Foreword

Thank you for using FI71 AC drives made by VTDRIVE TECHNOLOGY LIMITED.

This manual introduces installation, setup and commissioning of FI71 Drive, also troubleshoot and maintenance.

We will update the manual to improve it termly, and the contents in this document are subject to change without notice.

Please read the information carefully, and keep the manual, please make sure that the end customer has the manual.

Contents

Warnings, Cautions and Notes

Warning

A **Warning** contains information, which is essential for avoiding a safety hazard.

Caution

A **Caution** contains information, which is necessary for avoiding a risk of damage to the product or other equipment.

NOTE

A **Note** contains information, which helps to ensure correct operation of the product.

WARNING
• The FI71 AC drive should ONLY be installed by a qualified electrician. • Install the drive on the inflaming material like metal sheet in case a fire. • Do not install the Drive in the explosion air environment. • Even when the motor is stopped, dangerous voltage is present at the Power Circuit terminals L1, L2, L3 and U, V, W and, depending on the frame size, DC+ and DC−, or BR. • Dangerous voltage is present when input power is connected. After disconnecting the supply, wait at least 10 minutes (to let the intermediate circuit capacitors discharge) before removing the cover. • PE terminals must be earthed very well.

CAUTION
• The FI71 is not a field repairable unit. Never attempt to repair a malfunctioning unit; contact the factory or your local Authorized Service Center for replacement. • The FI71 will start up automatically after an input voltage interruption if the external run command is on. • Prior to measurements on the motor or the motor cable, disconnect the motor cable from the Variable Speed Drive. • Before connecting the Variable Speed Drive to mains, make sure that the FI71 front and cable covers are closed.

1 Technical specification

1.1 Model reference

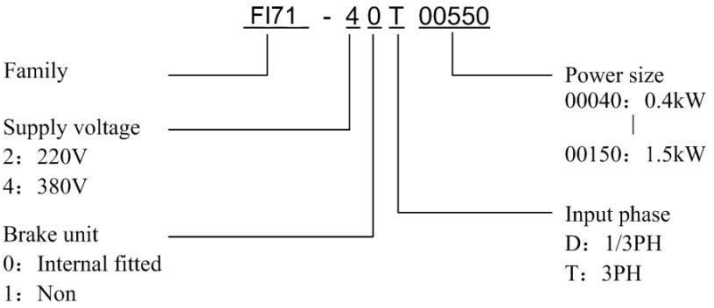


Figure1-1 FI71 Model description

1.2 Rating label

Figure1-2 FI71 Rating label

1.3 Power size

Power size of FI71 is referred to the standard 4 poles induction motor at rated voltage.

Overload: 150% rated output current, 1 minute

Table 1-1 220V rating data

Power supply: 220Vac~240Vac, 50Hz/60Hz, single/three phase				
Model Name	Drive Power Size (kVA)	Rated Input Current (A)	Rated Output Current (A)	Motor Power (kW)
		1/3PH		
FI71-20D00040	1.1	5.8/3.5	2.8	0.4
FI71-20D00075	1.7	11.3/6.3	4.5	0.75
FI71-20D00110	2.1	12.3/7.5	5.5	1.1

NOTE:

- FI71-21D00××× rating data are the same with FI71-20D00×××.
- All models have optional internal bake unit, see the Chapter 1.1.

Table 1-2 380V rating data

Power supply: 380Vac~480Vac, 50Hz/60Hz, three phase				
Model Name	Drive Power Size (kVA)	Rated Input Current (A)	Rated Output Current (A)	Motor Power (kW)
FI71-40T00040	1.0	2.8	1.5	0.4
FI71-40T00075	1.7	3.6	2.5	0.75
FI71-40T00150	2.8	5.7	4.2	1.5

NOTE:

- FI71-41T00××× rating data are the same with FI71-40T00×××.
- All models have optional internal bake unit, see the Chapter 1.1.

1.4 Technical specifications

Table 1-3 General technical specifications

Input Power	**Input Voltage U_{in}**	200V(−10%)～240V(+10%) 1/3PH 380V(−10%)～480V(+10%) 3PH
	Input Frequency	48Hz～62Hz
	Maximum Supply Imbalance	≤3%
Power Output	**Output Voltage**	0V～U_{in}
	Output Frequency	0Hz～300Hz
Main Performance Function	**Voltage Control**	V/F, Open loop Vector Control
	Switching Frequency	1kHz～15kHz
	Adjust Speed range	Open loop vector -1:100, V/F mode -1:50
	Start Torque	0.5Hz: 100% rated torque, 1Hz: 150% rated torque
	Torque Accuracy	7%
	Torque ripple	≤2%
	Speed accuracy	≤1%n (Under the rated operating conditions)
	Reference Resolution	Digit- 0.01Hz, Analogue- 0.1%×Max. frequency
	Accel. & Decel. Rate	0.1s～3600s
	Voltage Boost	0.1%～30.0%
	Overload	150% rated output current, 1 minute
	V/F	4 types: V/F (user can program) and ramp (2.0 power, 1.7 power, 1.2 power)
	DC Braking	Injection frequency: 0.0%～20.0% Max. frequency Injection current: 0.0%～300.0% rated current Injection time: 0.0s～60.0s
	Dynamic Braking	Brake rate: 0.0%～100.0%
	Jog	Jog frequency: 0.00Hz～50.00Hz Jog interval time: 0.1s～60.0s
	Preset	4 speeds (decided by control terminals)
	AVR	Maintain the rated output voltage when the input power supply voltage changed.
Special Performance Function	**Internal PID**	Easy to form a closed-loop control system

Control Terminal	**Reference Source**	Digit: display panel, motorized pot (E-Pot), PID, comms.
		Analogue: AI: 0V～10V, 0(4)mA～20mA, keypad potentiometer
	Operation Mode	Keypad, control terminals, serial comms.
	Digital Input Terminals	DI1～DI4: programmable terminals
	Analogue Input Terminal	AI: programmable terminal, 0V～10V, 0(4)mA～20mA, can be used as digital input terminal by programming
	Analogue Output Terminal	AO: programmable terminal, 0V～10V, can be used as digital output terminal by programming
	Status Relay	1 programmable relay, contactor data: AC250V/2A（COSΦ=1） AC250V/1A（COSΦ=0.4） DC30V/1A
Comms.	**Connectors**	Terminals A, B
	Protocol	Modbus RTU
Environment	**Altitude**	1000m rated 1000m～3000m,1% rated current derating per 100m
	Operating Temperature	-10°C～+40°C
	Max. Humidity	≤90%RH, no-condensing
	Vibration	≤5.9m/s^2（0.6g）
	Storage Temperature	-40°C～+70°C
	Running Environment	Indoor, non-flammable, no corrosive gasses, no contamination with electrically conductive material, avoid dust which may restrict the fan
Protection		Output shortage, over current, over load, over voltage, under Voltage, phase loss, over heat (heatsink and junction), external trip, etc.
Efficiency		≥89%
Mounting Method		Surface mounting, DIN rail
Enclosure		IP00, IP20 (by adding optional device)
Cooling Method		0.4kW model is nature cool, others are forced air cool

2 Installation and cabling

2.1 Dimensions

2.1.1 Parts of drive

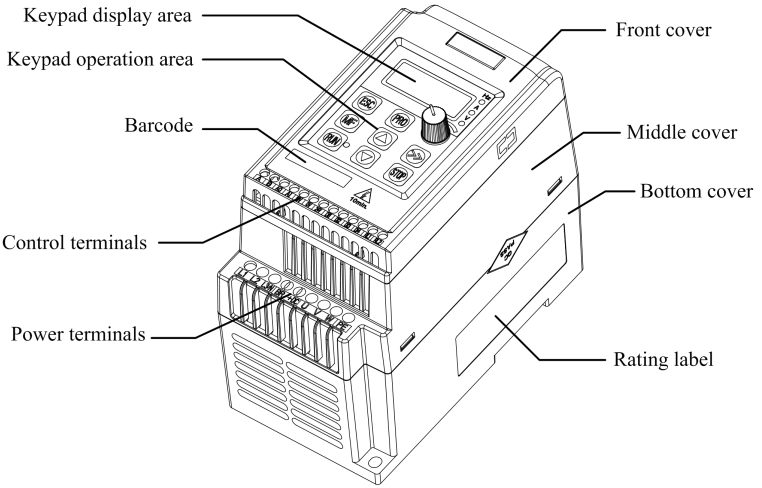


Figure 2-1 Parts of FI71 drive

2.1.2 Diagram of mounting

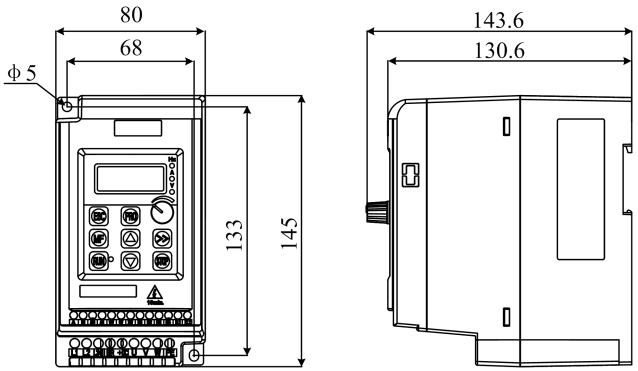


Figure 2-2 Mechanical dimensions and mounting

2.2 Mechanical installation

2.2.1 Drive installation diagram

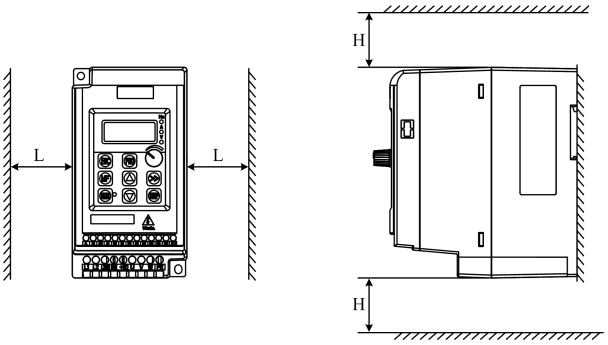


Figure 2-3 Single drive installation

Recommendation: L is unlimited，H≥100mm

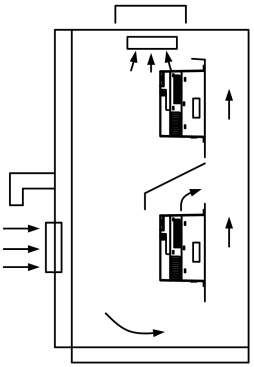


Figure 2-4 Multi drives vertical installation

NOTE: In vertical installations where drives are mounted above each other, there should be suitable air flow to keep the drives cool. Air flow should be drawn in and expelled as illustrated in the picture above.

2.2.2 DIN rail mounted

35mm DIN rail with mounted.

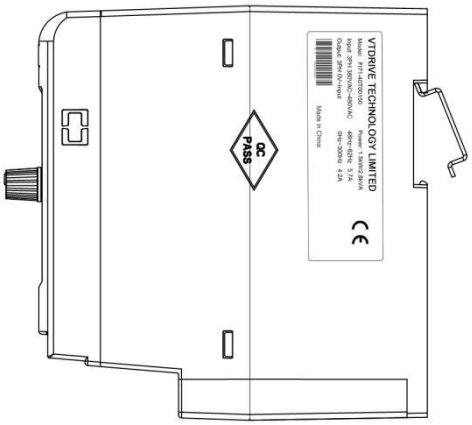


Figure 2-5 DIN rail mounted diagram

2.3 Electric installation

2.3.1 Power terminals

L1	L2	L3/N	BR	+DC	U	V	W	PE

Figure 2-6 Power terminals

Table 2-1 Power terminals function

Terminals	Function
L1, L2, L3/N	AC power supply. For single phase supply, suggest to use L1, L3/N
BR	Brake resistor, another end is +DC
+DC	Minus DC bus
U, V, W	Output terminals (Motor terminals)
PE	Protective earth terminal

2.3.2 Power connections

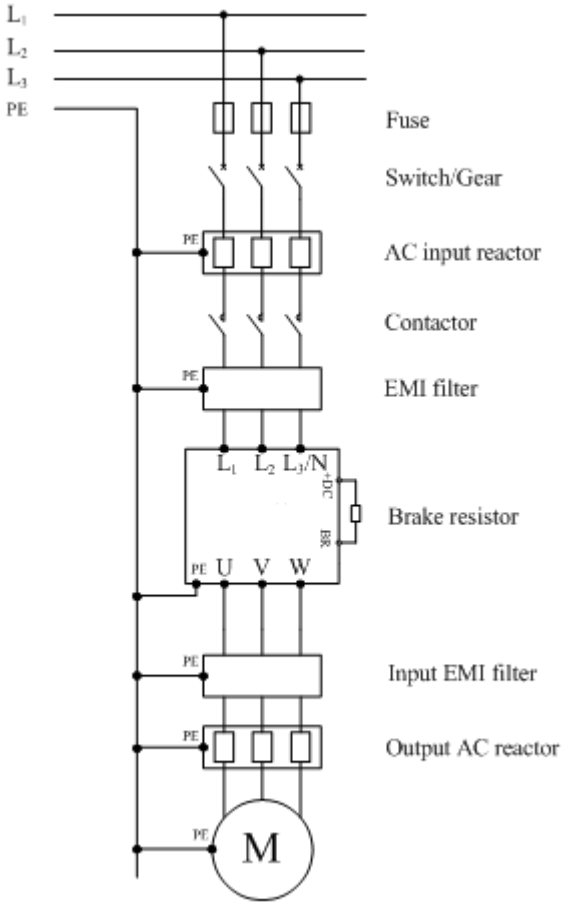


Figure 2-7 Typical power connections

Note:

- The selection of fuse and switch refers to table 2-2.
- Do not suggest using the power contactor to control the RUN/STOP of the drive.
- In default carrier frequency, the maximum motor cable length is 100 meters. When the motor cable is longer than 100m, recommend to use output reactor.
- For safety, Drive and Motor must be earthed, and the earth contacting resistance must be less than 10Ω. The earthing conductor minimum cross-sectional area should be the same as phase conductor the cross-sectional area.

Table 2-2 Recommending switch, fuse, power cable and control cable

Model Name	Input				Power				Control Cable (mm^2)
	Switch (A)		Fuse (A)		Input Current (A)	Supply Cable (mm^2)		Motor Cable (mm^2)	
	1PH	3PH	1PH	3PH	1/3PH	1PH	3PH	3PH	
FI71-20D00040	16	10	10	6	5.8/3.5	1.0	1.0	1.0	≥0.5
FI71-20D00075	25	25	16	16	11.3/6.3	1.5	1.0	1.0	≥0.5
FI71-20D00110	32	25	20	16	12.3/7.5	1.5	1.5	1.0	≥0.5
FI71-40T00040	10		6		2.8	1.0		1.0	≥0.5
FI71-40T00075	10		6		3.6	1.0		1.0	≥0.5
FI71-40T00150	16		10		5.7	1.0		1.0	≥0.5

2.3.3 Typical cabling

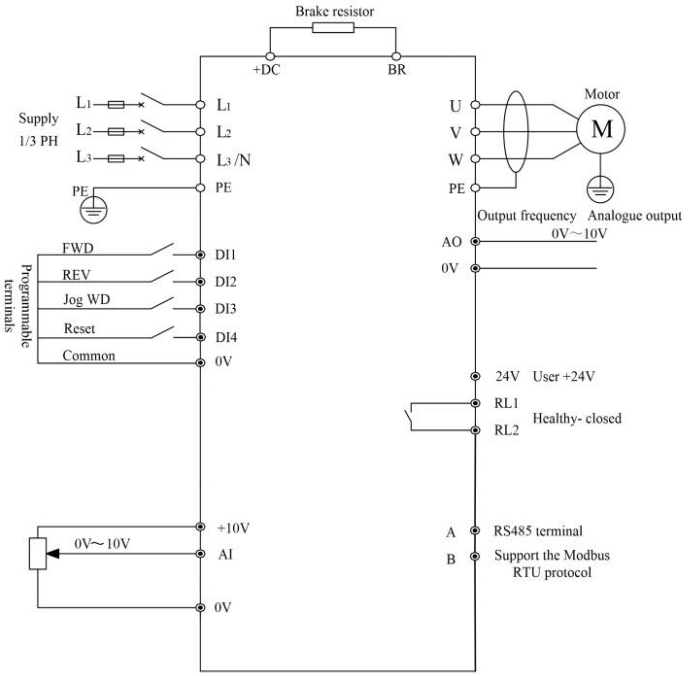


Figure 2-8 Typical cabling

Note:

- All the programmable control terminal functions are factory default set.
- For control wires, recommend using unshielded twisted pair, shielded cable, or shielded twisted pair.

2.3.4 Control terminals and cabling

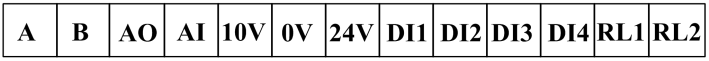


Figure 2-9 Control terminal diagram

Table 2-3 Control terminal & Comms. port

Type	Terminal Name	Function	Technical Specifications
Serial comms.	A, B	Serial communications	Two lines, Modbus RTU protocol
Digital input	DI1～DI4	Programmable digital input terminals	The common can be 0V or 24V by setting the P04.15 (default is 0V) Input resistance: 10 kΩ High, low logic threshold: 10V±1V Sampling period: 1ms
Analogue input & output	AI	Programmable analogue input terminal	Analogue input: 0V～10V Input resistance: 100kΩ (Minimum potentiometer resistance: 1kΩ) 0(4)mA～20mA Load resistance: 200Ω Resolution: 0.1% Accuracy: 2% Sampling period: 5ms Digital input: same as DI1～DI4
	AO	Programmable analogue output terminal	Analogue output: 0V～10V Max. output current: 10mA Resolution: 0.4% Accuracy: ±5% Updating rate: 5ms Digital output: Output: 10V Maximum output current: 10mA Update rate: 20ms
Rail supply & relay	10V	Analogue reference rail	Accuracy: 2% Max. output current: 10mA
	24V	User supply	Accuracy: ±15% Max. output current: 100mA

Type	Terminal Name	Function	Technical Specifications
Rail supply & relay	0V	Common	Common reference point for control signal
	RL1, RL2	Programmable relay output contactors Default: Relay1 is closed when powered and healthy.	Type: form A (normal open) Update rate: 5ms Contactor rating: 250VAC/2A(cosφ=1) 250VAC/1A(cosφ=0.4) 30VDC/1A

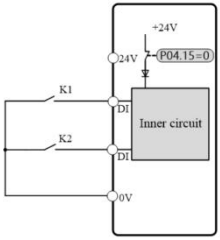
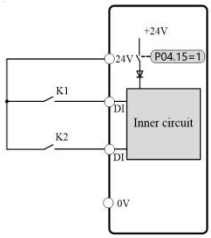
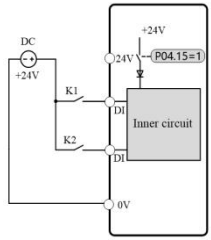
- Digital input common

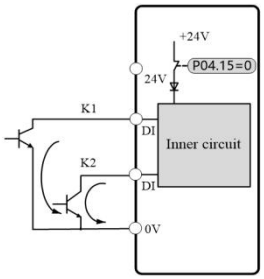
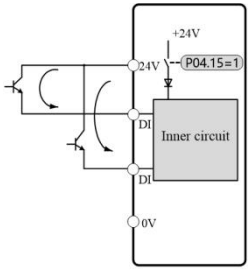
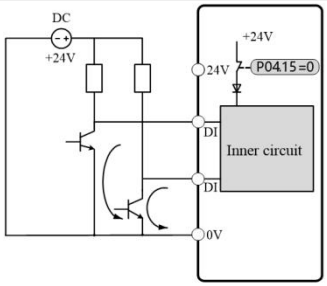
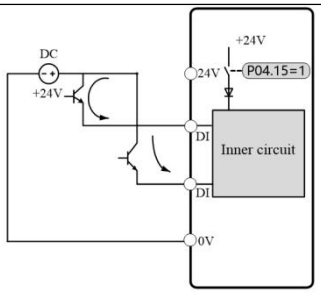
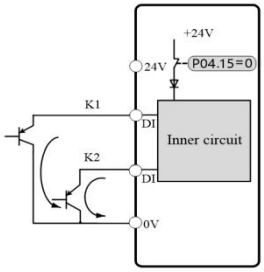
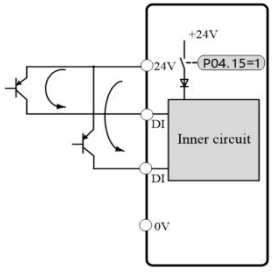
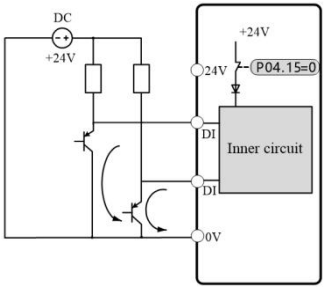
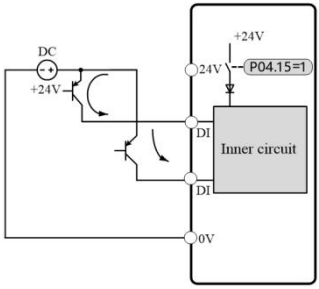
  There are four programmable digital input terminals.

  The common of DI could be programmed as 0V or 24V, the default is 0V. The parameter P04.15 can control the selection. When P04.15=0, common is 0V, P04.15=1, common is 24V.

  Different types connection of DI & Common as showed in table 2-4.

Table 2-4 FI71 digital input base function list

Connection \ P04.15		P04.15=0 (Source)	P04.15=1 (Sink)
Switch type	By inner 24V		
	By outer supply	–	

Connection \ P04.15		P04.15=0 (Source)	P04.15=1 (Sink)
OC (NPN)	By inner 24V		
	By Outer supply		
OC (PNP)	By inner 24V		
	By Outer supply		

Note: When outer supply is used, the range is 11V to 30V.

■ Analogue input terminal

Analogue input

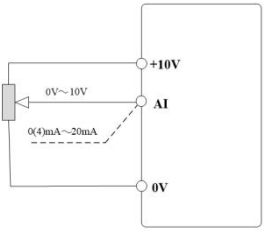


Figure 2-10 Analogue input connection

Digital input

As a digital input, the upper limit voltage is 6V and the lower limit voltage is 2V.

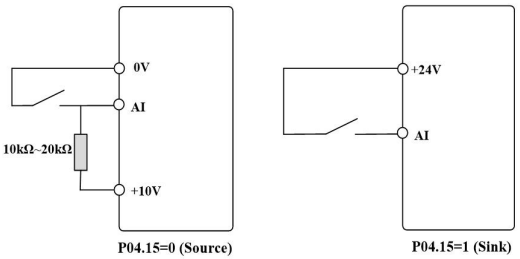


Figure 2-11 Digital input connection

■ Analogue output terminal

Analogue output

Output is voltage (0V～10V), maximum output current is 10mA.

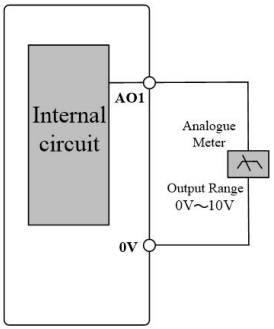


Figure 2-12 Analogue output connection

Digital output

AO as a digital output, output is open collector +10V output. For digital output function, please refer to Chapter 4 Parameter P04.07 (analogue output function).

2.3.5 Brake resistor

The actual resistance on the site application is decided by the motor power, system inertia, decelerating rate, etc. Users can choose it according to the actual situation.

Table 2-5 Brake resistor draft rating

Spec. / Model	Min. resistance (Ω)	Max. brake current (A)	Peak power (kW)	60s average power (kW)
FI71-20D00040	41	10	4.15	1.9
FI71-20D00075	41	10	4.15	1.9
FI71-20D00110	41	10	4.15	1.9
FI71-40T00040	120	7	5.67	2.67
FI71-40T00075	120	7	5.67	2.67
FI71-40T00150	120	7	5.67	2.67

2.3.7 EMC filter

- Optional RFI filter
  - Place the RFI filter close to the drive as possible, and the cable between the filter and drive is shorter and better.
  - The enclosure of the filter must be connected with the drive earth terminal.
- Inner EMC filter

  The drive leakage current is different with the Inner EMC filter fitted or not.

  Table 2-6 FI71 ground leakage current data

Model	200V	400V
With inner EMC filter (mA)	5.4	6.5
Without inner EMC filter (mA)	0.01	0.03

  Note:
  - The test condition of the Table 2-6 is no motor load.
  - When a ground leakage protecting contactor is used for front power supply, the internal EMC filter should be removed.
- Remove the internal EMC filter

  There is a metal link between the ground and EMC filter as show in the below figures.

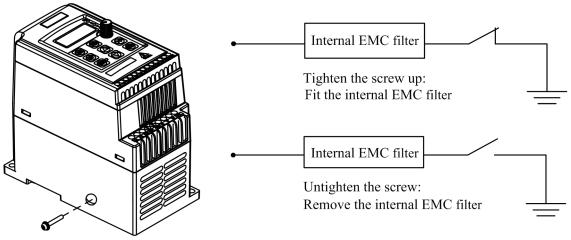


Figure 2-13 Fit and remove the internal EMC filter

3 Operation & Display

3.1 Keypad

There are a 5-digit LED display of 8 segment, 3 unit lights, a RUN light and a speed control potentiometer on the FI71 drive keypad as shown below:

Figure 3-1 Keypad

The LED display screen can show the drive status, parameters and value, trip, warning information, etc. The run light is on the right of the “RUN” switch. When the drive is active, the light is on.

Table 3-1 Unit light

Unit	Function	Colour
Hz	On: output frequency Flash: Reference frequency	Green
A	On: Output current	Green
V	On: Output voltage (RMS) Flash: DC bus voltage	Green

3.1.3 Switch function

Table 3-2 Switches function

Switches	Function Description
ESC	In different level display, pressing the switch will return the last level. Long press on the switch, will display output frequency.
MF	Default function is jog.

Switches	Function Description
	Enter next level of the display.
	When it is keypad control mode (P01.03=2), pressing the switch will make the drive run.
	• Stop, the switch will stop the drive. • Reset the drive.
 	These switches are used to select parameters and edit their values. Under keypad mode, they are used to increase and decrease the speed of the motor.
	• Under Run/Stop mode, if press the switch, the LED display will be reference frequency, output frequency, output current, output voltage, DC bus voltage in turn. • Under the edit of parameter value mode, pressing the switch will change the bite of the value.
	Used to change the frequency setting. Under Run/Stop mode, when the reference source is the potentiometer (P01.04=5), if turn the potentiometer in the clockwise direction, increase the frequency setting; if turn the potentiometer in the counterclockwise direction, decrease the frequency setting.

Note: If there is a conflict on the content of parameter, pressing the “PRG” switch cannot enter to the next parameter.

3.1.4 Display panel operation

The display panel can control the running of the drive, or monitor the status of the drive, details as below:

- LED display

  LED default shows the output frequency when the drive stops.

  Pressing >> will cycle display: reference frequency, output frequency, output current, output voltage, DC bus voltage. Operation procedure is as figure 3-2:

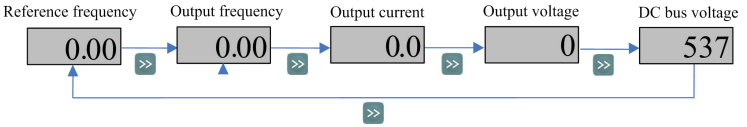


Figure 3-2 Display switchover flow

  In running mode, normal display is output frequency.

  Pressing >> will cycle display: output frequency, reference frequency, output current, output voltage, DC bus voltage. Operation procedure is as figure 3-3:

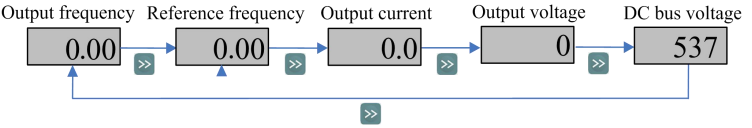


Figure 3-3 Display switchover flow

- The view of the parameter and the edit of parameter value

  For FI71 family, there are three levels about parameter view and edit.

  Level1: menu group

  Level2: parameter

  Level3: parameter content

  Operation flow is described in figure 3-4:

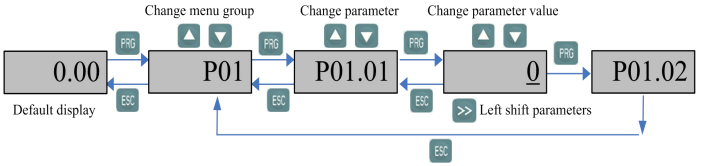


Figure 3-4 Parameter view and edit flow

Note:

- In level3, user can turn the display to level2 by pressing the PRG or ESC switch, the difference between them is:

  Press PRG will save the change of the value and return level2 (next parameter), press PRG again, will display the value of next parameter. Press ESC will not save the change and return the level2 (current parameter), pressing the ESC switch again will return the level 1 display.

- Only after pressing the PRG switch, the change can be active.
- If there is no bite of parameter value is flashing, means the value of the parameter cannot be changed. The reasons maybe:
  - ➢ It is an actual parameter, cannot be changed.
  - ➢ Drive is running, and the parameter cannot be changed at running.
- If more than one parameters are being set to same value (function), will happen following phenomena:
  - ➢ Display panel set up, the change will not be active after pressing PRG, and the display cannot enter the next parameter.

■ Example of parameter editing

The example is to change the value of P02.01 from 0.00Hz to 45.50Hz, as the following figure 3-5. The number with underline is flashing.

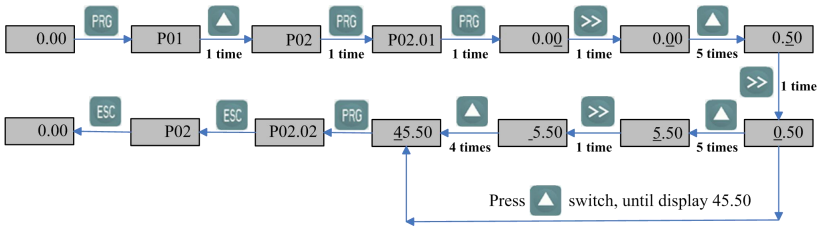


Figure 3-5 Editing parameter flow

- Autotune

  When do the motor auto-tune, make sure to set up the correct data of motor from the motor nameplate.

  Refer to the motor nameplate; enter in right value into following parameters:

  P01.12 motor rated voltage

  P01.13 motor rated current

  P01.15 motor rated frequency

  P01.16 motor rated speed (RPM)

  P01.19 motor power factor

  Then operate as below:

  Set P01.17=1, press PRG, press ESC to return the normal display. Press RUN and the drive will do the autotune.

  The display panel is shown as figure 3-6:

Figure 3-6 Autotune display

After finishing the autotune, the drive will stop.

3.2 Drive control

3.2.1 Control mode

Through P01.03, there are 3 control modes:

0: Terminal

1: Serial comms.

2: Display panel

3.2.2 Reference source

FI71 has 7 kinds of reference source, by setting P01.04, source channels are as following:

0: AI1

1: Preset

2: E-Pot

3: Serial communications

4: Keypad

5: Potentiometer

6: PID

3.3 Quick commissioning

3.3.1 Keypad control

Keypad control (P01.03=2) is default control mode of FI71. Reference source is from potentiometer (P01.04=5).

Other parameters settings as table 3-3：

Table 3-3 Keypad control setup

Parameter Setup	Description
P01.13=motor nameplate data	Set the motor rated voltage
P01.14=motor nameplate data	Set the motor rated current
P01.15=motor nameplate data	Set the motor rated frequency
P01.16=motor nameplate data	Set the motor rated speed
P01.19=motor nameplate data	Set the power factor of the motor

Other parameters are default setup.

- Jog

  Press “MF” switch and hold, the drive will run at 5.00Hz (the default setting value of P02.27). Release the switch, the drive will stop at the ramp mode set by P01.11.

  Note: Jog again have to wait the interval period set by P02.28.

- Common run

  Press “RUN” switch, drive is running, Run light is on. Turn the potentiometer in the clockwise direction, increase the output frequency; turn the potentiometer in the counterclockwise direction, decrease the output frequency. Press “STOP” switch, the drive will stop, when the inverter output is disabled, Run light is off.

3.3.2 Terminal control

Under terminal control mode, “RUN” and “MF” (default is jog) switches are invalid. Terminal connection is as figure 3-7 shown:

Table 3-4 Terminal control setup

Parameter Setup	Description
P01.03=0	Terminal control
P01.04=0	Reference is from AI
P01.12=motor nameplate data	Set the motor rated voltage
P01.13=motor nameplate data	Set the motor rated current
P01.15=motor nameplate data	Set the motor rated frequency
P01.16=motor nameplate data	Set the motor rated speed
P01.19=motor nameplate data	Set the Power factor of the motor

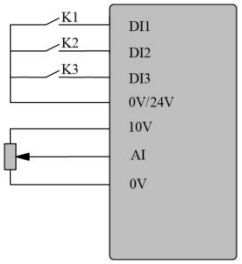


Figure 3-7 Two-wire (default) cabling

- Close the switch K1, the drive is running forward and the run light is on. Open the switch K1, the drive will stop at the ramp mode set by P01.11. When the inverter is disabled, the run light is off.
- Close the switch K2, the drive is running reverse and the run light is on. Open the switch K2, the drive will stop at the ramp mode set by P01.11. When the inverter is disabled, the run light is off.

  Note: Adjusting the potentiometer can change the output frequency.
- Close the switch K3, the drive will run at 5.00Hz (the default value of P02.27) at the acceleration rate (P01.08). Open the switch K3, the drive will stop at the ramp mode set by P01.11.

Note: Jog again have to wait the interval period set by P02.28.

4 Parameter

4.1 Property of parameter

The following parameter description includes:

Parameter ID: code of parameter.

Parameter name: simple explanation of the parameter.

Parameter range: the range of the parameter's content, in 【 】is the default value.

Change mode: to define if the parameter can be modified, and under what condition can change the parameter.

Run&Stop	Write can be done at running and stop.
Stop Only	Write can be done only at stop.
Actual	Read only

4.2 Menu P01: Basic Parameter

ID	Function	Range【Default】	Change Mode
P01.01	Load default	0～1【0】	Stop Only

0: no action

1: load default

When drive is not in running state, load default value (except for motor's parameters) and cloning them to EEPROM if P01.01=1.

Note: Restore factory parameter can also be executed in fault status.

ID	Function	Range【Default】	Change Mode
P01.02	Motor control mode	0～1【0】	Stop Only

0: V/F

1: Open loop vector control

ID	Function	Range【Default】	Change Mode
P01.03	Control mode	0～2【2】	Stop Only

0: Control terminal

1: Comms.

2: Keypad

ID	Function	Range【Default】	Change Mode
P01.04	Reference source selector	0～6【5】	Run&Stop

0: Analogue reference

In this mode, the frequency can be adjusted by changing the value of analogue reference. It can work in voltage or current mode. Please refer to P01.05.

1: Preset speed reference

In this mode, the frequency can be adjust by changing P02.11 to P02.18 (preset1 ～ preset8).See menu2 for detail.

2: E-pot reference

UP/Down terminals are used to control the frequency. In this mode, two terminals among DI1 to DI4 should be set to 12 (output falling) and 13 (output rising) separately. For example:

To set DI2 as UP terminal and DI3 as DOWN terminal, the following operations are needed.

P04.12 = 12

P04.13 = 13

3: Serial communication

In this mode, the frequency can be adjusted by changing P02.11 (preset 1)

4: Keypad

The UP and DOWN switches are used to control the frequency. When the UP (DOWN) switch is pushed, the given frequency value will increase (decrease) continuously.

5: Potentiometer

In this mode, the frequency can be adjusted by turning the potentiometer on the keypad in the clockwise/counterclockwise direction.

6: PID

ID	Function	Range【Default】	Change Mode
P01.05	AI mode selector	0～6【6】	Stop Only

AI signal can be voltage or current mode:

0: 0mA～20mA

1: 20mA～0mA

2: 4mA～20mA (current loosing with trip)

3: 20mA～4mA (current loosing with trip)

4: 4mA～20mA (current loosing without trip)

5: 20mA～4mA (current loosing without trip)

6: 0V～10V

When it is setup as from 0 to 5, if current input is beyond 26mA, the drive will generate a trip F012.

When it is setup as 2 or 3, if current input less than 3mA, the drive will generate a trip F013.

ID	Function	Range【Default】	Change Mode
P01.06	Max. frequency	0.00Hz～300.00Hz【50.00】	Stop Only
P01.07	Min. frequency	0.00Hz～Max. frequency【0.00】	Stop Only

These parameters are used to select the Max. frequency and Min. frequency.

Note：The minimum frequency range is 0.00Hz to the maximum frequency, and the default is 0.00Hz. If P03.01=0 (reverse enabled), then the minimum frequency is constant for 0.00Hz.

ID	Function	Range【Default】	Change Mode
P01.08	Acceleration rate	0.0s～3600.0s【5.0】	Run&Stop
P01.09	Deceleration rate	0.0s～3600.0s【10.0】	Run&Stop

Acceleration rate is the time from 0.00Hz to maximum reference (P01.06).

Deceleration rate is the time from maximum reference (P01.06) to 0.00Hz.

For example:

P01.06 =100.00Hz, set up the maximum reference

P01.08=10.0s set acceleration rate

After starting, the drive output frequency is from 0.00Hz ramp to 50.00Hz the accelerating time is: 10.0s × (50.00Hz/100.00Hz) = 5.0s

ID	Function	Range【Default】	Change Mode
P01.10	Start mode	0～2【0】	Stop Only

0: Start directly

Start with the set start frequency (P02.19) and start frequency hold time (P02.20).

1: First DC injection, then start

First DC injection brake（Refer to P02.21, P02.22），then start with mode 0.

3: Catch a spinning

Automatic tracking the motor speed and direction, the running motor can start smoothly without impact.

ID	Function	Range【Default】	Change Mode
P01.11	Stop mode	0～3【0】	Stop Only

0: Ramp stop

When receiving the stop command, the drive ramp down to zero frequency.

1: Coast stop

When receiving the stop command, immediately terminate the output, and the drive is freedom to stop as the mechanical inertia.

2: Ramp stop + DC injection

When receiving the stop command, the drive reduces the output frequency according to deceleration rate. When it gets to the DC injection start frequency (P02.23), the DC injection brake begins.

The function about the stop DC injection brake, please refer to the explanation of P02.23, P02.24, P02.25.

3: Ramp stop + coast stop

When receiving the stop command, the drive reduces the output frequency according to deceleration rate. When it gets to the coast stop frequency (P02.26), immediately terminate the output and the drive is freedom to stop as the mechanical inertia.

ID	Function	Range【Default】	Change Mode
P01.12	Motor rated voltage	200V：0V～240V【220】 400V：0V～480V【380】	Stop Only
P01.13	Motor rated current	0.1A～drive rated current×1.2【by model】	Stop Only

ID	Function	Range【Default】	Change Mode
P01.14	Number of motor pairs of pole	0～4【0】	Stop Only

0: Automatically calculate motor pole pairs according to motor rated voltage and speed

P(Number of pole pairs) = 60 × F(rated frequency) / N(rated speed). Integer part is valid.

For example:

F (rated frequency) = 50.00Hz, N (rated speed) = 1460.

N = 60 * F / P

P = 60 * F / N = 60 * 50 / 1460 = 2.054

Therefore, the motor is 2-pole pairs motor (4-pole pairs motor).

1: Number of pole pairs (2 pole pairs motor)

2～4: Same as 1.

ID	Function	Range【Default】	Change Mode
P01.15	Motor rated frequency	1.00Hz～300.0Hz【50】	Stop Only
P01.16	Motor full load speed	0rpm～18000rpm【0】	Stop Only

This parameter is used to set parameters of controlled asynchronous motor.

To ensure the controlling performance, please set the parameters according to the parameters of motor nameplate. When P01.16 is set to 0, slip automatic compensation function is disabled.

ID	Function	Range【Default】	Change Mode
P01.17	Auto-tune	0～1【0】	Stop Only

0: No measurement

1: Auto-tune 1 (run a time)

Set P01.17=1, at first time to get enable and run command, the drive start to measure. Then, P01.17=0, the result will be stored to EEPROM.

ID	Function	Range【Default】	Change Mode
P01.18	Motor stator resistance	0.000Ω～60.000Ω【0】	Stop Only

After motor auto-tune finished, the parameter is refreshed. If the calculated resistance is over the maximum value, drive display F016 trip.

ID	Function	Range【Default】	Change Mode
P01.19	Motor power factor	0.00～1.00【0.85】	Stop Only

This parameter and motor rated current (P01.13) are used to calculate the motor rated torque current and magnetizing current.

The motor rated torque current is used to control by drive, while the magnetizing current is used to compensate the stator resistance in vector control mode.

ID	Function	Range【Default】	Change Mode
P01.20	Keypad lock function selector	0～2【0】	Run&Stop

0: Unlocked

1: All switches locked

2: Locked except “RUN” and “STOP/RESET” switches

The parameter is used to lock and unlock the keypad.

Lock the keypad: set P01.20 to non-zero and press “PRG” switch.

Unlock the keypad: press “ESC” switch more than 5 seconds, P01.20 reset and unlock the keypad. After unlocking the keypad, P01.21 will flash once on keypad display screen.

ID	Function	Range【Default】	Change Mode
P01.21	Jog acceleration rate	0.0s～3600.0s【10.0】	Run&Stop
P01.22	Jog deceleration rate	0.0s～3600.0s【10.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P01.23	Switch frequency	1kHz～15kHz【6】	Run&Stop

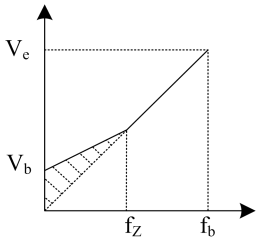
This parameter is used to set the carrier frequency of PWM output from drive. Carrier frequency affects noise and loss of motors. Please refer the table following:

Table 4-1 The carrier frequency changes on the influence of motors and drives

Carrier frequency	Lower → higher
Motor noise	More → less
Waveform of current	Worse → better
Motor temperature	Higher → lower
Drive temperature	Lower → higher
Leakage current	Less → more
Radiation	Less → more

ID	Function	Range【Default】	Change Mode
P01.24	Voltage boost	0.0%～30.0%【3.0】	Run&Stop
P01.25	Voltage boost stop frequency	0.0%～100.0%【50.0】	Stop Only

Voltage boost is used to improve the torque ability at low frequency. The higher voltage boost, the easier motor becomes hot and over current. For big load, increase the value; otherwise, decrease the value. When the value is set to zero, there is no torque improvement.



Ve: Motor rated voltage
V_b: Boost voltage＝Ve×P01.24
f_b: Motor rated frequency
f_z: Voltage boost stop frequency

Figure 4-1 Voltage boost

ID	Function	Range【Default】	Change Mode
P01.26	V/F control mode	0～3【0】	Stop Only

Different V/F characteristic is defined by P00.23 to meet the demanding from different load. There are three kinds of fixed curve and one user programmed line.

- When P01.26 is 0, user can define the different fold lines by setting of P02.01～P02.02. The default V/F is a straight line, as the line 0 in Figure 4-2.
- When P01.26 is 1, it is a 2.0 law ramp, curve1 in figure 4-2.
- When P01.26 is 2, it is a 1.7 law ramp, curve2 in figure 4-2.
- When P01.26 is 3, it is a 1.2 law ramp, curve3 in figure 4-2.

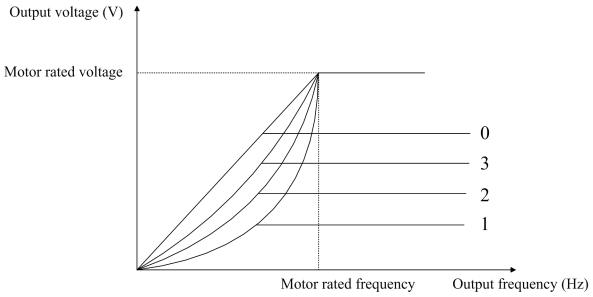


Figure 4-2 Motor V/F curve

ID	Function	Range【Default】	Change Mode
P01.27	Power up E-Pot reference	0～3【0】	Stop Only

The motorized pot modes are given in the table below:

Table 4-2 Power up E-Pot reference default value

P01.27	Mode	Comment
0	Zero at power up	● Reset to zero at each power-up. ● UP, DOWN and reset are active at all times.
1	Last value at power up	● Set to value at power-down when drive power-up. ● UP, DOWN and reset are active at all times.
2	Zero at power-up and only change when drive running	● Reset to zero at each power-up. ● UP, DOWN are only active when the drive is running. ● Reset is active at all times.
3	Last value at power-up and only change when drive running	● Set to value at power-down when drive powered-up. ● UP, DOWN are only active when the drive is running. Reset is active at all times.

ID	Function	Range【Default】	Change Mode
P01.28	Power up reference frequency	0～2【0】	Run&Stop

When reference source is the keypad reference (P01.04=4), after the drive power up, the output frequency is:

0: 0.00Hz

1: The running frequency when last powered off

2: Preset1

ID	Function	Range【Default】	Change Mode
P01.29	UP/DOWN acceleration rate	0.0s～250.0s【10.0】	Run&Stop

This parameter defines the time taken for the motorized pot function to ramp from 0 to 100.0%. Twice this time will be taken to adjust the output from −100.0% to +100.0%.

ID	Function	Range【Default】	Change Mode
P01.30	Digital mode, reference frequency when rerun	0～1【1】	Stop Only

0: Run again after stop, reference frequency is 0Hz.

1: Run again after stop, reference frequency is the last value.

Note:

- When P01.30=0, P01.27 and P01.28 power off saving function is invalid:
- No matter P01.27=1 or 3, reset E-pot reference when power up.
- No matter P01.28=1 or 2, reset keypad reference when power up.

4.3 Menu P02: Adjustive Parameter

ID	Function	Range【Default】	Change Mode
P02.01	V/F frequency	0.00Hz～P01.15【0.00】	Stop Only
P02.02	V/F voltage	0.0%～100.0%【0.0】	Stop Only

When P01.26=0, user can set up the parameters P02.01 and P02.02 to define the V/F curve, as the below diagram. By adding a point on the V/F curve showed as below, this can improve the performance during the acceleration under a specific application situation. Under the default setup, the V/F curve is a straight line.

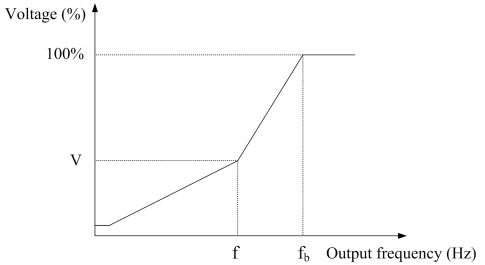


Figure 4-3 V point of V/F

ID	Function	Range【Default】	Change Mode
P02.03	Reserved	-	-
P02.04	Reserved	-	-

ID	Function	Range【Default】	Change Mode
P02.05	Active torque limit	0.0%～300.0%【200.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P02.06	Regenerative torque limit	0.0%～300.0%【150.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P02.07	Current limit	0%～300%【200】	Run&Stop

This parameter is a coefficient for current limit. It is efficient for both motor and generator torque. When P02.03 is 100%, the limited current is equal to motor rated current.

ID	Function	Range【Default】	Change Mode
P02.08	Current controller Kp gain	0.001～10.000【0.020】	Stop Only
P02.09	Current controller Ki time	0.00s～100.00s【0.20】	Stop Only

User can adjust dynamic responding characteristic of system by setting P02.08 and P02.09. It can shorten time of dynamic responding to increase proportion gain or decrease integral time. However, adjusting too more will cause system shocking.

Our suggestion: if default setting cannot meet requisition, please make sharp tuning with it: increase value of P02.08 at first to ensure that system does not shock, and then decrease P02.09 to speedup respond.

ID	Function	Range【Default】	Change Mode
P02.10	Slip compensation error	0rpm～1500rpm【0】	Run&Stop

The changing of motor load torque will generate error of motor slipping, and variety of motor speed. When motor speed does not match to references, adjusting P02.10 will fix it.

ID	Function	Range【Default】	Change Mode
P02.11	Preset 1	−P01.06～+P01.06【5.00】	Run&Stop
P02.12	Preset 2	−P01.06～+P01.06【10.00】	Run&Stop
P02.13	Preset 3	−P01.06～+P01.06【20.00】	Run&Stop
P02.14	Preset 4	−P01.06～+P01.06【30.00】	Run&Stop
P02.15	Preset 5	−P01.06～+P01.06【35.00】	Run&Stop
P02.16	Preset 6	−P01.06～+P01.06【40.00】	Run&Stop
P02.17	Preset 7	−P01.06～+P01.06【45.00】	Run&Stop
P02.18	Preset 8	−P01.06～+P01.06【50.00】	Run&Stop

With input terminal selection mode, one of preset 1 (P02.11)～preset 8 (P02.18) acts as setting frequency.

Note: Preset reference is prior to other mode.

For example:

Setting parameters as following:

P04.12 = 9 DI2 acts as preset select bit 0

P04.13 = 10 DI3 acts as preset select bit 1

P04.11 = 11 DI4 acts as preset select bit 2

As a result, preset has the following two operation modes:

- When preset is selected as reference, the relationship between selected preset and

terminal status is as Table 4-3 shown.

Table 4-3 Map1 between preset and preset select terminal

DI4 status (2 bit)	DI3 status (1 bit)	DI2 status (0 bit)	Frequency source selector
OFF	OFF	OFF	Preset 1 (P02.11)
OFF	OFF	ON	Preset 2 (P02.12)
OFF	ON	OFF	Preset 3 (P02.13)
OFF	ON	ON	Preset 4 (P02.14)
ON	OFF	OFF	Preset 5 (P02.15)
ON	OFF	ON	Preset 6 (P02.16)
ON	ON	OFF	Preset 7 (P02.17)
ON	ON	ON	Preset 8 (P02.18)

■ When preset is not set as reference, the relationship is as Table 4-4 shown.

Table 4-4 Map2 between preset and preset select terminal

DI4 status (2 bit)	DI3 status (1 bit)	DI2 status (0 bit)	Frequency source selector
OFF	OFF	OFF	Keep initial setting reference
OFF	OFF	ON	Preset 2 (P02.12)
OFF	ON	OFF	Preset 3 (P02.13)
OFF	ON	ON	Preset 4 (P02.14)
ON	OFF	OFF	Preset 5 (P02.15)
ON	OFF	ON	Preset 6 (P02.16)
ON	ON	OFF	Preset 7 (P02.17)
ON	ON	ON	Preset 8 (P02.18)

ID	Function	Range【Default】	Change Mode
P02.19	Start frequency	0.00Hz～50.00Hz【0.00】	Run&Stop
P02.20	Hold time for start frequency	0.0s～60.0s【0.0】	Run&Stop

Start frequency (f_s, P02.19) means the initiate speed at drive startup. Hold time for start frequency (T_1, P02.20) is the holding time at Fs. Refer to the below diagram:

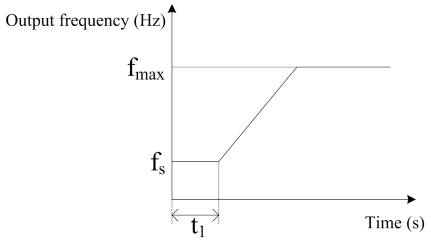


Figure 4-4 Start frequency & Hold time for start frequency

ID	Function	Range【Default】	Change Mode
P02.21	Start DC injection current	0.0%～100.0%【0.0】	Run&Stop
P02.22	Start DC injection time	0.0s～60.0s【0.0】	Run&Stop

The parameters P02.21 and P02.22 are valid when P01.10=1 only. Refer to the below diagram.

Start DC injection current (P02.21) is present of drive rated current. If start DC injection time (P02.22) is 0.0s, there is no process of DC injection.

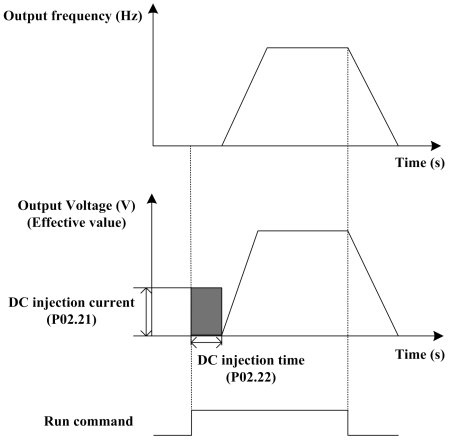


Figure 4-5 DC injection

ID	Function	Range【Default】	Change Mode
P02.23	DC injection start frequency	0.0%～20.0%【0.0】	Run&Stop
P02.24	Stop DC injection current	0.0%～100.0%【0.0】	Run&Stop
P02.25	Stop DC injection time	0.00s～60.00s【0.00】	Run&Stop

P02.23 is certain percent of P01.06.

P02.24 is certain percent of P01.13.

If Stop DC injection time is 0.00s, the drive will not DC inject.

ID	Function	Range【Default】	Change Mode
P02.26	Stop mode 3 frequency	0.00Hz～P01.06【0.00】	Run&Stop

This parameter indicates the stop frequency when P01.11 (Stop mode) = 3.

ID	Function	Range【Default】	Change Mode
P02.27	Jog frequency	0.00Hz～50.00Hz【0.00】	Run&Stop
P02.28	Jog interval time	0.1s～60.0s【1.0】	Run&Stop

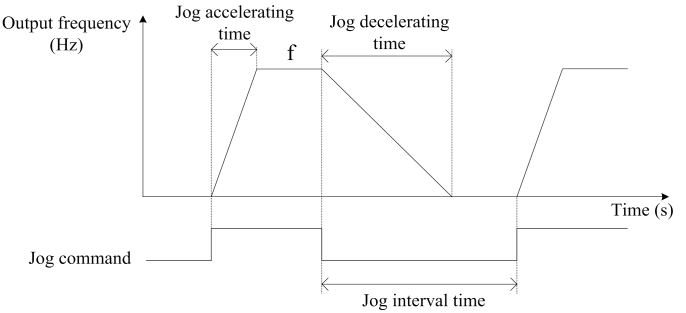
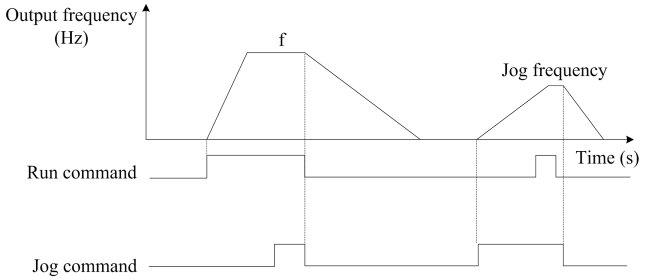


Figure 4-6 Jog

Jog interval time (P02.28) is from cancelling the last jog command to the next jog command coming into effect. The jog command is invalid during Jog interval time and the drive will run at 0.0Hz. If the command is always valid, it will carry out the jog command after finished the jog interval time.

Note:

- Under keypad control mode, pressing the switch MF will enable jog command with default setting. After releasing the switch MF, the drive will stop according to setting of P01.11. In terminal control mode, some of DI terminals can be programmed to realize jog forward or jog reverse function. So does serial communications.
- Jog accelerating/decelerating rate is according to acceleration/deceleration time (P01.08/P01.09).
- Jog command is NOT valid in running state.
- Running command is invalid during jogging.



ID	Function	Range【Default】	Change Mode
P02.29	Skip frequency	0.00Hz～P01.06【0.00】	Stop Only
P02.30	Band of skip frequency	0.00Hz～30.00Hz【0.00】	Stop Only

The skip frequency is available to prevent continuous operation at a speed that would cause mechanical resonance. When a skip reference parameter is set to 0.00, filter is disabled. The skip reference band parameter defines the frequency or speed range either side of the programmed skip reference, over which reference are rejected. The actual reject band is therefore twice that programmed in these parameters, the skip reference parameters defining the centre of the band. When the selected reference is within a band, the lower limit value of the band is the last reference. The last reference is limited among minimum frequency (P01.07) to maximum frequency (P01.06).

For example:

P01.06=50.00Hz, P01.07=0.00Hz,

P02.29=2.00Hz, P02.30=1.00Hz. (Other parameters with default)

When the given frequency is among 1.00Hz to 3.00Hz, the last frequency is 1.00Hz. When the given frequency is among 4.00Hz to 6.00Hz, the last frequency is 4.00Hz. The frequency out of skip reference band is not changed.

For example:

P01.06=50.00Hz, P01.07=0.10Hz，

P02.29=2.00Hz, P02.30=3.00Hz. (Other parameters with default)

When the given frequency is among 0.00Hz to 5.00Hz, the last frequency is 0.10Hz. The frequency out of skip reference band is not changed.

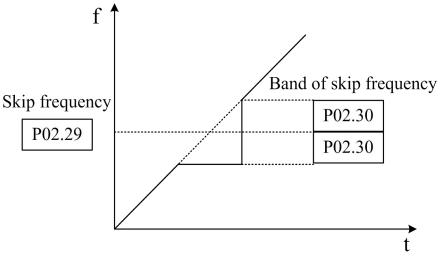


Figure 4-7 Skip frequency

Note: The drive output frequency can pass through skip reference band during acceleration and deceleration.

ID	Function	Range【Default】	Change Mode
P02.31	Threshold of zero speed	0.00Hz～P01.06【0.50】	Run&Stop

This parameter is used with P02.32 together.

Note: This parameter is no polar.

For example:

Set P02.31 = 0.50Hz, when the output frequency is ranged −0.5Hz to 0.5Hz, at the same time drive is running.

ID	Function	Range【Default】	Change Mode
P02.32	Frequency arrival range	0.00Hz～P01.06【2.50】	Run&Stop

As the below diagram, when output frequency of device is in the error, if defined to frequency arrived, DO terminal will output different level.

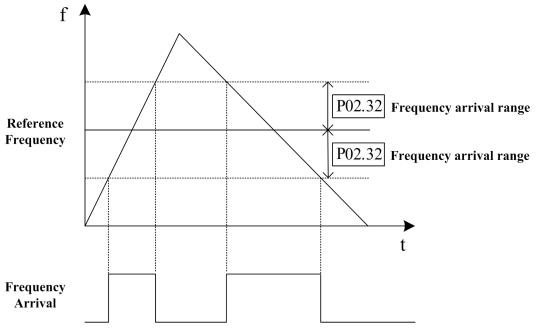


Figure 4-8 Frequency arrival & Band of frequency arrival

ID	Function	Range【Default】	Change Mode
P02.33	Output frequency detection value	0.00Hz～P01.06【0.00】	Run&Stop
P02.34	Output frequency detection delayed value	0.00Hz～P02.33【0.00】	Run&Stop

When |P05.09|≥P02.33 + P02.34, output frequency detection signal is valid.

When |P05.09|≤P02.33－P02.34, output frequency detection signal is invalid.

4.4 Menu P03: Accessorial Parameter

ID	Function	Range【Default】	Change Mode
P03.01	Run direction select	0～1【0】	Stop Only

This parameter is used to permit the drive reversing or not.

0: Reverse is enabled.

1: Reverse is disabled.

ID	Function	Range【Default】	Change Mode
P03.02	Deadtime for running direction change	0.0s～3000.0s【0.0】	Run&Stop

When drive changes run direction, it will hold at 0.00Hz for some time, which is set by P03.02. As the following diagram:

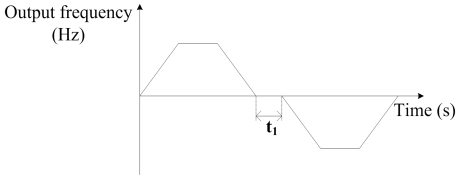


Figure 4-9 Dead time for running direction change

ID	Function	Range【Default】	Change Mode
P03.03	Communication break delay	0.1s～6000.0s【2.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P03.04	Auto energy saving control	0～1【0】	Stop Only

0: Disabled

1: Enabled

ID	Function	Range【Default】	Change Mode
P03.05	AVR control	0～2【1】	Stop Only

0: Off

1: On for all condition

2: On except ramp

When the input voltage deviates from rated value, setting P03.05 can maintain the constant output voltage. Therefore, AVR should act under normal circumstances, especially when input voltage is higher than the rated value. If set P03.05=0 at ramp stop, the decelerating time is

short, the operating current is slightly higher; set P03.05=1, the motor decelerates smoothly, operating current is smaller, but the decelerating time longer.

ID	Function	Range【Default】	Change Mode
P03.06	Auto-start after power off	0～1【0】	Stop Only
P03.07	Wait time for auto-start	0.0s～60.0s【0.0】	Run&Stop

Set P03.06=0, the drive cannot run automatically.

Set P03.06=1, the drive start to run automatically after time arrive setting of P03.07.

When set P03.06 = 1, with different control mode the auto-restart is different:

- Keypad control mode: the drive start to run automatically after time arrive setting of P03.07
- Terminal mode: the drive start to run automatically after time arrive setting of P03.07, only when running command is enabled.

Note: Please use this parameter CAREFULLY.

ID	Function	Range【Default】	Change
P03.08	Dynamic brake rate	0.0%～100.0%【50.0】	Run&Stop
P03.09	Dynamic brake DC voltage points	200V：350V～390V【390】 400V：650V～780V【780】	Stop Only

Brake unit works in the chopper way. P03.08 is used to define duty ratio of brake unit switch, the higher duty ratio the more apparent braking effect. Setting this parameter should be according to braking resistor value and power.

ID	Function	Range【Default】	Change
P03.10	Switch frequency auto adjust	0～1【1】	Run&Stop

0: Off

Switch frequency automatic adjustment is disabled.

1: On

Switch frequency automatic adjustment is enabled.

- If set P03.10=0, this function is disabled. Once it is disabled, if the IGBT temperature is too high, the drive will produce trip F009 immediately, LED on the display panel will be off, and IGBT will be blocked.
- If set P03.10=1, thermal protection will automatically adjust switch frequency according to IGBT temperature, in order to prevent the drive from overheating.

This parameter is set to 1, frequency converter thermal protection model according to automatically adjust the temperature will IGBT switch frequency, in order to prevent overheating frequency converter.

Note: Automatic adjustment range is limited to P01.23 value.

ID	Function	Range【Default】	Change Mode
P03.11	Low DC bus operation (only for 380V models)	0～1【0】	Stop Only

0: Off

1: On

This function is used to allow the 3-phase 380VAC input drive can run in single-phase 220VAC power source when the 3-phase AC input power is failure.

When 3-phase 380 VAC power failure, user can switch it to single-phase 220VAC backup power supply, so the drive can still run at derating conditions. For example, the function can guarantee elevator safety to stop at the door after a power failure.

Set P03.11=1, the drive DC bus voltage reduction will cause lower output power. At the same time, LED on keypad flashing indicates that the drive is using a backup lower power supply.

Note: If P03.11=1, voltage: <330VDC→display trip H005, <230VDC→display trip F003.

ID	Function	Range【Default】	Change Mode
P03.12	Comms. control word	0～65535【0】	Run&Stop

P03.12 is used to control the drive in serial communication control mode (P01.03=1).

P03.12 is serial communications control word in serial communication control mode. P03.12 is a 16-bit binary number. The meaning of each bit is shown as below table. It is displayed in decimal form on the keypad LED screen.

Table 4-5 Serial communications control word description

Bit	Function
0	Drive enable
1	Run
2	3-wire enable
3	Run forward
4	Run reverse
5	FWD/REV
6	Jog forward

Bit	Function
7	Jog reverse
8	Fault reset
9	Saving parameters
10	Clean the trip tack log
11	Enable comms. to write parameters
12	Reserved
13	Reserved
14	Reserved
15	Reserved

Bit 0～7: Start and stop logic control of the drive. In serial communication control mode (P01.03=1), the user can control the drive by changing serial communications control word (P03.12).

Bit 8: The bit changing from 0 to 1 will reset the drive (fault condition disappear and the failure code < F030).

Bit 9: The bit changing from 0 to 1 will bring parameters saved to the EEPROM.

Bit 10: The bit changing from 0 to 1 will clean error recording of the drive.

Bit 11: The bit changing from 0 to 1 will make selector parameters valid.

Table 4-6 Source reference is serial communication

Source parameters selector	
Analogue output function select	P04.07
Relay function	P04.18
DI1~DI4 function	P04.11～P04.14
3-wire mode	P04.17
AI function select	P04.01
PID main reference source	P06.01
PID reference source	P06.04
PID feedback source	P06.06
PID output select	P06.18

Note:

- These parameters are set through the display panel, it will be effective after pressing the switch PRG;
- Different destination parameter selector select the same destination parameter will cause function conflict, to avoid the conflict:
- When the parameter is set through the display panel, the function will not be effective

after pressing the switch PRG, and not enter into the next function code;

- When the parameter is set through serial communications, the drive will produce trip F021.

For serial communications, refer to Appendix 1 Communication.

ID	Function	Range【Default】	Change Mode
P03.13	Ramp hold by high	0～1【1】	Stop Only
P03.14	High voltage threshold	220V：350V～370V【370】 400V：750V～780V【780】	Stop Only

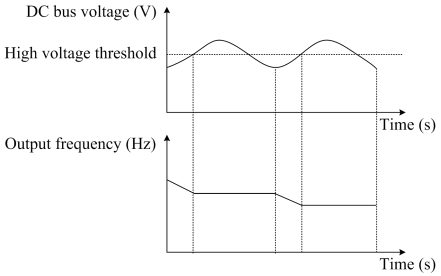


Figure 4-10 High voltage threshold

0: Disable

1: Enable

At ramp stop, the motor speed may appear lower than the drive's output frequency for the load inertia, and the motor may back power to the drive. It causes that the drive DC bus voltage increases. If no measures are taken, it will generate over-voltage protection.

When P03.13=0, the occurrence of the above situation, the bus voltage has been increased until over-voltage protection, display over voltage fault (F002).

When P03.31=1, high voltage threshold function is effective. This function is detecting the DC bus voltage during ramp stop, and compares with P03.14, if more than P03.14, the output frequency is held until it is lower than P03.14, decelerating on.

Note: When the external brake resistor is connected to the drive, recommend banning high voltage threshold.

ID	Function	Range【Default】	Change Mode
P03.15	Overload factor	0～(drive rated current/motor rated current)×100% 【100】	Run&Stop

This parameter is used for adjusting the detection time of overload protection.

Range of P03.15 changed according to drive rated current / Motor rated current.

Range: 0～(drive rated current÷motor rated current)×100%

Examples for specific protection time setting:

P01.13 (motor rated current) =5.0A, drive rated current=10.0A.

Range of P03.15 setting=0～(drive rated current/motor rated current)×100%=0 ~ 200%

If the ratio of drive rated current and motor rated current is the same, the greater the value of P03.15, the longer of motor overload protection detection time. As shown the below figure.

If set P03.15=0, overload protection is disabled.

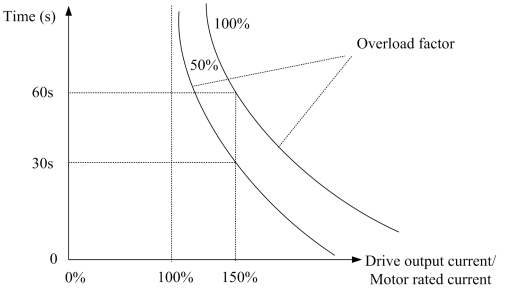


Figure 4-11 Overload protection

Default value is 100%, the detection time responding to overcurrent 150% is 60s.

At different output current rates, the overload protection at different times, if P03.15=100%, as the below table:

Table 4-7 Protection time

Drive output current/Motor rated current	Default protection time
110%	3000s
120%	2000s
130%	500s
140%	100s
150%	60s
160%	30s
170%	10s
180%	3s

(Specific protection time needs experiments to confirm. More than 1.8 times need protecting for 3s.)

For different settings of P03.15, the actual overload protection detection time = (overload protection detection time at P03.15 default value)×P03.15

When overload protection acts, it will generate F010 trip and the drive stops according to stop mode.

Note:

- If setting value exceeds default value, please run carefully to prevent overheating of the motor.
- If value of motor current setting is more than the drive current, overload protection calculated based on the drive rated current.

ID	Function	Range【Default】	Change Mode
P03.16	Auto reset	0～100【0】	Stop Only
P03.17	Auto reset delay	2.0s～20.0s【5.0】	Stop Only

Drives reset automatically if set P03.16 > 0 and reset time is defined by the value of P03.06. If P03.16=0, automatic reset is invalid. If P03.16=100, drives reset automatically for unlimited times.

Reset interval time is defined by P03.17.

P03.16 is valid for the same trip. It is invalid if reset times get to P03.16 or interval beyond 5 minutes, and the drive recover reset times to 0.

Manual reset will recover reset times to 0. The trip F018, F020 and upon F030 occur, automatic reset is invalid.

ID	Function	Range【Default】	Change Mode
P03.18	Address	0～247【1】	Run&Stop

This parameter is used to define the drive address on serial communicating bus. Commonly, the drive is slave machine. FI71 applies to Modbus RTU protocol.

ID	Function	Range【Default】	Change Mode
P03.19	Baud rate	0～5【3】	Run&Stop

0: 2.4KBPS

1: 4.8KBPS

2: 9.6KBPS

3: 19.2KBPS

4: 38.4KBPS

5: 57.6KBPS

This parameter is used for selecting communication baud rate, the unit is KBPS. Baud rate is a parameter that measure the communications speed. It indicates the number of transfer bit every second.

ID	Function	Range【Default】	Change Mode
P03.20	Comms. configuration	0～3【1】	Run&Stop

This parameter is used for setting communication data format.

0: 1-8-1, RTU, without checking

1: 1-8-2, RTU, without checking

2: 1-8-1, RTU, with odd bit checking

3: 1-8-1, RTU, with even bit checking

ID	Function	Range【Default】	Change Mode
P03.21	Communication break processing selector	0～3【0】	Stop Only

0: Not display trip code

1: Display trip code and clear the run command

Under communication control mode (P01.03=1), if P03.21 is set to 1 and communication break time more than the value P03.03 set, then F029 trip occurs. The drive stops and clear serial communication control word. After restore communications, F029 automatically reset.

ID	Function	Range【Default】	Change Mode
P03.22	Setting stop time at zero speed	0.0s～3000.0s【0.0】	Run&Stop

When the drive is running at zero speed (when the absolute value of output frequency is less than or equal to P02.31), the user can set this parameter to make the drive stop after the setting time. When the setting time is 0.0s, the parameter is invalid.

ID	Function	Range【Default】	Change Mode
P03.23	Input phase loss filter time	0.0s～600.0s【0.1】	Stop Only

When the power supply is unstable, set this parameter filtering to prevent the input phase loss misinformation. If P03.23 is set to 0, input phase loss protection is disabled.

ID	Function	Range【Default】	Change Mode
P03.24	Output phase loss protection	0～1【0】	Stop Only

0: Off

1: On

The parameter is used to select that drive output phase loss protection is enabled or disabled. When P12.10=1, output phase loss protection is disabled and the drive will not initiate a F005 trip. Please change this parameter value carefully.

ID	Function	Range【Default】	Change Mode
P03.25	Alarm enable	0～1【1】	Stop Only

The parameter is used to select that the drive alarm function is enabled or disabled.

0: Disable

1: Enable

ID	Function	Range【Default】	Change Mode
P03.26	Current limit protection	0～3【0】	Stop Only

0: Enable

1: Disable current limit protection above fundamental frequency

When the motor is running above fundamental frequency, the current limit factor will automatically decrease according to the output frequency in order to maintain constant power. If set P03.26=1, this function is disabled.

2: Disable fast acceleration/deceleration current limit protection

In order not to occur trip F001 (over current), the drive will predict that the current will arrive a value at fast acceleration/deceleration. If the prediction of current value is larger, it will automatically adjust the acceleration/deceleration slope. This function is valid when the acceleration/deceleration time is less than one second.

If set P03.26=2, this function is disabled.

3: Disable

Note: If P03.26=1, current limit protection is disabled above fundamental frequency. It may damage the motor. Please use this function carefully.

4.5 Menu P04: Terminal Parameter

ID	Function	Range【Default】	Change Mode
P04.01	AI function selector	0～20【20】	Stop Only

0: No function

1: Run forward (FWD)

2: Run reverse (REV)

3: Jog forward

4: Jog reverse

5: Run

6: FWD/REV

7: 3-wire enable

8: Coast stop

9: Preset select bit 0

10: Preset select bit 1

11: Preset select bit 2

12: UP

13: DOWN

14: Reset E-pot output

15: External trip

16: Reset trip

17: Control channel is switched to terminal

18: PID integral keep

19: PID output keep

20: Analogue reference frequency

Note:

- Terminal AI can be used as analogue input terminal and digital input terminal. When the AI terminal is used as digital input terminal, the upper limit of voltage is 6V and the lower limit of voltage is 2V.
- 0～19: Digital input function, refer to P04.11～P04.14 for details.
- 20: Analogue input function, analogue reference frequency.

ID	Function	Range【Default】	Change Mode
P04.02	AI offset	−100.0%～+100.0%【0.0】	Run&Stop

Analogue input can increase a offset (−100%～+100%). If the sum of analogue input and offset is more than the range ±100%, the result is limited to ±100%.

ID	Function	Range【Default】	Change Mode
P04.03	AI scaling	0.000～20.000【1.000】	Run&Stop

This parameter is used to scale the analogue input if so desired.

ID	Function	Range【Default】	Change Mode
P04.04	AI upper limit	0.0%～100.0%【100.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P04.05	AI lower limit	0.0%～P04.04【0.0】	Run&Stop

ID	Function	Range【Default】	Change Mode
P04.06	AI filtering time	0.00s～10.00s【0.10】	Run&Stop

The parameter is used to set AI filtering time. The greater the value of P04.06, the filtering effect is more stable, but the processing time is longer and response is slow. On the contrary, the smaller the value of P04.06, the response time is shorter but the filtering effect is worse.

Note: The user can adjust AI resolution by setting the second decimal place of P04.06 value. For example, if P04.06 is set to 0.11s, AI resolution is 2/1000; if P04.06 is set to 0.12s, AI resolution is 3/1000; if P04.06 is set to 0.19s, AI resolution is 10/1000=1/100, minimum resolution. When the external disturbance is severe, in order to stabilize AI input, the user can reduce AI resolution by setting this parameter.

ID	Function	Range【Default】	Change Mode
P04.07	Analogue output function selector	0～16【1】	Run&Stop

This parameter is used to assign analogue output to which parameter.

0: No function

1: Output frequency

2: Reference frequency

3: Output current

4: Motor speed

5: DC bus voltage

6: Output voltage

7: Drive healthy

No trips generated after power on, the output is 10V.

8: Drive is active

When the drive is running, the output is 10V.

9: External trip

If External trip occurs, the output is 10V.

10: Under voltage trip

When the DC bus voltage level below the under voltage limit, the output is 10V.

11: Alarm indicator

When the drive is alarming, the output is 10V.

12: Frequency reached

When the output frequency is in the frequency arrival range, the output is 10V.

13: Torque limit is working

When torque reference is limited by torque limit, the output is 10V.

14: Overload is calculating

When the drive output current is more than 1.3 times motor rated current and keeps more than 5s, the motor overload detection signal is valid. The output is 10V.

15: At zero speed

When the output frequency is less than P02.31, the output is 10V.

16: Output frequency

When the output frequency signal is valid, the output is 10V.

AO terminal can be used as analogue output terminal and digital output terminal.

When select 1 to 6 functions, analogue output 0V to 10V, and 100% output:

1: Output frequency	Maximum running frequency
2: Reference frequency	Maximum running frequency
3: Output current	Drive rated current
4: Motor speed	The motor speed (rpm) is calculated according to the maximum frequency
5: DC bus voltage	Drive rated voltage
6: Output voltage	Motor rated voltage

When select 7 to 16 functions, digital output function. When the digital function is valid, the analogue output is 10V; when the digital function is invalid, the analogue output is 0V.

ID	Function	Range【Default】	Change Mode
P04.08	Analogue output scaling	0.000～20.000【1.000】	Run&Stop

This parameter is used to enlarge the analog output according to user requirements.

ID	Function	Range【Default】	Change Mode
P04.09	Analogue input operation	-100.0%～+100.0%【0.0】	Actual

Analogue input operation display (P04.09) is used to indicate the analogue input operation result. It can be PID reference.

Note: When analogue input operation as PID reference, P04.01 should be set as analogue reference frequency.

ID	Function	Range【Default】	Change Mode
P04.10	Reserved	-	-

ID	Function	Range【Default】	Change Mode
P04.11	DI1 function	0～19【1】	Stop Only
P04.12	DI2 function	0～19【2】	Stop Only
P04.13	DI3 function	0～19【3】	Stop Only
P04.14	DI4 function	0～19【16】	Stop Only

0: No function

1: Run forward (FWD)

2: Run reverse (REV)

3: Jog forward

4: Jog reverse

5: Run

6: FWD/REV

7: 3-wire mode enable

8: Coast stop

9: Preset select bit 0

10: Preset select bit 1

11: Preset select bit 2

12: UP

13: DOWN

14: Reset of E-pot output

15: External trip

16: Reset trip

17: Control channel is switched to terminal

18: PID integral keep

19: PID output keep

Description:

- 0: No function
- 1～8: Operation modes
- 9～11: Preset select 0/1/2

  When preset is selected as reference source, 8 presets can be selected.

  Note: Preset is prior to other reference. When one or more of DI1 to DI4 is set as preset select bit 0 (9), preset select bit 1 (10) or preset select bit 2 (11) and at the same time, terminals are active, and then the source reference automatically switches to preset. Refer to the explanation of parameters P02.11 to P02.18 for details.
- 12～13: UP/DOWN

  E-pot output is controlled by the 2 bits, which increases or decreases with P01.08 or P01.09.

  Note: If UP and DOWN act at the same time, E-pot holds its current value.
- 14: Reset of E-pot output

  Reset E-pot output, E-pot reference slope will not change.
- 15: External trip

  When set DI as external trip function, trip F018 is displayed, once DI is connected with common part.
- 16: Reset trip

  Set DI as reset trip function. When drive is in fault status and the fault code is less than F030, once DI is connected to common part, the trip is cleared.
- 17: Control channel is switched to terminal

  Once DI is set as this function. When DI is connected to common part, the control mode is changed to terminal control from current control mode. Ex. P01.03 = 2, DI3 is set as control channel switched to terminal (DI3 = 17), when DI3 is connected with common part, then drive is controlled by terminal.
- 18: PID integral keep
- 19: PID output keep

ID	Function	Range【Default】	Change Mode
P04.15	DI common select	0～1【0】	Stop Only

This parameter is used to define common point of digital input terminal.

0: Common point is 0V (source);

1: Common point is +24V (sink).

ID	Function	Range【Default】	Change Mode
P04.16	DI inverter	0～5【0】	Stop Only

P04.16 = 0, DI1 to DI4 are not inverted.

P04.16 = 1, DI1 is inverted.

P04.16 = 2, DI2 is inverted.

P04.16 = 3, DI3 is inverted.

P04.16 = 4, DI4 is inverted.

P04.16 = 5, DI1 to DI4 are inverted.

ID	Function	Range【Default】	Change Mode
P04.17	Terminal control mode selector	0～2【0】	Stop Only

0: 2-wire control mode

1: 3-wire control mode 1

2: 3-wire control mode 2

When 3-wire control mode 1 (P04.17=1) is selected, DI1, DI2, DI3 are automatically set as below:

DI1 is STOP switch SB1 (normal closed), level-triggered, P04.11=7

DI2 is FWD switch SB2 (normal open), edge-triggered (latched), P04.12=1

DI3 is REV switch SB3 (normal open), edge-triggered (latched), P04.13=2

Wiring is as below figure 4-12:

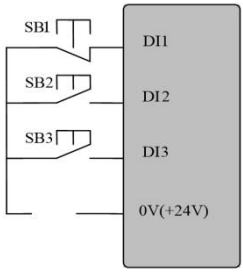


Figure 4-12 3-wire control mode 1 connection

SB1: Stop button SB2: Run Forward button SB3: Run Reverse button

Press SB2, drive is running forward and the order is latched;

Press SB3, drive is running reverse and the order is latched;

Press SB1, the drive stops.

When (P04.17=2) 3-wire control mode 2 is selected, DI1, DI2, DI3 are automatically set as below:

DI1 is RUN switch SB1 (normal open), edge-triggered (latched), P04.11=5

DI2 is STOP switch SB2 (normal closed), level-triggered, P04.12=7

DI3 is FWD/REV Switch K, level control, P04.13=6

Wiring is as below figure 4-13:

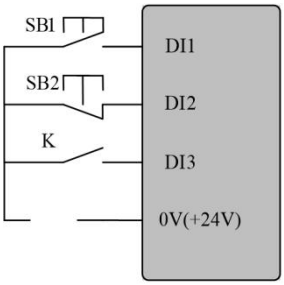


Figure 4-13 3-wire control mode 2 connection

SB1: Run button SB2: Stop button K: Direction switch

Press SB1, drive is running, order is latched.

K is open, run forward; K is closed, run reverse.

Press SB2, the drive stops.

Note: After pressing SB2, the drive stops. Release the SB2 button, the drive still stops. Have to trigger the SB1 again, and then the drive will run.

ID	Function	Range【Default】	Change Mode
P04.18	Relay function	0～10【1】	Run&Stop

0: No function

1: Drive healthy

No trips generated after power on, the relay acts;

2: Drive is active

IGBT working, the drive is running, the relay acts;

3: External trip

External fault alarm occurs, the relay acts;

4: Under voltage trip

When the DC bus voltage level below the under voltage limit, the relay acts;

5: Alarm indicator

The relay acts with alarm Hxxx;

6: Frequency arrival

When output frequency is in band of frequency arrival, the relay acts;

7: Torque limit is working

When torque reference is limited by torque limit, the relay acts;

8: Overload is calculating

When the drive output current is more than 1.3 times motor rated current and keeps more than 5s, the motor overload detection signal is valid. The relay acts.

9: At zero speed

When output frequency lower than P02.22, the relay acts.

10: Output frequency

When the output frequency signal is valid, the relay acts.

ID	Function	Range【Default】	Change Mode
P04.19	Relay inverter	0～1【0】	Run&Stop

The relay status is controlled by P04.18:

If P04.19 is set to 0, Relay1 status inverter is disabled.

If P04.19 is set to 1, Relay1 status inverter is enabled.

4.6 Menu P05: Display Parameter

ID	Function	Range【Default】	Change Mode
P05.01	Trip 1	0～99【0】	Actual
P05.02	Trip 2	0～99【0】	Actual
P05.03	Trip 3	0～99【0】	Actual
P05.04	Last trip	0～99【0】	Actual

The drive records its last 4 times trip, and P05.04 records the last trip, while P05.01 records the first trip. When there is a new trip (e.g. the fifth trip), the trip will be recorded in P05.04; meanwhile, all the old trip record menu number will decrease. And “the first trip” will be cleared, as “the second trip” will replace it recorded as the first trip. The trip character format is “Fxxx”, “xxx” is the trip number. E.g., there is over current trip, which trip number is 1, and then drive will display F001. Refer to Chapter 5 for details.

ID	Function	Range【Default】	Change Mode
P05.05	Last trip frequency	−max. frequency～+max. frequency【Actual】	Actual
P05.06	Last trip current	0.0A～3× motor rated current【Actual】	Actual
P05.07	Last trip DC bus voltage	200V: 0 to 415V【Actual】 400V: 0 to 830V【Actual】	Actual

The three parameters are used to indicate drive running frequency, current and DC bus voltage when the last trip occurred.

ID	Function	Range【Default】	Change Mode
P05.08	Setup reference	−max. frequency～+max. frequency【Actual】	Actual
P05.09	Running frequency	−max. frequency～+max. frequency【Actual】	Actual
P05.10	Output voltage	0V～drive rated voltage【Actual】	Actual
P05.11	DC bus voltage	200V: 0 to 415V【Actual】 400V: 0 to 830V【Actual】	Actual
P05.12	Output current	0.0A～3×Motor rated current【Actual】	Actual
P05.13	Torque current	−3×Motor rated current～+3×Motor rated current【Actual】	Actual

P05.08 indicates drive setting frequency.

P05.09 indicates drive output frequency.

P05.10 indicates drive output voltage.

P05.11 indicates drive DC bus voltage.

P05.12 indicates drive output current.

P05.13 indicates torque current.

ID	Function	Range【Default】	Change Mode
P05.14	Heatsink temperature	−25℃～127℃【Actual】	Actual
P05.15	IGBT junction temperature	−25℃～200℃【Actual】	Actual

P05.14 indicates heatsink temperature.

IGBT junction temperature is calculated by heatsink temperature and drive power part thermal module, which is displayed through the parameter. Moreover, the temperature can be used to change drive switch frequency to decrease power device heat loss.

ID	Function	Range【Default】	Change
P05.16	AI level	0.0%～100.0%【Actual】	Actual

This parameter displays the level of the analogue input signal. The value ranges from 0.0% to 100.0%, which is corresponding to P04.01 setting range.

ID	Function	Range【Default】	Change
P05.17	AO level	0.0%～100.0%【Actual】	Actual

This parameter displays the level of the analogue output signal.

For example：AO output voltage＝5V， P05.17= $\frac{5V\times100\%}{10V}$ =50.0%

ID	Function	Range【Default】	Change Mode
P05.18	DI1 status	0～1【Actual】	Actual
P05.19	DI2 status	0～1【Actual】	Actual
P05.20	DI3 status	0～1【Actual】	Actual
P05.21	DI4 status	0～1【Actual】	Actual

Indication of DI1, DI2, DI3 and DI4 input state. When digital input terminal is disconnected with common point, display 0; when digital input terminal is connected with common point, display 1.

ID	Function	Range【Default】	Change Mode
P05.22	Relay status	0～1【Actual】	Actual

The parameter is used to display relay status: 0 means relay opened, 1 means relay closed.

ID	Function	Range【Default】	Change Mode
P05.23	Model code	0～255【Actual】	Actual

ID	Function	Range【Default】	Change Mode
P05.24	Power MCU software version	0～99.99【Actual】	Actual
P05.25	Control MCU software version	0～99.99【Actual】	Actual

4.7 Menu P06: PID Parameter

ID	Function	Range【Default】	Change Mode
P06.01	Main reference source	0～6【0】	Run&Stop

The percentage of parameter setting value and the maximum value is PID main reference.

0: Zero input

1: Preset 7

2: Preset 8

3: Keypad potentiometer

4: Analogue input operation

5: E-pot

6: Keypad

ID	Function	Range【Default】	Change Mode
P06.02	PID enable	0～1【0】	Run&Stop

The parameter is used to enable or disable PID.

0: PID controller is disabled, PID output is 0.

1: PID controller is enabled.

ID	Function	Range【Default】	Change Mode
P06.03	Reserved	-	-

ID	Function	Range【Default】	Change Mode
P06.04	PID reference source	0～6【0】	Run&Stop

PID reference source is in the form of percentage as PID input.

0: Zero input

1: Preset 7

2: Preset 8

3: Keypad potentiometer

4: Analogue input operation

5: E-pot

6: Keypad

ID	Function	Range【Default】	Change Mode
P06.05	PID reference inverter	0～1【0】	Run&Stop

0: Off

1: On

The parameter can be used to invert the PID reference.

ID	Function	Range【Default】	Change Mode
P06.06	PID feedback source	0～6【0】	Run&Stop

PID feedback source is in the form of percentage as PID feedback input.

0: Zero input

1: Preset 7

2: Preset 8

3: Keypad potentiometer

4: Analogue input operation

5: E-pot

6: Keypad

ID	Function	Range【Default】	Change Mode
P06.07	PID feedback inverter	0～1【0】	Run&Stop

0: Off

1: On

The parameter can be used to invert the PID feedback.

ID	Function	Range【Default】	Change Mode
P06.08	PID reference slew rate	0.0s～3200.0s【0.0】	Run&Stop

This parameter defines the time taken for the reference input to ramp from 0.0 to 100.0%.

ID	Function	Range【Default】	Change Mode
P06.09	PID proportional gain	0.000～4.000【1.000】	Run&Stop

This is the proportional gain applied to the PID error.

Proportional gain depends on the present error. Proportional adjustment immediately responds to error. Once error generates, the PID controller is enabled. It makes the error of controlled variable reduced and the proportional gain increase for reducing the error.

A high proportional gain results in a large change in the output for a given change in the error. If the proportional gain is too high, the system can become unstable. In contrast, a small gain results in a small output response to a large input error, and a less responsive or less sensitive controller.

Note: If P06.09 is set to zero then the proportional action is disabled.

ID	Function	Range【Default】	Change Mode
P06.10	PID integral gain	0.000～4.000【0.500】	Run&Stop

This is the gain applied to the PID error before being integrated.

As long as the error is not zero, the integrator attempts to minimize the error by adjusting the process control inputs. The control action will not change until the error is zero. The system is stable and the error is disappeared. The integral action is controlled by the integral gain. If integral gain is high, the integral action is better and dynamic response is fast. If not, the integral action is weak and the dynamic response is slow.

If P06.10 is set to zero then the integral action is disabled.

ID	Function	Range【Default】	Change Mode
P06.11	PID derivative gain	0.000～4.000【0.000】	Run&Stop

This is the gain applied to the PID error before being differentiated.

PID derivative gain is a prediction of future errors and based on current rate of change. If the PID derivative gain is set correctly, the overshoot and adjusting time will be reduced. Derivative action cannot be used independently. It is used with proportional action or integral action together.

Note:

- If the parameter is set too big then the derivative action is too strong. It may be cause oscillating and the PID output with a “peak” or “sudden jump”.
- If P06.11 is set to zero, then the derivative action is disabled.

ID	Function	Range【Default】	Change Mode
P06.12	PID upper limit	0.0%～100.0%【100.0】	Run&Stop
P06.13	PID lower limit	-100.0～P06.12【0.0】	Run&Stop
P06.14	P06.12 and P06.13 function selector	0～1【0】	Run&Stop

If P06.14=0, then P06.12 defines the positive maximum output of PID controller and P06.13 defines the positive minimum output or negative maximum output of PID controller.

If P06.14=1, then P06.12 defines the positive or negative maximum output of PID controller.

I.e.: P06.14＝0, P06.13≤P06.18≤P06.12; P06.14＝1, −P06.12≤P06.18≤P06.12

ID	Function	Range【Default】	Change Mode
P06.15	PID output scaling	0.000～4.000【1.000】	Run&Stop

The PID output is scaled by this parameter before being added to the main reference. After the addition to the main reference, the output is automatically scaled again to match the range of the destination parameter.

ID	Function	Range【Default】	Change Mode
P06.16	PID integral hold	0.000～4.000【1.000】	Run&Stop

0: Off

1: On

If P06.16=1, PID integral gain remains the same.

ID	Function	Range【Default】	Change Mode
P06.17	PID output hold	0.000～4.000【1.000】	Run&Stop

0: Off

1: On

If P06.17=1, PID output remains the same.

ID	Function	Range【Default】	Change Mode
P06.18	PID output selector	0.000～4.000【1.000】	Run&Stop

ID	Function	Range【Default】	Change Mode
P06.19	PID output level	-100.0%～100.0%【0.0】	Actual

This parameter monitors the output of the PID controller. The value of the parameter displays as percentage. The range is limited by P06.12, P06.13, P06.14.

ID	Function	Range【Default】	Change Mode
P06.20	PID error level	-100.0%～100.0%【0.0】	Actual

This parameter monitors the error of the PID controller.

PID error = PID reference-PID feedback

ID	Function	Range【Default】	Change Mode
P06.21	Sleep mode enable	0～1【0】	Stop Only

0: Off

1: On

ID	Function	Range【Default】	Change Mode
P06.22	Sleep channel selector	0～1【0】	Stop Only

0: No function

1: Output frequency

ID	Function	Range【Default】	Change Mode
P06.23	Sleep threshold	0.0%～100.0%【0.0】	Stop Only

When P06.22 is set to 1, the absolute value of output frequency is less than P06.23 and keeps more than time set by P06.24, the drive stops output and the keypad LED screen alarms H007, then the drive enter into sleep mode.

ID	Function	Range【Default】	Change Mode
P06.24	Sleep delay time	0.0s～3000.0s【30.0】	Stop Only

ID	Function	Range【Default】	Change Mode
P06.25	Wakeup mode	0～1【0】	Stop Only

When P06.25=0, the absolute value of PID feedback is less than P06.27 and keeps more than time set by P06.28, then the drive will turn to wakeup mode from sleep mode and rerun according to the previous setting parameters.

When P06.25=1, the absolute value of PID feedback is more than P06.27 and keeps more than time set by P06.28, then the drive awaken.

ID	Function	Range【Default】	Change Mode
P06.26	Wakeup channel selector	0～1【0】	Stop Only

0: No function

1: PID feedback

ID	Function	Range【Default】	Change Mode
P06.27	Wakeup threshold	0.0%～100.0%【0.0】	Stop Only

ID	Function	Range【Default】	Change Mode
P06.28	Wakeup delay time	0.0s～3000.0s【30.0】	Stop Only

ID	Function	Range【Default】	Change Mode
P06.29	Sleep status indicator	0～1【Actual】	Actual

If P06.29=1, it indicates the drive is in the sleep mode.

5 Troubleshooting

5.1 Faults and corrective actions

When drive trip (fault) happens, the display panel will display the corresponding Trip code, drive output is disabled. FI71 trip list is in the table 5-1, the range is F001～F043. If there is a trip happens, please check according the guide in table 5-1, and record the faults phenomena carefully, if need service support, please contact local distributor or supply factory.

Table 5-1 Faults and corrective actions

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F001	Over current Turn off the IGBTs, can reset after 10s when trip removed	Output shortage	Checking the motor cable and electric connection
		Accelerating or decelerating time too short	Use appropriate ramp time
		When the motor axis is not static, run the drive	By P01.10, set the start mode is spinning
		Internal fault	Contact service
F002	Over voltage Turn off the IGBTs, can reset after 1s when trip removed	Supply voltage is too high	Make sure the power supply is in the spec. arrange
		Load change suddenly	Avoid to change load suddenly
		Decelerating rate is too short	Increase the deceleration rate and add a suitable brake resistor
		Internal fault	Contact service
F003	Under voltage Turn off the IGBTs, can auto reset after trip removed	Supply voltage is low	Checking the power supply
		During drive power off	Normal, and not log in the trip tracking
		Internal fault	Contact service

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F004	Input phase loosing Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	Power supply phase lost	Checking the power supply and cabling
F005	Output phase loosing Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	The output phase lost	Checking the output voltage and cabling
		Internal fault	Contact service
F006	Brake unit shorted Turn off the IGBTs, can reset after 10s when trip removed	Brake resistor trouble	Checking the brake resistance and the cabling
		Internal fault	Contact service
F007	Heatsink1 over heat, turn off the IGBTs, can reset after 1s when trip removed	Environmental temperature is high	Reducing the environmental temperature
		Air flow channel blocked	Clean the air flow channel
		Fan failed	Replace the fan
		Internal fault	Contact service
F008	Reserved	–	–
F009	IGBT junction over heat turn off the IGBTs, can reset after 1s when trip removed	Switch frequency is higher	Reduce the switch frequency
		Frequently accelerating and decelerating under heavy load condition	Replaced by a larger drive; increase the ramp time; enable the auto adjust function on switch frequency
		Internal fault	Contact service

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F010	Motor overload Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	V/F is not right	Setup V/F and boost correctly
		Supply voltage is lower	Checking the power supply and cabling
		Motor axis is stocked or the load changing is too big	Checking the load
		The factor for motor overload protecting (P12.12) is lower	Correct the factor
F011	Reserved	–	–
F012	AI over current Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	AI input current is over 26mA	Checking AI input
F013	AI1 input loosing Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	AI input current is smaller than 3mA	Checking AI input
F014	User 24V overload Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	Output current of 24V and DO1is over 100mA	Checking if there is shortage on the output of 24V
F015	Reserved	–	–

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F016	Auto-tune wrong can reset after 1s when trip removed	The drive size can't match the motor power size	Change the drive
		Set the wrong motor data	Reset up the motor data by motor nameplate
		Before the auto-tune finished, stop the drive	Wait until finished
F017	Output terminal short circuit when power up	Output terminal short circuit	Check wiring and motor insulation
		Current detection fault	Contact service
F018	External fault Stop the drive according to the Stop mode, turn off the IGBTs, can reset after 1s when trip removed	An external fault input from one of the DI terminals	Checking the external equipments
F019	Reserved	–	–
F020	EEPROM read & write failure	Wrong happens when read & write the control word	Press the STOP switch to reset the drive and try again; contact service
		Internal fault	Contact service
F021	Destination fault can reset after 1s when trip removed	Wrong parameter destination	Checking if these parameters are set to the same function, correct it, press STOP switch to reset. Load default, and reset the drive
F022～F032	Reserved	–	–
F033	Current sense fault Turn off IGBTs, can't reset	Internal fault	Contact service
F034	Reserved	-	-

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F035	MCU can't receive the data from DSP Turn off IGBTs, can't reset	Software abnormal	Contact service
		MCU or DSP failed	Contact service
F036	MCU receives wrong data from DSP Turn off IGBTs, can't reset	External disturbance	Proper cable layout
		Internal fault	Contact service
F037	Over current during power up Turn off IGBTs, can't reset	Earth fault or current sense circuit failure	Checking the output cabling and motor; Contact service
F038	Wrong drive model Turn off IGBTs, can't reset	Internal fault	Contact service
F039	Inner thermister failed Turn off IGBTs, can't reset	IGBT damaged	Contact service
F040	Software abnormal Turn off IGBTs, can't reset	Software running wrong	Contact service
		MCU or DSP failed	Contact service
F041	Watchdog failure Turn off IGBTs, can't reset	Software wrong	Contact service
		MCU or DSP failed	Contact service
F042	Reserved	–	–
F043	EEPROM internal fault Turn off IGBTs, can't reset	MCU or DSP failed	Contact service
		EEPROM failed	Contact service
F044～F049	Reserved	–	–

Note: In the stop state, when the drive power off and DC bus voltage is less than the under-voltage point, the keypad LED screen displays "OFF", warning the inverter power. Only in the running state, the drive alarms under voltage trip "F003".

All above trips can be categorized into 4 types, details in table 5-2:

Table 5-2 Fault category

Type	Trips	Description
Auto reset	F003	F003 (under voltage), can auto reset the drive base on the actual DC bus voltage.
Can not reset	≥F030	Fault from inner failure (except external disturbance).
EEPROM read & write	F020	When the trip happens, can load default, and then reset the drive.
Odinary trip 1	F001, F006	Can reset after 10s when trip removed
Odinary trip 2	Other trips	Can reset after 1s when trip removed

Note:

- F003 can be auto reset, the under voltage threshold level and hysteresis is different with different rated voltage level.
- When F003 happens, drive starts to save the parameters.
- Only when the drive is active, the trip F003 will be recorded in the fault tracking log.
- Menu P5 is for trip tracking.

5.2 Alarm and treatment

When drive is alarming, the drive will keep running and the display panel will display relative Alarm Code (Hxxx). The alarm code will keep flashing for 3 seconds then turn over to the normal display, the normal display will flash for 3 second then back to flash alarm code, will keep this cycle until the alarm is removed.

Table 5-3 Alarm codes and treatments

Code	Description	Possibilities	Treatments
H001	Current limit is working	Output current is limited at: P02.03×P01.13	Check the motor cable
			Properly increase the ace. and deceleration rate
			Set P01.10 to be the correct start mode (spinning)
H002	Reserved	–	–
H003	Heatsink is hot	Environment temperature is higher	Reduce the environment temperature
		Air flow channel stocked	Clean the flow channel
		Fan failed	Replace the fan

Code	Description	Possibilities	Treatments
H004	IGBT junction temperature is high	Frequently accelerating and decelerating	Modify the parameter setup
			Use bigger drive
H005	Low DC bus operation (only for 400V models)	Power supply voltage is low	Check the power supply
H006	Reserved	-	-
H007	Sleep status	The drive is in the sleep mode	Exit sleep mode
H008～H009	Reserved	-	-

5.3 Other issues

During the drive operation, maybe some other issues can happen and not caused by drive itself, so the drive will not display Trip or alarm code. Customer can check the issues following the suggestion in below table 5-4.

Table 5-4 Other issues

Issues	Reasons	Checking And Treatment
Motor does not start	Power issue	Checking input and output voltage and unbalance level
		If the motor connection is correct
	Control part	Run order input active?
		If both FWD and REV active same time?
		If the reference is 0?
		If the reference source is analogue, is there correct analogue input signal?
		If set P04.15 correctly? (correct common point)
	Parameter setup issue	If the control channel is set correctly? (P01.03)
		If the reference source is selected correctly? (P01.04)
		Check the digital input ports whether is set for 7, and is connected with the common point

Issues	Reasons	Checking And Treatment
Motor does not start	Load issue	If the load is too big?
		If the mechanical part is stuck?
	Motor torque is not enough	Check if the setup about torque parameters correctly?
Motor makes abnormal noise	Drive output voltage unbalance	Checking the motor connection
	Mechanical issue	Checking motor and related mechanical parts
	Wrong setup	Checking the parameter setup
Motor running direction abnormal	Motor cabling issue	Checking the output U, V, W if matches U, V, W of motor
	Control signal issue	Checking if the correct direction order is enable
Motor ramp motion is not stable	Accel. or decel. rate is too short	Try suitable values for P01.08 and P01.09
	Too big load	Adjust the load condition
After ramp operating, speed is not stable	Load issue	Checking if the mechanical load keeps changing
	No auto-tune	Do the motor auto-tune
	Motor data setup issue	Checking if set the motor data according to the motor nameplate
Cannot write the parameter	Change is limited	Only can change at stop
		The parameter property is "actual"
	Conflicts on parameter setup	Load default and set the parameters correctly
No display on the Display panel	Link issue	Checking the link between the display panel and drives, if the Display panel is fixed well?

6 Maintenance

6.1 Routine maintain

After long time running in the different environmental conditions, like high temperature, humidity, dusty, vibration, etc, some drive inner parts could be degrading somehow, this situation can make the risk of drive failure, or less of lifetime, so it is necessary to do the drive routine and termly maintenance.

Routine maintenance items:

- If there is abnormal noise from motor rotating
- If there is abnormal vibration during the motor running
- If the drive install environmental conditions changed
- If the drive fan is working well
- If the drive temperature is higher than normal

Daily clean:

- Try to keep the drive tidy.
- Clean the dust from drive surface, avoid the dust into the drive, especially metal dust.
- Effectively clean the oil stuff from the fan surface.

6.2 Periodic checking

Base on actual application and environment conditions, customer needs to do the termly checking to remove the risk of drive failure or safety issue. Attention, must make sure when the drive is powered off, the switching supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections. Checking details as below:

Table 6-1 Termly checking

Checking Area	Items	Method	Judgment
Environment	Make sure temperature, humidity, vibration level	Visual and measurement instrument	Must meet the FI71 environment specification
	If there are tools or other stuff around the drive	Visual	Remove them

Checking Area		Items	Method	Judgment
Voltage		Voltage of power and control parts	Instruments	Meet the technical specification
Mechanical		Abnormal noise or vibration	Visual, hearing	Normal
		Screws or nuts losing?	Retighten	Normal
		Deform, broken?	Visual, replace	Normal
		Colour changed by heating?	Visual and replace	Normal
		Attached dirty, dust?	Visual and clean	Normal
Power	General	Screws or nuts losing?	Retighten	Normal
		Attached dirty, dust on conductors	Clean	Normal
	Power terminal	Broken?	Visual and ask service	Normal
	Brake resistor	Smell or broken by heating?	Visual, nose	Normal
		Resistance normal?	Multimeter	The resistance should be in ± 10% error
	Transformer, choke	Unusual vibration or smell?	Visual, hearing, nose	Normal
	Contactor, relay	Cracking noise	Hearing	Normal
		Contactors are ok	Visual	Normal
Cool system	Fan	Screws loosing?	Retighten	Normal
		Colour changed by heating	Visual	Normal
		Abnormal noise or vibration	Visual, hearing, make the blades moving	Rotating smoothly
	Air flow channel	Heatsink, channel stocked?	Visual and clean	Normal

6.3 Parts replacement

Inside a drive, different parts have different lifetimes according to normal technique rules, and the actual lifetime is related with operating and environmental conditions, in order to maintain the drive to be healthy, it is recommended to replace some electrical parts termly, the suggestion is as in following table.

Table 6-2 Parts replacement recommending

Parts	Recommending Replace Time
Fan	2～3 years
Electrolytic capacitors	4～5 years
PCB	5～8 years

6.4 Drive storage

When the customer plans to store the drive for a short time or long time, please follow the below instructions:

- It is better to keep the drive in the original factory package.
- After long time storage, the drive's capacitors must be dealt with.
  Note: The calculation of storage time is not from the purchase date, but should be the factor' delivery date.

Table 6-3 Action on drive after storage

Storage Time	Action	Ready Time
In half year	No action	N/A
Half year to two years	Before run the motor, the drive is applied normal voltage for an hour	1 hour
Over two years	Use a variac to apply the voltage on the drive gradually	2 hours

6.5 Disposal

Please pay attention when the failed drives are disposal:

- Electrolytic capacitor: when set fire on the drive electrolytic capacitors, explosion may happen.
- Plastic parts: when fire the plastic parts of the drive, poisonous air could be released.。
  Handle method: handle the disposal drive as industrial waste.

Appendix

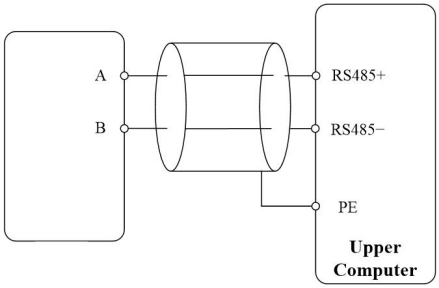
1 Communication

1. Communications port and wiring

   Two terminals (A/RS484+, B/RS485−)

   These two kinds of interface can play the same electric functions.

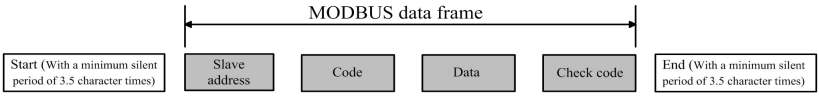
   A serial communications link enables one or more drives to be used in a system controlled by a host controller such as a PLC or computer.



A-figure 1-1 Communications link

2. Communication mode

   FI71 uses Modbus RTU, it supports to read/ write normal registers. The frame has the following basic format,



A-figure 1-2 Modbus RTU message format

Modbus RTU uses byte type of "big-endian" to state address and data (except the CRC, which is "little-endian"), sends high byte firstly, and then low byte.

The frame is terminated with a minimum silent period of 3.5 character times at start and end. Use CRC-16 to check the message information.

3. Function codes

The function code determines the different requests.

A-table 1-1 Function code

Code (Hex)	Description
03H	Read multiple registers
06H	Write single register, not save when power off
10H	Write multiple registers, not save when power off
17H	Read and write multiple registers, not save when power off

4. Parameter mapping

The mapping rules between parameter number and register address as below:

Register address (hexadecimal): MNH

M= decimal convert to hexadecimal from "m"

N= decimal convert to hexadecimal from "n"

"m" and "n" calculation is as below, use a parameter Px.y as the example,

x.y*100=m*256+n+1

For example:

Modbus register address of parameter P02.07

2.07×100=0×256+206+1

Then

m=0, n=206

by the decimal to hexadecimal converting,

M= 00, N=CE,

So, the Register address=00CEH,

Note: register addresses for all FI71 parameters are in the Appendix 2.

5. Function coed example 1 (03H)

The example is to read the contents in P02.07～P02.10 of FI71 drive, details as below table:

A-table1-2 Code 03H example

Master Require							
Drive Node	Code	Start Register Address		Number Of Register Read		Check Sum Of CRC	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	03H	00H	CEH	00H	04H	25H	F6H

Slave (FI71 drive) Response									
Drive Node	Code	Number Of Register Read	Contents of P02.01～P02.10					Check Sum Of CRC	
			P02.07		……	P02.10			
			MSB	LSB		MSB	LSB	LSB	MSB
01H	03H	08H	01H	F4H	……	0BH	B8H	86H	3FH

6. Function coed example 2 (06H)

   The example is to write 8 into P03.12.

A-table 1-3 Function code 06H example

Master Require							
Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	06H	01H	37H	00H	08H	38H	3EH
Slave (FI71 drive) Response							
Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	06H	01H	37H	00H	08H	38H	3EH

7. Abnormal communication

   If the communication is abnormal, FI71 drive will turn back to the response frame, the format is in the below table.

A-table 1-4 Abnormal response format

Drive node	code	Abnormal code	CRC checking sum	
1 bit	1 bit	1 bit	LSB	1 bit

A-table 1-5 Abnormal code description

Code	Description
81H	Not support the parameter
82H	Register address is beyond limit, the registers being read is too many
83H	The content of register is over limit

8. CRC checking

   CRC is 16 bit cycle redundance checking, normally the standard CRC-16 is called: x16+x15+x2+1. Send the 16 bit CRC message to LSB, in a frame do the calculation of all bits.

```
const unsigned char auchCRCHi[] = {
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
```

```
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
        0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
        0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
        0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
        0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
        0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
        0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
        0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40
} ;
//Low-Order Byte Table
const char auchCRCLo[] = {
        0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06,
        0x07, 0xC7, 0x05, 0xC5, 0xC4, 0x04, 0xCC, 0x0C, 0x0D, 0xCD,
        0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09,
        0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A,
        0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC, 0x14, 0xD4,
```

```
        0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
        0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3,
        0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4,
        0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
        0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29,
        0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF, 0x2D, 0xED,
        0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
        0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60,
        0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67,
        0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F,
        0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68,
        0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E,
        0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
        0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71,
        0x70, 0xB0, 0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92,
        0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C,
        0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B,
        0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B,
        0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
        0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42,
        0x43, 0x83, 0x41, 0x81, 0x80, 0x40
} ;
/*    CRC Generation for Modbus messages    */
// The function returns the CRC as a unsigned short type
unsigned short CCRC_ModbusRTUCRC16 (unsigned char *puchMsg, short usDataLen )
{
      unsigned short ReturnValue;
      // high byte of CRC initialized
      unsigned char uchCRCHi = 0xFF;
      // low byte of CRC initialized
      unsigned char uchCRCLo = 0xFF;
      // will index into CRC lookup table
      unsigned char uIndex;
```

```
    // pass through message buffer
    while (usDataLen--)      {
        // calculate the CRC
        uIndex          = uchCRCHi ^ *puchMsg++;
        uchCRCHi        = uchCRCLo ^ auchCRCHi[ uIndex ];
        uchCRCLo        = auchCRCLo[ uIndex ];
    }
    ReturnValue    = uchCRCHi;
    ReturnValue     <<= 8;
    ReturnValue      |= uchCRCLo;
    return ReturnValue;
}
```

9. FI71 communication parameters

A-table 1-6 FI71 communication parameters

Parameter ID	Function	Range	Default	Change Mode	Modbus Address
P01.03	Control mode	0: Control terminal 1: Comms. 2: Display panel	2	Stop Only	0066H
P01.04	Reference channel	0: Analogue reference 1: Preset speed reference 2: E-pot reference 3: Serial communication 4: Keypad 5: Potentiometer 6: PID	5	Run&Stop	0067H
P03.12	Comms. control word	0～65535	0	Run&Stop	0137H
P03.18	Address	0～247	1	Run&Stop	013DH

Parameter ID	Function	Range	Default	Change Mode	Modbus Address
P03.19	Baud rate	0：2.4KBPS 1：4.8KBPS 2：9.6KBPS 3：19.2KBPS 4：38.4KBPS 5：57.6KBPS	3	Run&Stop	013EH
P03.20	Communication configuration	0: 1-8-1, RTU, no checking 1: 1-8-2, RTU, no checking 2: 1-8-1, RTU, odd checking 3: 1-8-1,RTU,even checking	1	Run&Stop	013FH

Set:

P01.03 =1 Communication control mode

P01.04 =3 In serial communication mode, the frequency can be adjusted by changing P02.07.

P03.12 Comms. Control word. Each bit of the control word corresponds to a sequencing bit or function as shown below:

A-table 1-7 Control word (P03.12) description

Bit	Function
0	Drive enable
1	Run
2	3-wire enable
3	Run forward
4	Run reverse
5	FWD/REV
6	Jog forward
7	Jog reverse
8	Fault reset
9	Saving parameters
10	Clean the trip tack log
11	Enable comms. to write parameters
12	Reserved
13	Reserved
14	Reserved

Bit	Function
15	Reserved

The common settings as below:

P03.12 = 1, binary bit is 00000001B (01H), drive enable

P03.12 = 2, binary bit is 00000010B (02H), drive run

P03.12 = 8, binary bit is 00001000B (08H), drive run forward

P03.12 = 16, binary bit is 00010000B (10H), drive run reverse

P03.12 = 32, binary bit is 0010 0000B (20H), FWD/REV

P03.12 = 64, binary bit is 01000000B (40H), drive jog forward

P03.12 = 128, binary bit is 10000000B (80H), drive jog reverse

If P03.18 (drive address) = 0, the drive will not response the master.

The user can set other parameters according to the actual situation.

10. Scale definition

- Frequency: 1:100

  If the drive reference is 50.00Hz, then for hex is 1388H.

- Time rate: 1:10

  If the accelerating time is 10.0s, then for comms. Hex is 0064H.

- Current rate: 1:10

- Voltage rate: 1:1

  If voltage is 380V, then for comms. Hex is 017CH.

11. Examples of application

- Start the drive running forward and setting frequency is 50.00Hz.

  Analysis:

  The drive run forward, write P03.12=0008H, ModBus register address of parameter P03.12 is 0137H.

  Setting frequency is 50.00Hz, write P02.07=1388H, ModBus register address of parameter P02.07 is 00CEH.

A-table 1-8 Start drive running forward

Data Frames	Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
			MSB	LSB	MSB	LSB	LSB	MSB
Require	01H	06H	01H	37H	00H	08H	38H	3EH
Response	01H	06H	01H	37H	00H	08H	38H	3EH

A-table 1-9 Reference frequency 50.00Hz

Data Frames	Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
			MSB	LSB	MSB	LSB	LSB	MSB
Require	01H	06H	00H	CEH	13H	88H	E5H	63H
Response	01H	06H	00H	CEH	13H	88H	E5H	63H

- The drive output frequency (P05.09) is 50.00Hz (1388H), output voltage (P05.10) is 380V (017CH). Read the two parameters.

  Analysis:

  ModBus register address of parameter P05.09 is 01FCH, ModBus register address of parameter P05.10 is 01FDH.

A-table 1-10 Read the drive output frequency and output voltage

Data frames	Drive node	Code	Start register address		Number of register read		Number of register read bytes	The first data of register read		The second data of register read		Check sum of CRC	
			MSB	LSB	MSB	LSB		MSB	LSB	MSB	LSB	LSB	MSB
Request	01H	03H	01H	FCH	00H	02H	–	–		–		05H	C7H
Response	01H	03H	–		–		04H	13H	88H	01H	7CH	7EH	ECH

Note: When the drive is running in the communication control mode, press the switch STOP, the value of parameter P03.12 (communication control word) will not be changed. This means that the user have to reset P03.12 first in order to reset drives, and then write new control words.

2 Parameter List

Menu P01: Basic Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P01.01	Load default	0: no action 1: load default	1	0	Stop Only	0064H
P01.02	Motor control mode	0: V/F 1: open loop vector control	1	0	Stop Only	0065H
P01.03	Control mode	0: control terminal 1: comms. 2: Keypad	1	2	Stop Only	0066H
P01.04	Reference source selector	0: Analogue reference 1: Preset speed reference 2: E-pot reference 3: Serial communication 4: Keypad 5: Potentiometer 6: PID	1	0	Run&Stop	0067H
P01.05	AI mode selector	0: 0mA～20mA 1: 20 mA～0mA 2: 4mA～20mA (current loosing with trip) 3: 20mA～4mA (current loosing with trip) 4: 4mA～20mA (current loosing without trip) 5: 20mA～4mA (current loosing without trip) 6: 0V～10V	1	6	Stop Only	0068H
P01.06	Maximum frequency	0.00Hz～300.0Hz	0.01 Hz	50.00Hz	Stop Only	0069H
P01.07	Minimum frequency	0.00Hz～Max. frequency	0.01 Hz	0.00Hz	Stop Only	006AH

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P01.08	Accel. rate	0.0s～3600.0s	0.1	5.0s	Run&Stop	006BH
P01.09	Decel. rate	0.0s～3600.0s	0.1	10.0s	Run&Stop	006CH
P01.10	Start mode	0: start directly 1: first DC injection, then start 2: catch spinning	1	0	Stop Only	006DH
P01.11	Stop mode	0: ramp 1: coasting 2: ramp +DC injection 3: Ramp stop + coast stop	1	0	Stop Only	006EH
P01.12	Motor rated voltage	0V～240V	1V	200V：220V	Stop Only	006FH
		0V～480V		400V：380V		
P01.13	Motor rated current	0.1A～drive rated current×1.2	0.1A	By model	Stop Only	0070H
P01.14	Number of motor pairs of pole	0, 1, 2, 3, 4	1	0	Stop Only	0071H
P01.15	Motor rated frequency	1.00Hz～300.0Hz	0.01 Hz	50.00Hz	Stop Only	0072H
P01.16	Motor full load speed	0rpm～18000rpm	1rpm	0rpm	Stop Only	0073H
P01.17	Auto-tune	0: disable 1: auto-tune 1 (run a time)	1	0	Stop Only	0074H
P01.18	Motor stator resistance	0.000Ω～60.000Ω	0.001 Ω	0.000Ω	Stop Only	0075H
P01.19	Motor power factor	0.00～1.00	0.01	0.85	Stop Only	0076H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P01.20	Keypad lock function selector	0: Unlocked 1: All switches locked 2: Locked except “RUN” and “STOP/RESET” switches	1	0	Run&Stop	0077H
P01.21	Jog accelerati-on rate	0.0s~3600.0s	0.1s	10.0s	Run&Stop	0078H
P01.22	Jog decelerati-on rate	0.0s~3600.0s	0.1s	10.0s	Run&Stop	0079H
P01.23	Switch frequency	1kHz～15kHz	1kHz	6kHz	Run&Stop	007AH
P01.24	Voltage boost	0.0%～30.0%	0.1%	3.0%	Run&Stop	007BH
P01.25	Voltage boost stop frequency	0.0%～100.0%	0.1%	50.0%	Stop Only	007CH
P01.26	V/F control mode	0: user programmed V/F ramp 1: 2 law ramp 2: 1.7 law ramp 3: 1.2 law ramp	1	0	Stop Only	007DH
P01.27	Power up E-Pot reference	0: 0 1: running reference at last power off 2: 0, only can be changed when drive is active 3: running reference at last power off, only can be changed when drive is active	1	0	Run&Stop	007EH
P01.28	Power up reference frequency	0: 0.00Hz 1: the running frequency when last powered off 2: preset1	1	0	Run&Stop	007FH

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P01.29	UP/DOWN accelerati-on rate	0.0s～250.0s	0.1s	10.0s	Run&Stop	0080H
P01.30	Digital mode, reference frequency when rerun	0: reset 1: keep	1	1	Stop Only	0081H

Menu P02: Adjustive Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P02.01	V/F frequency	0.00Hz～P01.15	0.01Hz	0.00Hz	Stop Only	00C8H
P02.02	V/F voltage	0.0%～100.0%	0.1%	0.0%	Stop Only	00C9H
P02.03	Reserved	-	-	-	-	-
P02.04	Reserved	-	-	-	-	-
P02.05	Active torque limit	0.0%～300.0%	0.1%	200.0	Run&Stop	00CCH
P02.06	Regenerative torque limit	0.0%～300.0%	0.1%	150.0	Run&Stop	00CDH
P02.07	Current limit	0.0%～300.0%	0.1%	200.0%	Run&Stop	00CEH
P02.08	Current controller Kp gain	0.001～10.000	0.001	0.020	Run&Stop	00CFH
P02.09	Current controller Ki time	0.00～100.00s	0.01s	0.20s	Run&Stop	00D0H
P02.10	Slip compensation error	0rpm～1500rpm	1rpm	0rpm	Run&Stop	00D1H
P02.11	Preset 1	−P01.06～+P01.06	0.01Hz	5.00Hz	Run&Stop	00D2H
P02.12	Preset 2	−P01.06～+P01.06	0.01Hz	10.00Hz	Run&Stop	00D3H
P02.13	Preset 3	−P01.06～+P01.06	0.01Hz	20.00Hz	Run&Stop	00D4H
P02.14	Preset 4	−P01.06～+P01.06	0.01Hz	30.00Hz	Run&Stop	00D5H
P02.15	Preset 5	−P01.06～+P01.06	0.01Hz	35.00Hz	Run&Stop	00D6H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P02.16	Preset 6	−P01.06～+P01.06	0.01Hz	40.00Hz	Run&Stop	00D7H
P02.17	Preset 7	−P01.06～+P01.06	0.01Hz	45.00Hz	Run&Stop	00D8H
P02.18	Preset 8	−P01.06～+P01.06	0.01Hz	50.00Hz	Run&Stop	00D9H
P02.19	Start frequency	0.00Hz～50.00Hz	0.01Hz	0.00Hz	Run&Stop	00DAH
P02.20	Hold time for start frequency	0.0s～60.0s	0.1s	0.0s	Run&Stop	00DBH
P02.21	Start DC injection current	0.0%～100.0%	0.1%	0.0%	Run&Stop	00DCH
P02.22	Start DC injection time	0.0s～60.0s	0.1s	0.0s	Run&Stop	00DDH
P02.23	DC injection start frequency	0.0%～20.0%	0.1%	0.0%	Run&Stop	00DEH
P02.24	Stop DC injection current	0.0%～100.0%	0.1%	0.0%	Run&Stop	00DFH
P02.25	Stop DC injection time	0.00s～60.00s	0.01s	0.00s	Run&Stop	00E0H
P02.26	Stop mode 3 frequency	0.00Hz～P01.06	0.01Hz	0.00Hz	Run&Stop	00E1H
P02.27	Jog frequency	0.00Hz～50.00Hz	0.01Hz	5.00Hz	Run&Stop	00E2H
P02.28	Jog interval time	0.1s～60.0s	0.1s	1.0s	Run&Stop	00E3H
P02.29	Skip frequency	0.00Hz～P01.06	0.01Hz	0.00Hz	Stop Only	00E4H
P02.30	Band of skip frequency	0.00Hz～30.00Hz	0.01Hz	0.00Hz	Stop Only	00E5H
P02.31	Threshold of zero speed	0.00Hz～P01.06	0.01Hz	0.50Hz	Run&Stop	00E6H
P02.32	Band of frequency arrival	0.00Hz～P01.06	0.01Hz	2.50Hz	Run&Stop	00E7H
P02.33	Output frequency detection value	0.00Hz～P01.06	0.01Hz	0.00Hz	Run&Stop	00E8H
P02.34	Output frequency detection delayed value	0.00Hz～P02.33	0.01Hz	0.00Hz	Run&Stop	00E9H

Menu P03: Accessorial Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P03.01	Run direction select	0: reverse is permitted 1: reverse is disabled	1	0	Stop Only	012CH
P03.02	Deadtime for running direction change	0.0s～3000.0s	0.1s	0.0s	Run&Stop	012DH
P03.03	Communication break delay	0.1s~6000.0s	0.1s	2.0s	Run&Stop	012EH
P03.04	Auto energy saving control	0: off 1: on	1	0	Stop Only	012FH
P03.05	AVR control	0: off 1: on for all condition 2: on except ramp	1	1	Stop Only	0130H
P03.06	Auto-start after power off	0: off 1: on	1	0	Stop Only	0131H
P03.07	Wait time for auto-start	0.0s～60.0s	0.1s	0.0s	Run&Stop	0132H
P03.08	Dynamic brake rate	0.0%～100.0%	0.1%	50.0%	Run&Stop	0133H
P03.09	Dynamic brake DC voltage points	200V: 350V～390V 400V:650V～780V	1	200V：390V 400V：780V	Stop Only	0134H
P03.10	Switch frequency auto adjust	0: off 1: on	1	1	Run&Stop	0135H
P03.11	Low DC bus operation (only for 400V models)	0: off 1: on	1	0	Stop Only	0136H
P03.12	Comms control word	0～65535	1	0	Run&Stop	0137H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P03.13	Ramp hold by high voltage threshold	0: off 1: on	1	1	Stop Only	0138H
P03.14	high voltage threshold	220V：350V～370V 400V：750V～780V	1	220V：370V 400V：780V	Stop Only	0139H
P03.15	Overload factor	0～(drive rated current/motor rated current)×100%	1	100	Run&Stop	013AH
P03.16	Auto reset	0: no auto reset 1～100: times can auto reset	1	0	Stop Only	013BH
P03.17	Auto reset delay	2.0s～20.0s	0.1s	5.0s	Stop Only	013CH
P03.18	Address	0～247	1	1	Run&Stop	013DH
P03.19	Baud rate	0: 2.4KBPS 1: 4.8KBPS 2: 9.6KBPS 3: 19.2KBPS 4: 38.4KBPS 5: 57.6KBPS	1	3	Run&Stop	013EH
P03.20	Comms. configuration	0: 1-8-1, RTU, without checking 1: 1-8-2, RTU, without checking 2: 1-8-1, RTU, with odd bit checking 3: 1-8-1, RTU, with even bit checking	1	1	Run&Stop	013FH
P03.21	Communication break processing selector	0: No processing 1: Display trip code and clear the run command	1	0	Stop Only	0140H
P03.22	Setting stop time when zero speed	0.0s～3000.0s	0.1s	0.0s	Run&Stop	0141H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P03.23	Input phase loss filter time	0.0s~600.0s	0.1s	0.1s	Stop Only	0142H
P03.24	Output phase loss protection	0: Off 1: On	1	0	Stop Only	0143H
P03.25	Alarm enable	0: Disable 1: Enable	1	1	Stop Only	0144H
P03.26	Current limit protection	0: Enable 1: Disable current limit protection above fundamental frequency 2: Disable fast acceleration/deceleration current limit protection 3: Disable	1	0	Stop Only	0145H

Menu P04: Terminal Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P04.01	AI function selector	0: No function 1: Run forward (FWD) 2: Run reverse (REV) 3: Jog forward 4: Jog reverse 5: Run 6: FWD/REV 7: 3-wire enable 8: Coast stop 9: Preset select bit 0 10: Preset select bit 1 11: Preset select bit 2 12: UP 13: DOWN 14: Reset E-pot output 15: External trip 16: Reset trip 17: Control channel is switched to terminal 18: PID integral keep 19: PID output keep 20: Analogue reference frequency	1	20	Stop Only	0190H
P04.02	AI offset	−100.0%～100.0%	0.1%	0.0%	Run&Stop	0191H
P04.03	AI scaling	0.000～20.000	0.001	1.000	Run&Stop	0192H
P04.04	AI upper limit	0.0%～100.0%	0.1%	100.0%	Run&Stop	0193H
P04.05	AI lower limit	0.0%～P04.04	0.1%	0.0%	Run&Stop	0194H
P04.06	AI filter time	0.00s～10.00s	0.01s	0.10s	Run&Stop	0195H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P04.07	Analogue output function select	0: No function 1: Output frequency 2: Reference frequency 3: Output current 4: Motor speed 5: DC bus voltage 6: Output voltage 7: Drive healthy 8: Drive is active 9: External trip 10: Under voltage trip 11: Alarm indicator 12: Frequency reached 13: Torque limit is working 14: Overload is calculating 15: At zero speed 16: Output frequency	1	1	Run&Stop	0196H
P04.08	Analogue output scaling	0.000～20.000	0.001	1.000	Run&Stop	0197H
P04.09	Analogue input operation	-100.0%～100.0%	0.1%	0.0%	Actual	0198H
P04.10	Reserved	-	-	-	-	-

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P04.11	DI1 function	0: No function 1: Run forward (FWD) 2: Run reverse (REV) 3: Jog forward 4: Jog reverse 5: Run 6: FWD/REV 7: 3-wire mode enable 8: Coast stop 9: Preset select bit 0 10: Preset select bit 1 11: Preset select bit 2 12: UP 13: DOWN 14: Reset of E-pot output 15: External trip 16: Reset trip 17: Control channel is switched to terminal 18: PID integral keep 19: PID output keep	1	1	Stop Only	019AH
P04.12	DI2 function		1	2	Stop Only	019BH
P04.13	DI3 function		1	3	Stop Only	019CH
P04.14	DI4 function		1	16	Stop Only	019DH
P04.15	DI common selector	0: source 1: sink	1	0	Stop Only	019EH
P04.16	DI inverter	0～5	1	0	Stop Only	019FH
P04.17	Terminal control mode selector	0: 2-wire control mode 1: 3-wire control mode 1 2: 3-wire control mode 2	1	0	Stop Only	01A0H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P04.18	Relay function	0: No function 1: Drive healthy 2: Drive is active 3: External trip 4: Under voltage trip 5: Alarm indicator 6: Frequency arrival 7: Torque limit is working 8: Overload is calculating 9: At zero speed 10: Output frequency	1	1	Run&Stop	01A1H
P04.19	Relay inverter	0: off 1: on	1	0	Run&Stop	01A2H

Menu P05: Display Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P05.01	Trip 1	0～99	1	0	Actual	01F4H
P05.02	Trip 2	0～99	1	0	Actual	01F5H
P05.03	Trip 3	0～99	1	0	Actual	01F6H
P05.04	Last trip	0～99	1	0	Actual	01F7H
P05.05	Last trip frequency	−max. frequency～ +max. frequency	0.01Hz	0.00Hz	Actual	01F8H
P05.06	Last trip current	0.0A～3× motor rated output current	0.1A	0.0A	Actual	01F9H
P05.07	Last trip DC bus voltage	200V: 0 to 415V 400V: 0 to 830V	1V	0V	Actual	01FAH
P05.08	Setup reference display	−max. frequency～ +max. frequency	0.01Hz	Actual	Actual	01FBH
P05.09	Running frequency	−max. frequency～ +max. frequency	0.01Hz	Actual	Actual	01FCH

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P05.10	Output voltage	0V～drive rated voltage	1V	Actual	Actual	01FDH
P05.11	DC voltage	200V: 0 to 415V 400V: 0 to 830V	1V	Actual	Actual	01FEH
P05.12	Output current	0.0A～3×Motor rated current	0.1A	Actual	Actual	01FFH
P05.13	Torque current	±3×Motor rated current	0.1A	Actual	Actual	0200H
P05.14	Heatsink temperature	−25℃～127℃	1℃	Actual	Actual	0201H
P05.15	IGBT junction temperature	−25℃～200℃	1℃	Actual	Actual	0202H
P05.16	AI level	0.0%～100.0%	0.1%	Actual	Actual	0203H
P05.17	AO level	0.0%～100.0%	0.1%	Actual	Actual	0204H
P05.18	DI1 status	0～1	1	Actual	Actual	0205H
P05.19	DI2 status	0～1	1	Actual	Actual	0206H
P05.20	DI3 status	0～1	1	Actual	Actual	0207H
P05.21	DI4 status	0～1	1	Actual	Actual	0208H
P05.22	Relay status	0～1	1	Actual	Actual	0209H
P05.23	Model code	0～255	1	Actual	Actual	020AH
P05.24	Power MCU software version	0.00～99.99	0.01	Actual	Actual	020BH
P05.25	Control MCU software version	0.00～99.99	0.01	Actual	Actual	020CH

Menu P06: PID Parameter

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P06.01	Main reference source	0: Zero input 1: Preset 7 2: Preset 8 3: Keypad potentiometer 4: Analogue input operation 5: E-pot 6: Keypad	1	0	Run&Stop	0258H
P06.02	PID enable	0: disabled 1: enabled	1	0	Run&Stop	0259H
P06.03	Reserved	-	-	-	-	-
P06.04	PID reference source	0: Zero input 1: Preset 7 2: Preset 8 3: Keypad potentiometer 4: Analogue input operation 5: E-pot 6: Keypad	1	0	Run&Stop	025BH
P06.05	PID reference inverter	0: Off 1: On	1	0	Run&Stop	025CH
P06.06	PID feedback source	0: Zero input 1: Preset 7 2: Preset 8 3: Keypad potentiometer 4: Analogue input operation 5: E-pot 6: Keypad	1	0	Run&Stop	025DH

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P06.07	PID feedback inverter	0: Off 1: On	1	0	Run&Stop	025EH
P06.08	PID reference slew rate	0.0 s～3200.0 s	0.1	0.0	Run&Stop	025FH
P06.09	PID proportional gain	0.000～4.000	0.001	1.000	Run&Stop	0260H
P06.10	PID integral gain	0.000～4.000	0.001	0.500	Run&Stop	0261H
P06.11	PID derivative gain	0.000～4.000	0.001	0.000	Run&Stop	0262H
P06.12	PID upper limit	0.0 %～100.0%	0.1	100.0%	Run&Stop	0263H
P06.13	PID lower limit	-100.0%～P06.12	0.1	0.0%	Run&Stop	0264H
P06.14	P06.12 and P06.13 function selector	0～1	1	0	Run&Stop	0265H
P06.15	PID output scaling	0.000～4.000	0.001	1.000	Run&Stop	0266H
P06.16	PID integral hold	0: Off 1: On	1	0	Run&Stop	0267H
P06.17	PID output hold	0: Off 1: On	1	0	Run&Stop	0268H
P06.18	PID output selector	0: no output 1: PID frequency reference	1	0	Run&Stop	0269H
P06.19	PID output level	-100.0%～100.%	1.0%	0.0%	Actual	026AH
P06.20	PID error level	-100.0%～100.%	1.0%	0.0%	Actual	026BH
P06.21	Sleep mode enable	0: Off 1: On	1	0	Stop Only	026CH
P06.22	Sleep channel selector	0: No function 1: Output frequency	1	0	Stop Only	026DH
P06.23	Sleep threshold	0.0%～100.0%	0.1%	0.0%	Stop Only	026EH
P06.24	Sleep delay time	0.0s～3000.0s	0.1s	30.0s	Stop Only	026FH

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P06.25	Wakeup mode	0～1	1	1	Stop Only	0270H
P06.26	Wakeup channel selector	0: No function 1: PID feedback	1	0	Stop Only	0271H
P06.27	Wakeup threshold	0.0%～100.0%	0.1%	0.0%	Stop Only	0272H
P06.28	Wakeup delay time	0.0s～3000.0s	0.1s	0.0s	Stop Only	0273H
P06.29	Sleep status indicator	0～1	1	Actual	Actual	0274H

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