running command switchover terminal 1 21: Acceleration/Deceleration prohibited 22: PID pause 23: PLC status reset 24: Wobble pause 25: Counter input 26: Counter reset 27: Length count input	9	★
F4-03	S4 terminal function	28: Length reset 29: Torque control prohibited 30: Pulse input (enabled only for S5) 31: Reserved 32: Immediate DC injection braking 33: External fault normally closed (NC) input 34: Frequency modification enabled 35: PID action direction reverse	12	★
F4-04	S5 terminal function	36: External STOP terminal 1 37: Running command switchover terminal 2 38: PID integral disabled 39: Switchover between main frequency source and preset frequency 40: Switchover between auxiliary frequency source and preset frequency 41: Motor terminal selection 42: Reserved	13	★
F4-05	S6 terminal function	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 injection braking 50: Clear the current running time 51: Two-wire/Three-wire mode switchover 52: Reverse frequency forbidden 53-59: Reserved	0	★
F4-10	S filter time	0.000s to 1.000s	0.010s	☆
F4-11	Terminal control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0	★
F4-12	Terminal UP/YWN rate	0.001Hz/s~65.535Hz/s	1.00Hz/s	☆
F4-13	AI curve 1 minimum input	0.00V~F4-15	0.00V	☆
F4-14	AI curve 1 minimum input corresponding setting	−100.0%~+100.0%	0.0%	☆
F4-15	AI curve 1 maximum input	F4-13~+10.00V	10.00V	☆
F4-16	AI curve 1 maximum input corresponding setting	−100.0%~+100.0%	100.0%	☆
F4-17	AI1 filter time	0.00~10.00s	0.10s	☆
F4-18	AI curve 2 minimum input	0.00V~F4-20	0.00V	☆
F4-19	AI curve 2 minimum input corresponding setting	−100.0%~+100.0%	0.0%	☆
F4-20	AI curve 2 maximum input	F4-18~+10.00V	10.00V	☆
F4-21	AI curve 2 maximum input corresponding setting	−100.0%~+100.0%	100.0%	☆
F4-22	AI2 filter time	0.00~10.00s	0.10s	☆
F4-23	AI curve 3 minimum input	−10.00V~F4-25	−10.00V	☆
F4-24	AI curve 3 minimum input corresponding setting	−100.0%~+100.0%	−100.0%	☆
F4-25	AI curve 3 maximum input	F4-23~+10.00V	10.00V	☆
F4-26	AI curve 3 maximum input corresponding setting	−100.0%~+100.0%	100.0%	☆
F4-27	Keyboard potentiometer filter time	0.00s~10.00s	0.10s	☆
F4-28	PULSE minimum input	0.00kHz~F4-30	0.00kHz	☆
F4-29	PULSE minimum input corresponding setting	−100.0%~100.0%	0%	☆
F4-30	PULSE maximum input	F4-28~100.00kHz	50.00kHz	☆
F4-31	PULSE maximum input corresponding setting	−100.0%~100.0%	100.0%	☆
F4-32	PULSE filter time	0.00s~10.00s	0.10s	☆

F4-33	AI curve selection	BIT0:AI curve selection 1:curve 1 (2 point, check F4-13~F4-16) 2:curve 2 (2 point, check F4-18~F4-21) 3. curve 3 (2 point, check F4-23~F4-26) 4. curve 4 (4 point, check A6-00~A6-07) 5. curve 5 (4 point, check A6-08~A6-15) BIT 1:AI2 curve selection ditto. BIT 2:Keyboard potentiometer curve selection ditto.	321	☆
F4-34	AI below minimum input setting selection	BIT0: AI1 below minimum input setting selection 0: Corresponding to te minimum input setting 1:0. 0% BIT1:AI2 below minimum input setting selection ditto. BIT2:Keyboard potentiometer below minimum input setting selection ditto.	000	☆
F4-35	S1 delay time	0.0s~3600.0s	0. 0s	★
F4-36	S2 delay time	0.0s~3600.0s	0. 0s	★
F4-37	S3 delay time	0.0s~3600.0s	0. 0s	★
F4-38	S terminal valid mode selection 1	0:Active high 1:Active low BIT0: S1 BIT1: S2 BIT2: S3 BIT3: S4 BIT4: S5	00000	★
F4-39	S terminal valid mode selection 2	0:Active high 1:Active low BIT0: S6 BIT1: S7 BIT2: S8 BIT3: S9 BIT4: S10	00000	★
F4-40	AI2 current voltage switching	0~1	0	★

F5 Output Terminals

Function Code	Parameter Name	Setting Range	Default	Change
F5-00	Y4 output terminal mode selection	0:Pulse output (Y4P) 1:Switch output (Y4R)	0	☆
F5-01	Y4R output function selection	0:No output 1:Inverter is running 2:Fault output (fault for free stop) 3:Frequency level detection FDT1 output 4:Frequency reached 5:Running at zero speed (no output when stopped) 6:Motor overload pre-amarm 7:Inverter overload pre-amarm 8:Set count value reached 9:The specified count value reached 10:Length arrives 11:PLC cycle completed	0	☆

F5-02	Y1 relay function selection	12:Accumulated running time reached 13: Frequency limit 14:Torque limit 15:Ready to run 16:AI1>AI2 17:Upper limit frequency reached 18:Lower limit frequency reached (operation related) 19:Brown-out status output 20:Communication settings 21:Positioning complete (reserved) 22:Positioning close (reserved) 23:Running at zero speed 2 (output also when stopped) 24:The cumulative power-on time arrives 25:Frequency detection level FDT2 output 26:Frequency 1 arrives at the output	2	☆
F5-04	Y3 output function selection	27:Frequency 2 arrives at the output 28:Current 1 reaches the output 29:Current 1 reaches the output 30:Timed arrival output 31:AI1 input timeout 32:Downloading 33:Running in reverse 34:Zero current state 35:Module temperature reached 36:The output current exceeds the limit 37:The lower limit frequency is reached (it is also output when stopped) 38:Alarm output (all faults) 39:Motor over temperature pre-alarm 40:The running time has arrived 41:Fault output (it is a free stop fault and does not output under voltage)	1	☆
F5-06	Y4P output function selection	0:Operationg frequency 1:Set frequency 2:Output current 3:Output torque(torque absolute value) 4:Output power 5:Output voltage 6:PULSE input(100.0% correspond 100.0kHz) 7:AI1 8:AI2 9:Keyboard potentiometer 10:Length 11:Count value 12:Communication setting 13:Motor speed 14: Output current (100.0% correspond 1000.0A) 15: Output voltage (100.0% correspond 1000.0V) 16:Output torque (actual torque value)	0	☆
F5-07	AO1 output function selection	(see above)	0	☆
F5-08	AO2 output function selection	(see above)	1	☆
F5-09	Y4P output maximum frequency	0.01kHz~100.00kHz	50. 00kHz	☆
F5-10	AO1 zero bias factor	-100.0%~+100.0%	0.0%	☆
F5-11	AO1 gain	-10.0~+10.0	1.00	☆

F5-12	A02 zero bias factor	-100.0%~+100.0%	0.0%	☆
F5-13	A01 gain	-10.0~+10.0	1.00	☆
F5-17	Y4P output delay time	0.0s~3600.0s	0.0s	☆
F5-18	Y1 output delay time	0.0s~3600.0s	0.0s	☆
F5-20	Y3 output delay time	0.0s~3600.0s	0.0s	☆
F5-21	Y4 output delay time	0.0s~3600.0s	0.0s	☆
F5-22	Y output terminal valid state selection	0:Positive logic 1:Inverse logic BIT0:Y4R BIT1:Y1 BIT2:- BIT3:Y3 BIT4:Y4	00000	☆
F5-23	A01 current and voltage output switching	0:0 to 10V 1:0 to 20mA	0	★
F5-24	A02 current and voltage output switching	0:0 to 10V 1:0 to 20mA	0	★

F6 Start-stop control

Function Code	Parameter Name	Setting Range	Default	Change
F6-00	Start run mode	0:Start and stop directly 1:Speed tracking restart 2:Pre-excitation start(AC asynchronous motor)	0	☆
F6-01	Speed tracking method	0:Start with stop frequency 1:Start from zero speed 2:Start from maximum frequency	0	★
F6-02	Speed tracking speed	1~100	20	☆
F6-03	Start frequency	0.00Hz~10.00Hz	0.00Hz	☆
F6-04	Start frequency hold time	0.0s~100.0s	0.0s	★
F6-05	Start DC braking current/pre-excitation current	0%~100%	0%	★
F6-06	Start DC braking time/pre-excitation time	0.0s~100.0s	0.0s	★
F6-07	Acceleration and deceleration method	0:Linear acceleration time 1、2:Dynamic S-curve acceleration and deceleration	0	★
F6-08	The time ratio of the beginning of the S-curve	0.0%~(100.0%-F6-09)	30%	★

F6-09	The time proportion of the end of the S-curve	0.0%~(100.0%-F6-08)	30%	★
F6-10	Stop mode	0:Decelerate to stop 1:Coast to stop	0	☆
F6-11	DC injection braking start frequency	0.00Hz to the maximum frequency	0.00Hz	☆
F6-12	DC injection braking delay time	0.0s to 100.0s	0.0s	☆
F6-13	DC injection braking level	0% to 100%	0%	☆
F6-14	DC injection braking active time	0.0s to 100.0s	0.0s	☆
F6-15	Braking use ratio	0% to 100%	100%	☆
F6-18	Catching a spinning motor current limit	30% to 200%	Model dependent	★
F6-21	Demagnetization time (effective for SVC)	0.00s to 5.00s	Model dependent	☆

F7 Operating panel and display

Function Code	Parameter Name	Setting Range	Default	Change
F7-00	Pull out of the keyboard	0:Native keyboard 1:Pull out of the keyboard 2:680 keyboard 3:680 keyboard pull-out	0	☆
F7-01	MF.K key function selection	0:MF.K key disabled 1:Switchover from remote control(terminal or communication) to operating panel control 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 operating panel control 1:STOP/RESET key enabled in any operation mode	1	☆
F7-03	LED display running parameters	0000 to FFFF BIT0:Running frequency 1(Hz) BIT1:Set frequency(Hz) BIT2:Bus voltage(V) BIT3:Output voltage(V) BIT4:Output current(A) BIT5:Output power(kW) BIT6:Output torque 1(%) BIT7:S state BIT8:Y state BIT9:AI1 voltage(V) BIT10:AI2 voltage(V) BIT11:Keyboard potentiometer voltage(V) BIT12:Count value BIT0 13:Length value BIT14:Load speed display BIT15:PID reference	1F	☆

F7-04	LED display running parameters 2	0000 to FFFF BIT0:PID feedback BIT1:PLC stage BIT2:Pulse reference(kHz) BIT3:Running frequency 2(Hz) BIT4:Remaining running time BIT5:AI1 voltage before correction(V) BIT6:AI2 voltage before correction(V) BIT7:Keyboard potentiometer voltage before correction BIT8:Linear speed BIT9:currentpower-on time(h) BIT10:currentpower running time(Min) BIT11:Pulse reference(Hz) BIT12:Communication reference BIT13:Enceder feedback speed(Hz) BIT14:Main frequency X display(Hz) BIT15:Auxiliary frequency Y display(Hz)	0	☆
F7-05	Display stop parameter	0000 to FFFF BIT0:Frequency reference(Hz) BIT1:Bus voltage BIT2:S state BIT3:Y state BIT4:AI1 voltage(V) BIT5:AI2 voltage(V) BIT6:Keyboard potentiometer voltage BIT7:Count value BIT8:Length value BIT9:PLC stage BIT10:Load speed BIT11:PID reference BIT12:Pulse reference (kHz)	33	☆
F7-06	Load speed display coefficient	0.0001 to 6.5000	1.0000	☆
F7-07	Inverter module heat sink temperature	-20℃ to 120℃	-	●
F7-08	Product number	-	-	●
F7-09	Accumulative running time	0h to 65535h	-	●
F7-10	Performance software version	-	-	●
F7-11	Function software version	-	-	●
F7-12	Number of decimal places for load speed display	BIT0:Number of decimal places for U0-14 0:No decimal places 1:One decimal places　　2:Two decimal places BIT1:Number of decimal places for U0-19/U0-29 1:One decimal places　　2:Two decimal places	20	☆

F7-13	Accumulative power on time	0 to 65535h	-	●
F7-14	Accumulative power consumption	0 to 65535kWh	-	●

F8 Auxiliary Functions

Function Code	Parameter Name	Setting Range	Default	Change
F8-00	Jog frequency refence	0.00Hz to the maximum frequency	2.00Hz	☆
F8-01	Jog acceleration time	0.0s to 6500.0s	20.0s	☆
F8-02	Jog deceleration time	0.0s to 6500.0s	20.0s	☆
F8-03	Acceleration time 2	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	Model dependent	☆
F8-04	Deceleration time 2	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	Model dependent	☆
F8-05	Acceleration time 3	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	Model dependent	☆
F8-06	Deceleration time 3	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	Model dependent	☆
F8-07	Acceleration time 4	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	0.0s	☆
F8-08	Deceleration time 4	0.00s to 650.00s (F0-19=2) 0.0s to 6500.0s (F0-19=1) 0s to 65000s (F0-19=0)	0.0s	☆
F8-09	Frequency jump 1	0.00Hz to the maximum frequency	0.00Hz	☆
F8-10	Frequency jump 2	0.00Hz to the maximum frequency	0.00Hz	☆
F8-11	Frequency jump band	0.00Hz to the maximum frequency	0.00Hz	☆
F8-12	Forward/Reverse run switch over dead-zone time	0.0s to 3000.0s	0.0s	☆
F8-13	Reverse RUN selection	0:Disable　　　　1:Enable	0	☆
F8-14	Running mode when frequency lower than frequency lower limit	0:Run at frequency reference lower limit 1:Stop 2:Run at zero speed	1	☆
F8-15	Droop rate	0.00% to 100.00%	0.00%	☆
F8-16	Accumulative running time threshold	0 to 65000h	0h	☆

F8-17	Accumulative running time threshold	0 to 65000h	0h	☆
F8-18	Startup protection selection	0:Disabled 1:Enabled	0	☆
F8-19	Frequency detection value 1	0.00Hz to the maximum frequency	50.00Hz	☆
F8-20	Frequency detection hystersis 1	0.0% to 100.0%(FDTI level)	5.0%	☆
F8-21	Detection width of target frequency reached	0.0% to 100.0%(maximum frequency)	0.0%	☆
F8-22	Jump frequency function	0:Disabled 1:Enabled	0	☆
F8-25	Switch over frequency of acceleration time 1 and acceleration time 2	0.00Hz to the maximum frequency	0.00Hz	☆
F8-26	Switch over frequency of deceleration time 1 and deceleration time 2	0.00Hz to the maximum frequency	0.00Hz	☆
F8-27	Set highest priority to terminal JOG function	0:Disabled 1:Enabled	1	☆
F8-28	Frequency detection value (FDT2)	0.00Hz to the maximum frequency	50.00Hz	☆
F8-29	Frequency detection hysteresis (FDT2)	0.0% to 100.0%(FDT2 level)	5.0%	☆
F8-30	Detection of frequency 1	0.00Hz to the maximum frequency	50.00Hz	☆
F8-31	Detection width of frequency 1	0.0% to 100.0%(maximum frequency)	0.0%	☆
F8-32	Detection of frequency 2	0.00Hz to the maximum frequency	50.00Hz	☆
F8-33	Detection width of frequency 2	0.0% to 100.0%(maximum frequency)	0.0%	☆
F8-34	Zero current detection level	0.0% to 300.0% 100% corresponds to the rated motor current	5.0%	☆
F8-35	Zero current detection delay	0.01s～600.00s	0.10s	☆
F8-36	Output over current threshold	0.0%(no detection) 0.1% to 300.00%（rated motor current）	200.0%	☆
F8-37	Output over current detection delay	0.00s～600.00s	0.00s	☆
F8-38	Detection level of current 1	0.0% to 300.0%（rated motor current）	100.0%	☆
F8-39	Detection width of current 1	0.0% to 300.0%（rated motor current）	0.0%	☆
F8-40	Detection level of current 2	0.0% to 300.0%（rated motor current）	100.0%	☆
F8-41	Detection width of current 2	0.0% to 300.0%（rated motor current）	0.0%	☆

F8-42	Timing function	0:Disabled 1:Enabled	0	★
F8-43	Running time setting channel	0:Set by F8-44(running time) 1:AI1 2:AI2 3:Keyboard potentiometer (100% of analog input corresponds to the value of F8-44)	0	★
F8-44	Running time	0.0Min to 6500.0Min	0.0Min	★
F8-45	AI1 input voltage lower limit	0.00V to F8-46	3.10V	☆
F8-46	AI1 input voltage upper limit	F8-45 to 10.00V	6.80V	☆
F8-47	IGBT temperature	0℃ to 100℃	75℃	☆
F8-48	Cooling fan working mode	0:Working during running 1:Working continuously	0	☆
F8-49	Wake up frequency	F8-51(hibernating frequency)to F0-10(maximum frequency)	0.00Hz	☆
F8-50	Wake up delay time	0.0s to 6500.0s	0.0s	☆
F8-51	Hibernating frequency	0.00Hz to F8-49(wake up frequency)	0.00Hz	☆
F8-52	Hibernating delay time	0.0s to 6500.0s	0.0s	☆
F8-53	Running time threshold this time	0.0 to 6500.0Min	0Min	☆
F8-54	Output power correction coefficient	0.00% to 200.0%	100.0%	☆

F9 Fault and protection

Function Code	Parameter Name	Setting Range	Default	Change
F9-00	Motor overload protection	0: Disabled 1:Enabled	1	☆
F9-01	Motor overload protection gain	0.20 to 10.00	1.00	☆
F9-02	Motor overload pre-warning coefficient	50% to 100%	80%	☆
F9-03	Overvoltage protection gain	0 to 100	30	☆
F9-04	Overvoltage protection voltage	650V to 680V	770V	☆
F9-07	Detection of short-circuit to ground	BIT0: Detection of short-circuit to ground upon power on 0:Disabled 1:Enabled BIT1:Detection of short-circuit to ground before running 0:Disabled 1:Enabled	01	☆
F9-08	Braking unit applied voltage	650V to 800V	760V	☆
F9-09	Auto reset times	0 to 20	0	☆

F9-10	Selection of Y action during auto reset	0: Not act 1: Act	0	☆
F9-11	Delay of auto reset	0.1s to 100.0s	1.0s	☆
F9-12	Input phase loss/Contactor protection	BIT0:Input phase loss protection 0:Disabled 1:Enabled BIT1:Contactor protection 0:Disabled 1:Enabled	11	☆
F9-13	Output phase loss protection	BIT0:Output phase loss protection 0:Disabled 1:Enabled BIT1:Contactor protection before running 0:Disabled 1:Enabled	01	☆
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: Pre-charge power fault 9: Undervoltage 10: AC drive overload 11: Motor overload 12: Input phase loss	–	●
F9-15	2nd fault type	13: Output phase loss 14: IGBT overheat 15: External fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder/PG card fault 21: Parameter read and write fault 22: AC drive hardware fault 23: Motor short circuited to ground 24: Reserved	–	●
F9-16	3rd (latest) fault type	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 lost 31: PID feedback lost during running 40: Fast current limit timeout 41: Motor switchover error during running 42: Too large speed deviation 43: Motor over-speed 45: Motor overheat 51: Initial position error 55: Slave error in master-slave control	–	●
F9-17	Frequency upon 3rd (latest) fault	–	–	●
F9-18	Current upon 3rd (latest) fault	–	–	●

F9-19	Bus voltage upon 3rd (latest) fault	–	–	●
F9-20	S state upon 3rd (latest) fault	–	–	●
F9-21	Y state upon 3rd (latest) fault	–	–	●
F9-22	AC drive state upon 3rd (latest) fault	–	–	●
F9-23	Power-on time upon 3rd (latest) fault	–	–	●
F9-24	Running time upon 3rd (latest) fault	–	–	●
F9-27	Frequency upon 2nd fault	–	–	●
F9-28	Current upon 2nd fault	–	–	●
F9-29	Bus voltage upon 2nd fault	–	–	●
F9-30	S state upon 2nd fault	–	–	●
F9-31	Y state upon 2nd fault	–	–	●
F9-32	AC drive state 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	S state upon 1st fault	–	–	●
F9-41	Y state upon 1st fault	–	–	●
F9-42	AC drive state upon 1st fault	–	–	●
F9-43	Power-on time upon 1st fault	–	–	●
F9-44	Running time upon 1st fault	–	–	●

Function Code	Parameter Name	Setting Range	Default	Change
F9-47	Fault protection action selection 1	BIT0:Motor overload (Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:Input phase loss (Err12) BIT2:Output phase loss (Err13) BIT3:Thousands: External fault (Err15) BIT4:Communication fault (Err16)	00000	☆
F9-48	Fault protection action selection 2	BIT0:Encoder fault (Err20) 0: Coast to stop BIT1:EEPROM read-write fault (Err21) 0: Coast to stop 1: Stop according to the stop mode BIT2:Reserve BIT3:Motor overheat (Err45) BIT4:Accumulative running time reached(Err26)	00000	☆
F9-49	Fault protection action selection 3	BIT0:User-defined fault 1 (Err27) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:User-defined fault 2 (Err28) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT2:Accumulative power-on time reached (Err29) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT3:Load lost (Err30) 0: Coast to stop 1: Deceleration to stop 2: Continue to run at 7% of rated motor frequency and restore to the frequency reference if the load recovers BIT4:PID feedback lost during running (Err31) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	00000	☆
F9-50	Fault protection action selection 4	BIT0:Too large speed feedback error(Err42) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run BIT1:Motor overspeed (Err43) BIT2:Initial position fault(Err51)	0000	☆
F9-54	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0	☆
F9-55	Backup frequency upon fault	0.0% to 100.0% (100.0% corresponds to F0-10.)	100.0%	☆

Function Code	Parameter Name	Setting Range	Default	Change
F9-56	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	☆
F9-57	Motor overheat protection threshold	0℃ to 200℃	110℃	☆
F9-58	Motor overheat pro-warning threshold	0℃ to 200℃	90℃	☆
F9-59	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0	☆
F9-60	Threshold of power dip ride-through function disabled	80% to 100%	85.0%	☆
F9-61	Judging time of bus voltage recovering from power dip	0.0 to 100.0s	0.50s	☆
F9-62	Threshold of power dip ride-through function enabled	60% to 100%	80.0%	☆
F9-63	Load lost protection	0: Disabled 1:Enabled	0	☆
F9-64	Load lost detection level	0.0 to 100.0%	10.0%	☆
F9-65	Load lost detection time	0.0 to 60.0s	1.0s	☆
F9-67	Overspeed detection level	0.0% to 50.0% (maximum frequency)	20.0%	☆
F9-68	Overspeed detection time	0.0s: Not detected 0.1 to 60.0s	1.0s	☆
F9-69	Detection level of speed error	0.0% to 50.0% (maximum frequency)	20.0%	☆
F9-70	Detection time of speed error	0.0s: Not detected 0.1 to 60.0s	5.0s	☆
F9-71	Power dip ride-through gain Kp	0 to 100	40	☆
F9-72	Power dip ride-through integral coefficient Ki	0 to 100	30	☆
F9-73	Deceleration time of power dip ride-through	0 to 300.0s	20.0s	★

FA PID Function

Function Code	Parameter Name	Setting Range	Default	Change
FA-00	PID reference setting channel	0: Set by FA-01 (PID digital setting) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference (S5) 5: Communication reference 6: Multi-reference	0	☆
FA-01	PID digital setting	0.0% to 100.0%	50.0%	☆

FA-02	PID feedback setting channel	0:AI1 1:AI2 2:Keyboard potentiometer 3:AI1-AI2 4:Pulse reference (S5) 5: Communication reference 6: AI1 + AI2 7: Max. (|AI1|, |AI2|) 8: Min. (|AI1|, |AI2|)	0	☆
FA-03	PID operation direction	0: Forward 1: Reverse	0	☆
FA-04	PID reference and feedback range	0 to 65535	1000	☆
FA-05	Proportional gain Kp1	0.0 to 1000.0	20.0	☆
FA-06	Integral time TI1	0.01s to 10.00s	2.00s	☆
FA-07	Differential time TD1	0.000s to 10.000s	0.000s	☆
FA-08	PID output limit in reverse direction	0.00 Hz to the maximum frequency	0.00Hz	☆
FA-09	PID error limit	0.0% to 100.0%	0.0%	☆
FA-10	PID differential limit	0.00% to 100.00%	0.10%	☆
FA-11	PID reference change time	0.00 to 650.00s	0.00s	☆
FA-12	PID feedback filter time	0.00 to 60.00s	0.00s	☆
FA-13	PID output filter time	0.00 to 60.00s	0.00s	☆
FA-14	Reserved	–	–	☆
FA-15	Proportional gain Kp2	0.0 to 100.0	20.0	☆
FA-16	Integral time Ti2	0.01s to 10.00s	2.00s	☆
FA-17	Differential time Td2	0.000s to 10.000s	0.000s	☆
FA-18	PID parameter switchover condition	0: No switchover 1: Switchover using S 2: Auto switchover based on PID error 3: Auto switchover based on running frequency	0	☆
FA-19	PID error 1 for auto switchover	0.0% to FA-20 (PID error 2 for auto switchover)	20.0%	☆
FA-20	PID error 2 for auto switchover	FA-19 (PID error 1 for auto switchover) to 100.0%	80.0%	☆
FA-21	PID initial value	0.0% to 100.0%	0.0%	☆
FA-22	PID initial value active time	0.00 to 650.00s	0.00s	☆
FA-23	Reserved	-	–	☆

FA-24	Reserved	–	–	☆
FA-25	PID integral property	BIT0: Integral separation 0: Disabled 1: Enabled BIT1: Whether to stop integral operation when the PID output reaches the limit 0: Continue integral operation 1: Stop integral operation	00	☆
FA-26	Detection level of PID feedback loss	0.0%: No detection 0.1% to 100.0%	0.0%	☆
FA-27	Detection time of PID feedback loss	0.0s to 20.0s	0.0s	☆
FA-28	Selection of PID operation at stop	0: Stop and do not operate 1: Compute shutdown	0	☆

FB Fixed Length and Count

Function Code	Parameter Name	Setting Range	Default	Change
FB-05	Set length	0 m to 65535 m	1000m	☆
FB-06	Actual length	0 m to 65535 m	0m	☆
FB-07	Number of pulses permeter	0.1 to 6553.5	100.0	☆
FB-08	Set count value	1 to 65535	1000	☆
FB-09	Designated count value	1 to 65535	1000	☆

FC Multi-Reference and Simple PLC Function

Function Code	Parameter Name	Setting Range	Default	Change
FC-00	Reference 0	-100.0% to 100.0%	0.0%	☆
FC-01	Reference 1	-100.0% to 100.0%	0.0%	☆
FC-02	Reference 2	-100.0% to 100.0%	0.0%	☆
FC-03	Reference 3	-100.0% to 100.0%	0.0%	☆
FC-04	Reference 4	-100.0% to 100.0%	0.0%	☆
FC-05	Reference 5	-100.0% to 100.0%	0.0%	☆
FC-06	Reference 6	-100.0% to 100.0%	0.0%	☆
FC-07	Reference 7	-100.0% to 100.0%	0.0%	☆
FC-08	Reference 8	-100.0% to 100.0%	0.0%	☆
FC-09	Reference 9	-100.0% to 100.0%	0.0%	☆
FC-10	Reference 10	-100.0% to 100.0%	0.0%	☆
FC-11	Reference 11	-100.0% to 100.0%	0.0%	☆
FC-12	Reference 12	-100.0% to 100.0%	0.0%	☆
FC-13	Reference 13	-100.0% to 100.0%	0.0%	☆
FC-14	Reference 14	-100.0% to 100.0%	0.0%	☆
FC-15	Reference 15	-100.0% to 100.0%	0.0%	☆

FC-16	Simple PLC running mode	0: Stop after running one cycle 1: Keep final values after running one cycle 2: Repeat after running one cycle	0	☆
FC-17	Simple PLC retentive selection	BIT0:Retentive at power down 0: Not retentive 1: Retentive BIT1:Retentive at stop 0: Not retentive at stop 1: Retentive at stop	00	☆
FC-18	Running time of simple PLC reference 0	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-19	Acceleration/ Deceleration time of simple PLC reference 0	0 to 3	0	☆
FC-20	Running time of simple PLC reference 1	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-21	Acceleration/ Deceleration time of simple PLC reference 1	0 to 3	0	☆
FC-22	Running time of simple PLC reference 2	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-23	Acceleration/ Deceleration time of simple PLC reference 2	0 to 3	0	☆
FC-24	Running time of simple PLC reference 3	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-25	Acceleration/ Deceleration time of simple PLC reference 3	0 to 3	0	☆
FC-26	Running time of simple PLC reference 4	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-27	Acceleration/ Deceleration time of simple PLC reference 4	0 to 3	0	☆
FC-28	Running time of simple PLC reference 5	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-29	Acceleration/ Deceleration time of simple PLC reference 4	0 to 3	0	☆
FC-30	Running time of simple PLC reference 6	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-31	Acceleration/ Deceleration time of simple PLC reference 6	0 to 3	0	☆
FC-32	Running time of simple PLC reference 7	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-33	Acceleration/ Deceleration time of simple PLC reference 7	0 to 3	0	☆
FC-34	Running time of simple PLC reference 8	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-35	Acceleration/ Deceleration time of simple PLC reference 8	0 to 3	0	☆
FC-36	Running time of simple PLC reference 9	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-37	Acceleration/ Deceleration time of simple PLC reference 9	0 to 3	0	☆
FC-38	Running time of simple PLC reference 10	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-39	Acceleration/ Deceleration time of simple PLC reference 10	0 to 3	0	☆
FC-40	Running time of simple PLC reference 11	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-41	Acceleration/ Deceleration time of simple PLC reference 11	0 to 3	0	☆
FC-42	Running time of simple PLC reference 12	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-43	Acceleration/ Deceleration time of simple PLC reference 12	0 to 3	0	☆
FC-44	Running time of simple PLC reference 13	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-45	Acceleration/ Deceleration time of simple PLC reference 13	0 to 3	0	☆

Function Code	Parameter Name	Setting Range	Default	Change
FC-46	Running time of simple PLC reference 14	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-47	Acceleration/ Deceleration time of simple PLC reference 14	0 to 3	0	☆
FC-48	Running time of simple PLC reference 15	0.0s (h) to 6553.5s (h)	0.0s(h)	☆
FC-49	Acceleration/ Deceleration time of simple PLC reference 15	0 to 3	0	☆
FC-50	Time unit of simple PLC running	0: s 1: h	0	☆
FC-51	Reference 0 source	0: Set by FC-00 (Reference 0) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference 5: PID 6: Set by preset frequency (F0-08), modified using terminal UP/YWN	0	☆

FD Communication

Function Code	Parameter Name	Setting Range	Default	Change
FD-00	Baud rate	BIT0: MODBUS 0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps BIT1: Reserved BIT2: Reserved BIT3: Reserved	5005	☆
FD-01	Modbus data format symbol	0: No check (8,N,2) 1: Even parity check (8,E,1) 2: Odd parity check (8,0,1) 3: No check, data format (8,N,1) (Valid for Modbus)	0	☆
FD-02	Local address	0: Broadcast address; 1 to 247 (Valid for Modbus)	1	☆
FD-03	Modbus response delay	0 to 20 ms (Valid for Modbus)	2	☆
FD-04	Serial port communication timeout	0.0: Disabled 0.1 to 60.0s (Valid for Modbus)	0.0	☆

Function Code	Parameter Name	Setting Range	Default	Change
FD-05	Modbus communication data format	BIT0:Modbus 0: Non-standard Modbus protocol 1: Standard Modbus protocol BIT1:Reserved	31	☆
FD-06	Current resolution read by communication	0: 0.01 A (valid when ≤ 55 kW)	0	☆
FD-08	Reserved	–	–	☆

FE User-Defined Parameters

Function Code	Parameter Name	Setting Range	Default	Change
FE-00	User-defined parameter 0		U3.17	☆
FE-01	User-defined parameter 1		U3.16	☆
FE-02	User-defined parameter 2		F0.00	☆
FE-03	User-defined parameter 3		F0.00	☆
FE-04	User-defined parameter 4		F0.00	☆
FE-05	User-defined parameter 5		F0.00	☆
FE-06	User-defined parameter 6	F0-00 to FP-xx	F0.00	☆
FE-07	User-defined parameter 7	A0-00 to Ax-xx	F0.00	☆
FE-08	User-defined parameter 8	U0-00 to U0-xx U3-00 to U3-xx	F0.00	☆
FE-09	User-defined parameter 9		F0.00	☆
FE-10	User-defined parameter 10		F0.00	☆
FE-11	User-defined parameter 11		F0.00	☆
FE-12	User-defined parameter 12		F0.00	☆
FE-13	User-defined parameter 13		F0.00	☆
FE-14	User-defined parameter 14		F0.00	☆
FE-15	User-defined parameter 15		F0.00	☆
FE-16	User-defined parameter 16		F0.00	☆

FE-17	User-defined parameter 17		F0.00	☆
FE-18	User-defined parameter 18		F0.00	☆
FE-19	User-defined parameter 19		F0.00	☆
FE-20	User-defined parameter 20		U0.68	☆
FE-21	User-defined parameter 21	F0-00 to FP-xx	U0.69	☆
FE-22	User-defined parameter 22	A0-00 to Ax-xx	F0.00	☆
FE-23	User-defined parameter 23	U0-00 to U0-xx U3-00 to U3-xx	F0.00	☆
FE-24	User-defined parameter 24		F0.00	☆
FE-25	User-defined parameter 25		F0.00	☆
FE-26	User-defined parameter 26		F0.00	☆
FE-27	User-defined parameter 27		F0.00	☆
FE-28	User-defined parameter 28		F0.00	☆
FE-29	User-defined parameter 29		F0.00	☆

FP Parameter Management

Function Code	Parameter Name	Setting Range	Default	Change
FP-00	User password	0 to 65535	0	☆
FP-01	Parameter Initialization	0: No operation 01: Restore factory parameters except motor parameters 02: Clear records 04: Back up current user parameters 501: Restore user backup parameters	0	☆
FP-02	Parameter display property	BIT0: Group U 0: Not displayed 1: Displayed BIT1: Group A 0: Not displayed 1: Displayed	11	☆
FP-03	Selection of individualized parameter display	BIT0: Selection of user-defined parameter display 0: Not displayed 1: Displayed BIT1: Selection of user-modified 0: Not displayed 1: Displayed	00	☆
FP-04	Selection of parameter modification	0: Disabled 1: Enabled	0	☆

A0 Torque Control and Limit

Function Code	Parameter Name	Setting Range	Default	Change
A0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0	★
A0-01	Torque reference source in torque control	0: Set by A0-03 (Torque digital setting in torque control) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference 5: Communication reference 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) The full scale of 1-7 corresponds to A0-03.	0	★
A0-03	Torque digital setting in torque control	-200.0% to 200.0%	150.0%	☆
A0-05	Forward max. frequency in torque control	0.00 Hz to the maximum frequency	50.00Hz	☆
A0-06	Reverse max. frequency in torque control	0.00 Hz to the maximum frequency	50.00Hz	☆
A0-07	Acceleration time in torque control	0.00s to 650.00s	0.00s	☆
A0-08	Deceleration time in torque control	0.00s to 650.00s	0.00s	☆

A1 Virtual IO

Function Code	Parameter Name	Setting Range	Default	Change
A1-00	VS1 function selection	0 to 59	0	★
A1-01	VS2 function selection	0 to 59	0	★
A1-02	VS3 function selection	0 to 59	0	★
A1-03	VS4 function selection	0 to 59	0	★
A1-04	VS5 function selection	0 to 59	0	★
A1-05	VS active state setting mode	0: Decided by state of VYx 1: Decided by A1-06 BIT0:VS1 BIT1:VS2 BIT2:VS3 BIT3:VS4 BIT4:VS5	00000	★
A1-06	Selection of VS active state	0: Disabled 1:Enabled BIT0:VS1 BIT1:VS2 BIT2:VS3 BIT3:VS4 BIT4:VS5	00000	★

Function Code	Parameter Name	Setting Range	Default	Change
A1-07	Function selection for AI1 used as S	0 to 59	0	★
A1-08	Function selection for AI2 used as S	0 to 59	0	★
A1-09	Function selection for keyboard used as S	0 to 59	0	★
A1-10	Active state selection for AI used as S	0: High level active 1: Low level active BIT0:AI1 BIT1:AI2 BIT2:Pull out keyboard potentiometer	000	★
A1-11	VY1 function selection		0	☆
A1-12	VY2 function selection	0: Short with physical Sx internally	0	☆
A1-13	VY3 function selection	1 to 41: See physical Y selection in group F5	0	☆
A1-14	VY4 function selection		0	☆
A1-15	VY5 function selection		0	☆
A1-16	VY1 output delay	0.0s to 3600.0s	0.0s	☆
A1-17	VY2 output delay	0.0s to 3600.0s	0.0s	☆
A1-18	VY3 output delay	0.0s to 3600.0s	0.0s	☆
A1-19	VY4 output delay	0.0s to 3600.0s	0.0s	☆
A1-20	VY5 output delay	0.0s to 3600.0s	0.0s	☆
A1-21	VY active mode selection	0: Positive logic active 1: Negative logic active BIT0:VY1 BIT1:VY2 BIT2:VY3 BIT3:VY4 BIT4:VY5	00000	☆
A2 Motor 2 Parameters				
Function Code	Parameter Name	Setting Range	Default	Change
A2-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	★
A2-01	Rated motor power	0.1 kW to 1000.0 kW	Model dependent	★
A2-02	Rated motor voltage	1 V to 2000 V	Model dependent	★
A2-03	Rated motor current	0.01 A to 655.35 A (AC drive power ≤ 55 kW) 0.1 A to 6553.5 A (AC drive power > 55 kW)	Model dependent	★
A2-04	Rated motor frequency	0.01 Hz to the maximum frequency	Model dependent	★
A2-05	Rated motor speed	1 rpm to 65535 rpm	Model dependent	★
A2-06	Stator resistance	0.001 Ω to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 Ω to 6.5535 Ω (AC drive power > 55 kW)	Model dependent	★

Function Code	Parameter Name	Setting Range	Default	Change
A2-07	Rotor resistance	0.001 Ω to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 Ω to 6.5535 Ω (AC drive power > 55 kW)	Model dependent	★
A2-08	Leakage inductive reactance	0.01 mH to 655.35 mH (AC drive power ≤ 55 kW) 0.001 mH to 65.535 mH (AC drive power > 55 kW)	Model dependent	★
A2-09	Mutual inductive reactance	0.1 mH to 6553.5 mH (AC drive power ≤ 55 kW) 0.01 mH to 655.35 mH (AC drive power > 55 kW)	Model dependent	★
A2-10	No-load current	0.01 A to A2-03 (AC drive power ≤ 55 kW) 0.1 A to A2-03 (AC drive power > 55 kW)	Model dependent	★
A2-27	Encoder pulses per revolution	1 to 65535	1024	★
A2-28	Encoder type	0: ABZ incremental encoder 2: Resolver	0	★
A2-29	Speed feedback channel selection	0: Local PG card 1: Extension PG card 2: Pulse input (S5)	0	★
A2-30	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reverse	0	★
A2-31	Encoder installation angle	0.0 to 359.9°	0.0°	★
A2-34	Number of pole pairs of resolver	1 to 65535	1	★
A2-36	Encoder wire-break fault detection time	0.0s: No detection 0.1s to 10.0s	0.0s	★
A2-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor partial static auto-tuning 2: Asynchronous complete dynamic auto-tuning 3: Asynchronous complete static auto-tuning	0	★
A2-38	Speed loop proportional gain 1	1 to 100	30	☆
A2-39	Speed loop integral time 1	0.01s to 10.00s	0.50s	☆
A2-40	Switchover frequency 1	0.00 to A2-43	5.00Hz	☆
A2-41	Speed loop proportional gain 2	1 to 100	20	☆
A2-42	Speed loop integral time 2	0.01s to 10.00s	1.00	☆
A2-43	Switchover frequency 2	A2-40to the maximum frequency	10.00Hz	☆
A2-44	Vector control slip compensation gain	50% to 200%	100%	☆
A2-45	SVC torque filter constant	0.000s to 0.100s	0.000s	☆
A2-47	Torque limit source in speed control	0: Set by A2-48 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse reference 5: Communication reference 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) The full scale of 1-7 corresponds to A2-48.	0	☆
A2-48	Digital setting of torque limit in speed control	0.0% to 200.0%	150.0%	☆

A2-50	Digital setting of torque limit in speed control (regenerative)	0.0% to 200.0%	150.0%	☆
A2-51	Excitation adjustment proportional gain	0 to 20000	2000	☆
A2-52	Excitation adjustment integral gain	0 to 20000	1300	☆
A2-53	Torque adjustment proportional gain	0 to 20000	2000	☆
A2-54	Torque adjustment integral gain	0 to 20000	1300	☆
A2-55	Speed loop integral separation selection	BIT0: Integral separation 0: Disabled 1:Enabled	0	☆
A2-59	Max. torque coefficient of field weakening area	50% to 200%	100%	☆
A2-60	Regenerative power limit selection	0: Disabled　　　1:Enabled	0	☆
A2-61	Motor 2 control mode	0: SVC 1: FVC 2: V/F control	0	★
A2-62	Motor 2 acceleration/deceleration time selection	0: Same to Motor 1 1: Acceleration/Deceleration time 1 2: Acceleration/Deceleration time 2 3: Acceleration/Deceleration time 3 4: Acceleration/Deceleration time 4	0	☆
A2-63	Motor 2 torque boost	0.0%: Automatic torque boost 0.1% to 30.0%	Model dependent	☆
A2-65	Motor 2 oscillation suppression gain	0 to 100	40	☆

A5 Control Optimization

Function Code	Parameter Name	Setting Range	Default	Change
A5-00	DPWM switchover frequency upper limit	5.00 Hz to the maximum frequency	8.00Hz	☆
A5-01	PWM modulation pattern	0: Asynchronous modulation 1: Synchronous modulation	0	☆
A5-02	Dead zone compensation mode selection	0: Disabled 1: Enabled (compensation mode 1)	1	☆
A5-03	Random PWM depth	0: Random PWM invalid 1 to 10: Random PWM	0	☆
A5-04	Overcurrent fast prevention	0: Disabled 1: Enabled	1	☆
A5-05	Voltage over modulation coefficient	100 to 110	105	★

A5-06	Undervoltage threshold	210 to 420V	350V	☆
A5-08	Dead-zone time adjustment	100% to 200%	150%	★
A5-09	Overvoltage threshold	200.0V to 2500.0V	Model dependent	★

A6 AI Curve Setting

Function Code	Parameter Name	Setting Range	Default	Change
A6-00	AI curve 4 min. Input	-10.00 V to A6-02	0.00V	☆
A6-01	Corresponding percentage of AI curve 4 min. Input	-100.0% to +100.0%	0.0%	☆
A6-02	AI curve 4 inflection 1 input	A6-00 to A6-04	3.00V	☆
A6-03	Corresponding percentage of AI curve 4 inflection 1 input	-100.0% to +100.0%	30.0%	☆
A6-04	AI curve 4 inflection 2 input	A6-02 to A6-06	6.00V	☆
A6-05	Corresponding percentage of AI curve 4 inflection 2 input	-100.0% to +100.0%	60.0%	☆
A6-06	AI curve 4 max. Input	A6-04 to +10.00V	10.00V	☆
A6-07	Corresponding percentage of AI curve 4 max. Input	-100.0% to +100.0%	100.0%	☆
A6-08	AI curve 5 min. Input	-10.00V to A6-10	-10.00V	☆
A6-09	Corresponding percentage of AI curve 5 min. Input	-100.0% to +100.0%	-100.0%	☆
A6-10	AI curve 5 inflection 1 input	A6-08 to A6-12	-3.00V	☆
A6-11	Corresponding percentage of AI curve 5 inflection 1 input	-100.0% to +100.0%	-30.0%	☆
A6-12	AI curve 5 inflection 2 input	A6-10 to A6-14	3.00V	☆
A6-13	Corresponding percentage of AI curve 5 inflection 2 input	-100.0% to +100.0%	30.0%	☆
A6-14	AI curve 5 max. Input	A6-12 to +10.00V	10.00V	☆
A6-15	Corresponding percentage of AI curve 5 max. Input	-100.0% to +100.0%	100.0%	☆
A6-16	Pull-out keyboard potentiometer minimum input	0.00V to A6-18	0.50V	☆

A6-17	Corresponding setting of minimum input of keyboard potentiometer	-100.0% to +100.0%	0.0%	☆
A6-18	Pull-out keyboard potentiometer maximum input	A6-13 to 10.00V	10.00V	☆
A6-19	Corresponding setting of maximum input of keyboard potentiometer	-100.0% to +100.0%	100.0%	☆
A6-24	Jump point of AI1 input corresponding setting	-100.0% to +100.0%	0.0%	☆
A6-25	Jump amplitude of AI1 input corresponding setting	0.0% to 100.0%	0.5%	☆
A6-26	Jump point of AI2 input corresponding setting	-100.0% to +100.0%	0.0%	☆
A6-27	Jump amplitude of AI2 input corresponding setting	0.0% to 100.0%	0.5%	☆
A6-28	Keyboard potentiometer to set the jump point	-100.0% to +100.0%	0.0%	☆
A6-29	Keyboard potentiometer to set the jump range	0.0% to 100.0%	0.5%	☆

A7 User Programmable Card

Function Code	Parameter Name	Setting Range	Default	Change
A7-00	User programmable function selection	0: Disabled 1: Enabled	0	★
A7-01	Control board output terminal control mode selection	0:AC drive control 1:User programmable card control BIT0:Y4R (Y4 used as digital output) BIT1:Relay (Y1A-Y1B-Y1C) BIT2:Y1 BIT3:Y4P (Y4 used as pulse control) BIT4:A01	0	★
A7-02	Programmable card AI/AO function selection	0: Keyboard potentiometer (voltage input), AO2 (voltage output) 1: Keyboard potentiometer (voltage input), AO2 (current output) 2: Keyboard potentiometer (current input), AO2 (voltage output) 3: Keyboard potentiometer (current input), AO2 (current output) 4: Keyboard potentiometer (PTC input), AO2 (voltage output) 5: Keyboard potentiometer (PTC input), AO2 (current output) 6: Keyboard potentiometer (PT100 input), AO2 (voltage output) 7: Keyboard potentiometer (PT100 input), AO2 (current output)	0	★

A7-03	Y4P output	0.0% to 100.0%	0.0%	☆
A7-04	A01 output	0.0% to 100.0%	0.0%	☆
A7-05	Selection of PLC program controlling digital output	Binary setting BIT0:Y4R BIT1:Relay 1 BIT2:Y	000	☆
A7-06	Setting frequency reference using the user programmable card	-100.00% to 100.00%	0.0%	☆
A7-07	Setting torque reference using the user programmable card	-200.0% to 200.0%	0.0%	☆
A7-08	Setting running command using the user programmable card	0: No command 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Coast to stop 6: Decelerate to stop 7: Fault reset	0	☆
A7-09	Setting torque reference with the user programmable card	0: No fault 80 to 89: User-defined fault code	0	☆

A8 Point-to-point Communication

Function Code	Parameter Name	Setting Range	Default	Change
A8-00	Point-to-point communication	0: Disabled 1:Enabled	0	☆
A8-01	Master or slave selection	0: Master 1: Slave	0	☆
A8-02	Selection of action of the slave in point-to-point communication	BIT0:Whether to follow master's command 0: No 1: Yes BIT1:Whether to send fault information to master when a fault occurs 0: No 1: Yes BIT2:Whether to alarm when it becomes off-line 0: No 1: Yes(Err16)	011	★
A8-03	Slave received data	0:Torque given 1:Frequency given	0	☆
A8-04	Zero offset of received data (torque)	-100.00% to 100.00%	0.00%	★
A8-05	Gain of received data (torque)	-10.00 to 100.00	1.00	★
A8-06	Point-to-point communication interruption detection time	0.0 to 10.0s	1.0s	☆

A8-07	Master data sending cycle in point-to-point communication	0.001 to 10.000s	0.001s	☆
A8-11	Window width	0.20 Hz to 10.00 Hz	0.50Hz	☆

AI/AO Correction

Function Code	Parameter Name	Setting Range	Default	Change
AC-00	AI1 measured voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-01	AI1 displayed voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-02	AI1 measured voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-03	AI1 displayed voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-04	AI2 measured voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-05	AI2 displayed voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-06	AI2 measured voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-07	AI2 displayed voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-08	Keyboard potentiometer measured voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-09	Keyboard potentiometer displayed voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-10	Keyboard potentiometer measured voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-11	Keyboard potentiometer displayed voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-12	AO1 target voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-13	AO1 measured voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-14	AO1 target voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-15	AO1 measured voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-16	AO2 target voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-17	AO2 measured voltage 1	-10.00 V to 10.000 V	Factory corrected	☆
AC-18	AO2 target voltage 2	-10.00 V to 10.000 V	Factory corrected	☆
AC-19	AO2 measured voltage 2	-10.00 V to 10.000 V	Factory corrected	☆

U0 Monitoring Parameters

Function Code	Parameter Name	Minimum Unit	Change
U0-00	Running frequency	0.01Hz	7000H
U0-01	Frequency reference	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	S state	1	7007H
U0-08	Y state	1	7008H
U0-09	AI1 voltage	0.01V	7009H
U0-10	AI2 voltage (V)/current (mA)	0.01V/0.01mA	700AH
U0-11	Keyboard potentiometer voltage	0.01V	700BH
U0-12	Count value	1	700CH
U0-13	Length value	1	700DH
U0-14	Load speed display	Determined by F7-12 bit0	700EH
U0-15	PID reference	1	700FH
U0-16	PID feedback	1	7010H
U0-17	PLC stage	1	7011H
U0-18	Pulse reference	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 (V)/current (mA) before correction	0.001V/0.01mA	7016H
U0-23	Keyboard potentiometer voltage before correction	0.001V	7017H
U0-24	Motor speed	1RPM	7018H
U0-25	Current power-on time	1Min	7019H
U0-26	Current running time	0.1Min	701AH
U0-27	Pulse reference	1Hz	701BH
U0-28	Communication reference	0.01%	701CH
U0-29	Encoder feedback speed	0.01Hz	701DH
U0-30	Main frequency reference X display	0.01Hz	701EH
U0-31	Auxiliary frequency reference Y display	0.01Hz	701FH
U0-32	Viewing any register address value	1	7020H
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	S state display	1	7029H
U0-42	Y state display	1	702AH
U0-43	S set for function state display 1 (function 01-40)	1	702BH
U0-44	S set for function state display 2 (function 41-80)	1	702CH
U0-45	Fault information	1	702DH
U0-58	Phase Z counting	1	703AH
U0-59	Rated frequency	0.01%	703BH
U0-60	Running frequency	0.01%	703CH
U0-61	AC drive state	1	703DH
U0-62	Current fault code	1	703EH
U0-63	Sending torque value of point-to-point communication	0.01%	703FH
U0-64	Number of slaves	1	7040H
U0-65	Torque upper limit	0.1%	7041H
U0-66	Reserved	–	7042H
U0-67	Communication extension card version	Display range	–
U0-68	AC drive state on DP card	BIT0: AC drive running status BIT1: Running direction BIT2: Whether the AC drive has a fault BIT3: Target frequency reached BIT4 to BIT7: Reserved BIT8 to BIT15: Fault code	7043H
U0-69	Speed of transmitting DP/0.01 Hz	0.00Hz to Max.frequency	7044H
U0-70	Motor speed of transmitting DP/RMP	0 to rated motor speed	7045H
U0-71	Communication card current display	Display range	–
U0-72	Communication card faulty state	Display range	–
U0-73	Motor SN	0: Motor 1 1: Motor 2	7046H
U0-74	AC drive output torque	0.1%	7047H

## 8.2 Appendix 2: Product specification

Product standard specification

Voltage: 220V		Voltage: 380V	
Power (kW)	Rated output current(A)	Power (kW)	Rated output current(A)
0.75	4.8	0.75	2.5
1.5	8.0	1.5	4.2
2.2	10.0	2.2	5.6
		4.0	9.4
		5.5	13.0
		7.5	17.0
		11	25.0
		15	32.0
		18.5	38.0
		22	45.0
		30	60.0
		37	75.0
		45	90.0
		55	110.0
		75	150.0
		90	176.0
		110	210.0
		132	253.0
		160	304.0
		200	380.0
		220	450.0
		250	480.0
		280	520.0
		315	605.0

8.3 Appendix 3: Optional digital manipulator and external components

■ LED manipulator
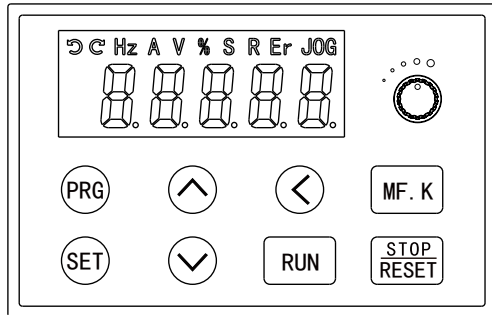
■ External components
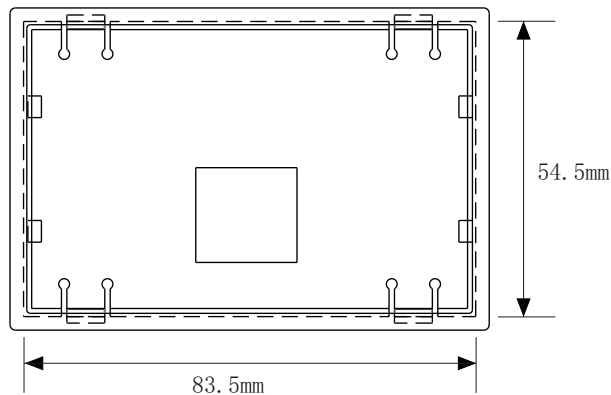
Sheet metal installation hole size:
83.5mm*54.5mm

8.4 Appendix 4: Braking resistor

● Frequency of braking in common application

Application	Elevator	Winding &rewinding	Centrifuge	Accidental braking load	General occasion
Braking frequency	20%～30%	20%～30%	50%～60%	5%	10%

AC Drive Model	Adapter motor (kW)	Brake unit (quantity)	125% braking torque (10% ED, max. 10s)		Min. Resistance of Braking Resistor (Ω)
			Braking Resistor	Quantity	
EC590D75G02D2P43	0.75	Built-in	80W 1450Ω	1	96
EC5901D5G02D2P43	1.5		300W 380Ω	1	64
EC5902D2G03D0P43	2.2		440W 260Ω	1	64
EC5904D0G05D5P43	4.0		740W 150Ω	1	32
EC5905D5G07D5P43	5.5		1100W 100Ω	1	32
EC5907D5G0011P43	7.5		1500W 75Ω	1	32
EC590011G0015P43	11		2200W 50Ω	1	20
EC590015G18D5P43	15		3000W 38Ω	1	20
EC5918D5G0022P43	18.5		4000W 32Ω	1	24
EC590022G0030P43	22		4500W 27Ω	1	24
EC590030G0037P43	30		6000W 20Ω	1	19.2
EC590037G0045P43	37		7000W 16Ω	1	14.8
EC590045G0055P43	45		9000W 13Ω	1	12.8
EC590055G0075P43	55	2	11000W 10.5Ω	1	9.6
EC590075G0090P43	75	2	15000W 7.7Ω	1	6.8
EC590090G0110P43	90	2	9000W 10.0Ω	2	9.3×2
EC590110G0132P43	110	2	11000W 9.4Ω	2	9.3×2
EC590132G0160P43	132	2	13000W 6.8Ω	2	6.2×2

EC590160G0185P43	160	2	16000W 6.3Ω	2	6.2×2
EC590200G0220P43	200	2	19000W 4.5Ω	2	2.5×2
EC590220G0250P43	220	2	21000W 4.1Ω	2	2.5×2
EC590250G0280P43	250	2	24000W 3.6Ω	2	2.5×2
EC590280G0315P43	280	2	27000W 3.2Ω	2	2.5×2
EC590315G0350P43	315	3	20000W 4.3Ω	3	2.5×3
EC590350G0400P43	350	3	23000W 3.8Ω	3	2.5×3
EC590400G0450P43	400	3	26000W 3.4Ω	3	2.5×3

Note!

1. If the AC drive of 400V class, ≥45kW or above, to achieve rapid braking, a brake unit must be installed.

2. Select the resistance value and frequency of use established by our company.

3. The company does not bear any responsibility for the damage to the AC drive or other equipment caused by the use of braking resistors and braking modules not provided by our company.

4. The installation of the braking resistor must consider the safety and flammability of the environment.

5. To change the resistance and power number, please contact your local dealer.

6. The braking resistor and braking module need to be ordered separately. For details, please contact your local dealer.

EACON
Manufacturer of high quality inverter

Warranty Card

User Name			
User Address			
User Contact		Tel	
Specification		Number	
Distributor			
Contacts		Date of delivery	

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