

VEICHI

Manual

Version V1.0

SF81 Series Frequency Inverter



Version: YEAR2016, V1.0

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Chapter 1 Overview

1.1 Technical Features

Compared with synchronous servo, VEICHI SF81 Asynchronous Servo Controller of Injection Molding Machine does not need to install pressure sensors, encoders or replace the oil pump and the motor. Easy installation, simple maintenance and cost-effective; Its main advantages are as follows:

1) Fast response

After using SF81 servo control system pumps, the response time can reach 0.3s (0 ~ maximum output pressure). 0.3s (0 ~ Flow maximum output capacity), which is significantly faster compared with traditional hydraulic power control system, and it can shorten the work cycle, improving production efficiency.

2) High precision

The repeat accuracy can reach 3% after using SF81 servo control system pump. The repeat accuracy is much higher compared with conventional hydraulic power control system, which can effectively guarantee the stability of products and reduce the defect rate.

3) Energy-saving

electric saving rate is 25%-70% and the saving rate mainly depends on molding process parameters. Speed value of mold process parameter (0 to 99%) and energy saving are closely related; the slower the speed, the higher the energy saving rate. If the speed value of the mold is between 0 to 30%, the saving rate can reach 70%; if the plastic injection mold and melt velocity values are above 90% without net cooling time (melt completion molding), energy-saving rate can also reach 25%.

4) Run a small noise

Significantly reducing operating noise, low-speed run quietly. Lower than 70 db under ideal conditions.

5) Low equipment operation temperature

Motor proportionally outputs hydraulic oil to avoid the generation of excessive heat. Hydraulic oil temperature is low, even without cooling, you can save a lot of cooling water.

6) Easy maintenance

When SF81 asynchronous servo drive needs maintenance, the power-saving / Mains hit state does not affect the normal production of injection molding machines.

1.2 Electric Saving Principle

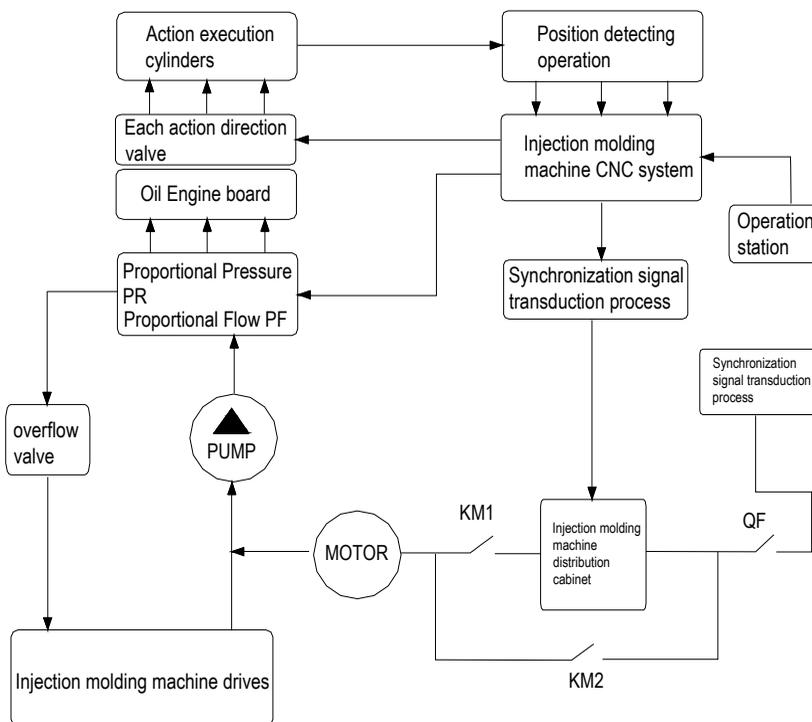
Injection molding machine hydraulic pump uses vane pump, gear pumps, which is typical of positive displacement pumps. And the pump speed is proportional to the amount of oil.

During 50Hz mains constant speed operation, the fuel supply of pump is constant. The actual injection molding machine operating pressure and flow rate change. When the actual flow rate is small and the fuel supply of pump is much greater than the actual load consumption (oversupply), and the surplus hydraulic oil under high pressure all overflows through the overflow valve. Hydraulic

oil under high pressure would release a lot of heat after overflow, this part of energy dissipation is actually part of energy the pump motor absorbed from the grid. Small flow has longer duration but also greater dissipated power. Therefore, there is a serious problem of energy waste of the injection molding machine hydraulic system.

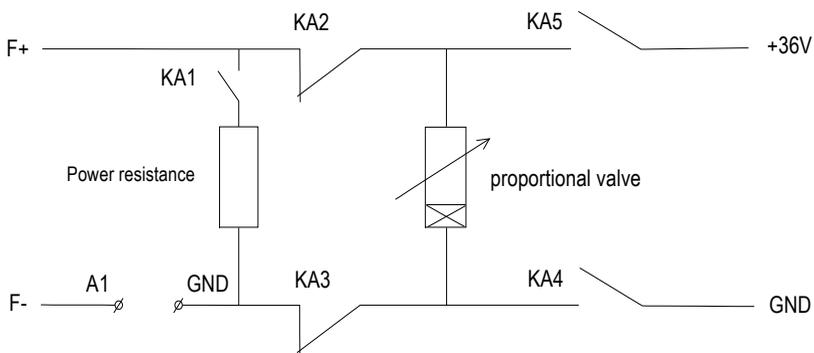
There's special intelligent control system of injection molding machine for VEICHI asynchronous servo drive. During injection molding cycle, the running state signals from the injection molding machine control system are automatic detected, analyzed and calculated. The output frequency of asynchronous servo is automatically controlled according to the current operating state, (mold, mold, injection plastic, recycled materials, thimble, etc.) working pressure and working speed requirements, thus adjusting the pump speed. The actual amount of oil flow requirement is consistent with the injection molding machine. Changing the metering pump to variable pump can eliminate overflow phenomenon and reduce power consumption. The drive dynamic response and instantaneous over current ability can be perfectly combined with the injection molding machine to achieve 25% to 70% of electric saving of oil pump motor.

1.3 Injection molding machine Transformation Technology Schematic



Energy-supporting / transformation technology Schematic

1.4 Wiring diagram proportional flow valve

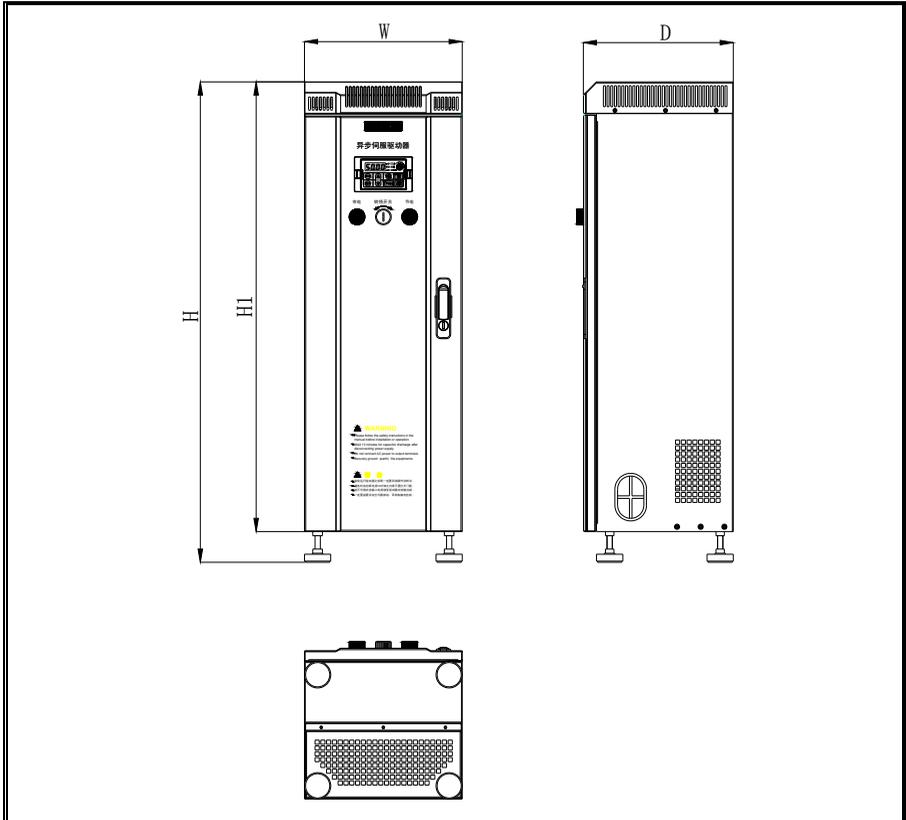


Note:

1. Applicable to injection molding machine whose flow proportional valve is 0 ~ 1A.
2. Power resistance can be replaced by the old proportional flow valve coil or 36 Euro 100 watt power resistance.

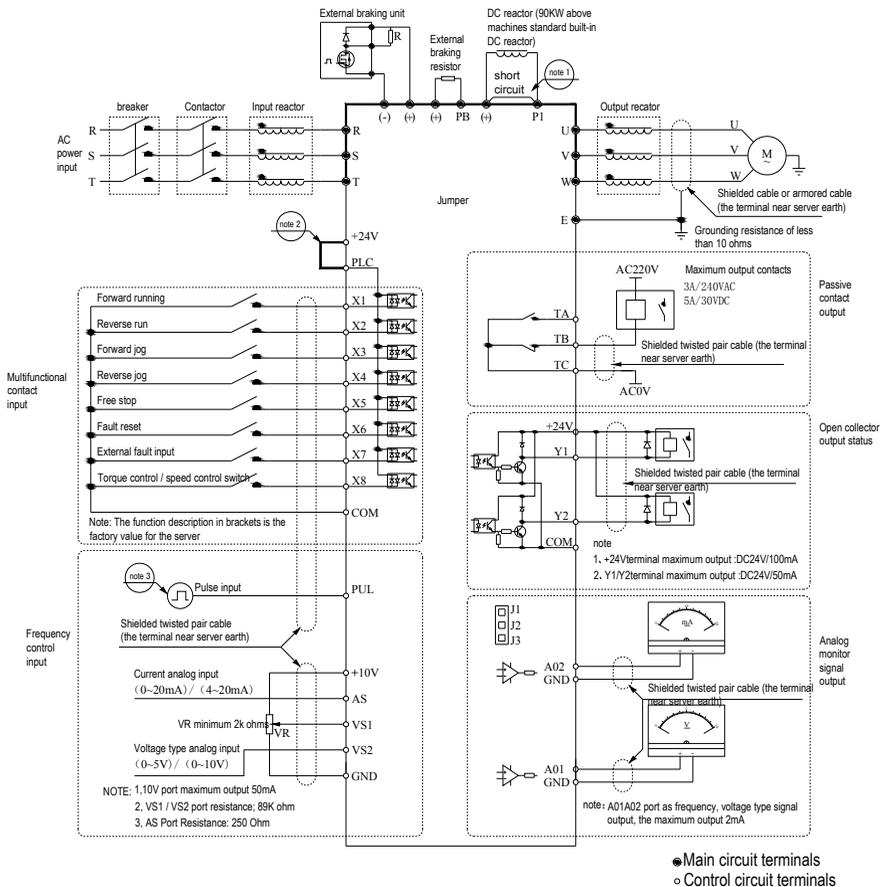
Chapter 2 Installation and Wiring

2.1 Dimension



Model	W	H	H1	D
SF81-T3-7R5ZK	230	695	635	220
SF81-T3-011ZK				
SF81-T3-015ZK	256	810	750	285
SF81-T3-018ZK				
SF81-T3-022ZK	300	910	850	285
SF81-T3-030ZK				
SF81-T3-037ZK	400	930	870	340
SF81-T3-045ZK				
SF81-T3-055ZK	440	980	920	390
SF81-T3-075ZK				

2.2 standard connection



Note:

- 1, when installing a DC reactor, make sure to remove P1, (+) jumper between terminals;
- 2, NPN or PNP transistor signal can be selected as an input for multi-function input terminals (X1 ~ X8); offset voltage can select server internal power supply (+ 24V terminals) or external power supply (PLC terminal); factory value '+ 24V 'and' PLC 'shorted.
- 3, analog monitor outputs are the special output for frequency meter, ammeter, voltmeter and other special instruction, and it can not be used for feedback control, control type operations.

● Auxiliary terminal output capacity

Terminal	Function	Max output
+10V	10V auxiliary power output forming a loop with GND	50mA
A01/A02	Analog monitor output forming a loop with GND	As frequency, voltage type The maximum output signal 2mA
+24V	24V auxiliary power output forming a loop with COM	100mA
Y1/Y2	Open collector output can be programmed motion objects	DC24V/50mA
TA/TB/TC	Passive contact output can be programmed action object.	3A/240VAC 5A/30VDC

Table 2-1: output capacity of auxiliary terminal of the drive

● Switching terminal connection function description

Switching terminal	Position on selection	Graphic	Function
	J1		0.0~50kHz output
	J2		0~20mA output 4~20mA output
	J3		0~10V output
	J4 J6	  → J4 connect  → J6 connect	External tracking selection J4 J6 (With PG card mode)
	J5 J7	  → J 5 connect  → J 7 connect	Internal tracking selection J5 J7 (Without PG card mode)

Table 2-2: Drive switching terminal connection Description

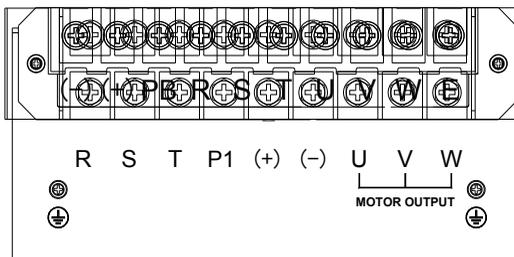
2.3 Main circuit terminals

- Main circuit terminal arrangement and definitions

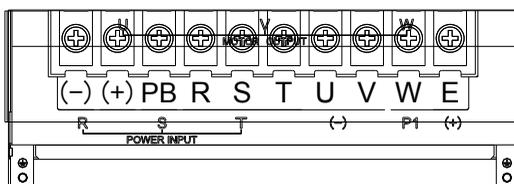
main circuit terminal order <18.5kW:



main circuit terminal order <22~110kW:



main circuit terminal order <132~560kW:

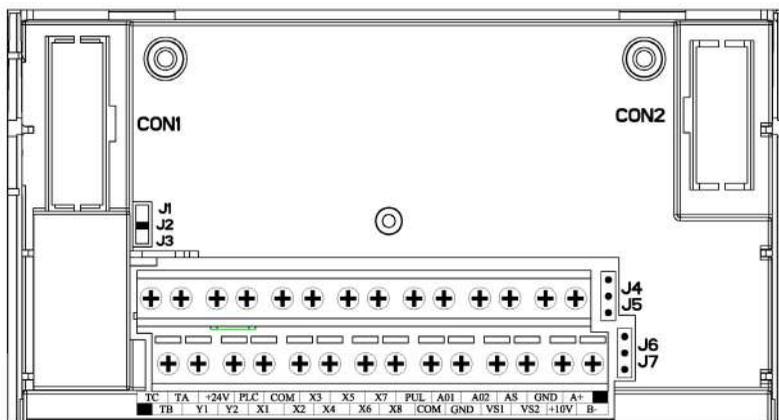


Terminal symbol	Name	Function
(-)	DC power terminal	DC power terminal, (-)Negative DC bus, (+)Positive DC bus for external connection with braking unit.
(+)		
(+)	Braking resistance terminal	Used for external connection with braking unit and realize quick stop
PB		
P1	DC reactor terminal	Used for external connection with DC reactor
(+)		
R	Drive input terminal	Used for connection with 3 phase AC
S		
T		
U	Drive output terminal	Used for connection with motor
V		
W		
⊕	Earth	Ground terminal, grounding resistance <10 ohms.
E		

Table 2-3: drive main circuit terminal arrangement and definitions

2.4 Control circuit terminals

- Control circuit terminal arrangement



Type	Terminal symbol	Name	Function
Passive connect output	TA	Normally open contact point	Action objects can be programmed, maximum contact capacity: 3A/240VAC 5A/30VDC
	TB	Normally close contact point	
	TC	Public connecting point	
Status output	Y1	Open collector output 1	Action objects can be programmed, maximum contact capacity: DC30V/50mA
	Y2	Open collector output 2	
Auxiliary power supply	+24V	Auxiliary power output +	Max output 24VDC/100mA
	COM	Auxiliary power output -	
Multifunction connection input	X1	Multifunction connection input 1	Inside is the photoelectric converter, which can be programmed action object, input conditions: Maximum DC30V / 8mA. Note: factory setting is common collector characteristics of the input; when common emitter characteristics input is needed, remove the jumper between terminal "+ 24V" and "PLC"
	X2	Multifunction connection input 2	
	X3	Multifunction connection input 3	
	X4	Multifunction connection input 4	
	X5	Multifunction connection input 5	

	X6	Multifunction connection input 6	and use the jumper to connect the terminal "PLC" and "COM" Short.
	X7	Multifunction connection input 7	
	X8	Multifunction connection input 8	
	PLC	Multifunction connection input public terminal	
Pulse input	PUL	pulse input	Pulse range 0.0~50.00kHz
Analog output	A01	Analog output 1	Action objects can be programmed, output signal physical type:0~10VDC
	A02	Analog output 2	Action objects can be programmed, output signal physical type:0~10V, 0~20mA, 4~20mA , Frequency pulse output can be selected by the parameter [F3.26] and switch J1 J2 J3(see Table 2-2)
Analog input	AS	Current type analog input	As the frequency control signal or feedback signal, the operating range and speed of response can be set by program. VS1 / VS2 terminal resistance: 89K ohms; AS Port resistance: 250 ohms.
	VS1	Voltage type analog input 1	
	VS2	Voltage type analog input 2	
Signal auxiliary power supply	+10V	Signal auxiliary power source terminal	Max output 10VDC/50mA
	GND	Signal auxiliary power source terminal	Analog output, analog input signal auxiliary power source public point
Communication terminal	A+	Communication terminal A+	RS485 Communication interface
	B-	Communication terminal B-	

Table 2-4: drive control circuit terminal arrangement and definitions

- Control circuit terminal wiring specifications

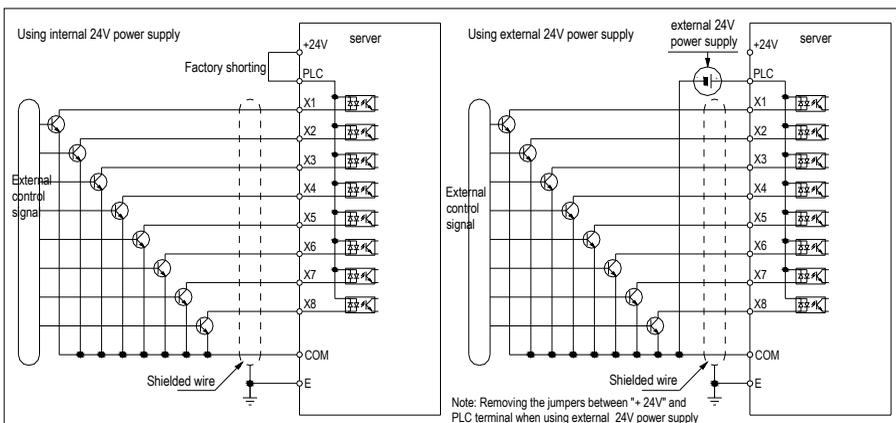
Terminal name	Screw Specification (mm)	Fixed torque (N·m)	Cable specification (mm ²)	Cable type
A+ B-	M2.5	0.4~0.6	0.75	Shielded pair cable
+10V GND A01 A02 VS1 VS2 AS	M2.5	0.4~0.6	0.75	Shielded pair cable
+24V COM Y1 Y2 TA TB TC PLC PUL X1 X2 X3 X4 X5 X6 X7 X8	M2.5	0.4~0.6	0.75	Shielded cable

Table 2-5: Control circuit terminal wiring specifications

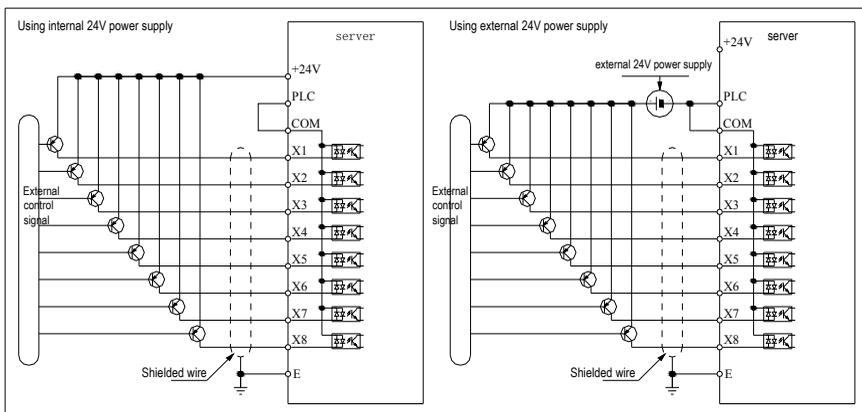
2.5 Connection

2.5.1 Multifunction contact input connections

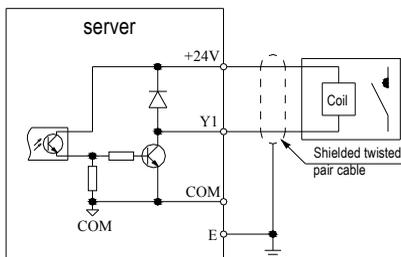
- NPN transistor characteristics connections



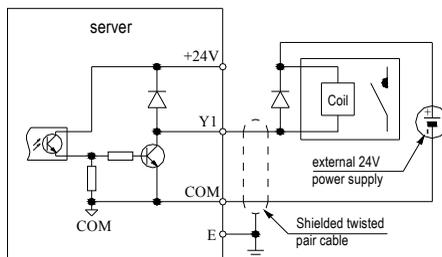
● Connection mode of PNP transistor



2.5.2 Connection of digit output signal



using internal 24V power supply to achieve the control of external relays



Using external 24V power supply to achieve the control of external relays

Chapter 3 Keyboard and Operation

3.1 server keyboard layout and function specification

- keyboard operator appearance



- key features

Key symbol	Key specification	Function description
	Menu key	Enter function menu when standby or running. Press this key to return when modifying parameter. Press for 1 sec to enter condition monitoring interface when in standby or running condition.
	Confirm/modify key	Press to modify parameter when in menu interface. Press again to confirm after modifying. Press to change LED monitoring items at down time when in standby or running condition.
	Up/down key	Select parameter group in menu interface. Modify parameter in modifying interface. Modify given frequency, PID, given torque or magnetic powder clutch given torque when at standby or condition monitoring state (When given frequency, PID, given torque or magnetic powder clutch given torque are set by keyboard, please set [F4.04])
	Shift key	Select digit of function number modified by up/down key; Select parameter digits modified by up/down key.
	Forward run key	When run/stop is controlled by keyboard, press this key, the inverter forwardly rotate and the indicator is always on. When reverse, the indicator sparks.
	Jog/reverse key	This key function can be defined by parameter [F4.02]. Press it, the machine reverses and indicator is off if this key is defined as REVERSE; the machine jogs and indicator is on if this key is defined as JOG.

	<p>Stop/reset key</p>	<p>The machine stops if press it while run/stop is controlled by keyboard. Its efficiency range is defined via function no [F4.03]. Inverter resets if press it in fault state (the machine would not reset if the fault is not solved).</p>
	<p>Keyboard potentiometer</p>	<p>Can be used as input channel for given frequency, upper frequency limit, given torque, given PID or PID feedback setting.</p>

● Indicator light meanings

Name	State	Meaning
Unit Indicator Light	Hz	Spark Digital display given frequency.
	Hz	On Digital display output frequency.
	A	On Digital display actual output current.
	V	On Digital display input voltage.
	V	Spark Digital display output voltage.
	S	On Time unit is second.
	S	Spark Time unit is ms, min, or h.
	RPM	On Digital display motor speed.
	%	Spark Digital display given PID.
	%	On Digital display PID feedback.
State Indicator Light	FWD	On Inverter is forwardly rotating.
	FWD	Spark Inverter is reversely rotating.
	FWD	Off Inverter stops.
Function indicator light	REV/JOG	On Jog.
	REV/JOG	Off Reverse.

Chart 3-1: Indicator Light Meanings

Chapter 4 Function Parameter Specification

4.1 Basic Parameters

F0.00	Control mode	Setting range: 0-5	Factory default: 1
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0: VC without PG: no speed sensor VC, the control mode is used for all variable speed control. Set the mode when you need high-precision speed control. In this mode control, even without using the feedback signal of the motor, the torque also can respond quickly and get a lot of low-speed torque when the motor is running.

1:V/F without control: control voltage/frequency ratio, all variable speed, especially suitable for occasions where a server is driven by many motors to improve the gear switching system. This mode is also used when motor parameters is not clear or when the motor can't self study.

Note:

- 1. When choosing VC mode, before first running, right motor parameters should be inputted and motor parameters self adjust to gain right motor parameter. Please refer to details in F5 parameter groups.**
- 2. Rightly setting VC control parameters to ensure stable and dynamic control performance. For VC control parameter setting and adjustment, please refer to details of F6 parameter groups.**
- 3. When choosing VC mode, all inverters can only drive one motor, and the capacitance rating difference between the inverters and the motor can't be too large. The inverter can be 2 rating bigger or 1 rating smaller than the motor. Otherwise, the control performance will descend. Or the drive system can't run normally.**
- 4. When choosing V/F mode, the related parameters of 'F8' should be rightly set.**

F0.01	Speed / torque control mode	Setting range: 0-1	Factory default: 0
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0: speed control: when using speed control, the server controls motor speed by controlling output frequency so that the system speed could be controlled.

Motor speed is decided by the output frequency of server; the max output torque of server is decided by [F6.11]; when in speed control, for the frequency given setting and adjustment, please refer to parameters [F0.03~F0.07] .

F0.02	Run command channel	Setting range: 0-3	Factory default: 0
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It is channel for inverter receiving run and stop order and run direction. It is only used for starting and stopping control under torque control.

0: Keyboard control Inverter run and stop is controlled by keyboard key **FWD**, **REV/JOG**, **STOP/RESET**. **REV/JOG** key is defined as reverse when [F4.02] set as "0" and jog when [F4.02] set as "1". Please refer to details of [F4.02].

1: Terminal control Factory default as two line mode 1 control mode. Under two line mode 1,

inverter run, stop and direction is controlled by whether “FWD” or “REV” set for [F2.00-F2.07] “multi function input terminal” connects to control board terminal (COM) or not. “FWD” and “REV” definition refer to [F2.00-F2.07]. When under other control mode, run, stop and direction refer to [F2.12].

Note:

1. When doing fault reset, key **STOP/RESET**, control terminal reset order and RS485 communication terminal are valid reset order.
2. When inverter input frequency is 0Hz or lower than Min output frequency [F1.26]. As long as you input run order, keyboard FWD indicator will be on, the motor will run as 0 frequency.

Tip: keyboard key **STOP/RESET** function can be selectable. Under exterior terminal control or communication control, it can be defined as stop function. Please refer to [F4.03]. Under exterior terminal control, if use **STOP/RESET** to stop, inverter stops and close exterior terminal run order. It needs to input exterior terminal stop order and unlock. The exterior terminal run order will be valid again. So is the communication control.

F0.03	Frequency give main channel selection	Setting range: 0-12	Factory default 11
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0: Keyboard Number Setting Given frequency of the main channel is given and modified by [F0.08] keyboard numbers setting frequency. When parameter [F4.04] LED “0” digit “keyboard up/down key modification selection” is set as “1”, no matter inverter is run or stop, [F0.08] setting value can be quickly modified by keyboard up/down key directly. Whether store the value modified by the shortcut key is decided by [F4.04] LED “00” digit.

1: Keyboard Potentiometer Given Main channel given frequency is given and modified by keyboard potentiometer. Please refer to [F4.07-F4.10] details for the relationship between keyboard potentiometer and frequency.

2: Terminal VS1 Voltage Analog Main channel given frequency is given and modified by (VS) input analog. Please refer to [F3.00-F3.04] details for the relationship between input analog filter time and frequency.

3 Terminal VS2 Voltage Analog Main channel given frequency is given and modified by (VS) input analog. Please refer to [F3.05-F3.09] details for the relationship between input analog filter time and frequency.

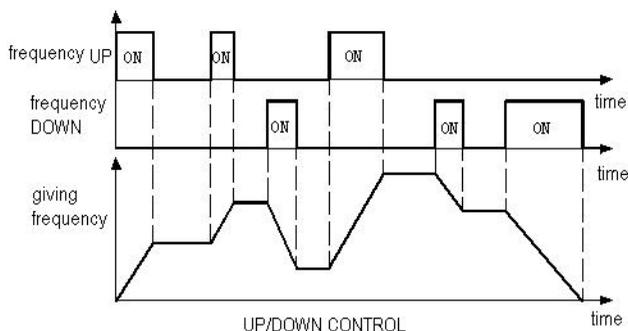
4 Terminal AI Analog Main channel given frequency is given and modified by (AI) input analog. Please refer to [F3.10~F3.14] details for the relationship between input analog filter time and frequency.

5: Terminal Pulse Signal Main channel given frequency is given and modified by (PUL) input pulse signal. Please refer to [F2.16-F2.21] details for the relationship between input pulse signal and frequency.

6:RS485 Communication Port: Main channel given frequency is given and modified by the signal accepted by RS485 communication port (A+) and (B-). Please refer to Fd communication control parameter groups and appendix 2: RS485 communication protocol details.

7: UP/DOWN Control Main channel given frequency is given and modified by if UP terminal is

connected to DOWN terminal or not, what is set by multi-function terminals (X1-X8). Anyone of the (X1-X8) terminals can be defined as UP and DOWN. Please refer to [F2.00-F2.07] details. UP, DOWN store and clear mode after adjustment can be set by [F2.22]. Please refer to [F2.22] details. ACC AND DEC of UP/DOWN control running given frequency is set by [F2.23]. UP/DOWN variation frequency can be cleared to 0 at any time by “UP/DOWN clear 0” terminal. Details see [F2.00-F2.07].



8: PID Control Given: This channel is selected for PID closed loop control system. PID control is the control mode makes feedback the same as the target. Refer to PID control parameters “Fb”. Under this mode, when [F4.04] LED “0” digit is set as 3 by keyboard UP/DOWN key; [Fb.01] can be modified by UP/DOWN key. Whether save the modification is decided by [F4.04] LED “00” digit. PID control state and trait are changed by multifunction terminals. Details refer to [F2.00-F2.07].

9: Program Control (PLC) Given Main channel given frequency and frequency running direction is controlled by inner simple PLC control. Max 15 steps speed can be process control. Details see “FC” multi step, PLC function and swing frequency parameter group. If one step speed running time is set as “0”, it will jump over this step. It is convenient to set step speed. When [F0.07] LED “00” digit is 0, frequency control direction is invalid. When [F0.16] is set as 2—REV forbid and any step direction is set as REV, this step run as 0 speed. PLC and multi steps speed are both for frequency inverter vary speed and run under certain rules. Under multi steps running, step switch and direction change is control be the different combination between multi step control terminal and COM defined by multifunction input terminals. PLC not only can define one cycle of multi steps frequency in the function parameters. It can also define the run time, direction, ACC/DEC time and cycle mode of multi steps in the function parameters. Multi steps control terminal can be defined by any multifunction terminal. Details refer to [F2.00-F2.07].

10: Reserved

11: special channel for injection molding machine: details see parameter F9.

F0.04	Main channel gain	Setting range: 0.000-5.000	Factory default: 1.000
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It is used to magnify or reduce the main channel input signal, can adjust given frequency of main channel in proportion.

F0.05	Frequency give auxiliary channel selection	Setting range: 0-6	Factory default: 11
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It is used to select auxiliary channel for frequency given, directly control or impact output frequency of frequency inverter. Relation between main channel and auxiliary channel can be defined by **[F0.07]**.

0: Keyboard number frequency given

The given and modification of auxiliary channel given frequency is decided by parameter **[F0.08]** keyboard digital setting frequency; when parameter **[F4.04]** LED keyboard UP/DOWN is set to "1", regardless of the server is in running or stop state, the current set value of parameters **[F0.08]** can be modified directly by keyboard UP/DOWN. The parameter **[F4.04]** LED '00' digit can decide whether to remember the value modified by the shortcut keys.

1: Keyboard potentiometer given

Given frequency of auxiliary channel is decided by **Keyboard potentiometer**; for the relation between the keyboard potentiometer and frequency of detailed parameters, please refer to **[F4.07 ~ F4.10]**

2: Terminal VS1 voltage analog given

Given frequency of auxiliary channel is decided by (VS1) Analog input; for the relation between the analog input and frequency and input analog quantity filtering time, please refer to parameter **[F3.00 ~ F3.04]**

3: Terminal VS2 voltage analog given

Given frequency of auxiliary channel is decided by (VS2) Analog input; for the relation between the analog input frequency and input analog quantity filtering time, please refer to parameter **[F3.05 ~ F3.09]**

4: Terminal AS current analog given

Given frequency of auxiliary channel is decided by (AS) Analog input; for the relation between the analog input frequency and input analog quantity filtering time, please refer to parameter **[F3.10 ~ F3.14]**

5: Terminal pulse PUL given

Given frequency of auxiliary channel is decided by (PUL) input pulse signal; for the relation between input pulse signal and frequency, please refer to parameter **[F2.16 ~ F2.21]**

11: multi-step speed channel

By multi-step speed command port, 15 speed can be achieved by X1 ~ X7 terminals and code combinations, see FC parameters.

F0.06	Auxiliary channel gain	Setting range: 0.000-5.000	Factory default: 1.000
-------	------------------------	----------------------------	------------------------

It is used to magnify or reduce the main channel input signal, can adjust given frequency of main channel in proportion.

F0.07	Frequency give channels combinations mode	Setting range: 0000-0016	Factory default: 0000
-------	-------------------------------------------	--------------------------	-----------------------

LED “0” digit: combination mode selection It is used to select the combination method of the main input channel and the auxiliary input channel of the give frequency.

0: Main channel valid: Only main channel [F0.03] is valid, auxiliary channel [F0.05] is invalid.

1: Auxiliary channel valid: Only auxiliary channel [F0.05] is valid, main channel [F0.03] is invalid.

2: Main+auxiliary The sum of main channel [F0.03] add auxiliary channel [F0.05] is the output frequency of the inverter.

3: Main-auxiliary: The result of main channel [F0.03] minus auxiliary channel [F0.05] is the output frequency of the inverter.

4: MAX {main, auxiliary}: The bigger one of main channel [F0.03] and auxiliary channel [F0.05] is the output frequency of the inverter.

5: MIN {main, auxiliary} The smaller one of main channel [F0.03] and auxiliary channel [F0.05] is the output frequency of the inverter.

6: Main*auxiliary Given frequency of main channel [F0.03] multiply certain percent which is percent of given frequency of auxiliary channel [F0.05] responding to max frequency [F0.09]. The result is output frequency of the frequency inverter.

LED “00” digit: frequency control direction selection It is used to select whether permit negative frequency change the running direction of the frequency inverter when the result is negative.

0: invalid If result is negative, frequency inverter output 0.00Hz.

1: valid If result is negative, frequency inverter change running direction and output related frequency.

LED “000” digit: reserved

LED “0000” digit::reserved

Note:

1. When main*auxiliary, frequency only count positive value. When any channel frequency is negative, count as 0.00Hz, frequency inverter output 0.00Hz.

2. Can’t overlay main+auxiliary when JOG and multi step speed running.

3. When rotate direction selection [F0.16] is set as REV forbid, whatever frequency control direction selection is set, frequency inverter outputs 0.00Hz frequency if count result is negative.

Tip: Given frequency synthesized by main channel and auxiliary channel also limited by upper limit frequency and lower limit frequency.

F0.08	Keyboard number set frequency	Setting range: 0-upper limitation	Factory default: 50.00Hz
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When frequency given channel is keyboard numbers, it is used to set and modify frequency. If [F4.04] LED “0” digit is 1, the up/down key can modify the parameter value. Whether saving the modified value or not after power off is decided by [F4.04] LED “00” digit

F0.09	Max frequency output	Setting range: 0.00-320.00Hz	Factory default: 50.00Hz
F0.10	Upper limitation source selection	Setting range: 0~6	Factory default:0
F0.11	Number give upper limitation	Setting range: Lower limitation-max output frequency	Factory default: 50.00Hz
F0.12	Lower limitation	Setting range: 0.00-upper limitation	Factory default: 0.00Hz
F0.13	Lower limitation run mode	Setting range: 0-1	Factory default: 1

Max frequency output: The max frequency the frequency inverter permit to set. When [F1.13] LED “0” digit is 0, it is also the base of ACC/DEC time setting.

Upper limitation source selection: To select the give source of upper frequency limitation of frequency inverter. It is the max output frequency limitation set according to the machinery max rotate speed.

0: Upper limit number given Upper limitation set by [F0.11]. Max setting is small or equal to max frequency [F0.09]. Min setting is bigger or equal to min frequency [F0.12].

1: Keyboard potentiometer Upper limitation set by keyboard potentiometer.

2: Terminal VS voltage analog Upper limitation set by VS input analog.

3: Terminal AI voltage analog Upper limitation set by AI input analog.

4: Terminal AS current analog Upper limitation set by AS input analog.

5: Terminal pulse PUL given Upper limitation set by PUL input pulse frequency.

6: RS485 communication given Upper limitation set by RS485 communication

(0x3004/0x2004) .Max set is not over max frequency [F0.09]. Min set not lower than [F0.12].

Details refer to Fd communication control parameter group and appendix 2: Modbus communication protocol, communication given upper frequency (0x3004 / 0x2004).

Note: Relation between input analog or PUL pulse frequency and upper limit frequency: when input max valid value, upper limit frequency is max frequency [F0.09]. When input min valid value, upper limit frequency is 0.00Hz.

Number setting of upper limitation: It is the upper limit frequency given channel when [F0.10] is set as 0.

Lower limitation: It is the lower limitation of output frequency. When given frequency is lower than this value, [F0.13] decides the run frequency.

Lower limitation run mode

0: Stop: When actual given frequency is lower than the lower limitation, inverter runs at 0.00Hz.

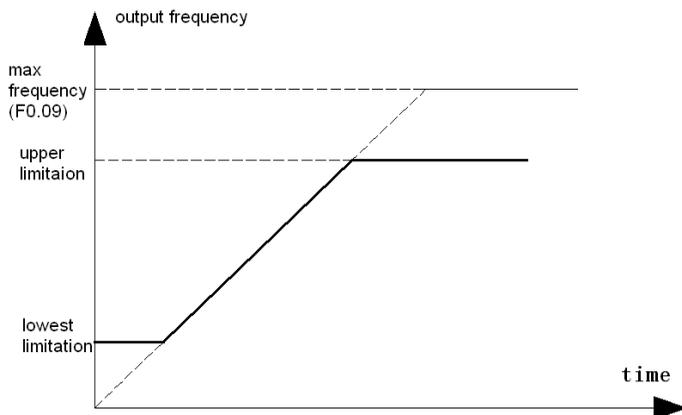
1: Run as lower limitation: When actual given frequency is lower than the lower limitation, inverter run at the lower limitation.

Note:

1. Given upper limitation by analog or PUL pulse frequency, lower limitation is invalid if upper limitation is lower than lower limitation.

2. Max frequency, upper limitation and lower limitation set carefully according to actual need

please. Except upper limitation and lower limitation, inverter is also limited by parameters set such as start frequency, free stop frequency, stop DC brake start frequency and so on. Max frequency, upper limitation and lower limitation relationship as below:

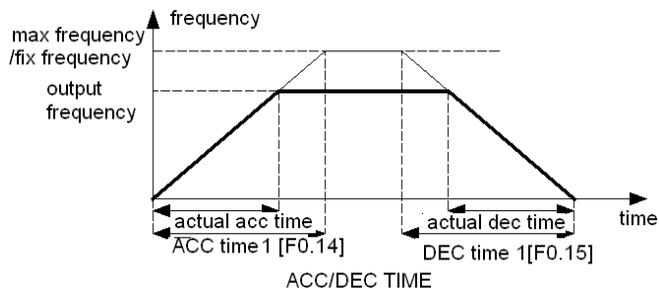


max frequency, upper limitation and lowest limitation relationship

F0.14	ACC time 1	Setting range: 0.01-650.00s	Factory default: model set
F0.15	DEC time 1	Setting range: 0.01-650.00s	Factory default: model set

ACC time 1: When [F1.13] LED “0”digit is 0, it means the time needed for output frequency accelerate from 0.00Hz to max frequency [F0.09]. When [F1.13] LED “0”digit is 1, it means the time needed for output frequency accelerate from 0.00Hz to 50.00Hz. Details refer to [F1.13].

DEC time 1: When [F1.13] LED “0”digit is 0, it means the time needed for output frequency decelerate from max frequency [F0.09] to 0.00Hz. When [F1.13] LED “0”digit is 1, it means the time needed for output frequency decelerate from 50Hz to 0.00Hz. Details refer to [F1.13].



This frequency inverter can set 4 kinds of ACC/DEC time at most. If there’s need to select other ACC/DEC time group, it must be selected by control terminal. For details please refer to [F2.00-F2.07] and [F1.18-F1.23].

ACC time is only valid for normal speed-up process, not including start per-excite, start DC brake time and start frequency hold time. DEC time is only valid for normal speed process, not including stop DC brake time.

During process running, ACC/DEC time 1 is defined as first kind of ACC/DEC time. The other 3 kinds of ACC/DEC time details please refer to [F1.18-F1.23].

JOG ACC/DEC time is set by [F1.33、 F1.34] alone.

F0.16	Rotate direction choosing	Setting range: 0-2	Factory default: 0
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0: Consistent: The actual run direction is the same as required. No adjustment to the current direction.

1: Reverse: The actual run direction is reverse to the required direction. Adjust the current direction.

2: Forbid reverse: When it is set as forbid, the reverse orders of all run order channels (operation board, exterior terminal, RS485 communication, optional card and program running) are invalid.

When frequency setting is negative (including that after combination), no matter what the [F0.07] LED "00" digit is, the actual output frequency is limited as 0.00Hz.

Note: When reset to factory default, this setting is not changed.

Attention: All reverse order is forbidden. If reverse order is give, the frequency inverter would not run.

F0.17	Carrier frequency	Setting range: 0.6-15.0kHz	Factory default: Accord model
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It is used to set IGBT frequency. Please set this parameter when adjusting electromagnetic noise and reducing leakage current. This feature is mainly used to improve noise and vibration during operation of the inverter. At higher carrier frequency of the current wave, the motor noise would be small. It is suitable for locations that need mute environment when run in high carrier frequency, but at the same time the main parts switch loss and the heat are heavy while the efficiency would be reduced. In the meantime, radio disturbance is heavy. And the other problem is that capacitance leak current would increase, and if there is leak protection, there may be mistake action or over current. When run in low carrier frequency, the case will be totally different. Different motors would have different carrier frequency responses. The best carrier frequency comes with adjustment based on actual case. The bigger the capacity, the smaller the carrier frequency should be.

The Company reserves the right to limit maximum carrier frequency.

Carrier frequency	Motor noise	Electric disturbance	Radiator temperature
low	big	Small	low
↓	↓	↓	↓
high	small	big	high

Note: We advice ratio of carrier frequency to max frequency not lower than 36. If work under low frequency long time, we advice reduce carrier frequency to reduce the dead area time impact.

Attention: when carrier frequency is higher than the factory default, the rated power would reduce 5% every time when carrier frequency adds 1 KHz.

F0.18	Carrier frequency characteristic selection	Setting range: 0000-2111	Factory default: 0000
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LED “0” digit: carrier temperature associated settings

0: associated module temperature is invalid

1: associated module temperature is valid

When module temperature is too high, the frequency inverter reduces carrier frequency automatically, which can reduce switch loss and avoid frequent alarm for over heat.

LED “00” digit: associated settings of carrier output frequency

0: associated frequency output temperature is invalid

1: associated frequency output temperature is valid

When carrier frequency is related to frequency output, it can automatic adjust carrier frequency according to frequency output, which can improve the low frequency performance and high frequency mute effect.

LED “000” digit: PWM mode selection

0: Fixed carrier: Noise frequency is fixed.

1: Random carrier: This mode allows the inverter output voltage harmonic spectrum evenly distributes over a wide frequency range, which can effectively suppress electrical noise and mechanical vibration.

LED “0000”: PWM wave sending mode

0: PWM mode 1: In this mode, high-quality low-speed sinusoidal current waveform can be outputted to obtain better low frequency performance and less noise, reducing the number of switching power devices at high speed and reducing power consumption, but the noise is bigger.

1: PWM mode 2: In this mode, high-quality current waveform can be obtained and the noise is low, but the power consumption and server temperature increase.

2: PWM mode 3: In this mode, the number of switching power devices and server temperature can be reduced, but the noise gets louder.

F0.19	Parameter initialization	Setting range: 0-2	Factory default: 0
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0: No operation

1: Restore factory default, function parameters are restored to factory defaults.

2: Clear malfunction records, clear all [FA.25-FA.44] mistake history.

Note:

1: Keyboard shows SRVE when recover factory setting. SRVE disappear when initialization finished.

2: No changing of [F0.16] and [F4.11-F4.14] setting when recovering factory setting.

3: If power off when recovering factory defaults, it can't be completed. It needs to restore after power on again.

F0.20	AVR function selection	Setting range: 0-2	Factory default: 2
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0: invalid

1: valid

2: invalid when deceleration, valid in the other state

AVR means the output voltage auto regulation function. When the automatic voltage regulator function is invalid, the output voltage would vary with the input voltage; when valid, as long as the minimum input voltage fluctuation is greater than the set output voltage (motor rated voltage), the output voltage can be substantially maintained at the set value. When the supply voltage is below the rated output voltage, output voltage drops with the input voltage.

4.2 Running Control Parameter

F1.00	Start-up mode	Setting range: 0-2	Factory default: 0
F1.01	Start pre-excitation time	Setting range: 0.00-60.00s	Factory default: model setting
F1.02	Start frequency	Setting range: 0.00-60.00Hz	Factory default: 0.50Hz
F1.03	Start frequency hold time	Setting range: 0.0-50.0s	Factory default: 0.0s
F1.04	Braking current before start	Setting range: 0.0-150.0%	Factory default: 0.0%
F1.05	Braking time before start	Setting range: 0.0-30.0s	Factory default: 0.0s

Start-up Mode

0: Start by start-up frequency [F1.02] start-up frequency and **[F1.03]** start-up frequency hold time control the frequency inverter start. It is suitable for big static friction torque and small load inertia occasion or occasion with exterior machine brake equipment. Motor spindle can keep static before restart after stop.

1: DC brake and start. Firstly [F1.04] brake current and **[F1.05]** brake time give certain energy to motor with load (electromagnetic hold brake). Then start by start-up frequency. It is suitable for stop state, small inertia load with REV and FWD.

2: Speed track, direction judge and start Detect speed and direction firstly, and then start as the speed detected out and reach the given frequency according to ACC/DEC time. Speed tracking modes include inner speed tracking and external speed tracking, selected by the transfer terminal.

Control mode Tracking mode	VC without PG	V/F without PG	VC with PG (PG card input)	VC with PG (PUL input)	V/F with PG (PG card input)	V/F with PG (PUL input)
Internal tracking	Valid	Valid		Valid		Valid
External tracking			Valid		Valid	

Start pre-excitation time: It is used to set pre-excitation time for asynchrony motor when start. It can set up magnetic field before motor start and improve start performance and reduce start current and start time.

Start frequency: It is the initial output frequency when start. Right start frequency can bring big start torque. When start, certain instant force can be brought for load with big static friction under static state. But if the set value is too large, sometimes there might be fault like E.oC1.

Start frequency hold time: the time of the inverter running under start frequency.

Braking current before start: It is the braking current that the inverter gives the motor when DC braking. It is based on the output rated current of the inverter. Only when [F1.00] is 1, there would be DC braking when start. When the parameter is set to 0, the DC braking is invalid.

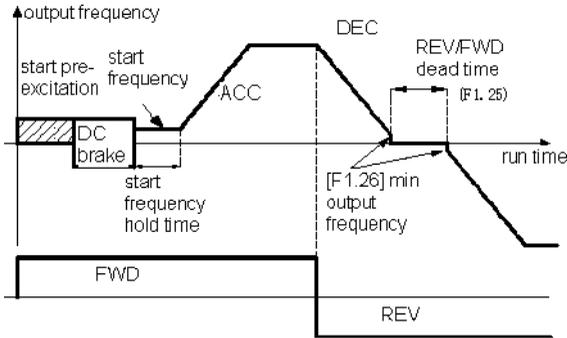
Braking time before start: It is the time that DC braking current hold when start. Only when [F1.00] is 1, there is DC braking when start. There is no DC braking when braking time is 0.0s.

Note: Start frequency is not limited by lower limit frequency [F0.12], but limited by [F1.26] min output frequency. If setting is smaller than [F1.26], the output frequency is 0.00Hz.

Reminder:

1: Under process of REV/FWD switch when normal running or process of frequency setting change when up/down running, frequency inverter starts from or reduces to min output frequency [F1.26] and then output 0.00Hz.

2: In process of inverter start ACC, inverter output 0 when given frequency is small than start frequency.



START UP FIG

F1.06	Speed track waiting time	Setting range: 0.00-60.00s	Factory default model setting
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It is defined as the waiting time from inverter receiving the run order to the time inverter starts speed tracking. After this time, inverter output according to the frequency and direction detected and running to given frequency according to the ACC/DEC time setting.

For big inertia load, prolong speed track waiting time to reduce the instant impact current.

F1.07	Stop mode	Setting range: 0-1	Factory default: 0
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0: DEC to stop DEC to 0.00Hz and stop output. When give frequency is small then stop DC braking start frequent [F1.08], inverter output frequency will change to 0. DC brake and stop work. Otherwise inverter will decelerate to min output frequency and stop working.

For inverter with build in braking unit (under than AC80B-T3-018G), braking resistor (optional) can be used. When DC bus voltage is over [FA.08] energy braking act voltage, inverter begins to carry out the energy braking act.

For inverter without build in braking unit (upper than AC80B-T3-022G), braking unit and braking resistance can be selected. It is mainly used for occasions that need quick braking when stop.

1: Free stop Inverter stop output when receiving the stop order. Usually, it cooperates with exterior machine hold brake.

F1.08	Initial frequency of stop DC braking	Setting range: 0.00-50.00Hz	Factory default: 0.00Hz
F1.09	Stop DC braking current	Setting range: 0.0-150.0%	Factory default: 0.0%
F1.10	Waiting time of stop DC braking	Setting range: 0.0-60.0s	Factory default: 0.0s
F1.11	Stop DC braking duration	Setting range: 0.0-60.0s	Factory default: 0.0s

Initial frequency of stop DC braking: When inverter DEC to this frequency, it will stop output and start DC braking.

In stop state, when the output frequency is less than shutdown DC braking starting frequency, the DC brake function would start.

During deceleration, when a given frequency is less than shutdown DC braking start frequency, start DC braking and the output frequency will jump to zero. If there's no strict requirement for operating conditions, the DC brake start frequency should be set as low as possible

Stop DC braking current: It is the current that inverter give motor when DC braking. It is based on the output rated current of the inverter. DC braking can afford 0 speed torque. It is usually used for improve stop accuracy and quick stop. It can't be used for DEC braking for normal running.

Waiting time of stop DC braking: It is the time for waiting to DC braking when inverter DEC to initial frequency of stop DC braking and stop output.

Stop DC braking duration: It is DC braking current holding time after stop. It is no DC braking process when braking time is 0.0s.

F1.12	Reserved
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F1.13	ACC/DEC mode selections	Setting range: 0000-0011	Factory default: 0000
F1.14	Start ACC rate of S curve	Setting range: 20.0%-100.0%	Factory default: 50.0%
F1.15	Start DEC rate of S curve	Setting range: 20.0%-100.0%	Factory default: 50.0%

ACC/DEC mode selections

LED "0" digit: ACC/DEC time base

0: max frequency Base is max frequency [F0.09]

1: fixed frequency Base is 50.00Hz

LED "00" digit: ACC/DEC mode

This series server provides two kinds of ACC/DEC mode; in processes like normal start, stop, FWD/REV, ACC/DEC, the two modes are valid.

0: straight line Suitable for general load.

1: S Curve Suitable for load need reduce noise, vibration, impact or load need descend torque for low frequency and ACC short time for high frequency. If over current or over load when start, please increase [F1.14] setting.

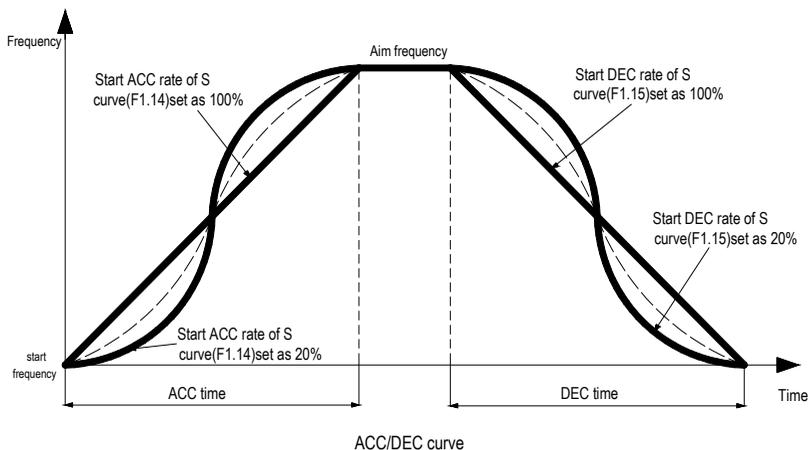
LED "000" digit: reserved

LED "0000" digit: reserved

Start ACC rate of S curve: It is the rate when start ACC. The smaller the rate is, the ACC S curve

is sharper. Otherwise, the bigger the rate is, the ACC S curve is more like a beeline. If you want it ACC more smoothly, you can reduce the rate and prolong ACC time.

Start DEC rate of S curve: It is the rate when start DEC. The smaller the rate is, the DEC S curve is sharper. Otherwise, the bigger the rate is, the ACC S curve is more like a beeline. If you want it DEC more smoothly, you can reduce the rate and prolong DEC time.



Note: ACC /DEC time of S curve will not be changed when modifying F1.14 and F1.15.

F1.16-F1.17	Reserved
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F1.18	ACC time 2	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.19	DEC time 2	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.20	ACC time 3	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.21	DEC time 3	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.22	ACC time 4	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.23	DEC time 4	Setting range: 0.01-650.00s	Factory default: 10.00s

ACC time 2/3/4: When [F1.13] LED "0" digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency [F0.09]. When [F1.13] LED "0" digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details refer to [F1.13].

DEC time 2/3/4: When [F1.13] LED "0" digit is 0, it means the time need for output frequency DEC from max frequency [F0.09] to 0.00Hz. When [F1.13] LED "0" digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.

ACC/DEC time 2/3/4 can only be determined by the on-off combination of multi-functional terminals such as 'deceleration time selection terminal 1' and 'deceleration time selection terminal 2' and (COM) to switch the current ACC/DEC time group (except PLC program running);

If the ACC/DEC time selection terminal has not been set, the default deceleration time 1 is valid and the inverter would implement ACC/DEC according to the ACC/DEC 1.

ACC/DEC time details refer to [FC.31-FC.45].

JOG ACC/DEC time is set by [F1.33, F1.34]

ACC/DEC time table:

Terminal 2	Terminal 1	ACC/DEC time selection
OFF	OFF	ACC/DEC time 1
OFF	ON	ACC/DEC time 2
ON	OFF	ACC/DEC time 3
ON	ON	ACC/DEC time 4

If any unclear, please see FC parameter group multi steps time order fig.

F1.24	Emergency stop DEC time	Setting range: 0.01-650.00s	Factory default: 10.00s
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Used to set the DEC time of emergency stop; it is the same as the definition of ACC/DEC time.

Emergency stop can be take effect by emergency stop terminal; details refer to [F2.00-F2.07].

When terminal control two line run, whether carry out the original run order is decided by [2.13] LED "00" digit. Details refer to [F2.13].

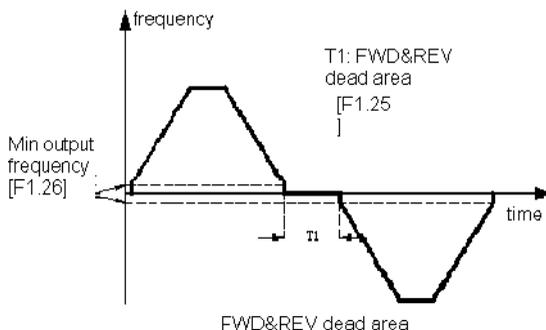
If LED "00" digit, and LED "0" digit are set as "1", the server would DEC to stop with this DEC time and report the corresponding fault, details see in [FA.01]

When multifunction terminal is set as emergency stop, refer to detail [F2.29-F2.31].

F1.25	FWD&REV dead area time	Setting range: 0.0-120.0s	Factory default: 0.0s
F1.26	Min output frequency	Setting range: 0.00-60.00Hz	Factory default: 0.50Hz

FWD&REV dead area time: Waiting time at 0.0Hz when switch between FWD/REV. It sets for equipment with machine dead area when big inertia load and change direction.

Min output frequency: If lower than this frequency, inverter output 0.00Hz



F1.27	0 speed hold torque	Setting range: 0.0-150.0%	Factory default: model setting
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Set output torque at 0 speed.

F1.28	Reserved		
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F1.29	Power off restart action selection	Setting range: 0-1	Factory default: 0
F1.30	Power off restart waiting time	Setting range: 0.00-120.00s	Factory default: 0.50s

Power off restart action selection:

0: Invalid: Only run with order for power on again. When keyboard operation control, RS485 communication control or optional card control is working, the running order would be automatically cleared when power off.

When external terminal control, run as [F1.31] setting.

1: Valid If inverter is at run state before power off, it start automatically after [F1.30] waiting time. When waiting, it does not accept any orders. But if inputting stop order, it will not restart.

Note: Power off restart action selection can make machine automatic re-start when power recovers. Please use it carefully.

Power off restart waiting time: When [F1.29] setting is valid, inverter restarts after [F1.30] waiting time. The setting principle of the time is mainly based on the related recovery preparation time after power restoration.

F1.31	Terminal running protection selection	Setting range :0000-0011	Factory default: 11
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After selecting terminal operation, the initial state of the peripheral device wiring may affect the device safety, which would provide protective measures for terminal operation.

LED “0” digit: when electrifying, terminal operation command selection

Implement operation command when electrifying and when the terminal operation command is valid.

0: Terminal running order invalid: when electrifying terminal controls stop firstly and then restart.

1: Terminal running order valid: when electrifying terminal controls start directly

LED “00” digit: when switch the running order give channel

Select running order channel switching to terminal order when the terminal operation command is valid; Implement operation command method

0: invalid Terminal controls stop firstly and then restart.

1: valid Terminal controls start directly.

F1.32	JOG running frequency setting	Setting range: 0.00-Max frequency	Factory default: 5.00Hz
F1.33	JOG ACC time	Setting range: 0.01-650.00s	Factory default: 10.00s
F1.34	JOG DEC time	Setting range: 0.01-650.00s	Factory default: 10.00s

JOG running frequency setting: Set output frequency when JOG.

JOG ACC time: When [F1.13] LED“0”digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency [F0.09]. When [F1.13] LED“0”digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details see [F1.13].

JOG DEC time: When [F1.13] LED “0”digit is 0, it means the time need for output frequency DEC from max frequency [F0.09] to 0.00Hz. When [F1.13] LED “0”digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.

Jog frequency has the highest command priority (terminal jogging). That is in any state, once the jogging command is valid, immediately run with jog ACC/DEC time from the current operating frequency to jogging frequency. Jog ACC/DEC time is defined same as the ACC/DEC time. The server jog can be controlled by the jog running command of keyboard, control terminal, RS485 or optional card.

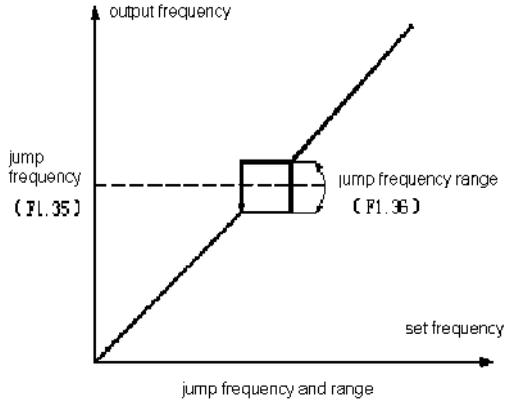
Note: JOG run frequency set is only limited by [F0.09]. When JOG frequency setting is bigger than [F0.11] upper limitation, actual JOG output frequency is limited by upper limitation. Only terminal JOG priority is not limited by run order channels. Other JOG orders have priority only when the channel is the same as others. Such as keyboard JOG is only valid under keyboard control.

F1.35	Jump frequency	Setting range: 0.00-Max frequency	Factory default: 0.00Hz
F1.36	Jump frequency range	Setting range: 0.00-Max frequency	Factory default: 0.00Hz

Jump frequency: When running, the frequency avoid running.

Jump frequency range: The up/down frequency range of [F1.35] avoid running.

When the inverter is running with load, in order to avoid resonance frequencies of mechanical load for the output frequency, jump frequency can be used to avoid the resonance. The inverter can set one jump point to implement the jumping and after setting the skip frequency parameters, even if the drive frequency is within the given point of the mechanical resonance frequency of the load, the output frequency of the inverter will be automatically adjusted to the resonance frequencies of the external mechanical load in order to avoid running on the resonance point.



Note: Output frequency will jump through frequency area when ACC/DEC.

4.3 Quantum Digital Terminal Parameter

F2.00	Multifunction input terminal 1(X1)	Setting range: 0-51	Factory default:1
F2.01	Multifunction input terminal 2(X2)		Factory default:2
F2.02	Multifunction input terminal 3(X3)		Factory default:4
F2.03	Multifunction input terminal 4(X4)		Factory default:5
F2.04	Multifunction input terminal 5(X5)		Factory default:6
F2.05	Multifunction input terminal 6(X6)		Factory default:8
F2.06	Multifunction input terminal 7(X7)		Factory default:10
F2.07	Multifunction input terminal 8(X8)		Factory default:11

The machine has eight multi-functional input terminals. Parameter [F2.00 ~ F2.07] can define separately multifunctional input terminals (X1-X8) function. Multi-function input terminal parameter characteristics and filter through time can be set by [F2.08 ~ F2.11], see parameters [F2.08 ~ F2.11].

Multi-function input terminals can be easily set and chosen according to needs. Settings and functions in the table below:

Setting	Setting	Setting	Setting
0	No function(can choose again)	24	PID trait switch
1	FWD	25	PID give switch 1
2	REV	26	PID give switch 2
3	3 line running control(Xi)	27	PID give switch 3
4	FWD JOG	28	PID feedback switch 1

5	REV JOG	29	PID feedback switch 2
6	Free stop	30	PID feedback switch 3
7	Emergency stop	31	PLC pause
8	Fault reset	32	PLC restart
9	Out fault input	33	Swing frequency input
10	Frequency (UP)	34	Swing frequency pause
11	Frequency (DW)	35	Swing frequency reset
12	(UP/DW clear)	36	Frequency channel switch terminal 1
13	Reserved	37	Frequency channel switch terminal 2
14	Reserved	38	Frequency channel switch terminal 3
15	Multi speed terminal 1	39	Frequency channel switch terminal 4
16	Multi speed terminal 2	40	Timer touch terminal
17	Multi speed terminal 3	41	Timer clear terminal
18	Multi speed terminal 4	42	Counter clock input terminal
19	ACC/DEC time selection terminal 1	43	Counter clear terminal
20	ACC/DEC time selection terminal 2	44	DC brake order
21	ACC/DEC pause	45	Pre-excitation order terminal
22	PID control cancel	47	Start magnetic clutch function
23	PID control pause	47	Signal terminal of injection molding

0: No function: it means terminal invalid. If the terminal function is idle, it is recommended to set "0" to prevent the occurrence of misuse.

1: FWD When run order is given by terminal, and **[F2.12]** is set as 2 line 1, and when the terminal is valid, inverter will FWD. Other control mode, please refer to **[F2.12]**.

2: REV When run order is given by terminal, and **[F2.12]** is set as 2 line 1, and when the terminal is valid, inverter will REV. Other control mode, please refer to **[F2.12]**.

3: 3 line run control (Xi): When the run order is given by terminal, and **[F2.12]** is set as 3 line 1/2, it is 3 line run control (Xi). Details refer to **[F2.12]**.

4: FWD JOG

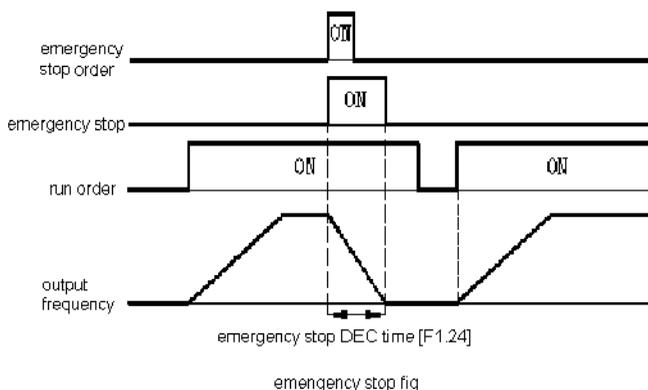
5: REV JOG

When the terminal is valid, the inverter jogs forward. Terminal jog command has the highest priority. Jog parameters detailed settings see **[F1.32 ~ F1.34]**.

6: Free stop: When it is valid, inverter stops output. Motor will free run. When free stop terminal is always valid, inverter does not accept any start order and keep stop state. Whether recover to original order after free stop order is relieved when terminal 2 line control running, refer to **[F2.13]** please. It does not recover to original order after free stop order is relieved when keyboard, RS485, optional card and terminal 3 line control running. If need start inverter, it needs to input run order

again.

7: Emergency stop If input emergency stop order when running, inverter DEC and stop according [F1.24] DEC time setting. Details refer to [F1.24]. It can't run again before totally stopping. When [F1.07] is set as free stop, emergency stop order and free stop order is same function. Once this terminal is valid, inverter stops output and free stop immediately. If emergency stop terminal is always valid, inverter does not accept start order and keep stop. Under 2 line control mode, whether recover original run order after relieve emergency stop order is decided by [F2.13]. When working under keyboard, RS485, optional card and terminal 3 line control mode, the original order would not be recovered when the emergency stop order is removed. If need start inverter, please input order again.



Note: When use emergency stop function, please set right [F1.24] DEC time or work with energy brake function. Otherwise over-voltage fault might happen. Therefore, when using the emergency stop function, please set appropriate deceleration time under [F1.24], or cooperate with the use of dynamic braking function.

8: Fault reset: The inverter can be reset by the terminal when alarm. Whether recover original order after fault reset is decided by [F2.13].

9: Out fault input Inverter stop output when accept external fault input signal by it, which is convenient for the fault monitoring and protection of external equipments. Output would be sealed when receiving external input signal and motor runs freely and displays fault information E.EF.

10: Frequency (UP)

11: Frequency (DW)

Frequency UP/DW is realized by the control terminal. And the control would be valid only when [F0.03] is set as 7. Details refer to [F0.03].

12: (UP/DW clear): Only valid when [F0.03] is set as 7. Details refer to [F0.03].

13: Speed torque control switching

Terminal switching priority over [F0.01], torque control when effective; determined by [F0.01] setting when invalid

14: Reserved

15: Multi steps terminal 1

16: Multi steps terminal 2

17: Multi steps terminal 3

18: Multi steps terminal 4

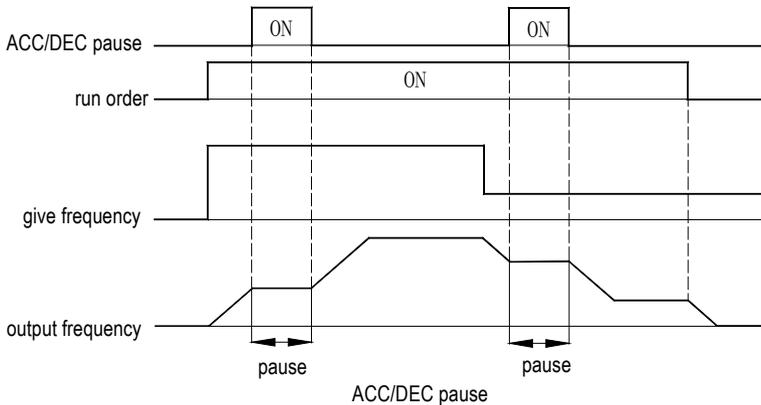
15 speeds would be realized by code combinations for multi-speed instruction; multi-speed command has priority second only to jog command. See parameter details of multi steps and FC group of PLC.

19: ACC/DEC time selection terminal 1

20: ACC/DEC time selection terminal 2

4 ACC/DEC speeds would be realized by code combinations. ACC/DEC time selection terminal 1 is defaulted as valid when not set parameter and terminal invalid. Details see [F1.18-F1.23].

21: ACC/DEC pause: In ACC/DEC process, if the terminal is valid, the inverter stops ACC/DEC and keeps the speed. It is only valid when inverter is running. It is invalid for DEC stop.



F2.08	X1-X4 terminal trait selection	Setting range: 0000-1111	Factory default: 0000
F2.09	X1-X4 input terminal filter time	Setting range: 0.000-60.000s	Factory default: 0.050s

X1-X4 terminal trait selection: set multi-function input terminals X1, X2, X3, X4 features.

LED "0" digit: X1 terminal

0: On valid

1: Off valid

LED "00" digit: X2 terminal

0: On valid

1: Off valid

LED "000" digit: X3 terminal

0: On valid

1: Off valid

LED "0000" digit: X4 terminal

0: On valid

1: Off valid

X1-X4 input terminal filter time: When input terminal state changes, only if changed state keeps after filter time setting, it is considered as valid terminal state change. Otherwise, it keeps last state to effectively avoid misact caused by disturbance.

F2.10	X5-X7 terminal trait selection	Setting range: 0000-1111	Factory default: 0000
F2.11	X5-X7 input terminal filter time	Setting range: 0.000-60.000s	Factory default: 0.050s

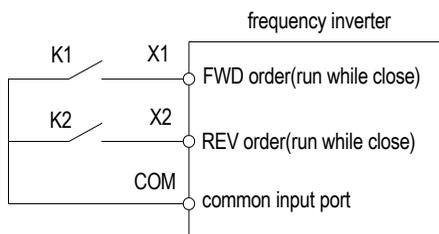
Same as above

F2.12	Terminal control mode	Setting range: 0-3	Factory default: 0
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The parameter defines the 4 different ways of controlling the inverter operation by external terminals.

0:2-line 1 Run and direction in 1. Factory set is X1(FWD), X2(REV) terminals decide motor forward or reverse.

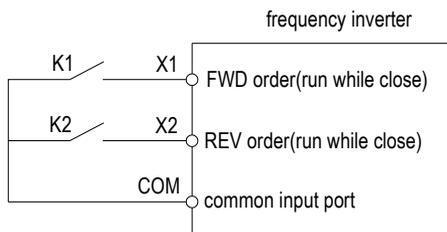
K1	K2	run order
0	0	stop
1	0	FWD
0	1	REV
1	1	COM



0: 2-line 1

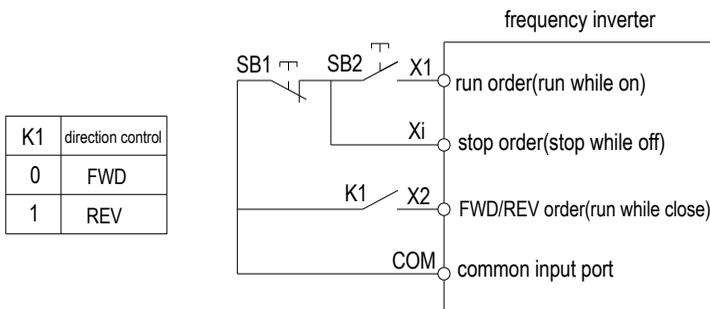
1:2-line 2 Run and direction is separate. FWD terminal X1 is run terminal. FWD terminal X2 state decides direction.

K1	K2	run order
0	0	stop
1	0	FWD
1	1	REV
0	1	stop



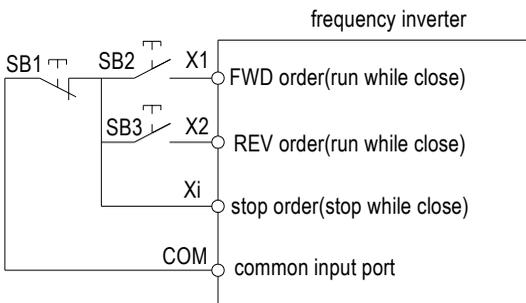
1: 2-line 2

2:3-line 1 Xi is stop run terminal. Run order is decided by FWD terminal X1. Direction is controlled by REV terminal X2. Xi is valid input.



2: 3-line 1

3:3-line 2 Xi is stop run terminal. Run order is decided by FWD terminal X1 or REV terminal X2. Direction is controlled by both terminals.



3: 3-line 2

Note: SB1: Stop Button. SB2: FWD Button. SB3; REV Button; Xi is set as 3 multi function input terminal [3 line control (Xi)].

F2.13	Terminal act mode	Setting range: 0000-0111	Factory default: 0111
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The following states are valid only when the terminal control [F0.02] is set to "1", and only valid when [F0.02] is 1 and [F2.12] is set as 0 or 1. Running command must be re-entered when under three-line control mode.

LED "0" digit: free stop terminal reset mode

0: Reset to original order when invalid

1: Not reset to original order when invalid

When the free stop terminal is in terminal control operating state, whether to implement the original operation command or not when free stop terminal turns from valid to invalid.

LED "00" digit: emergency stop terminal reset mode

0: Reset to original order when invalid

1: Not reset to original order when invalid

When the free stop terminal is in terminal control operating state, whether to implement the original operation command or not when free stop terminal turns from valid to invalid.

LED “000” digit: terminal run mode after fault reset

0: Terminal control to power on directly

1: Terminal control to power on after stop

LED “0000” digit: reserved

Note: 3 channels given can send reset signal to inverter when fault alarm. If it is terminal control mode, inverter can select whether to carry out terminal order by these parameters when receiving reset signal of terminal or the other two channels.

F2.29	Output terminal 1 (Y1)	Setting range: 0~28	Factory default: 1
F2.30	Output terminal 2 (Y2)		Factory default: 2
F2.31	Relay output terminal (TA-TB-TC)		Factory default: 3

0:No output: terminal invalid; set '0'when not using to prevent malfunction.

1:Running: output signal valid

2:REV running: output signal valid

3: Fault trip alarm 1(alarm when fault self-recover)

4: Fault trip alarm 2(no alarm when fault self-recover)

4.4 Analog Terminal Parameter

F3.00	VS1 Lower limit	Setting range: 0.00-10.00V	Factory default 0.00V
F3.01	VS1 Lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default 0.00%
F3.02	VS1 upper limit	Setting range: 0.00-10.00V	Factory default 10.00V
F3.03	VS1 upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default 100.00%
F3.04	VS1 filter time	Setting range: 0.00-10.00s	Factory default 0.05s

VS1 Lower limit: It defines signal accepted by analog input terminal (**VS1**), Inverter deal voltage lower than this value as lower limit.

VS1 lower limit corresponding setting: It defines ratio of VS1 lower limit.

VS1 upper limit: It defines signal accepted by analog input terminal (**VS1**). Inverter deal voltage higher than this value as higher limit.

VS1 upper limit corresponding setting: It defines ratio of VS1 upper limit.

VS1 filter time: It is (VS1) input analog signal filter time to eliminate disturb signal. The longer filter time is, the stronger anti-disturb force is. The shorter filter time is, the weaker anti-disturb force is. But respond speed will be quicker.

F3.05	AI Lower limit when used as VS	Setting range: 0.00-10.00V	Factory default 0.00V
F3.06	AI Lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default 0.00%
F3.07	AI upper limit when used as VS	Setting range: 0.00-10.00V	Factory default 10.00V
F3.08	AI upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default 100.00%
F3.09	AI filter time	Setting range: 0.00-10.00s	Factory default 0.10s
F3.10	AS Lower limit	Setting range: 0.00-20.00mA	Factory default 4.00mA
F3.11	AS Lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default 0.00%
F3.12	AS upper limit	Setting range: 0.00-20.00mA	Factory default 20.00mA
F3.13	AS upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default 100.00%
F3.14	AS filter time	Setting range: 0.00-10.00s	Factory default 0.05s

See VS explain. AI (VS) indicates setting when the AV terminal input voltage analog.

4.5 Keyboard and Display Parameters

F4.00	Parameter and key lock selections	Setting range: 0-3	Factory default: 0
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0: Unlock Parameter and keyboard lock function invalid.

1: Function parameter lock: Lock all function parameter settings, can't modify parameter.

Password is needed when unlocking and password is set by parameter [F4.01] .

2: Parameter and key lock (except FWD/STOP/JOG) Lock all parameter settings, can't modify parameter. And lock all keys on keyboard except FWD/STOP/JOG. That is start/stop operation on servers can only be operated by keyboard. Password is needed when unlocking and password is set by parameter [F4.01] .

3: All parameter and key lock: Lock all parameter settings, can't modify parameter. And lock all keys on keyboard except PRG. No operation could be done to the server via keyboard. Password is needed when unlocking and password is set by parameter [F4.01] .

Note:

When [F4.00] is set as "2" or "3", press "PRG" to enter into password input interface and log in function parameter interface by inputting the right password.

F4.01	User password	Setting range: 0-9999	Factory default: 0
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It is used to set user password. When [F4.00] is (not 0) lock state, password input is needed to unlock. Factory default is 0.

F4.02	REV/JOG selections	Setting range: 0-1	Factory default: 0
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Used to select the REV/JOG function of the keyboard

0: REV When keyboard control, press this button, inverter reverse run. Key REV/JOG not light.

1: JOG When keyboard control, press this button, inverter JOG. Key REV/JOG light.

F4.03	STOP key function range	Setting range: 0000-0011	Factory default: 0000
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LED "0" digit: terminal control selection

0: invalid to terminal order: When terminal given signal, STOP key can't control to stop.

1: valid to terminal order: When terminal given signal, STOP key can control to stop.

LED "00" digit: communication control selection

0: invalid to communication order: When terminal given signal, STOP key can't control to stop.

1: valid to communication order: When terminal given signal, STOP key can control to stop.

LED "000" digit: reserved

LED "0000" digit: reserved

Note: When valid to terminal order or communication order, inverter is in stop lock state after press STOP. If inverter needs to restart, stop order needs to be given by selected order channel to unlock stop state firstly.

F4.04	UP/DOWN key modification selections	Setting range: 0000-0014	Factory default: 0011
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LED "0" digit: keyboard UN/DOWN key modify selection

0: Invalid UP/DOWN key can't modify parameters.

1: Modify frequency keyboard digit setting (F0.08) UP/DOWN key can modify settings of [F0.08].

2: Modify torque keyboard digit setting (F7.01) UP/DOWN key can modify settings of [F7.01].

3: Modify PID given keyboard digit setting (Fb.01) UP/DOWN key can modify settings of [Fb.01].

4: Modify magnetic powder clutch torque digit given (F7.15) UP/DOWN key can modify settings of [F7.15].

LED "00" digit: keyboard UN/DOWN key store selection

0: No save after power down

1: Save after power down

It is used to select whether to save the parameter modified by UP/DOWN key when power cut.

LED "000" digit: reserved
 LED "0000" digit: reserved

F4.05	Function parameter copy	Setting range: 0-2	Factory default: 0
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- 0: No operation
- 1: Send machine parameters to keyboard and save
- 2: Send parameters saved by keyboard to server

F4.06	Reserved		
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F4.07	Keyboard potentiometer lower limit	Setting range: 0.00-5.00V	Factory default: 0.50V
F4.08	Keyboard potentiometer lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 0.00%
F4.09	Keyboard potentiometer upper limit	Setting range: 0.00-5.00V	Factory default: 4.50V
F4.10	Keyboard potentiometer upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 100.00%

Keyboard potentiometer lower limit: It defines the lower limit of the signal given by potentiometer. Inverter treats the voltage lower than this value as the lower limit signal.

Keyboard potentiometer lower limit corresponding setting: It sets ratio of keyboard potentiometer lower limit.

Keyboard potentiometer upper limit: It defines the upper limit of the signal given by potentiometer. Inverter treats the voltage higher than this value as the lower limit signal.

Keyboard potentiometer upper limit corresponding setting: It set ratio of keyboard potentiometer upper limit.

F4.11	Upper LED display content when run	Setting range: 0000-FFFF	Factory default: 3210
F4.12	Upper LED display content when stop	Setting range: 0000-FFFF	Factory default: 3210

Upper LED display content when run: Set monitor content showed in the upper line of LED when running. The content can be modified by "SET" key when running. Not save modification when power cut. Default display LED "0" digit setting after power on.

Upper LED display content when stop: Set monitor content showed in the upper line of LED when stop. The content can be modified by “SET” key when stop. Not save modification when power cut. Default display LED “0” digit setting after power on.

LED “0” digit to “0000” digit settings:

0: Given frequency 1: Output frequency 2: Output current 3: Input voltage
 4: Output voltage 5: Machine speed 6: Reserved 7: Output torque
 8: PID given value 9: PID feedback value A: Output power B: Bus voltage
 C: Module temperature 1 D: Module temperature 2 E: ON/OFF state of input terminal X
 F: ON/OFF state of input terminal Y

F4.13	Lower LED display content when run	Setting range: 0000-FFFF	Factory default: 3210
F4.14	Lower LED display content when stop	Setting range: 0000-FFFF	Factory default: 3210

It is only valid when keyboard with 2 lines. Details refer to [F4.11-F4.12].

F4.15	Rotate speed display coefficient	Setting range: 0.1-5000.0%	Factory default: 100.0%
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It sets the display coefficient of keyboard monitor item “machine speed” .100% is corresponding to motor rated speed.

F4.16	Keyboard display coefficient	Setting range: 0000-1111	Factory default: 0000
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LED “0” digit: LCD display language

0: Chinese

1: English

LED“00” digit: reserved

LED“000” digit: machine speed display selection

0: Actual speed

1: Aim speed

LED“0000” digit: reserved

4.6 Motor Parameters

F5.00	Reserved		
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F5.01	Motor poles	Setting range:2~48	Factory default:4
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Set motor poles according to the motor nameplate.

F5.02	Motor rated power	Setting range: 0.4-1000.0kW	Factory default: model setting
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Set motor rated power; 0.1kw as an unit according to the motor nameplate; every time when motor rated power setting is changed, the inverter will automatically adjust default parameter as the **[F5.03-F5.11]** default. If self-study, parameters of **[F5.07-F5.11]** will automatically change according to the result of self-study. If high accuracy motor control is needed, please implement motor self study after correct setting of parameter **[F5.01-F5.06]**.

F5.03	Motor rated frequency	Setting range: 0.01Hz-max frequency	Factory default: model setting
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Set motor rated frequency according to the motor nameplate.

F5.04	Motor rated speed	Setting range: 0-65000rpm	Factory default: model setting
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Set motor rated speed according to the motor nameplate.

F5.05	Motor rated voltage	Setting range: 0-1500V	Factory default: mode setting
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Set motor rated voltage according to the motor nameplate.

F5.06	Motor rated current	Setting range: 0.1-2000.0A	Factory default: mode setting
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Set motor rated current according to the motor nameplate.

F5.07	Motor no-load current	Setting range:0.01~650.00A	Factory default: mode setting
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Set motor no-load current when rotary self study.

F5.08	Motor stator resistor	Setting range:0.001~65.000	Factory default: mode setting
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Set motor stator resistor when rotary self study.

F5.09	Motor rotor resistor	Setting range:0.001~65.000	Factory default: mode setting
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Set motor rotor resistor when rotary self study.

F5.10	Motor stator inductance	Setting range:0.1~6500.0mH	Factory default: mode setting
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Set motor stator inductance when rotary self study.

F5.11	Stator mutual inductance	Setting range:0.1~6500.0mH	Factory default: mode setting
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Set motor mutual inductance when rotary self study.

F5.12	Parameters self-tuning selections	Setting range: 0-2	Factory default: 0
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0: No operation: Set as default without self study.

1: Rotary type self-study: Before self tuning, please correctly input the parameter value [F5.01-F5.06] of asynchronous motor which is controlled. During rotary tuning, firstly, asynchronous motor at static state, it automatically detects motor stator resistance, motor rotor resistance, motor stator & rotor inductance. Then the asynchronous motor at rotate state, it automatically detects motor no-load current, motor stator & rotor mutual inductance. All results will be auto written in [F5.08], [F5.09], [F5.10] and [F5.07],[F5.11] and renewed when rotary tuning is over. After parameter setting, press FWD key to start self study, keyboard LED display “t-01”. Motor automatically stops when self tuning is over. Inverter recovers to standby state.

2: static type self-study: Before self tuning, please correctly input the parameter value [F5.01-F5.06] of asynchronous motor which is controlled. During static tuning, motor at static state, it automatically detects motor stator resistance, motor rotor resistance, motor stator & rotor inductance. All results will be auto written in [F5.08], [F5.09], [F5.10] and renewed when static tuning is over. After parameter setting, press FWD key to start self study, keyboard LED displays “t-02”. FWD indicator is off when self tuning is over. Inverter recovers to standby state.

Note: [F5.12] is automatic set as 0 after self tuning.

Attention:

1. Before setting [F5.12] as 1 –self study, unload the motor firstly.
2. In some occasions (such as can't unload), if it can't self study or it is not high control accuracy required, static self study or no self study is ok. If no self study, please do set right parameters [F5.01-F5.06]
3. If user know the right parameter. User can set [F5.01-F5.11] directly.
4. Ensure stop state before starting self study, otherwise, self study can't be normal.
5. When [F5.12] is 1, if there is over voltage or over current in self study process, ACC/DEC

time [F0.14, F0.15] can be prolonged.

6. If static self study is not successful, alarm E.tE1 fault. If rotary self study is not successful, alarm E.tE2 fault.

4.7 VC Parameters

F6.00	ASR proportional gain 1	Setting range: 0.00-1.00	Factory default: model setting
F6.01	ASR integral time 1	Setting range: 0.01-10.00s	Factory default: model setting
F6.02	ASR differential coefficient time 1	Setting range: 0.0-100.0	Factory default: 0.0
F6.03	ASR filter time1	Setting range: 0.000-0.100s	Factory default: 0.005s
F6.04	ASR switch frequency 1	Setting range: 0.00-50.00Hz	Factory default: 5.00Hz
F6.05	ASR proportional gain 2	Setting range: 0.00-1.00	Factory default: model setting
F6.06	ASR integral time 2	Setting range: 0.01-10.00s	Factory default: model setting
F6.07	ASR differential coefficient time 2	Setting range: 0.0-100.0s	Factory default: 0.0s
F6.08	ASR filter time 2	Setting range: 0.000-0.100s	Factory default: 0.100s
F6.09	ASR switch frequency 2	Setting range: 0.00-50.00Hz	Factory default: 10.00Hz

Function code [F6.00~F6.09] is only valid in VC control or V/F with PG mode. The speed response feature can be changed by setting the proportional gain P and integral time I of speed regulator.

ASR proportional gain and ASR integral time adjustment: System response will be quicker by increasing proportional gain. But if proportional gain is too big, there would be surge. System response will be quicker by decreasing integral time. But if integral time is too short, there would be surge. Usually, adjust proportional gain firstly, and then adjust integral time.

Note: If ASR proportional gain is too big and ASR integral time is too small, over voltage may happen from system start to high speed quickly (without extra braking resistance or braking unit). It is caused by energy feedback reborn and it can be avoided by adjusting ASR proportional gain and ASR integral time.

ASR proportional gain and ASR integral time adjustment at high/low speed: Set ASR switching frequency [F6.04] and [F6.09] when there's quick response requirement for load at high/low speed.

Usually increasing proportional gain and decreasing integral time to improve response at low frequency running. Adjusting steps: Select right switching frequency [F6.04] and [F6.09]. The first group of ASR parameter is valid when output frequency is under switch frequency 1 [F6.04]. The second group of ASR parameter is valid when output frequency is between switch frequency 1

[F6.04] and switch frequency 2 **[F6.09]**. Parameter linearly transits from switch frequency 1 **[F6.04]** to switch frequency 2 **[F6.09]** pro rate. Adjust ASR proportional gain 1 **[F6.00]** and ASR integral time 1 **[F6.01]** at low speed to ensure no surge and good response. Adjust ASR proportional gain 2 **[F6.05]** and ASR integral time 2 **[F6.06]** at high speed to ensure no surge and good response. Usually, ASR differential coefficient time does not need to set. It is used to restrain sudden speed change. If it is too big, system surge comes easily.

F6.10	VC slip compensation coefficient	Setting range: 0-250%	Factory default:100%
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Used in occasion that needs quick response and high speed accuracy. Adjust this parameter properly, the system response can be improved and stable speed error can be eliminated.

F6.11	Speed control Max output torque	Setting range: 20.0-250.0%	Factory default:180.0%
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Used to adjust the upper limit of output torque in speed control mode and vector control. 100.00% corresponding to rated current.

F6.12	Constant power area torque compensation start frequency	Setting range:100.0-500.0%	Factory default:120.0%
F6.13	Constant power area torque compensation coefficient	Setting range: 0-100%	Factory default:30%

Constant power area torque compensation start frequency: when setting inverter under VC control, switching to the torque constant power zone limit value of starting frequency; it's 100.00% corresponding to motor rated frequency.

Constant power area torque compensation coefficient: Set coefficient of torque compensation in constant power area. Appropriate reducing of the value can effectively prevent the motor from losing speed in weak magnetic field.

F6.14	Constant power area limit start frequency	Setting range: 100.0%-500.0%	Factory default:200.0%
F6.15	Constant power area limit value	Setting range: 50-200%	Factory default:120%

Constant power area limit start frequency: Set to switch to start frequency of torque limitation in constant power area under VC control. 100.00% is corresponding to motor rated frequency.

Constant power area limit value: Set limitation of torque in constant power area. It can effectively anti motor stall at weak magnetic area by reduce this limitation properly.

F6.16	Deceleration over-excitation coefficient	Setting range:100.0~150.0%	Factory default:100.0%
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Deceleration over-excitation coefficient: used to set the magnetic flow when server decelerates. 100.0% represents rated magnetic flow. This feature works by increasing the deceleration stop magnetic flow without an external braking resistor optional, also comparable generally faster deceleration to stop the motor. Set 100.0% to turn off the function. Best value varies due to magnetic saturation characteristics of the motor.

In order to improve the braking performance of over-excitation deceleration, please increase **[F6.16]** setting within the range of 100.0 - 150.0%.

Set too high may cause over current (E.OC), motor overload (E.oL1), server overload (E.oL2) due to magnetic saturation, please decrease the **[F6.16]** setting.

Cautions:

1. The use of renewable energy is consumed mainly in the form of heat inside the motor, so if you frequently use the over-excitation deceleration, the temperature inside the motor would rise. Do not allow the motor temperature exceeds the maximum allowable value. If fast start and stop of servers are needed, but start and stop times are too frequent, the motor may be overheated or damaged, installation of braking resistor optional corresponding to the server power is recommended.
2. The server will then decelerate according to the deceleration time. Set the deceleration time to avoid E.oU2 (main circuit overvoltage).
3. If a run command is inputted when over excitation deceleration, the deceleration will be canceled and the server will accelerate again to the set frequency.

4.8 V/F Control Parameters

F8.00	V/F curve selection	Setting range: 0~4	Factory default:0
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V/F curve selection: used to select the V/F curve types to meet different load requirements. This series of servers providing a total of four kinds of fixed V / F curve and one custom V / F curve. Generally load using an optional constant torque curve "0" Beeline, air pumps and other optional drop squared torque load torque curve.

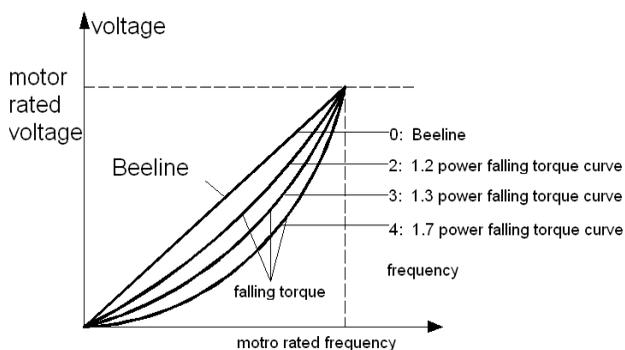
0: beeline.

1: Self-define V / F curve, this way is run by custom V / F curve, the user can customize to set the appropriate V / F curve according to the load characteristics; see [F8.01 ~ F8.10].

2: 1.3 times idempotent lower power torque curve

3: 1.7 times idempotent lower power torque curve

4: 2.0 times idempotent lower power torque curve

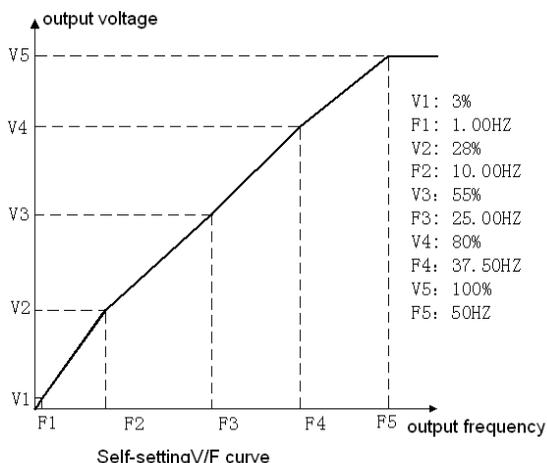


V/F curve

F8.01	Self-setting voltage V1	Setting range: 0.0-100.0%	Factory default:3.0%
F8.02	Self-setting frequency F1	Setting range: 0.00-max frequency	Factory default:1.00Hz
F8.03	Self-setting voltage V2	Setting range: 0.0-100.0%	Factory default:28.0%
F8.04	Self-setting frequency F2	Setting range: 0.00-max frequency	Factory default:10.00Hz
F8.05	Self-setting voltage V3	Setting range: 0.0-100.0%	Factory default:55.0%
F8.06	Self-setting frequency F3	Setting range: 0.00-max frequency	Factory default:25.00Hz
F8.07	Self-setting voltage V4	Setting range: 0.0-100.0%	Factory default:78.0%
F8.08	Self-setting frequency F4	Setting range: 0.00-max frequency	Factory default:37.50Hz

F8.09	Self-setting voltage V5	Setting range: 0.0-100.0%	Factory default 100.0%
F8.10	Self-setting frequency F5	Setting range: 0.00-max frequency	Factory default 50.00Hz

Self-setting V/F curve: Users set the 1st/2nd/3rd/4th/5th voltage ratio of V/F curve corresponding to F1/F2/F3/F4/F5 frequency based on rated output voltage 100%. Users set the 1st/2nd/3rd/4th/5th frequency of V/F curve corresponding to V1/V2/V3/V4/V5.



Must meet: $0 \leq F1 \leq F2 \leq F3 \leq F4 \leq F5 \leq \text{max frequency}$. $0 \leq V1 \leq V2 \leq V3 \leq V4 \leq V5 \leq 100.0\%$
V1, V2, V3, V4, V5 is based on motor rated voltage.

F8.11	Output voltage percentage	Setting range: 25-100%	Factory default: 100%
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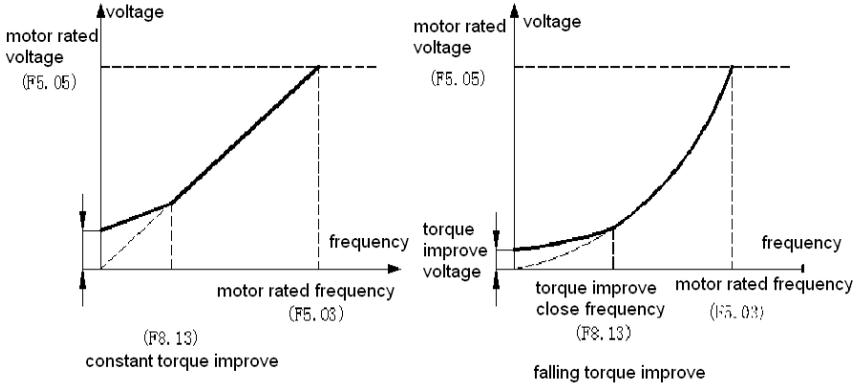
Output voltage adjustment coefficient adjusts output voltage of inverter to meet different V/F requirement.

F8.12	Torque boost	Setting range: 0.1-30.0%	Factory default: Accord model
F8.13	Torque boost cut-off frequency	Setting range: 0.0-100.0%	Factory default: 20.0%

Torque boost: Improve low frequency torque trait by voltage compensation. Please set it rightly. If too high, motor maybe happens over excitation at low frequency running, over heat when long time, even over current protection or can't start normally.

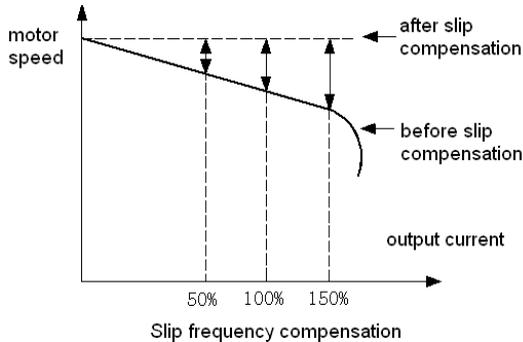
Note: when [F8.00] is 1, [F8.12] is invalid.

Torque boost cut-off frequency: Set torque boost valid range. When output frequency exceeds this value, torque boost function stop. 100% is corresponding to motor rated frequency.



F8.14	V/F slip compensation	Setting range:0.0-200.0%	Factory default:0.0%
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This function allows the output frequency change with motor load automatically adjusted within the set range; dynamic compensation to the slip frequency of the motor, so that the motor remains substantially constant speed, effectively reducing the impact of load changes on the motor speed



If automatic torque function is used, the low-torque characteristics of the inverter can be significantly improved. 100.0% slip frequency compensation corresponds to the motor rated slip; it may cause the motor speed exceeds setting value when the compensation value is set too large.

F8.15	Auto energy save selection	Setting range: 0-1	Factory default:0
F8.16	Lower frequency limit of energy save running	Setting range: 0.0-500.0%	Factory default:25.0%
F8.17	Energy save voltage down time	Setting range: 0.01-50.00s	Factory default:10.00s
F8.18	Energy save voltage lower limit	Setting range: 20.0-100.0%	Factory default:50.0%

Auto energy-saving selection:

0: no operation

1: auto energy-saving

In operation, the inverter can automatically calculate the best output voltage in the load condition to save power. The power saving is working by reducing the output voltage and increasing motor efficiency.

Lower frequency limit of energy-saving running: When output frequency is lower than this value, auto energy save function will close. 100% corresponds to motor rated frequency.

Energy-saving time voltage down time: It is the time for the output voltage changing from rated voltage to 0V when meeting auto energy save conditions.

Energy-saving voltage down lower limit: Set lower limitation of voltage in energy-saving running condition. 100% corresponds to motor rated frequency.

F8.19	ASR(VF) proportion gain1	Setting range:0.0~100.00	Factory default:1.00
F8.20	ASR(VF) integral	Setting range:0.01~10.00s	Factory default:0.50s
F8.21	ASR(VF) filter time 1	Setting range:0.000~10.000s	Factory default:0.005s
F8.22	ASR(VF)switch frequency 1	Setting range:0.00~50.00Hz	Factory default:5.00Hz
F8.23	ASR(VF)proportional gain 2	Setting range:0.0~100.00	Factory default:1.00
F8.24	ASR(VF) integral time 2	Setting range:0.01~10.00s	Factory default:0.50s
F8.25	ASR(VF) filter time 2	Setting range:0.000~10.000s	Factory default:0.100s
F8.26	ASR(VF)switch frequency 2	Setting range:0.00~50.00Hz	Factory default:10.00Hz

Function code [F8.19~F8.26] V/F with PG control mode valid. In V/F with PG control mode. By setting the speed regulator proportional gain P and integration time I, thus changing the speed with PG V / F control mode response.

ASR(VF) proportional gain: Increasing proportional gain can speed up the response time of the server to the load, but surge may occur if the gain is too large. Decreasing proportional gain can slow down the response time of the server to the load, and surge can be decreased within a certain range when decreasing proportional gain.

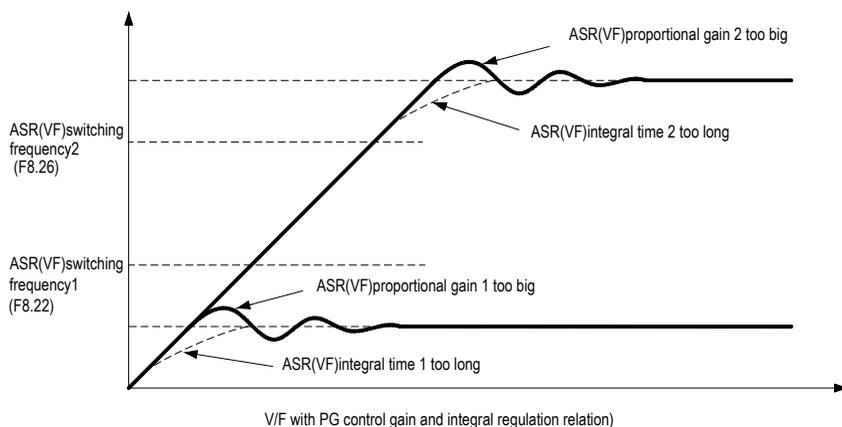
ASR(VF) integral time: Long integration time can slow down the response to mutation load, but it can effectively suppress the fluctuation. When integration time is too short, surge may occur. Usually adjust proportional gain first, increase its value as no system surge premise; then adjusting

the integration time enables rapid response characteristics of the system without overshoot.

ASR(VF) filter time: PG card is vulnerable to external interference during signal acquisition, so filter of signal to remove interference is needed. In the case of the encoder is mounted eccentric or signal fluctuations exist appropriate time to extend the filter, effectively filter out interfering signals.

ASR proportional gain and ASR integral time adjustment at high/low speed: Set ASR switching frequency [F6.04] and [F6.09] when there's quick response requirement for load at high/low speed. Set ASR(VF) switching frequency [F8.22] and [F8.26] .

Usually increasing proportional gain and decreasing integral time to improve response at low frequency running. Adjusting steps: Select right switching frequency [F8.22] and [F8.26] . The first group of ASR parameter is valid when output frequency is under switch frequency 1 [F8.22]. The second group of ASR parameter is valid when output frequency is between switch frequency 1 [F8.22] and switch frequency 2 [F8.26]. Parameter linearly transits from switch frequency 1 [F8.22] to switch frequency 2 [F8.22] pro rate. Adjust ASR proportional gain 1 [F8.19] and ASR integral time 1 [F8.20] at low speed to ensure no surge and good response. Adjust ASR proportional gain 2 [F8.23] and ASR integral time 2 [F8.24] at high speed to ensure no surge and good response.



Note: If ASR proportional gain is too big and ASR integral time is too small, over voltage may happen from system start to high speed quickly (without extra braking resistance or braking unit). It is caused by energy feedback reborn and it can be avoided by adjusting ASR proportional gain and ASR integral time.

F8.27	ASR(VF)slip limit	Setting range:0.0~500.0%	Factory default: 100.0%
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This parameter is used to limit the maximum value of slip frequency compensation under PG V / F control. Motor rated slip is 100% the parameter reference value. When the load is heavy, increasing in the slip rotational speed limit can effectively compensate steady state speed error. In high precision or heavy load state, ASR (VF) slip limit can be appropriately increased.

4.9 Malfunction and Protection Parameters

FA.00	Protective function selection 1	Setting range:0000~0111	Factory default:0001
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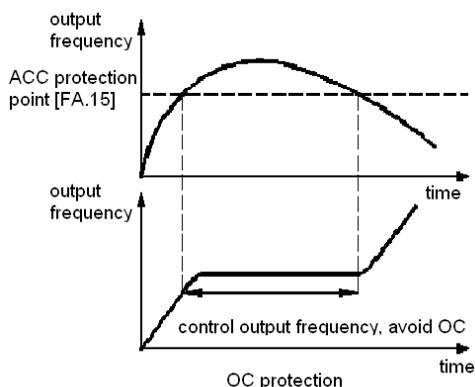
Over current suppression function is run by real-time monitoring of the load current, automatic limit that it does not exceed the set current limit level (Server controls the output current by stopping the acceleration, deceleration or decrease, increase output frequency mode) to prevent tripping over current fault caused, which is particularly useful for some inertia or big change of load situations. Use of this function may extend the ACC/DEC time, and during the server start and stop process, if the output frequency can not run to the given frequency as desired when large electricity occurs, indicating that the current limiting function is activated, then please lighten load or adjust the parameters.

LED '0' digit: Acceleration over current inhibition choice

Set server over current during acceleration suppression is valid. Acceleration, if the function is active, when the server output current exceeds [FA.15] setting, the server enters over current suppression state, the acceleration time is automatically extended until the current down to [FA.15] setting value, then continue to accelerate the process.

0: Invalid

1: Valid



LED '00' digit: Deceleration over-current inhibition choice

Setting server in deceleration over current suppression function is valid or not. During deceleration, if the function is valid, when the server output current exceeds [FA.16] setting, the server enters over current suppression state and the deceleration time is automatically extended until the current decreases down to [FA.16] setting value, and then continue to slow down the speed.

0: Invalid 1: Valid

LED '000' digit: running current limiter selection

Set server running at steady speed current limit function is valid or not. When this feature is valid,

during constant run if the server output current exceeds [FA.17] setting, the server enters into the current limit state and according to the [FA.18] set deceleration time, automatically reduce server output frequency until the current slows down to [FA.17] setting value, and press [FA.18] set deceleration time to accelerate to the set frequency.

0: Invalid 1: Valid

LED '0000' digit: Reserved

FA.01	Protective function selection 2	Setting range: 0000~3212	Factory default: 0001
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LED '0' digit: DEC OV suppression selection

0: Invalid DEC OV suppression function closed

1: 1st level overvoltage suppression strong voltage suppression ability to inhibit the process of bus voltage fluctuation.

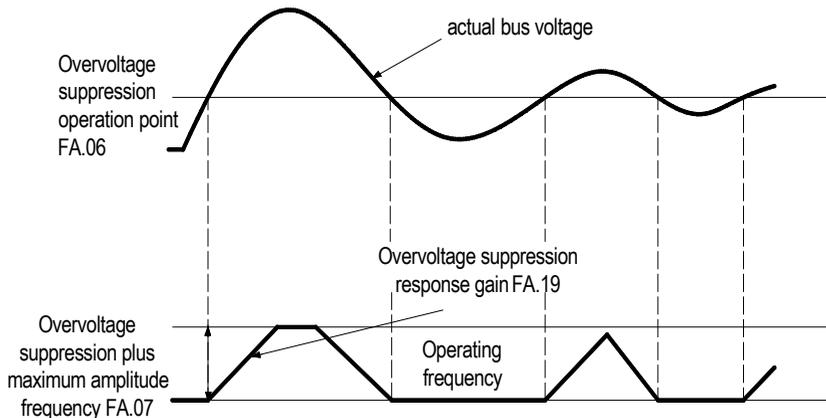
2: 2^{ed} level overvoltage suppression have the strongest voltage suppression ability to inhibit the process of bus voltage fluctuation.

When you select a server deceleration voltage suppression is valid. If this feature is valid, deceleration when the server bus voltage reaches or exceeds [FA.05] value set, the server will slow down or stop decelerating, thus ensuring the server does not cause the bus voltage skipping pressure protection due to high voltage.

LED '00' digit: acceleration and constant speed overvoltage suppression selection

0: Invalid: running overvoltage suppression function is closed.

1: valid: server acceleration and constant speed when the bus voltage reaches or exceeds [FA.06] value set, the server will automatically adjust the operating frequency suppression bus voltage increases, thus ensuring the server does not skip for voltage protection. This feature is especially valid for eccentric load.



Running overvoltage suppression schematic

Tip: overvoltage suppression function is turned on during acceleration and constant speed, the need to set reasonable [FA.07] and [FA.19] parameters according to the load.

LED '000' digit: servo Overload Operation Selection

Setting the protection mode when server overload.

0: stop, report fault: when overload due to large output current, the server immediately blocks output, motor free stop and the report server failure E.oL2.

1: emergency stop, report fault: when overload due to large output current, the server immediately blocks output, the server immediately emergency stop, the motor DEC according to the emergency stop deceleration time and report server failure E.oL2.

2: The current limit running: when the server is running with large output current, which leads to overload operation, the server immediately switch current limit run by the initiative to reduce the output frequency, output current is limited so that the server is limited within the rated current.

LED '0000' digit: Motor overload action Selection

Setting the protection mode when server overload.

0: stop, report fault: when overload due to large output current, the server immediately blocks output, motor free stop and the report server failure E.oL1.

1: emergency stop, report fault: when overload due to large output current, the server immediately blocks output, the server immediately emergency stop, the motor DEC according to the emergency stop deceleration time and report server failure E.oL1.

2: The current limit running: when the server is running with large output current, which leads to overload operation, the server immediately switch current limit run by the initiative to reduce the output frequency, output current is limited so that the server is limited within the rated current.

3: Motor overload shutdown.

Note: When the server or motor overload, if you select "Emergency Stop, reported fault" state, the server will perform the following:

1, the server enters the emergency stop state and will not accept any command until the end of the emergency stop. And the server would not accept fault reset command in emergency stop state.

2, during an emergency stop, if the multi-function output terminal is set to fault trip alarms 1, signal would be immediately outputted in case of failure; if the function output terminal is set to fault trip alarm 2, then the signal would be outputted when deceleration is completed.

3, during the emergency stop the error message is displayed in the first row of the keyboard, and the current monitor item displayed alternately.

FA.02	Protective function selection 3	Setting range: 0000 ~ 1112	Factory default: 0110
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LED '0' digit: Servo over heat action selection

0: stop, report fault: when overload due to large output current, the server immediately blocks output, motor free stop and the report server failure E. OH1.

1: emergency stop, report fault: when overload due to large output current, the server immediately

blocks output, the server immediately emergency stop, the motor DEC according to the emergency stop deceleration time and report server failure E. OH1.

2: The current limit running: when the server is running with large output current, which leads to overload operation, the server immediately switch current limit run by the initiative to reduce the output frequency, output current is limited so that the server temperature is limited within 70°C.

LED '00' digit: Input phase loss protection selection

Used to set if the input phase loss protection is valid or not; the server output would be immediately blocked when server detects the input phase and report fault E.ILF.

0: Invalid

1: Valid

LED '000' digit: Output phase loss protection selection

Used to set if the output phase loss protection is valid or not; the server output would be immediately blocked when server detects the input phase and report fault E.oLF.

0: Invalid

1: Valid

LED '0000' digit: Reserved

FA.03	Protective function selection	Setting range: 0000~0011	Factory default: 0000
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LED " digit: SC interference suppression

When this feature is valid, the server would implement smart alarm E. SC judgment and eliminate interference, only to make alarm for a real fault signal. This feature may delay the alarm time, please use cautiously.

0: Invalid

1: Valid

LED '00' digit: OC interference suppression

When this feature is valid, the server would over current warning intelligence judgments, eliminate interference, only to make alarm for a real fault signal. This feature may delay the alarm time, please use cautiously.

0: Invalid

1: Valid

LED '000' digit: Reserved

LED '0000' digit: Reserved

FA.04	Fan control	Setting range: 0-2	Factory default 1
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Select fan run mode.

0: Fan run after electrify No matter temperature of module is high or not, fan runs when inverter power on.

1: Fan stop related to temperature Work when running. When inverter stops, fan runs when module temperature is over 50 degree and stops 30 seconds after module temperature is lower

than standard. When inverter runs, fan runs.

2: Fan stop when machine stop, run related to temperature When inverter runs, fan runs when module temperature is over 50 degree and stops 30seconds after module temperature is lower than standard. When inverter stops, fan stops.

Note: This function can prolong fan life.

FA.05	DEC OV suppression point	Setting range: 110~150%	Factory default: 120%
FA.06	ACC and steady speed OV suppression point	Setting range: 100~150%	Factory default: 115.0%

This parameter is defined as the ratio of overvoltage suppression amplitude servo and the DC bus voltage rating.

$$\text{Server DC bus rated voltage} = \text{Server input rated voltage} * 1.414$$

DEC OV suppression point: used to set the OV suppression point when DEC. only valid when [FA.01] LED'0'is set as '1'.

ACC and steady speed OV suppression point: only valid when [FA.01] LED'0'is set as '1'.

FA.07	ACC and steady speed OV suppression plus frequency max amplitude	Setting range: 0~50.00Hz	Factory default: 2.00Hz
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ACC and steady speed OV suppression plus frequency max amplitude: In acceleration and constant speed period, when the bus voltage is greater than [FA.06] set value, the bus voltage will be suppressed by increasing operating frequency. Overvoltage suppression plus frequency maximum amplitude is used to limit the amplitude of increasing frequency.

Large bus voltage fluctuation can increase this value to improve suppression capacity, setting large value may cause speed volatility. Reasonable set of overvoltage suppression plus frequency maximum amplitude can effectively suppress overvoltage, while ensuring small speed fluctuations.

Tip:

1: Adjust [FA.07] parameters according to the bus voltage fluctuation range, over set of the value would increase overvoltage. If the plus frequency value in debugging process has reached the maximum amplitude, the [FA.07] parameters should be increased when bus voltage continues to rise.

2:In the bus voltage rising process or over voltage suppression plus frequency process, if bus voltage rises without slowing trend, [FA.19] acceleration and constant speed overvoltage suppression response gain should be increased to increase the response rate

of suppression.

3: In debugging process, acceleration and constant speed overvoltage suppression can only be reached through [FA.07] parameter and [FA.19] parameter adjustment.

FA.08	Energy braking act	Setting range: 115.0-140.0%	Factory default 120.0%
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Energy braking action voltage: Energy braking action voltage is the set value of [FA.08] when server DC bus voltage rises and exceeds (rated voltage × FA.08). Server energy braking starts action. The set value of voltage ratio [FA.08] when server stops energy braking is lower than DC20V, so be careful with it.

Servers under AC80B-T3-018G have build in braking parts. AC80B -S2-3R7G and braking parts under 220V input have no built-in braking parts. All machines do not have braking resistance. Optional resistance is needed during energy braking.

Note: stop OV suppression function when using energy braking function, setting [FA.01] LED '0' and LED '00' as '0'. Energy braking is only valid when running; invalid when stop.

FA.09	Reserved		
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FA.10	Bus under-voltage protection	Setting range:50.0-100.0%	Factory default: 60.0%
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This parameter specifies the lower voltage allowed by bus voltage during operation, for some low power occasions, appropriate under-voltage protection level can be reduced to ensure the normal working of the inverter.

Note: When the grid voltage is too low, the motor output torque will decrease. For constant power load and constant torque load, low grid voltage will increase the frequency converter input and output current, thereby reducing the reliability of the inverter operation.

FA.11	Output power correction factor	Setting range: 0-200%	Factory default 20%
FA.12	Instant loss power main circuit target voltage	Setting range: 0~200%	Factory default: 90%
FA.13	Instant loss power deceleration gain	Setting range: 0.01~10.00	Factory default: 2.00
FA.14	Instant loss power speed recovery waiting time	Setting range: 0.0~100.0s	Factory default: 2.0s

Function in the case of an instantaneous power failure or a sudden drop in voltage, the server reduces the output frequency, load feedback energy, reduce the offset voltage in order to maintain

the server continues to run short.

When the input voltage is lower than **[FA.11]** when the server starts to decelerate, the bus voltage to rise, when the voltage rises **[FA.12]**, stop deceleration, and stable operation of the server in the current frequency **[FA.14]** setting after a time, accelerate to the set frequency.

[FA.13] is defined as the gain deceleration time, the parameter set is large, the voltage rise faster, suitable for small inertia load; this parameter setting is small, the voltage to rise slowly, suitable for large inertia loads.

FA.15	ACC over-current suppression point	Setting range:100~250%	Factory default:160%
FA.16	DEC over-current suppression point	Setting range:100~250%	Factory default:160%
FA.17	Current amplitude limit value when running	Setting range: 100~250%	Factory default:160%
FA.18	Current amplitude limit ACC/DEC time	Setting range:0.01~650.00s	Factory default:10.00s

Over current suppression point is defined as the ratio of the server output current and the rated current value of the server. 100% is the rated current server.

Acc over current suppression point: is used to set over current suppression point during acceleration.

Deceleration over current suppression point: is used to set over current suppression point during deceleration.

Running current limit: is used to set over current limit value set for constant speed operation of the server.

Current limiting frequency ACC/DEC time: When running in the current limiter function is activated, this parameter is defined as the frequency increase or decrease ACC/DEC time

FA.19	ACC and constant speed OV suppression response gain	Setting range: 0~10.0	Factory default:0.2
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ACC and constant speed OV suppression response gain: Using tracking adjustment mode in voltage suppression process, the server automatically adjusts the frequency increasing process according to the bus voltage plus incremental rate and bus voltage measured values. Increasing the overvoltage suppression overvoltage suppression gain can improve response speed, but will increase speed fluctuation. Reducing overvoltage suppression gain can realize smooth process and

small speed fluctuation, but overvoltage suppression response speed is slow.

Note: over current is likely to occur when the acceleration and constant speed overvoltage suppression response gain is set too high during debugging. Appears in the overvoltage suppression over the course should be appropriate to increase the flow [FA.07] acceleration and constant speed OV frequency plus max amplitude should be increased and the acceleration and constant speed OV suppression response gain should be decreased when over current occurs in the OV suppression process.

FA.20	Reserved
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FA.21	Motor overload protective coefficient	Setting range: 20.0~250.0%	Factory default: 100.0%
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Long term motor overload would produce serious heat and the parameter is used to set the current coefficient for server on the load motor heat relay protection.

Setting value of this parameter is determined by the following formula:

Motor overload protection current coefficient = Motor protection current coefficient / motor rated current coefficient

Note: When a server with multiple motors run in parallel, the thermal relay protection function server will be out of function; in order to effectively protect the motor, please install heat protection relay at the end of each motor.

FA.22	Malfunction auto-reset times	Setting range: 0~5	Factory default:0
FA.23	Malfunction auto-reset interval	Setting range: 0.1~100.0s	Factory default:1.0s

Malfunction auto-reset times:

0: Off No automatic reset function; manual reset.

1-5: On 1-5 is the automatic reset times;

The inverter would fail or stop during operation due to load fluctuations, voltage fluctuations and other factors. At this time in order to ensure continuity of system operation, automatic resets of inverter for overload, over current, system abnormalities, overvoltage, under voltage faults are allowed. The inverter would restart by speed tracking in the process of self recovery. If the inverter can't restart within the set times, stop output for fault protection; Fault recovery times can be set up to five times, after 10 minutes running the fault recovery times would be re-recorded and the times before is automatically cleared. Consecutive failures of restarting might cause harm, so the proposed fault recovery time is 1;

Output terminal can be selected to act or not act in automatic reset process. Details refer to [F2.29-F2.31].

Malfunction auto-reset interval: It defines waiting time before resetting after fault.

Note: 1: Only valid for fault of OL, OC, system abnormality, under voltage. Not valid for other faults.

2: Can't reset before dealing with malfunction.

Attention: Please use this function carefully in occasions that can't start with load, or that needs alarm immediately when there's no output.

FA.24	Reserved
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FA.25	Malfunction types	Please see malfunction code table	--
FA.26	Malfunction running frequency	0.00-max frequency	--
FA.27	Malfunction output voltage	0-1500V	--
FA.28	Malfunction output current	0.1-2000.0A	--
FA.29	Malfunction bus voltage	0-3000V	--
FA.30	Malfunction module temperature	0-100°C	--
FA.31	Malfunction machine state	LED "0" digit: run direction 0: FWD 1: REV LED "00" digit: run state 0: stop 1: stable speed 2: ACC 3: DEC LED "000" digit: reserved LED "0000" digit: reserved	--
FA.32	Malfunction input terminal state	See input terminal chart	--
FA.33	Malfunction output terminal state	See input terminal chart	--
FA.34	The last 1 malfunction types	Please see malfunction code table	--
FA.35	The last 1 malfunction running frequency	0.00-max frequency	--
FA.36	The last 1 malfunction output voltage	0-1500V	--
FA.37	The last 1 malfunction output current	0.1-2000.0A	--
FA.38	The last 1 malfunction bus voltage	0-3000V	--

FA.39	The last 1 malfunction module temperature	0-100°C	--
FA.40	The last 1 machine state	LED "0" digit: run direction 0: FWD 1: REV LED "00" digit: run state 0: stop 1: stable speed 2: ACC 3: DEC LED "000" digit: reserved LED "0000" digit: reserved	--
FA.41	The last 1 malfunction input terminal state	See input terminal chart	--
FA.42	The last 1 malfunction output terminal state	See input terminal chart	--
FA.43	The last 2 malfunction types	Please see malfunction code table	--
FA.44	The last 3 malfunction types	Please see malfunction code table	--

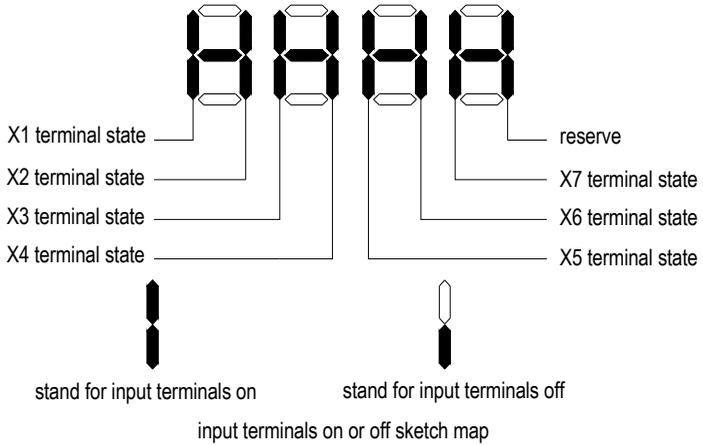
Note: Malfunction records can be cleared by [F0.19]. See [F0.19] details.

4.10 Server Fault Code List

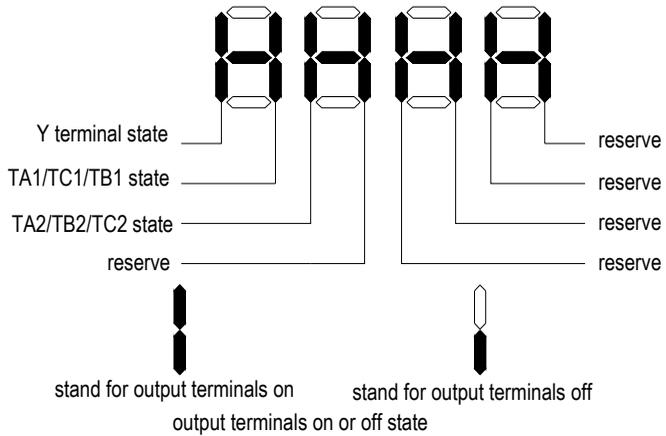
Communication code	Fault display	LED Fault display	Fault
0	--	--	No fault
1	L.U.1	L.U.1	Under voltage when stop
2	E.LU2	E.LU2	Under voltage when run
3	E.oU1	E.oU1	Over-voltage when ACC
4	E.oU2	E.oU2	Over-voltage when DEC
5	E.oU3	E.oU3	Over-voltage in stable speed
6	E.oU4	E.oU4	Over-current when stop
7	E.oC1	E.oC1	Over-current when ACC
8	E.oC2	E.oC2	Over-current when DEC
9	E.oC3	E.oC3	Over-current in stable speed
10	E.oL1	E.oL1	Motor Overload

11	E.oL2	E.oL2	Inverter Overload
12	E. SC	E. SC	System abnormal
13	E.oH1	E.oH1	Inverter over-heat
14	E.oH2	E.oH2	Rectifier over-heat
15	E.tE1	E.tE1	Motor static fault detecting
16	E.tE2	E.tE2	Motor rotary fault detecting
17	E.EEP	E.EEP	Storage fault
18	LIFE	LIFE	Reserved
19	E.iLF	E.iLF	Input phase loss
20	E.oLF	E.oLF	Output phase loss
21	E.GnD	E.GnD	Output earth
22	E.HAL	E.HAL	Current fault detecting
23	E. EF	E. EF	Server external fault
24	E.PAn	E.PAn	Keyboard connecting fault
25	E. CE	E. CE	RS485communication abnormal
26	E.CPE	E.CPE	Parameter copy abnormal
27	E.ECF	E.ECF	Extended card connecting abnormal
28	E. PG	E. PG	PG feedback wire break
29	E.PID	E.PID	PID feedback wire break
30	E.EDI	E.EDI	Copy software version not compatible

Input Terminal on/off Diagram:



Output Terminal on/off Diagram:



4.11 Multi-speed Parameters

FC.00	PLC multi-speed 1	Setting range : -50.00 ~ 50.00Hz	Factory default: 10.00Hz
FC.01	PLC multi-speed 2	Setting range: -50.00 ~ 50.00Hz	Factory default: 20.00Hz
FC.02	PLC multi-speed 3	Setting range: -50.00 ~ 50.00Hz	Factory default: 30.00Hz
FC.03	PLC multi-speed 4	Setting range: -50.00 ~ 50.00Hz	Factory default: 40.00Hz
FC.04	PLC multi-speed 5	Setting range: -50.00 ~ 50.00Hz	Factory default: 50.00Hz
FC.05	PLC multi-speed 6	Setting range: -50.00 ~ 50.00Hz	Factory default: 40.00Hz
FC.06	PLC multi-speed 7	Setting range: -50.00 ~ 50.00Hz	Factory default: 30.00Hz
FC.07	PLC multi-speed 8	Setting range: -50.00 ~ 50.00Hz	Factory default: 20.00Hz
FC.08	PLC multi-speed 9	Setting range: -50.00 ~ 50.00Hz	Factory default: 10.00Hz
FC.09	PLC multi-speed 10	Setting range: -50.00 ~ 50.00Hz	Factory default: 20.00Hz
FC.10	PLC multi-speed 11	Setting range: -50.00 ~ 50.00Hz	Factory default: 30.00Hz
FC.11	PLC multi-speed 12	Setting range: -50.00 ~ 50.00Hz	Factory default: 40.00Hz
FC.12	PLC multi-speed 13	Setting range: -50.00 ~ 50.00Hz	Factory default: 50.00Hz
FC.13	PLC multi-speed 14	Setting range: -50.00 ~ 50.00Hz	Factory default: 40.00Hz
FC.14	PLC multi-speed 15	Setting range: -50.00 ~ 50.00Hz	Factory default: 30.00Hz

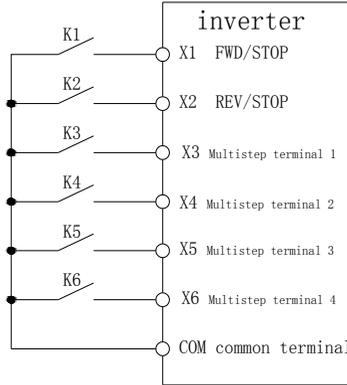
It sets run frequency of 15 steps in PLC and multistep control.

Multi-speed control has priority only after JOG. When in multi-speed control, 4 multifunction input terminals are needed to set as control terminals. Set details refer to **[F2.00-F2.07]**.

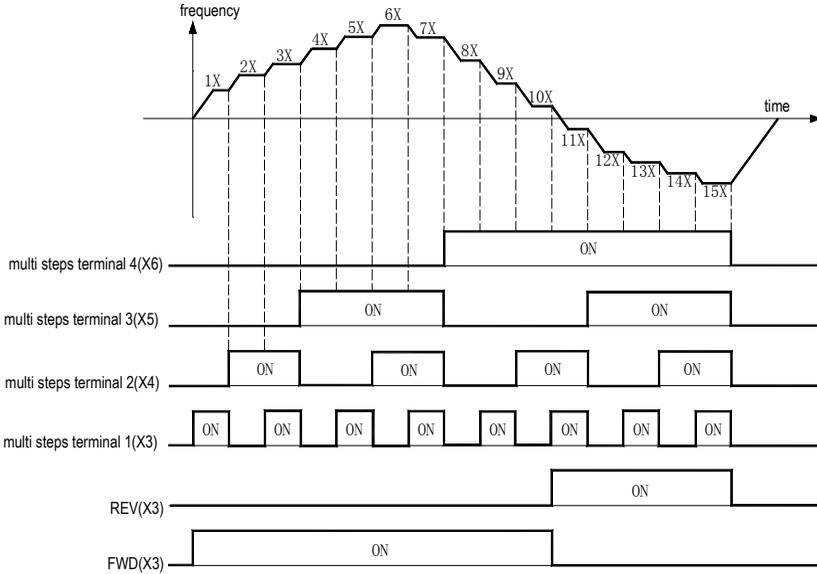
Running speed of inverter is decided by the ON/OFF state of 4 control terminals and **COM**. The running and direction is controlled by running signal and direction given by **[F0.02]**. ACC/DEC time default is ACC/DEC time 1 **[F0.14]**, **[F0.15]**. ACC/DEC time can also be selected by ACC/DEC time selection terminal set by **[F2.00-F2.07]**.

Multi speed terminal 4	Multi speed terminal 3	Multi speed terminal 2	Multi speed terminal 1	terminal speed
OFF	OFF	OFF	ON	1X [FC.00]
OFF	OFF	ON	OFF	2X [FC.01]
OFF	OFF	ON	ON	3X [FC.02]
OFF	ON	OFF	OFF	4X [FC.03]
OFF	ON	OFF	ON	5X [FC.04]
OFF	ON	ON	OFF	6X [FC.05]
OFF	ON	ON	ON	7X [FC.06]
ON	OFF	OFF	OFF	8X [FC.07]
ON	OFF	OFF	ON	9X [FC.08]
ON	OFF	ON	OFF	10X [FC.09]
ON	OFF	ON	ON	11X [FC.10]
ON	ON	OFF	OFF	12X [FC.11]

ON	ON	OFF	ON	13X [FC.12]
ON	ON	ON	OFF	14X [FC.13]
ON	ON	ON	ON	15X [FC.14]



Terminal connection



MULTI STEP TIME ORDER

Chapter 5 Parameter List

- “●”: Parameter can be changed in running state.
- “○”: Parameter can't be changed in running state.
- “×”: Parameter can be read only.
- “—”: Factory setting parameter, only factory can set.
- “※”: Parameter is related to the model.

5.1 Basic Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F0.00	Control mode	0 :VC without PG 1 :V/F without PG 2 :VC with PG 3 :V/F with PG	0	○
F0.01	Speed/torque control mode	0:speed control 1:torque control	0	○
F0.02	Run command channel	0: Keyboard control 1: Terminal control 2: RS485 communication control 3: Optional card (communication)	0	○
F0.03	Frequency given main channel selection	0: Keyboard number given frequency 1: Keyboard potentiometer given 2: Terminal VS1 analog given 3: Terminal VS2 analog given 4: Terminal AS analog given 5: Terminal pulse signal given 6: RS485 communication port given 7: UP/DW control given 8: PID control given 9: Program control (PLC) given 10: Reserved 11: special channel for injection molding machine 12: Terminal switching	11	○
F0.04	Main channel gain	0.000 ~5.000	1.000	○
F0.05	Frequency given auxiliary channel selection	0: Keyboard digital given frequency 1: Keyboard potentiometer given 2: Voltage analog VS1 given 3: Voltage analog VS2 given 4: Terminal AS analog given	11	○

		5: Terminal pulse signal given 6: RS485 communication port given 11 :Multi-step speed channel		
F0.06	Auxiliary channel gain	0.000~5.000	1.000	○
F0.07	Frequency given channels combination mode	LED"0"digit: 0: Main channel valid 1: Auxiliary channel valid 2: Main + auxiliary 3: Main-auxiliary 4: MAX{ main, auxiliary } 5: MIN{ main, auxiliary } 6: Main*auxiliary LED"10"digit: 0: Direction of frequency control invalid 1: Direction of frequency control invalid LED"100"digit: Reserved LED"1000"digit: Reserved	0002	○
F0.08	Keyboard number setting frequency	0~upper limit	50.00Hz	●
F0.09	Max frequency output	0~320.00Hz	50.00Hz	○
F0.10	Upper limitation source selection	0: Upper limit frequency digital given 1: Keyboard potentiometer given 2: Voltage analog VS1 given 3: Voltage analog VS2 given 4: Terminal AS analog given 5: Terminal pulse signal given 6: RS485 communication port given	0	○
F0.11	Upper frequency limit digital setting	Lower frequency limit~max output frequency	50.00Hz	○
F0.12	lower frequency limit	0~upper limit	0.00Hz	○
F0.13	Lower frequency limit running mode	0: Stop 1: Run as lower frequency limit	1	○
F0.14	ACC time 1	0.01~650.00s	Model set	●
F0.15	DEC time 1	0.01~650.00s	Model set	●
F0.16	Rotary direction selection	0: Consistent 1: Reverse 2: Reverse banned	0	●
F0.17	Carrier frequency	0.6~15.0kHz	Model	●

			set	
F0.18	Carrier frequency PWM characteristic selection	LED"0"digit: carrier frequency relates with temperature 0: Unrelated to temperature 1: Related to temperature LED"10"digit: carrier frequency relates with output frequency 0: Unrelated to frequency output 1: Related to frequency output LED"100"digit: carrier frequency mode 0: Fixed carrier 1: Random carrier LED"1000"digit: Over modulation options 0: PWM mode 1 1: PWM mode 2 2 : PWM mode 3	0000	●
F0.19	Parameter initialization	0: No action 1: Restore factory default (not restoring motor parameters) 2: Clear malfunction records	0	○
F0.20	AVR function selection	0 :invalid 1 :valid 2 :invalid when DEC speed,valid in other states	2	●

5.2 Running Control Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F1.00	Start-up mode running	0: Start directly 1: Braking first then start by start frequency 2: Speed tracking , judge direction then start	0	○
F1.01	Start pre-excitation time	0.00-60.00s	Model set	●
F1.02	Start frequency	0.00~60.00Hz	0.50Hz	●
F1.03	Start frequency hold time	0.0~50.0s	0.0s	●
F1.04	Braking current before start	0~150.0%	0.0%	●
F1.05	Braking time before start	0.0~30.0s	0.0s	●

F1.06	Speed tracking stability waiting time	0.00~60.00s	Model set	●
F1.07	Stop mode	0: DEC to stop 1: Free stop	0	●
F1.08	DC braking initial frequency	0.00~50.00Hz	0.00Hz	●
F1.09	DC braking current	0.0~150.0%	0.0%	●
F1.10	DC braking waiting time	0.0~60.0s	0.0s	●
F1.11	DC braking duration	0.0~60.0s	0.0s	●
F1.12	Reserved			
F1.13	ACC/DEC mode selection	LED "0" digit: ACC/DEC time base 0: max frequency 1: fixed frequency LED "00" digit: ACC/DEC mode 0: Beeline 1: S Curve LED "000" digit: reserved LED "0000" digit: reserved	0000	○
F1.14	Start ACC rate of S curve	20.0%-100.0%	50.0%	●
F1.15	ACC slope increment of S curve	20.0%-100.0%	50.0%	●
F1.16	Reserved			
F1.17	Reserved			
F1.18	ACC time 2	0.01-650.00s	10.00s	●
F1.19	DEC time 2	0.01-650.00s	10.00s	●
F1.20	ACC time 3	0.01-650.00s	10.00s	●
F1.21	DEC time 3	0.01-650.00s	10.00s	●
F1.22	ACC time 4	0.01-650.00s	10.00s	●
F1.23	DEC time 4	0.01-650.00s	10.00s	●
F1.24	Emergency stop DEC time	0.01-650.00s	10.00s	●
F1.25	FWD&REV dead time	0.0~120.0s	0.0s	●
F1.26	Min output frequency	0.00-60.00Hz	0.50Hz	●
F1.27	0 speed hold torque	0.0-150.0%	Model set	●
F1.28	Reserved			
F1.29	Power off restart action selection	0: Invalid 1: Valid	0	●

F1.30	Power off restart waiting time	0.00-120.00s	0.50s	●
F1.31	Terminal running protection selection	LED "0" digit: run command selection when electrifying 0: Terminal running order invalid when electrifying 1: Terminal running order valid when electrifying LED "10" digit: when switching the run command given channel 0: invalid 1: valid	0011	●
F1.32	JOG running frequency setting	0.00-Max frequency	5.00Hz	●
F1.33	JOG ACC time	0.01-650.00s	10.00s	●
F1.34	JOG DEC time	0.01-650.00s	10.00s	●
F1.35	Jump frequency	0.00-Max frequency	0.00Hz	●
F1.36	Jump frequency range	0.00-Max frequency	0.00Hz	●

5.3 Quantum Digital Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F2.00	Multifunction input terminal 1(X1)	0: No function 1: FWD 2: REV 3: 3-line running control 4: FWD JOG 5: REV JOG 6: Free stop 7: Emergency stop 8: Malfunction reset 9: External fault input 10: Frequency UP 11: Frequency DW 12: UP/DW clear 13: Speed torque control clear (UP/DOWN clear o) 14: Reserved 15: Multispeed terminal1 16: Multispeed terminal 2 17: Multispeed terminal 3 18: Multispeed terminal 4 19: ACC/DEC time choose terminal 1	1	●
F2.01	Multifunction input terminal 2(X2)		2	●

F2.02	Multifunction input terminal 3(X3)	20: ACC/DEC time choose terminal 2	4	●
F2.03	Multifunction input terminal 4(X4)	21: ACC/DEC pause	5	●
F2.04	Multifunction input terminal 5(X5)	22: PID control cancel	6	●
F2.05	Multifunction input terminal 6(X6)	23: PID control pause	8	●
F2.06	Multifunction input terminal 7(X7)	24: PID characteristic switch	10	●
F2.07	Multifunction input terminal 8(X8)	25: PID given switch 1 26: PID given switch 2 27: PID given switch 3 28: PID feedback switch 1 29: PID feedback switch 2 30: PID feedback switch 3 31: PLC pause 32: PLC restart 33: Swing frequency input 34: Swing frequency pause 35: Swing frequency reset 36: Frequency channel switching terminal 1 37: Frequency channel switching terminal 2 38: Frequency channel switching terminal 3 39: Frequency channel switching terminal 4 40: Timer trigger terminal 41: Timer clear zero terminal 42: Timer clock input terminal 43: Counter clear terminal 44: DC braking order 45: Pre excitation order terminals 46: Reserved 47: Start magnetic powder clutch function 48: Reserved 49: Reserved 50: Reserved 51: Signal terminal of injection molding machine	11	●
F2.08	X1-X4 terminal feature selection	LED "0" digit: X1 terminal 0: On valid 1: Off valid LED "00" digit: X2 terminal 0: On valid 1: Off valid LED "000" digit: X3 terminal 0: On valid	0000	○

		1: Off valid LED "0000" digit: X4terminal 0: On valid 1: Off valid		
F2.09	X1-X4 input terminal filter time	0.000-60.000s	0.005s	●
F2.10	X5-X8 terminal feature selection	LED "0" digit: X5 terminal 0: On valid 1: Off valid LED "00" digit: X6 terminal 0: On valid 1: Off valid LED "000" digit: X7 terminal 0: On valid 1: Off valid LED "0000" digit: X8 terminal 0: On valid 1: Off valid	0000	○
F2.11	X5-X8 input terminal filter time	0.000-60.000s	0.005s	●
F2.12	Terminal control mode	0: 2-line 1 1: 2-line 2 2: 3-line 1 3: 3-line 2	0	○
F2.13	Terminal action mode	LED "0" digit: free stop terminal reset mode 0: Reset to original order when invalid 1: Not reset to original order when invalid LED "00" digit: emergency stop terminal reset mode 0: Reset to original order when disconnected 1: Not reset to original order when disconnected LED "000" digit: terminal run mode after fault reset 0: Terminal control to power on directly 1: Terminal control to power on after stop LED "0000" digit: reserved	0111	○
F2.14	Reserved			
F2.15	Reserved			

F2.16	PUL input min frequency	0.0-50.00kHz	0.00 kHz	●
F2.17	PUL min frequency corresponding setting	0.00-100.00%	0.00%	●
F2.18	PUL input max frequency	0.0-50.00kHz	50.00 kHz	●
F2.19	PUL max frequency corresponding setting	0-100.00%	100.00 %	●
F2.20	PUL filter time	0.00s-10.00s	0.10s	●
F2.21	PUL cut-off frequency	0.000~50.000kHz	0.010 kHz	●
F2.22	UP/DW terminal frequency control mode	0: Off electricity storage 1: Off electricity does not storage 2: Valid in running, clear zero at stop	0	●
F2.23	ACC/DEC speed of UP/DW terminal frequency	0.01~50.00Hz/s	0.50 Hz/s	●
F2.24	Reserved			
F2.25	Timer time of unit	0: Second 1: Minute 2: Hour	0	●
F2.26	Timer setting	0~65000	0	●
F2.27	Counter max value	0~65000	1000	●
F2.28	Counter setting value	0~65000	500	●
F2.29	Output terminal 1 (Y1)	0: No output 1: FWD Running 2: REV Running 3. Fault trip alarm 1(alarm when fault self-recover) 4: Fault trip alarm 2(no alarm when fault self-recover) 5: Fault retrying 6: External fault stop 7: Under voltage 8: Finish ready for running 9: Output frequency level test 1(FDT1) 10: Output frequency level test 2(FDT2) 11: Reaching given frequency 12: running at 0 speed	1	●
F2.30	Output terminal 2 (Y2)		2	●
F2.31	Output relay terminal (TA-TB-TC)		3	●

		13: Reaching upper frequency limit 14: Reaching lower frequency limit 15: Program running circle period completed 16: Program running Speed completed 17: PID feedback exceeds upper limit 18: PID feedback under lower limit 19: PID feedback sensor wire break 20: Reserved 21: Timer time arrived 22: Counter reaching biggest value 23: Counter reaching setting value 24: Energy braking 25: PG feedback break 26: Emergency stop 27: Pre alarm output for over load 28: Pre alarm output for under load		
F2.32	Output frequency level 1 (FDT1)	0.00~Max frequency	30.00 Hz	●
F2.33	FDT1 lag	0.00~Max frequency	0.00Hz	●
F2.34	Output frequency level 2 (FDT2)	0.00~Max frequency	50.00 Hz	●
F2.35	FDT2 lag	0.00~Max frequency	0.00Hz	●
F2.36	Speed arriving checkout range	0.00-50.00Hz	0.00Hz	●
F2.37	Over load pre alarm level	0.0-200.0%	180.0%	●
F2.38	Over load pre alarm delay	0.0-100.0s	0.5s	●
F2.39	Under load pre alarm level	0.0-200.0%	30.0%	●
F2.40	Under load pre alarm delay	0.0-100.0s	0.5s	●

5.4 Analog Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F3.00	VS1 lower limit	0.00~10.00V	0.00V	●
F3.01	VS1 lower limit corresponding setting	0.00~100.00%	0.00%	●
F3.02	VS1 upper limit	0.00~10.00V	10.00V	●
F3.03	VS1 upper limit corresponding setting	0.00~100.00%	100.00%	●
F3.04	VS1 filter time	0.00~10.00s	0.05s	●
F3.05	VS2 lower limit	0.00~10.00V	0.00V	●
F3.06	VS2 lower limit corresponding setting	0.00~100.00%	0.00%	●
F3.07	VS2 upper limit	0.00~10.00V	10.00V	●
F3.08	VS2 upper limit corresponding setting	0.00~100.00%	100.00%	●
F3.09	VS2 filter time	0.00~10.00s	0.10s	●
F3.10	AS lower limit	0.00~20.00mA	4.00mA	●
F3.11	AS lower limit corresponding setting	0.00~100.00%	0.00%	●
F3.12	AS upper limit	0.00~20.00mA	20.00 mA	●
F3.13	AS upper limit corresponding setting	0.00~100.00%	100.00%	●
F3.14	AS filter time	0.00~10.00s	0.05s	●
F3.22	AO1 output selection	0: given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Machine speed 6: Setting Torque 7: Output torque 8: PID given value 9: PID feedback value	0	●
F3.23	AO2 output selection	10: Output power 11: bus voltage 12: VS1 input value 13: VS2 input value 14: AS input value 15: PUL input value 16: module temperature 1 17: module temperature 2	1	●
F3.24	AO1 output gain	25.0~200.0%	100.0%	●

F3.25	A01 output signal bias	-10.0~10.0%	0.0%	●
F3.26	A02 signal selection	0: 0~10V 1: 4.00~20.00mA 2: 0.00~20.00mA 3: FM frequency pulse output	0	●
F3.27	A02 output gain	25.0~200.0%	100.0%	●
F3.28	A02 analog output signal bias	-10.0%~10.0%	0.0%	●
F3.29	A02FM frequency output lower limit	0.00~50.00kHz	0.20 kHz	●
F3.30	A02FM frequency output upper limit	0.00~50.00kHz	50.00 kHz	●

5.5 Keyboard and Display Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F4.00	Parameter and key lock selections	0: Not locked 1: Function parameter locked 2: Function parameter and key locked (except for RUN/STOP/JOG) 3: All function parameter and key locked	0	●
F4.01	User password	0-9999	0	●
F4.02	REV/JOG selections	0: REV 1: JOG	0	●
F4.03	STOP key function range	LED "0" digit: terminal control 0: invalid to terminal order 1: valid to terminal order1 LED "00" digit: communication control 0: invalid to communication order 1: valid to communication order LED "000" digit: reserved LED "0000" digit: reserved	0000	●
F4.04	UP/DOWN key modification selections	LED "0" digit: keyboard UN/DOWN key modify selection 0: Invalid 1: Modify frequency setting by key board numbers (F0.08) 2: Modify torque setting by key board numbers (F7.01) 3: Modify PID give setting by key board numbers (Fb.01) 4: Modify magnetic powder clutch	0011	●

		braking torque digit given(F7.15) LED "00" digit: keyboard UN/DOWN key store selection 0: No save after power down 1: Save after power down LED "000" digit: reserved LED "0000" digit: reserved		
F4.05	Function parameter copy	0: No operation 1: Send inverter parameters to keyboard and save 2: Send parameters to keyboard and save	0	○
F4.06	Reserved			
F4.07	Keyboard potentiometer lower limit	0.00V-5.00V	0.50V	●
F4.08	Keyboard potentiometer lower limit corresponding setting	0-100.00%	0.00%	●
F4.09	Keyboard potentiometer upper limit	0.00V-5.00V	4.50V	●
F4.10	Keyboard potentiometer upper limit corresponding setting	0-100.00%	100.00%	●
F4.11	The display content of the first line in running state	LED"0"digit: display the first group 0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Machine speed 6: Reserved 7: Output torque 8: PID given value 9: PID feedback value A: Output power B: Bus voltage C: Module temperature 1 D: Module temperature 2 E: ON/OFF state of input terminal X F: ON/OFF state of input terminal Y LED"10"digit: display the second group LED"100"digit: display the third	3210	●

		group LED"1000" digit: display the fourth group		
F4.12	The display content of the first line in stop state	LED "0" digit: display the first group LED"00"digit:display the second group LED"000" digit: display the third group LED"0000"digit:display the fourth group	3210	●
F4.13	The display content of the second line in running state	LED "0" digit: display the first group LED"00"digit:display the second group LED"000" digit: display the third group LED"0000"digit:display the fourth group	3210	●
F4.14	The display content of the second line in stop state	LED "0" digit: display the first group LED"00"digit:display the second group LED"000" digit: display the third group LED"0000"digit:display the fourth group	3210	●
F4.15	Rotate speed display coefficient	0.0-5000.0%	100.0%	●
F4.16	Keyboard display item selection	LED "0" digit: LED display language 0: Chinese 1: English LED"00" digit: output frequency selection 0: Aim frequency 1: Synchronous frequency LED"000"digit: machine speed display selection 0: Aim speed 1: Actual speed LED"0000" digit: reserved	0000	●

5.6 Motor Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F5.00	Reserved			○
F5.01	Number of motor poles	2~48	4	○
F5.02	Motor rated power	0.4-1000.0KW	Model set	○
F5.03	Motor rated frequency	0.01Hz-max frequency	Model set	○
F5.04	Motor rated speed	0-65000rpm	Model set	○
F5.05	Motor rated voltage	0-1500V	Model set	○
F5.06	Motor rated current	0.1-2000.0A	Model set	○
F5.07	Motor no-load current	0.01-650.00A	Model set	○
F5.08	Motor stator resistance	0.001-65.000	Model set	○
F5.09	Motor rotor resistance	0.001-65.000	Model set	●
F5.10	Motor stator & rotor inductance	0.1-6500.0mH	Model set	●
F5.11	Motor stator & rotor mutual inductance	0.1-6500.0mH	Model set	●
F5.12	Motor parameters self-adjustment selections	0: No operation 1: Rotary type self-study 2: Static type self-study	0	●
F5.13	Reserved			○
F5.14	Reserved			○

F5.15	PG selection	LED "0" digit: sensor phase 0: 1-phase input 1: 2-phase input LED "00" digit: sensor phase adjustment 0: same direction 1: reverse direction LED "000" digit: wire break inspection 0: OFF 1: ON LED "0000" digit: PG feedback channel 0: PG interface 1: PUL interface	0001	○
F5.16	PG pulse per week	0~60000	1024	○
F5.17	PG wire break detection time	0.100~60.000s	2.000s	●

5.7 VC Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F6.00	ASR proportional gain 1 (speed loop)	0.00~1.00	Model set	●
F6.01	ASR integral time 1 (speed loop)	0.01~10.00s	Model set	●
F6.02	ASR differential time 1(speed loop)	0.0~100.0	0.0	●
F6.03	ASR filter time 1	0.000~0.100s	0.005s	●
F6.04	ASR switch frequency 1	0.00~50.00Hz	5.00Hz	●
F6.05	ASR proportional gain 2 (speed loop)	0.00~1.00	Model set	●
F6.06	ASR integral time 2 (speed loop)	0.01~10.00s	Model set	●
F6.07	ASR differential time 2(speed loop)	0.0~100.0s	0.0s	●
F6.08	ASR filter time 2	0.000~0.100s	0.100s	●
F6.09	ASR switch frequency 2	0.00~50.00Hz	10.00Hz	●
F6.10	Vector slip compensation coefficient	0~250%	100%	●
F6.11	Max output torque	20.0~250.0%	180.0%	●
F6.12	Constant power area torque compensation start frequency	100.0%~500.0%	120.0%	●

F6.13	Constant power area torque compensation coefficient	0~100%	30%	●
F6.14	Constant power area limit start frequency	100.0%~500.0%	200.0%	●
F6.15	Constant power area limit value	50~200%	120%	●
F6.16	DEC over excitation coefficient	100.0~150.0%	100.0%	●

5.8 V/F Control Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
F8.00	V/F curve selection	0: Beeline 1: Customized V / F curve 2: 1.3 idempotent curve 3: 1.7 idempotent curve 4: 2.0 idempotent curve	0	○
F8.01	Self set voltage V1	0.0~100.0%	3.0%	○
F8.02	Self set frequency F1	0.00~Max frequency	1.00Hz	○
F8.03	Self set voltage V2	0.0~100.0%	28.0%	○
F8.04	Self set frequency F2	0.00~Max frequency	10.00Hz	○
F8.05	Self set voltage V3	0.0~100.0%	55.0%	○
F8.06	Self set frequency F3	0.00~Max frequency	25.00Hz	○
F8.07	Self set voltage V4	0.0~100.0%	78.0%	○
F8.08	Self set frequency F4	0.00~Max frequency	37.50Hz	○
F8.09	Self set voltage V5	0.0~100.0%	100.0%	○
F8.10	Self set frequency F5	0.00~Max frequency	50.00Hz	○
F8.11	Output voltage percentage	25~100%	100%	○
F8.12	Torque boost	0.1~30.0%	Model set	○
F8.13	Torque boost cut-off frequency	0.0~100.0%	20.0%	○
F8.14	V/F Slip compensation	0.0~200.0%	0.0%	●
F8.15	Auto energy saving selection	0: no operation 1: auto energy saving running	0	●
F8.16	Energy saving running lower limit	0.0~500.0%	25.0%	●
F8.17	Energy saving voltage decreasing time	0.01~50.00s	10.00s	●

F8.18	Energy saving voltage decreasing lower limit	20.0~100.0%	50.0%	●
F8.19	ASR(VF)proportional gain 1	0.0~100.00	1.00	●
F8.20	ASR(VF) integral time 1	0.01~10.00s	0.50s	●
F8.21	ASR(VF)filter time 1	0.000~10.000s	0.005s	●
F8.22	ASR(VF)switch frequency 1	0.00~50.00Hz	5.00Hz	●
F8.23	ASR(VF) proportional gain 2	0.0~100.00	1.00	●
F8.24	ASR(VF) integral time 2	0.01~10.00s	0.50s	●
F8.25	ASR(VF) filter time 2	0.000~10.000s	0.100s	●
F8.26	ASR(VF) switch frequency 2	0.00~50.00Hz	10.00Hz	●
F8.27	ASR(VF) slip limit	0.0~500.0%	100.0%	●

5.9 Special Parameter Group for Injection Molding Machine

NO.	Function description	Range of settings and definition	Factory default	Feature
F9.00	Channel 1 signal selection	LED '0': Channel 1 input characteristics 0: Linear 1: 1 decline curve 2: 2 decline curve 3: Customized curve inflection point LED '00': Channel 2 input feature 0: Linear 1: 1 decline curve 2: 2 decline curve 3: Customized curve inflection point LED '000': Reserved LED '0000': Reserved	0	●
F9.01	Channel 1 start terminal	0.00~100.00%	0.00%	●
F9.02	Channel 1 start terminal corresponding frequency	0.00~50.00Hz	0.0 Hz	●
F9.03	Channel 1 end terminal	0.0~100.0%	100.0%	●
F9.04	Channel 1 end terminal corresponding frequency	0.00~50.00Hz	50.00 Hz	●
F9.05	Channel 1 weight coefficient	0.0~2.00	1.00	●
F9.06	Channel 1 inflection point 1	0.00~100.00%	20.00%	●

F9.07	Channel 1 inflection point 1 corresponding frequency	0.00~50.00Hz	10.00Hz	●
F9.08	Channel 1 inflection point 2	0.00~100.00%	50.00%	●
F9.09	Channel 1 inflection point 2 corresponding frequency	0.00~50.00Hz	25.00Hz	●
F9.10	Channel 1 filter time constant	0.005~1.000s	0.01	●
F9.11	Channel 2 start terminal	0.0~100.00%	0.00%	●
F9.12	Channel 2 start terminal corresponding frequency	0.00~50.00Hz	0.0Hz	
F9.13	Channel 2 end terminal	0.0~100.00%	100.00%	●
F9.14	Channel 2 end terminal corresponding frequency	0.00~50.00Hz	50.00 Hz	●
F9.15	Channel 2 weight coefficient	0.0~2.00	1.000	●
F9.16	Channel 2 inflection point 1	0.0~100.00%	20.00%	●
F9.17	Channel 2 inflection point 1 corresponding frequency	0.00~50.00Hz	10.00Hz	●
F9.18	Channel 2 inflection point 2	0.0~100.00%	50.00%	●
F9.19	Channel 2 inflection point 2 corresponding frequency	0.00~50.00Hz	25.00Hz	●
F9.20	Channel 2 filter time constant	0.005~1.000s	0.01	●
F9.21	Injection molding machine special channel combination channel	0: Channel 1 valid 1: Channel 2 valid 2: Channel 1 + Channel 2 3: select whichever is greater between the 2 channels	2	●

5.10 Malfunction and Protection Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
FA.00	Protection function selection 1	LED '0': Acceleration over current suppression selection 0: Invalid 1: Valid LED '00': Deceleration over-current suppression selection 0: Invalid 1: Valid LED '000': running current amplitude limit selection 0: Invalid 1: Valid LED '0000': Reserved	0001	●
FA.01	Protection function selection 2	LED '0': Deceleration overvoltage suppression selection 0: Invalid 1: 1st level overvoltage suppression 2: 2ed level overvoltage suppression LED '00': acceleration and constant speed overvoltage suppression selection 0: Invalid 1: Valid LED '000':server overload action selection 0: Invalid 1: Valid LED '0000': motor overload action selection 0: instant stop, fault report 1:emergency stop, fault report 2:current amplitude limit running 3:Motor overload protection close	0001	●
FA.02	Protection function selection 3	LED'0': servo overheat action selection 0: instant stop, fault report 1: emergency stop, fault report 2: current limit running LED '00': Input loss phase protection selection 0: Invalid 1: Valid LED'000': Output loss phase protection selection	0110	●

		0: Invalid 1: Valid LED'0000': Reserved		
FA.03	Protection function selection 4	LED '0': SC disturbing suppression 0: Invalid 1: Valid LED '00': over-current disturbing suppression 0: Invalid 1: Valid LED '000':Reserved LED '0000': Reserved	0000	●
FA.04	Fan control	0: Fan runs after electrifying 1: Fan stop related to temperature and work when running 2: Fan stop when stop and run related to temperature	1	●
FA.05	Deceleration OV suppression point	110~150%	120%	●
FA.06	Acceleration and constant speed over voltage suppression point	100~150%	115%	●
FA.07	Acceleration and constant speed over voltage suppression frequency plus max amplitude	0~50.00Hz	2.00Hz	○
FA.08	Energy braking action voltage	115.0~140.0%	120.0%	●
FA.09	Reserved			
FA.10	Bus under voltage protection value	50.0~100.0%	60.0%	●
FA.11	Instant loss power deceleration action voltage threshold value	0~200%	20%	●
FA.12	Instant loss power main circuit target voltage	0~200%	90%	●
FA.13	Instant loss power deceleration gain	0.01~10.00	2.00	●
FA.14	Instant loss power speed recovery waiting time	0.0~100.0s	2.0s	●
FA.15	Acceleration over current suppression point	100~250%	160%	●
FA.16	Deceleration over current suppression point	100~250%	160%	●

FA.17	Running current amplitude limit	100~250%	160%	●
FA.18	Current amplitude limit frequency ACC/DEC time	0.01~650.00s	10.00s	●
FA.19	Acceleration and constant speed OV suppression response gain	0.1~10.0	0.2	○
FA.20	Reserved			
FA.21	Motor overload protection current coefficient	20.0~250.0%	100.0%	●
FA.22	Fault self recovery times	0~5	0	●
FA.23	Fault self recovery interval	0.1~100.0s	1.0s	●
FA.24	Reserved			
FA.25	Fault type	See fault code list	--	×
FA.26	Fault running frequency	0.00~max frequency	--	×
FA.27	Fault output voltage	0~1500V	--	×
FA.28	Fault output current	0.1~2000.0A	--	×
FA.29	Fault bus voltage	0~3000V	--	×
FA.30	Fault module temperature	0~100℃	--	×
FA.31	Fault servo state	LED '0': running direction 0:FWD 1: REV LED '00': running state 0: stop 1: steady speed 2:ACC 3:DEC LED '000':Reserved LED '0000': Reserved	--	×
FA.32	Fault input terminal state	See input terminal state diagram	--	×
FA.33	Fault output terminal state	See output terminal state	--	×
FA.34	Last fault type	See fault code list	--	×
FA.35	Last fault running frequency	0.00~max frequency	--	×
FA.36	Last fault output voltage	0~1500V	--	×
FA.37	Last fault output current	0.1~2000.0A	--	×
FA.38	Last fault output bus voltage	0~3000V	--	×
FA.39	Last fault module temperature	0~100℃	--	×
FA.40	Last fault servo state	LED '0': running direction 0:FWD 1: REV	--	×

		LED '00': running state 0: stop 1: steady speed 2:ACC 3:DEC LED '000':Reserved LED '0000': Reserved		
FA.41	Last fault input terminal state	See input terminal state diagram	--	×
FA.42	Last fault output terminal state	See output terminal state diagram	--	×
FA.43	The last two fault type	See fault code list	--	×
FA.44	The last three fault type	See fault code list	--	×

5.11 Multi-Speed, PLC Function and Swing Frequency Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature
FC.00	PLC multi-step speed 1	-50.00~50.00Hz	10.00Hz	●
FC.01	PLC multi-step speed2	-50.00~50.00Hz	20.00Hz	●
FC.02	PLC multi-step speed3	-50.00~50.00Hz	30.00Hz	●
FC.03	PLC multi-step speed4	-50.00~50.00Hz	40.00Hz	●
FC.04	PLC multi-step speed5	-50.00~50.00Hz	50.00Hz	●
FC.05	PLC multi-step speed6	-50.00~50.00Hz	40.00Hz	●
FC.06	PLC multi-step speed7	-50.00~50.00Hz	30.00Hz	●
FC.07	PLC multi-step speed8	-50.00~50.00Hz	20.00Hz	●
FC.08	PLC multi-step speed9	-50.00~50.00Hz	10.00Hz	●
FC.09	PLC multi-step speed10	-50.00~50.00Hz	20.00Hz	●
FC.10	PLC multi-step speed11	-50.00~50.00Hz	30.00Hz	●
FC.11	PLC multi-step speed12	-50.00~50.00Hz	40.00Hz	●
FC.12	PLC multi-step speed13	-50.00~50.00Hz	50.00Hz	●
FC.13	PLC multi-step speed14	-50.00~50.00Hz	40.00Hz	●
FC.14	PLC multi-step speed15	-50.00~50.00Hz	30.00Hz	●
FC.15	PLC running mode selection	LED"0"digit:: cycle mode 0: Stop after single cycle 1: Continuous cycles 2: Keep final value after single cycle LED"00"digit: Time unit 0: second 1: minute 2: hour LED"000"digit: Power down	0000	●

		memory mode 0: not saved 1: save LED“0000”digit: Start-up mode 0: Restart from the 1st stage 1: Restart from the stop stage 2: Continue from the time when stop		
FC.16	PLC 1st Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.17	PLC 2nd Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.18	PLC 3rd Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.19	PLC 4th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.20	PLC 5th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.21	PLC 6th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.22	PLC 7th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.23	PLC 8th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.24	PLC 9th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.25	PLC 10th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.26	PLC 11th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.27	PLC 12th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.28	PLC 13th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.29	PLC 14th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.30	PLC 15th Step running time	0.0~6500.0(s/m/h)	10.0	●
FC.31	PLC 1st Step direction and ADD/DEC time	LED “0” digit: this step run direction 0: FWD 1: REV LED “00” digit: ACC/DEC time in this step 0: ACC/DEC time 1 1: ACC/DEC time 2 2: ACC/DEC time 3 4: ACC/DEC time 4 LED “000” digit: reserved LED “0000” digit: reserved	0000	●
FC.32	PLC 2nd Step direction and ADD/DEC time		0000	●
FC.33	PLC 3rd Step direction and ADD/DEC time		0000	●
FC.34	PLC 4th Step direction and ADD/DEC time		0000	●
FC.35	PLC 5th Step direction and ADD/DEC time		0000	●
FC.36	PLC 6th Step direction and ADD/DEC time		0000	●
FC.37	PLC 7th Step direction and ADD/DEC time		0000	●
FC.38	PLC 8th Step direction and ADD/DEC time		0000	●
FC.39	PLC 9th Step direction and ADD/DEC time		0000	●
FC.40	PLC 10th Step direction and ADD/DEC time		0000	●

FC.41	PLC 11th Step direction and ADD/DEC time		0000	●
FC.42	PLC 12th Step direction and ADD/DEC time		0000	●
FC.43	PLC 13th Step direction and ADD/DEC time		0000	●
FC.44	PLC 14th Step direction and ADD/DEC time		0000	●
FC.45	PLC 15th Step direction and ADD/DEC time		0000	●
FC.46	Reserved			
FC.47	Reserved			
FC.48	Reserved			
FC.49	Swing frequency control	LED "0" digit: swing frequency control 0: invalid 1: valid LED "00" digit: swing frequency input mode 0: auto 1: manual LED "000" digit: amplitude control 0: variable amplitude 1: fixed amplitude LED "0000" digit: reserved	0000	○
FC.50	Preset swing frequency	0.00~Max frequency	0.00Hz	●
FC.51	Preset frequency lasting time	0.00~650.00s	0.00s	●
FC.52	Swing frequency amplitude	0.0~100.0%	0.0%	●
FC.53	Startup frequency amplitude	0.0~50.0%	0.0%	●
FC.54	Swing frequency rising time	0.00~650.00s	5.00s	●
FC.55	Swing frequency falling time	0.00~650.00s	5.00s	●

★ monitoring code

Enter into "C" parameter group by pressing PRG for more than 2s. Check the current state of servo.

Code No.	Function code name	Unit and definition	Code No.	Function code name	Unit and definition
C-00	Given frequency	0.01Hz	C-15	Output terminal Y on/off state	See output terminal state diagram
C-01	Output frequency	0.01Hz	C-16	Analog VS1 input value	0.001V
C-02	Output current	0.1A	C-17	Analog VS2 input value	0.001V
C-03	Input voltage	0.1V	C-18	Analog AS input value	0.001mA
C-04	Output voltage	0.1V	C-19	Pulse signal PUL input value	0.001kHz
C-05	Machine speed	1RPM	C-20	Analog output AO1	0.01V
C-06	Cycle period	0.01s	C-21	Analog output AO2	0.01V/0.01mA/0.01kHz
C-07	Output torque	0.1%	C-22	Counter count value	
C-08	PID given value	0.1%	C-23	Electrifying running time	0.1h
C-09	PID feedback value	0.1%	C-24	Total running time	h
C-10	Output power	0.1%	C-25	Servo power level	kW
C-11	Bus voltage	0.1V	C-26	Servo rated voltage	V
C-12	Module temperature1	0.1℃	C-27	Servo rated current	A
C-13	Module temperature 2	0.1℃	C-28	Software version	
C-14	Input terminal X on/off state	See input terminal state diagram	C-29	PG feedback frequency	0.01Hz

Chapter 6 Debugging Steps and Parameter Modulation

6.1 Motor Rotary Self Study

Close the injection molding machine pump contactor and turn the servo drive into power-saving state. Set parameters F5.01 ~ F5.06 into the servo drive according to the actual motor parameter, and then set F5.12 to 1, then press FWD; in this case the servo drive motor implements rotary self-study, and the motor spins up until SF81 servo drive complete motor parameter self study.

There's hydraulic oil in oil pump, and no-load current would increase when the motor rotates the self study with a light load. When the motor study is completed, adjust F5.07 to a smaller load current according to the motor power. There're different no-load current for different motor power, usually we turn down about 1 ~ 2A.

Low no-load current would easily lead to low motor output torque and deteriorated load capacity. Large load would lead to serious motor heat and too big no-load current would lead to motor over excitation and SF81 reporting over current protection easily. Note the original no-load current before self study and set the original factory no-load current back to F5.07 after self-study.

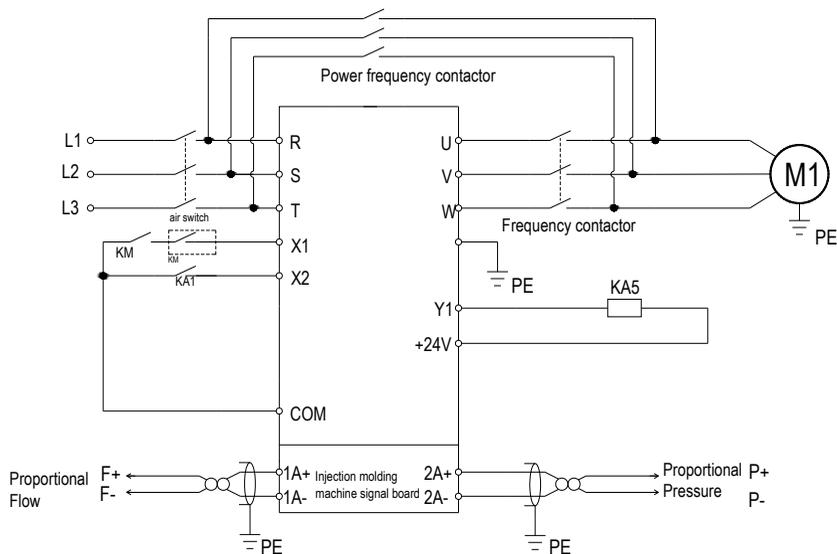
For SF81 servo drive software version before version 1105, F6.00 should be adjusted to 0.05; for all SF81 servo drives software, the carrier frequency F0.17 can be adjusted to 6K.

Since the proportional flow valve supplies electrical power directly after the top (DC36V), and it's on when SF81 is in power-saving state. After the proportional flow valves or mechanical top, will result in the injection molding machine too fast when one or more actions. So to the introduction of multi-speed overlay function (the frequency of the applied frequency is negative). For example: When clamping excessive vibration, this time in the injection molding machine I/O terminals will be introduced into the clamping action SF81 multifunction terminal (superimposed negative frequency), by acceleration and deceleration time 2 down-run, so that when the seat clamping reduce vibration and sound. Deceleration time 2 set according to the actual condition.

NO.	Function code No.	Function code name	Setting range	On-site debugging
1	F5.01	Motor levels	2~48	On site motor nameplate
2	F5.02	Motor rated power	0.4~1000.0KW	On site motor nameplate
3	F5.03	Motor rated frequency	0.01~max frequency	On site motor nameplate
4	F5.04	Motor rated speed	65000RPM	On site motor nameplate
5	F5.05	Motor rated voltage	0~1500V	On site motor nameplate
6	F5.06	Motor rated current	0.1~2000.0A	On site motor nameplate
7	F5.12	Motor self tuning selection	0~2	1

6.2 Debugging Scheme 1

1) Access flow signal and pressure signal respectively to SF81 control terminals 1A+, 1A-,2A+,2A-.



SF81 Debugging scheme1: Wiring Diagram

2) Check C16 value when the flow digit is set as 0% on the LCD settings of the injection molding machine, and set into the F9.01, if C16 is 2%, then F9.01 is set to 2%, F9.02 is set to 0; F3.00 is set to 0.02V, check C16 value when the flow digit is set as 99% on the LCD settings of the injection molding machine, and set into the F9.03, if C16 is 85%, then F9.03 is set to 85%, F9.04It is set to 50Hz, F3.02 is set to 8.5V.

3) Flow inflection point setting method: F9.06 is set to 5%, F9.07 is set to 10Hz, F9.08 is set to 50% and F9.07 is set to 30Hz.

4) Check C17 value when the flow digit is set as 70% on the LCD settings of the injection molding machine, and set into the F9.11, if C17 is 50%, then F9.11 is set to 50%, F9.12 is set to 5Hz; Check C17 value when the flow digit is set as 140% on the LCD settings of the injection molding machine, and set into the F9.13, if C17 is 90%, then F9.13 is set to 90%, F9.14 is set to 15Hz;

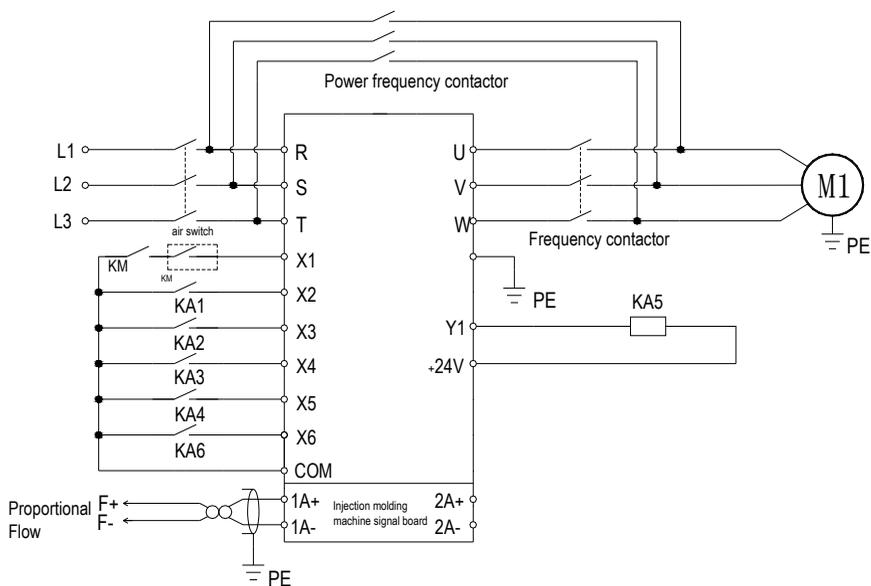
5) Injection molding machine special channel combination method F9.21 is set to 2, channel 1 + channel 2.

6) Access the injection molding machine clamping termination signal into terminal X2, and F2.01 is set to 51.

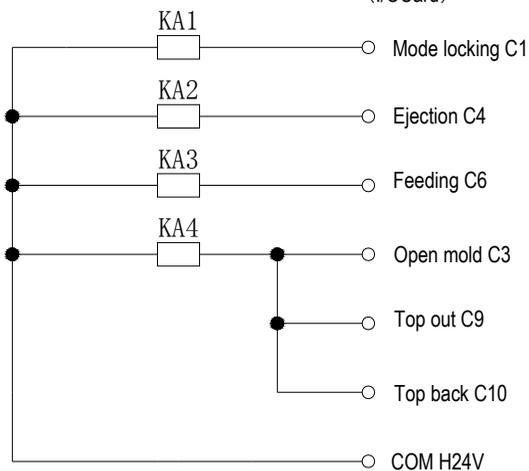
7) Set F2.29 to 1; the servo in operation.

No.	Code name	Setting	No.	Code name	Setting
F0.00	Control mode	0	F9.07	Channel 1 inflection point 1 corresponding frequency	10Hz
F0.01	Speed/torque control mode	0	F9.08	Channel 1 inflection point 2	50%
F0.02	Run command channel	1	F9.09	Channel 1 inflection point 2 corresponding frequency	30Hz
F0.03	Frequency given main channel selection	11	F9.11	Channel 2 start terminal	70% pressure corresponding value
F2.00	Multifunction input terminal (X1)	1	F9.12	Channel 2 start terminal corresponding frequency	5Hz
F2.01	Multifunction input terminal (X2)	51	F9.13	Channel 2 end terminal	140% pressure corresponding value
F9.00	Channel signal selection	0033	F9.14	Channel 2 end terminal corresponding frequency	15Hz
F9.01	Channel 1 start terminal	0% flow corresponding value	F9.16	Channel 2 inflection point 1	100% pressure corresponding value
F9.02	Channel 1 start terminal corresponding frequency	0Hz	F9.17	Channel 2 inflection point 1 corresponding frequency	8Hz
F9.03	Channel 1 end terminal	99% flow corresponding value	F9.08	Channel 2 inflection point 2	120% pressure corresponding value
F9.04	Channel 1 end terminal corresponding frequency	50Hz	F9.09	Channel 2 inflection point 2 corresponding frequency	12Hz
F9.06	Channel 1 inflection point 1	5%	F9.21	Injection molding machine channel combination mode	2

6.3 Debugging Scheme 2



Injection molding machine drive (I/OCard)



SF81 debugging scheme 2: Auxiliary frequency digit signal wiring diagram

- 1) The quantum digital signal output is negative. The negative terminal of injection molding machine I / O card can be directly connected with the COM terminal of SF81. The mode locking, ejection, feeding, open mold, top out and top back terminals are connected directly with SF81 control panel X2 ~ X5 terminals. Mode locking end signal is directly connected with X6 terminal, if the quantum digital signal output of injection molding machine I / O cards is a positive output, namely common point is not H24V, but 0V, then the diode would be the opposite of the figure above.
- 2) Check C16 value when the flow digit is set as 0% on the LCD settings of the injection molding machine, and set into the F9.01, if C16 is 2%, then F9.01 is set to 2%, F9.02 is set to 0; F3.00 is set to 0.02V, check C16 value when the flow digit is set as 99% on the LCD settings of the injection molding machine, and set into the F9.03, if C16 is 85%, then F9.03 is set to 85%, F9.04 is set to 50Hz, F3.02 is set to 8.5V.
- 3) Connect mold locking end signal with X6 terminal and set F2.05 to 51.
- 4) Set F2.29 to 1; the servo in operation.

No.	Code name	Setting	No.	Code name	Setting
F0.00	Control mode	0	F2.29	Output terminal 1 (Y1)	1
F0.01	Speed/torque control mode	0	F9.00	Channel 1 signal selection	0003
F0.02	Run command channel	1	F9.01	Channel 1 start terminal	0% flow corresponding value
F0.03	Frequency given main channel selection	11	F9.02	Channel 1 start terminal corresponding frequency	0Hz
F0.05	Frequency given auxiliary channel	11	F9.03	Channel 1 end terminal	99% flow corresponding value
F0.07	Main/auxiliary channel combination mode	2	F9.04	Channel 1 end terminal corresponding frequency	50Hz
F0.08	Keyboard digit setting frequency	0	F9.05	Channel 1 weight coefficient	1
F0.14	ACC time	0.4	F9.06	Channel 1 inflection point 1	5%
F0.15	DEC time	0.5	F9.07	Channel 1 inflection point 1 corresponding frequency	10Hz
F0.17	Carrier frequency	5	F9.08	Channel 1 inflection point 2	50%
F2.00	Multi-functional input terminal (X1)	1	F9.09	Channel 1 inflection point 2 corresponding frequency	30Hz
F2.01	Multi-functional input terminal (X2)	15	F9.21	Injection molding machine channel combination mode	0

F2.02	Multi-functional input terminal (X3)	16	FC.00	PLC multi-step speed1	According to site setting
F2.03	Multi-functional input terminal (X4)	17	FC.01	PLC multi-step speed 2	According to site setting
F2.04	Multi-functional input terminal (X5)	18	FC.03	PLC multi-step speed 4	According to site setting
F2.05	Multi-functional input terminal (X6)	51	FC.07	PLC multi-step speed 8	According to site setting

6.4 FC Multi-step Speed Parameter Setting Method

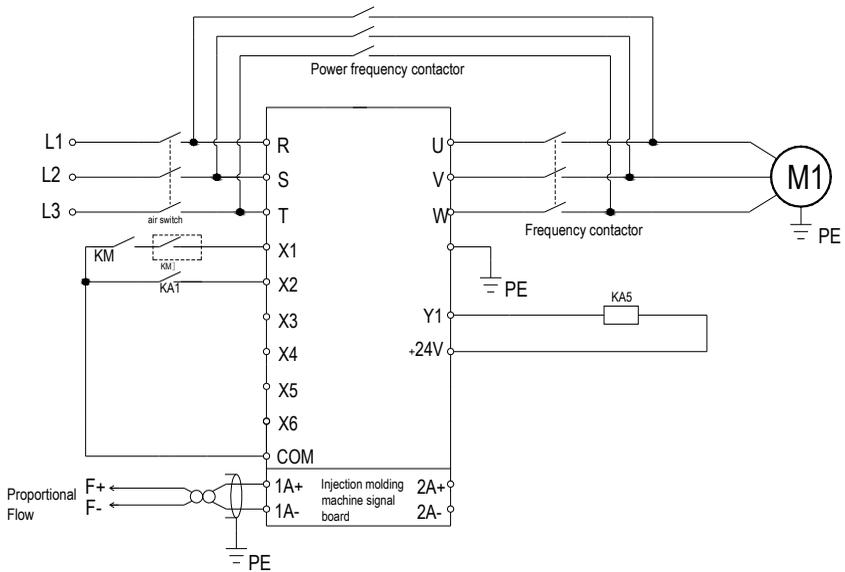
No.	Code name	Setting range	Description
FC.00	Multi frequency 1	-50~+50Hz	Mode locking action overlaying frequency
FC.01	Multi frequency 2	-50~+50Hz	Ejection action overlaying frequency
FC.03	Multi frequency 4	-50~+50Hz	Collosol action overlaying frequency
FC.07	Multi frequency 8	-50~+50Hz	Open mold, thimble action overlaying frequency

The four parameters above are the corresponding frequencies when one of the control panel X2 ~ X5 is turned on. Set all FC.00 ~ FC.14 parameters to 0Hz when debugging. When the injection molding machine is running, adjust the FC group parameters (without adjusting the parameters of the injection molding machine under conditions) if there're prolonged working hours, product defects and abnormal sound. When there is combination action, such as X2 and X3 or X2 and X4 are turned on simultaneously, which is common for straight cylinder type (opposite horn type) injection molding machine, please set the parameters according to the chart below.

Multi frequency terminal 4(X5)	Multi frequency terminal 3(X4)	Multi frequency terminal 2(X3)	Multi frequency terminal 1(X2)	Setting frequency
OFF	OFF	OFF	0N	Multi frequency 1(FC.00) mode locking
OFF	OFF	ON	OFF	Multi frequency 2(FC.01) ejection
OFF	OFF	ON	0N	Multi frequency 3(FC.02) ejection When X2 and X3 are connected
OFF	ON	OFF	OFF	Multi frequency 4(FC.03) collosol
OFF	ON	OFF	0N	Multi frequency 5(FC.04) collosol When X2 and X3 are connected
OFF	ON	ON	OFF	Multi frequency 6(FC.05)
OFF	ON	ON	0N	Multi frequency 7(FC.06)

ON	OFF	OFF	OFF	Multi frequency 8(FC.07) open mode thimble
ON	OFF	OFF	ON	Multi frequency 9(FC.08)
ON	OFF	ON	OFF	Multi frequency 10(FC.9)
ON	OFF	ON	ON	Multi frequency 11(FC.10)
ON	ON	OFF	OFF	Multi frequency 12(FC.11)
ON	ON	OFF	ON	Multi frequency 13(FC.12)
ON	ON	ON	OFF	Multi frequency 14(FC.13)
ON	ON	ON	ON	Multi frequency 15(FC.14)

6.5 Debugging Scheme 3



- 1) Check C16 value when the flow digit is set as 0% on the LCD settings of the injection molding machine, and set into the F9.01, if C16 is 2%, then F9.01 is set to 2%, F9.02 is set to 0; F3.00 is set to 0.02V, check C16 value when the flow digit is set as 99% on the LCD settings of the injection molding machine, and set into the F9.03, if C16 is 85%, then F9.03 is set to 85%, F9.04It is set to 50Hz, F3.02 is set to 8.5V.
- 2) Flow inflection point setting method: F9.06 is set to 5%, F9.07 is set to 10Hz, F9.08 is set to 50% and F9.07 is set to 30Hz.
- 3) Connect mold locking end signal with X2 terminal and set F2.01 to 51.
- 4) Set F2.29 to 1; the servo in operation.

No.	Code name	Setting	No.	Code name	Setting
F0.00	Control mode	0	F9.00	Channel 1 signal selection	0003
F0.01	Speed/torque control mode	0	F9.01	Channel 1 start terminal	0% flow corresponding value
F0.02	Run command channel	1	F9.02	Channel 1 start terminal corresponding frequency	0Hz
F0.03	Frequency given main channel selection	11	F9.03	Channel 1 end terminal	99% flow corresponding value
F0.14	ACC time	0.4	F9.04	Channel 1 end terminal corresponding frequency	50Hz
F0.15	DEC time	0.5	F9.06	Channel 1 inflection point 1	5%
F0.17	Carrier frequency	3	F9.07	Channel 1 inflection point 1 corresponding frequency	10Hz
F2.00	Multi-functional input terminal(X1)	1	F9.08	Channel 1 inflection point 2	50%
F2.01	Multi-functional input terminal(X2)	51	F9.09	Channel 1 inflection point 2 corresponding frequency	30Hz
F2.29	Output terminal 1(Y1)	1	F9.21	Injection molding machine channel combination mode	0

Chapter 7 F9 Special Parameter Specification

F9.00 channel 1 and channel 2 signal selection, in the application of injection molding machine, usually channel 1 and channel 2 are set as 0 or 3.

When set as 0: The input proportional flow or proportional pressure signal is linear with the output frequency. For example: proportional flow current 0 ~ 1A, when F9.00 is set to 0000, then the corresponding frequency 0 ~ 1A linear proportional to the change is 0 ~ 50Hz, when the current is 0.5A, output frequency is 25Hz.

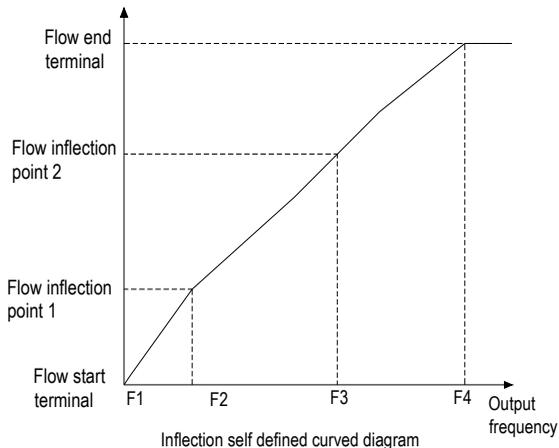
When set as 3: It refers to the inflection point self definition; each channel can be set to two inflection points; the injection molding machine set to 100 as the reference, corresponding to the F1, F2, F3, F4 frequencies respectively.

F9.01 ~ F9.04: refers to when using channel 1 and the signal connected with channel 1 is the flow signal. Check C16 value when the flow digit is set as 0% on the LCD settings of the injection molding machine, and set into the F9.01, if C16 is 2%, then F9.01 is set to 2%, F9.02 is set to 0; This means when the flow digit is set to 0%, the current is 0.02A; the factory default is 0A, so set F9.01 to 2%, corresponding frequency 0Hz; when F3.00 set to 0.02V, due to the presence of the bottom current, the servo drive outputs low-frequency.

F3.00 is set to 0.02V, check C16 value when the flow digit is set as 99% on the LCD settings of the injection molding machine, and set into the F9.03, if C16 is 85%, then F9.03 is set to 85%, F9.04It is set to 50Hz, F3.02 is set to 8.5V.

F9.05 channel 1 weighting coefficient: refers to the amplification or reduction factor of signal received by channel 1. Less than 1 means reducing given frequency, greater than 1 means enlarging given frequency, and the factory default is 1.

F9.06 ~ F9.09 Channel 1 inflection point settings methods: User set flow rate / frequency curve of the flow end terminal, set injection molding machine 1A is 100% as an reference for the inflection point 1, the inflection point 2, flow end terminal, corresponding respectively to F1, F2, F3, F4 frequency points, set by the user Flow / first / second / third / fourth frequency value of the frequency curve, corresponding respectively to flow start terminal, flow 2, flow 3, flow end terminal.



This parameter must meet the following criteria:

$0 \leq F1 \leq F2 \leq F3 \leq F4 \leq$ maximum frequency;

$0 \leq$ Flow start terminal \leq flow inflection point $2 \leq$ flow inflection point $1 \leq$ Flow end terminal \leq maximum flow 100%;

F9.10 channel 1 filter time constant: is defined as (channel 1) analog input signal filtering flow size, used to eliminate the disturbing signal. The longer the filter time, the stronger the anti-interference ability, but the reaction slows down; the shorter the filter time, the weaker the anti-interference ability, but the reaction becomes faster.

Note: Channel 2 setting method of F9.11 ~ F9.20 parameter is the same as channel 1.

F9.21 injection molding machine special channel combinations:

0: Channel 1 valid: means when set as 0, all channel 2 parameters are invalid, SF81 drive runs according to the settings of parameter channel 1.

1: Channel 2 valid: means when set as 1, all channel 1 parameters are invalid, SF81 drive runs according to the settings of parameter channel 2.

2: Channel 1 + Channel 2 valid: means when set as 2, all parameters of channel 1 and Channel 2 are valid, SF81 drive runs according to the settings combinations of parameter channel 1 and channel 2.

3: Two channels set 3: means when set as 3, all parameters of channel 1 and Channel 2 are valid,, SF81 drive runs according to whichever the given frequency is bigger after the comparison of the proportional flow and proportional pressure received by channel 1 and channel 2.

Chapter 8 Maintenance and Options

8.1 Precautions

1. The main circuit using BVR line. Line specifications: 11kw motor diameter 6 mm²; 15kw ~ 22kw motor diameter 10 mm²; 30kw diameter 16 mm²; 37 ~ 45kw motor diameter 25 mm²; 55kw motor diameter 35 mm². Each machine needs 15- 60 meters.
2. The analog control circuit using 2x0.5mm² RVVP shielded cable; quantum switch control circuit using 8x0.5mm² RVV soft cable. Each machine needs 3 -10 meters.
3. The main circuit inlet and outlet pipes go through separately, and install zero-phase reactor installation (ring) in the cabinet Saver; the control circuit cable goes a single line pipe, line pipe with plastic bag snakeskin hose.
4. After installation power Saver, the machine has actually converted into variable pump injection molding machine, and it is recommended that all molds should be regulated in asynchronous servo (power saving).

8.2 Site Maintenance

1. Dust and oil clean inside the cabinet and radiator cover monthly.
2. Check whether the cooling fan is running normally every month; check whether the sound is normal, and if there're stop, abnormal sound or vibration, please replace the fan; free replacement during warranty.
3. Be sure to do maintenance after all power cut off for at least 10 minutes.
4. Under normal circumstances, the plugs on control board can not be pulled out.
5. Only electricians are allowed to do the maintenance of the drive.

8.3 Energy Saving Devices

Device	Specification	Qty/Month	Brand promotion
Main Wire	BVR(4mm ² ~50mm ²)	15~50m	Jin Longyu
Relay	MY4NJ(DC24V)	MY4NJ(DC24V)	Zheng Tai
Soft cable	RVV(8x0.5mm ²) RVVP(2x0.5mm ²)	2~10m each	Jin Longyu
Magnetic ring	φ85	2	