Preface

Thank you very much for buying AD300 series inverter by Shenzhen Altiutde Elec-Tech Co., Ltd.

The AD300 series frequency inverter is a series of high-performance vector control inverter. The product adopts internationally advanced speed sensor-less vector control technology and combines various applications characteristics to further enhance the product reliability, environment adaptability. And thus it can meet the demands of the various electric driving applications better.

This manual provides the user with a guide on installation & wiring, parameter setting, daily maintenance, fault diagnosis and trouble shooting. The user is required to peruse the whole contents of the manual carefully and be familiar with the relevant know-how and notes on inverter safety before any attempts of installation, setting, operation and maintenance.

The technical specifications applied to this product or the content of this manual may be subject to any change without advance notifying.

This manual is required to be kept properly until the inverter is out of its service life.

Safety Precautions

Description of safety marks:

Danger: The misuse may cause fire, severe injury, even death.

Notice: The misuse may cause medium or minor injury and equipment damage.

■ Use

Danger
● This series of inverter is used to control the variable speed operation of three-phase motor and cannot be used for single-phase motor or other applications. Otherwise, inverter failure or fire may be caused. ● This series of inverter cannot be simply used in the applications directly related to the human safety, such as the medical equipment. ● This series of inverter is produced under strict quality management system. If the inverter failure may cause severe accident or loss, safety measures, such as redundancy or bypass, shall be taken.

■ Goods Arrival Inspection

Notice
● If the inverter is found to be damaged or lack parts, the inverter cannot be installed. Otherwise, accident may be caused.

■ Installation

Notice
● When handling and installing the product, please hold the product from bottom. Do not hold the enclosure only. Otherwise, your feet may be injured and the inverter may be damaged because of dropping. ● The inverter shall be mounted on the fire retardant surface, such as metal, and kept far away from the inflammables and heat source. ● Keep the drilling scraps from falling into the inside of the inverter during the

installation; otherwise, inverter failure may be caused.

- When the inverter is installed inside the cabinet, the electricity control cabinet shall be equipped with fan and ventilation port. And ducts for radiation shall be constructed in the cabinet.

■ Wiring

Danger

- The wiring must be conducted by qualified electricians. Otherwise, there exists the risk of electric shock or inverter damage.
- Before wiring, confirm that the power supply is disconnected. Otherwise, there exists the risk of electric shock or fire.
- The grounding terminal PE must be reliably grounded, otherwise, the inverter enclosure may become conductive.
- To ensure the safety, the inverter and the motor must be grounded. Please do not touch the main circuit terminal. The wires of the inverter main circuit terminals must not contact the enclosure. Otherwise, there exists the risk of electric shock.
- The connecting terminals for the braking resistor are （+）and PB. Please do not connect terminals other than these two. Otherwise, fire may be caused.

Notice

- The three-phase power supply cannot connect to output terminals U-V-W, otherwise, the inverter will be damaged.
- It is forbidden to connect the output terminal of the inverter to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the inverter may be damaged
- Please confirm that the power supply phases, rated voltage are consistent with that of the nameplate, otherwise, the inverter may be damaged.
- The wires of the main circuit terminals and the wires of the control circuit terminals shall be laid separately or in a square-crossing mode, otherwise, the control signal may be interfered.
- When the length of the cables between the inverter and the motor is more

than 100m, it is suggested to use output reactor to avoid the inverter failure caused by the over-current of the distribution capacitor.

- The inverter which equipped with DC reactor must connect with DC reactor between the terminal of P1、(+) otherwise the inverter will not display after power on.

■ Operation

Danger

- Power supply can only be connected after the wiring is completed and the cover is installed. It is forbidden to remove the cover in live condition; otherwise, there exists the risk of electric shock.
- When auto failure reset function or restart function is set, isolation measures shall be taken for the mechanical equipment, otherwise, personal injury may be caused.
- When the inverter is powered on, even when it is in the stop state, the terminals of the inverter are still live. Do not touch the inverter terminals; otherwise electric shock may be caused.
- The failure and alarm signal can only be reset after the running command has been cut off. Otherwise, personal injury may be caused.

Notice

- Do not start or shut down the inverter by switching on or off the power supply, otherwise the inverter may be damaged.
- Before operation, please confirm if the motor and equipment are in the allowable use range, otherwise, the equipment may be damaged.
- The heat sink and the braking resistor have high temperature. Please do not touch such devices; otherwise, you may be burnt.
- When it is used on lifting equipment, mechanical contracting brake shall also be equipped.
- Please do not change the inverter parameter randomly. Most of the factory set parameters of the inverter can meet the operating requirement, and the user only needs to set some necessary parameters. Any random change of the parameter may cause the damage of the mechanical equipment.
- In the applications with mains frequency and variable frequency switching,

the two contactors for controlling the mains frequency and variable frequency switching shall be interlocked.

■ Maintenance & Inspection

Danger
● In the power-on state, please do not touch the inverter terminals; otherwise, there exists the risk of electric shock. ● If cover is to be removed, the power supply must be disconnected first. ● Wait for at least 10 minutes after power off or confirm that the CHARGE indicator is off before maintenance and inspection to prevent the harm caused by the residual voltage of the main circuit electrolytic capacitor to persons. ● The components shall be maintained, inspected or replaced by qualified electricians.

Notice
● The circuit boards have large scale CMOS IC. Please do not touch the board to avoid the circuit board damage caused by static electricity.

Contents

Chapter 1 Introduction to AD300 Series Inverter

1.1 Product Model Description

The digits and letters of the inverter model number on the nameplate indicate information such as the product series, power supply class, power ratings and software/hardware versions.

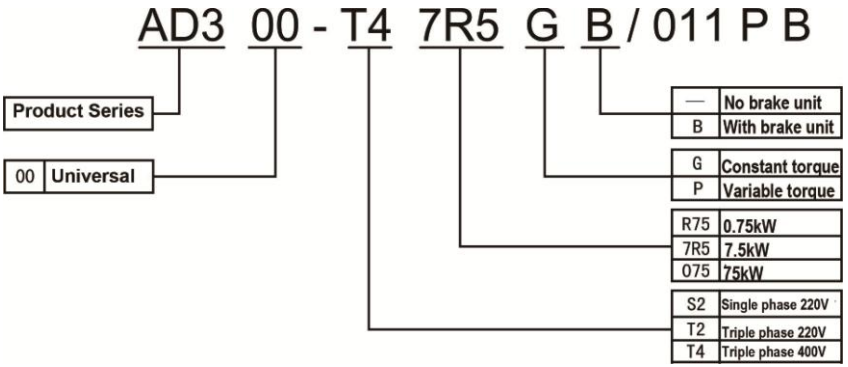


Fig.1-1 Product Model Description

1.2 Product Nameplate Description

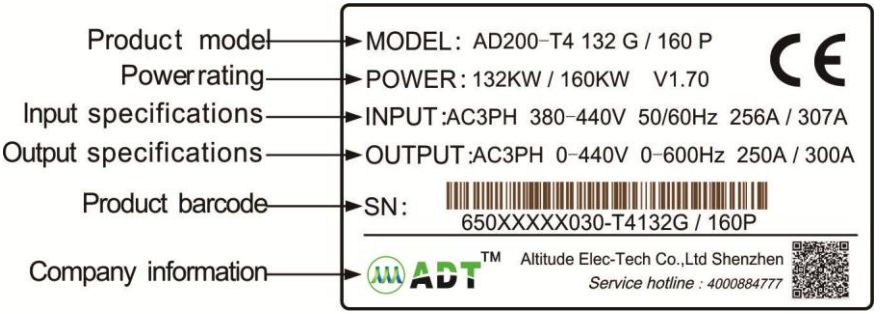


Fig.1-2 Product Nameplate Description

1.3 Product Series

■ AD300−T4□□□G(B) Three-phase 400V Constant torque/heavy-duty application

Power (kW)		1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Motor power (kW)		1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output	Voltage (V)	Three-phase 0 to rated input voltage															
	Rated current (A)	4	6	9	13	17	25	32	37	45	60	75	90	110	150	176	210
	Overload capacity : 150% 1 minute; 180% 20 seconds,																
Input	Rated voltage/frequency :Three-phase 380V~440V; 50Hz/60Hz																
	Max. voltage range: 304V ~ 456V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%																
	Rated current(A)	5.4	7	10.7	15	20.5	27	35	38.5	46.5	62	76	92	113	157	180	214
Braking unit		Built-in as standard							Need external								
Protection class		IP20															
Cooling mode		Forced air convection cooling															
Power(kW)		132	160	185	200	220	250	280	315	355	400	450	500	560	630	710	800
Motor power(kW)		132	160	185	200	220	250	280	315	355	400	450	500	560	630	710	800
Output	Voltage (V): Three-phase 0 to rated input voltage																
	Rated current (A)	250	300	340	380	420	470	540	600	660	730	840	900	950	1160	1300	1460
	Overload capacity : 150% 1 minute; 180% 20 seconds,																
Input	Rated voltage/frequency :Three-phase 380V~440V; 50Hz/60Hz																
	Max. voltage range: 304V~456V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%																
	Rated current (A)	256	307*	345*	385*	430*	480*	548*	610*	670*	740*	850*	910*	960*	1170*	1310*	1470*
Braking unit		Need external															
Protection class		IP20															
Cooling mode		Forced air convection cooling															

* AD300−T4160G and above products are equipped with in-built DC reactor as standard.

■ AD300−T4□□□P(B) Three-phase 400V Variable torque/light-duty application

Power (kW)		2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
Motor power (kW)		2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
Output	Voltage (V)	Three-phase 0 to rated input voltage															
	Rated current (A)	6	9	13	17	25	32	37	45	60	75	90	110	150	176	210	250
	Overload capacity : 120% 1 minute; 150% 1 second,																
Input	Rated voltage/frequency :Three-phase 380V~440V; 50Hz/60Hz																
	Max. voltage range: 304V ~ 456V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%																
	Rated current(A)	7	10.7	15	20.5	27	35	38.5	46.5	62	76	92	113	157	180	214	256
Braking unit		Built-in as standard							Need external								
Protection class		IP20															
Cooling mode		Forced air convection cooling															
Power(kW)		160	185	200	220	250	280	315	355	400	450	500	560	630	710	800	900
Motor power(kW)		160	185	200	220	250	280	315	355	400	450	500	560	630	710	800	900
Output	Voltage (V): Three-phase 0 to rated input voltage																
	Rated current (A)	300	340	380	420	470	540	600	660	730	840	900	950	1160	1300	1460	1640
	Overload capacity : 120% 1 minute; 150% 1 second																
Input	Rated voltage/frequency :Three-phase 380V~440V; 50Hz/60Hz																
	Max. voltage range: 304V~456V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%																
	Rated current (A)	307	345*	385*	430*	480*	548*	610*	670*	740*	850*	910*	960*	1170*	1310*	1470*	1650*
Braking unit		Need external															
Protection class		IP20															
Cooling mode		Forced air convection cooling															

* AD300−T4185P and above products are equipped with external DC reactor as standard.

1.4 Technical Specifications of Product

AD300 Series Technical Specifications				
Input	Voltage range	3 phase:304V~456VAC (Rated 380~440V)		
Output	Frequency	0.00~3200.00Hz		
	Overload capability	G type: 150% 1min, 180% 20s; P type: 120% 1min, 150% 1s		
Control features	Control mode	**Closed-loop vector**	**Open-loop vector**	**V/F control**
	Startup torque	0.00Hz 180%	0.5Hz 150%	1.5Hz 150%
	Speed adjust range	1:1000	1:100	1:50
	Speed stabilization precision	±0.02%	±0.2%	±0.5%
	Torque control	Y	Y	N
	Torque precision	±5%	±10%	----
	Torque response time	<10ms	<20ms	----
Main functions	Key functions	Torque/ speed control switching, Under voltage adjustment, Manual/auto torque boost, Multi-function I/O terminals, AC operation grounding switching Multi-steps operation, Simple PLC, Flying start, Slip compensation, Current limitation, S curve Acc./Dec, Torque tracking, Torque limit, Rich PID, Length control, AVR Function Drooping control,		
	Freq. setting mode	Keypad, terminal up/down, communication, Analog input AI1 AI2, terminal pulse input		
	Acc./Dec. time	0.1~3600s		
	Starting frequency	0.00~60.00Hz		
	DC injection braking	DC braking activation frequency:0.00~300.0Hz; DC braking current: G type 0.0~100.0%; P type 0.0~80.0% DC braking time:0.0~30.0s; Quick DC brake activation without lag time		
	Magnetic flux braking	Fast deceleration through adding motor magnetic flux		
	Dynamic braking	400V : Braking unit action voltage 650~750V 200V : Braking unit action voltage 360~390V		

Unique functions	Multi-function key (MFK)	MFK can set the frequently used operations: JOG, Fwd/Rev switch, Running command reference modes switching etc.
	Parameter copy	Parameter upload & download via keypad User can forbid the overwriting of the uploaded parameters.
	Common DC bus	AD300 supports common DC bus for multiple drives.
	Independent air duct	Independent air duct design to raise the electrical reliability.
	Extension card	Various extension cards including I/O Expansion card, injection molding interface card, ±10V analog extension card, etc.
	Power-up detection	Automatic detection of internal and peripheral circuits when power-up
Communication	Rs485 protocol	Equipped with ModBus-RTU communication protocol
Protections	**Protections for:** Phase-to-phase short circuit, Auto-tune failure, Output-to-ground short circuit, Parameter copy error, Extension card connection error, Communication error, Power supply abnormal, IGBT protection Temperature sampling abnormal, Output phase lost, Power supply under/over-voltage, External devices faults, Analog input/output abnormal, Drives/motor overload Abnormal power failure in running Over-current, Under/over voltage, Relay contact error Encoder off-line, Heat sink over-heat, EEPROM abnormal Temperature sampling offline	
Efficiency	Used as rated power: 7.5kW and below ratings ≥93%, 11kW~45kW ratings ≥95%, 55kW and above ratings ≥98%	
Environment	Ambient temperature	-10 ~ +40 ℃, derated at 40 ~ 50 ℃, the rated output current shall be decreased by 1% for every temperature rise of 1 ℃
	Humidity	5~95%,no condensing
	Vibration	3.5mm, 2~9Hz; 10 m/s^2 , 9~200Hz; 15 m/s^2 , 200~500Hz
	Altitude	0~2000m; Derating use above 1000m; Derate 1% every 100m higher.
	Storage temperature	−40~ +70 ℃

1.5 Product Outline, Mounting Dimension（Unit：mm）

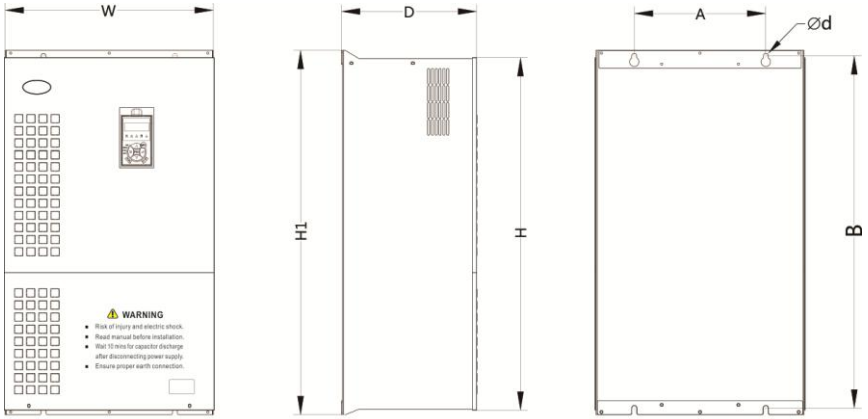


Fig.1-3 Product Outline, Mounting Dimension Schematic diagram

Inverter Model	H	W	D	H1	A	B	d
AD300-T41R5GB/2R2PB AD300-T42R2GB/4R0PB AD300-T44R0GB/5R5PB	210	133	180	238	108	225	7
AD300-T45R5GB/7R5PB AD300-T47R5GB/011PB	258	155	180	285	120	270	7
AD300-T4011GB/015PB AD300-T4015GB/018PB	330	200	195	355	150	340	7
AD300-T4011GB/015PB-A AD300-T4015GB/018PB-A AD300-T4018GB/022PB AD300-T4022GB/037PB	310	192	186	340	150	323	7
AD300-T4018G/022P AD300-T4022G/030P AD300-T4030G/037P AD300-T4037G/045P-B	425	270	200	450	200	430	7
AD300-T4037G/045P-A	517	324	213	547	240	525	9

Inverter Model	H	W	D	H1	A	B	d
AD300-T4037G/045P AD300-T4045G/055P AD300-T4055G/075P	535	320	248	560	240	540	9
AD300-T4075G/093P AD300-T4093G/110P AD300-T4110G/132P	640	380	248	665	240	640	9
AD300-T4132G/160P	1100	400	400	1120	300	1090	11
AD300-T4132G/160P-U AD300-T4132G/160P-D AD300-T4160G/185P-U AD300-T4160G/185P-D	710	465	355	750	380	719	11
AD300-T4160G/200P-H AD300-T4200G/220P-H AD300-T4220G/250P-H	1400	400	400	1400	460	1270	13
AD300-T4185G/200P-U AD300-T4185G/200P-D AD300-T4200G-U AD300-T4200G-D	859	550	385	900	440	868	11
AD300-T4250G/280P-H AD300-T4280G/315P-H AD300-T4315G/355P-H	1600	500	420	1600	560	1460	13
AD300-T4355G/400P-H AD300-T4400G/450P-H AD300-T4450G/500P-H AD300-T4500G/560P-H	1800	780	500	1800	840	1630	13
AD300-T4560G/630P-H AD300-T4630G/710P-H AD300-T4710G/800P-H AD300-T4800G/900P-H		1000	700	2000			

Note:

-H refers to cabinet type machine with DC reactor.

-U means input lines come from upside and output lines come out downside.

-D means input lines come from downside and output lines come out downside.

1.6 Operating keypad panel outline and mounting dimensions (Unit：mm)

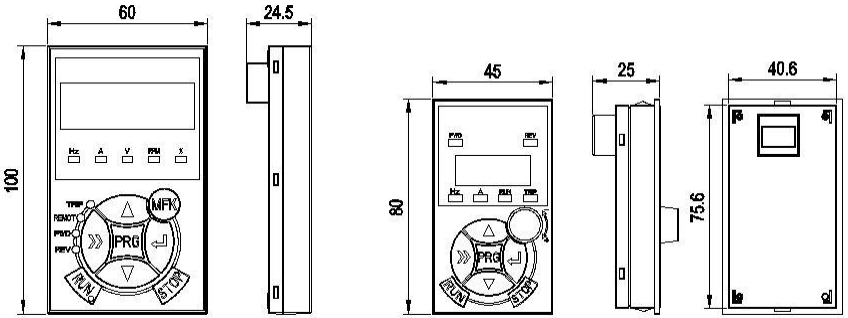
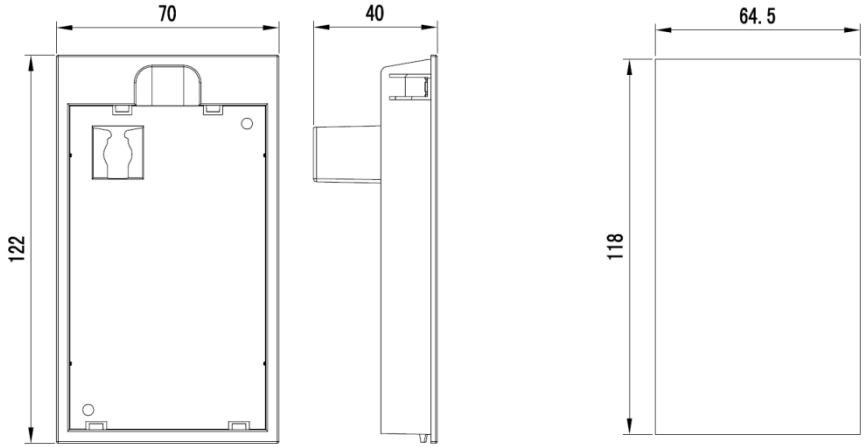


Fig.1-4 Operating Panel Outline and Mounting Dimension

1.7 Keypad holder outline and mounting dimensions

KB-SAL01 is the mounting tray when the operation panel is to install on the electric control cabinet. The outline and dimensions are as follows:(Unit：mm)：



Keypad tray dimensions　　Keypad tray hole size

Fig.1-5 Operating Panel Outline and Mounting Dimension

Note: The small size keypad tray sheet metal hole size 41.5mm×76.5mm. Adapted sheet metal thickness is 1.0~1.5mm.

1.8 Braking resistor applying guide

Inverter model	Braking unit	Braking resistor unit			Braking torque%
		Braking resistor		Qty.	
AD300-T41R5GB/2R2PB	Built-in as standard	400W		1	135
AD300−T42R2GB/4R0P		500W	200Ω	1	135
AD300−T44R0GB/5R5P		500W	200Ω	1	135
AD300−T45R5GB/7R5P		500W	100Ω	1	135
AD300−T47R5GB/011P		800W	75Ω	1	130
AD300−T4011GB/015PB		1000W	50Ω	1	135
AD300−T4015GB/018PB		1500W	40Ω	1	125
AD300−T4018G/022P	Need external	4000W	30Ω	1	125
AD300−T4022G/030P		4000W	30Ω	1	125
AD300−T4030G/037P		6000W	20Ω	1	125
AD300−T4037G/045P		9000W	16Ω	1	125
AD300−T4045G/055P		9000W	13.6Ω	1	125
AD300−T4055G/075P		6000W	20Ω	2	135
AD300−T4075G/090P		9000W	13.6Ω	2	145
AD300−T4090G/110P		6000W	20Ω	3	130
AD300−T4110G/132P		6000W	20Ω	3	130
AD300−T4132G/160P		6000W	20Ω	4	130
AD300−T4132G/160P-U		6000W	20Ω	4	130
AD300−T4132G/160P-D		6000W	20Ω	4	130
AD300−T4160G/185P-U		9000W	13.6Ω	4	130
AD300−T4160G/185P-D		9000W	13.6Ω	4	130
AD300−T4160G/185P-H		9000W	13.6Ω	4	130
AD300- T4185G/200P-H		9000W	13.6Ω	4	130
AD300−T4200G/220P-H		9000W	13.6Ω	5	130
AD300−T4220G/250P-H		9000W	13.6Ω	5	130
AD300−T4250G/280P-H		9000W	13.6Ω	5	130
AD300−T4280G/315P-H		9000W	13.6Ω	6	130
AD300−T4315G/355P-H		9000W	13.6Ω	6	130
AD300−T4355G/400P-H		40000	3Ω	2	130

Inverter model	Braking unit	Braking resistor unit			Braking torque%
		Braking resistor		Qty.	
AD300−T4400G/450P-H		40000	3Ω	2	130
AD300−T4450G/500P-H		60000	2Ω	2	130
AD300−T4500G/560P-H		60000	2Ω	2	130
AD300- T4560G/630P-H		60000	2Ω	2	130
AD300- T4630G/710P-H		60000	2Ω	3	130
AD300- T4710G/800P-H		60000	2Ω	3	130
AD300-T4800G/900P-H		80000	2Ω	3	130

Note:

The connection mode for multiple braking resistors is parallel connection. For example, the inverter of AD300-T4055G/075P, the braking resistor is suggested to be two 6000W 20Ω braking resistors parallel connection, amount to braking resistor is 12000W,10Ω

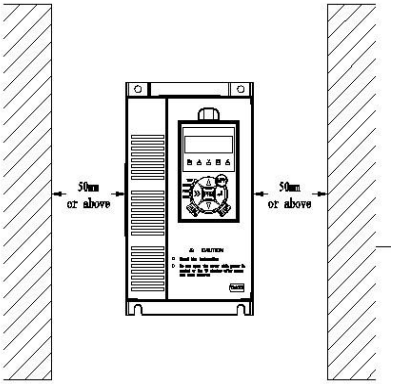
Chapter 2 Inverter Installation

2.1 Environment for Product Installation

- Avoid installing the product in the sites with oil mist, metal powder and dust.
- Avoid installing the product in the sites with hazardous gas and liquid, and corrosive, combustible and explosive gas.
- Avoid installing the products in salty sites.
- Do not install the product in the sites with direct sunlight.
- Do not mount the product on the combustible materials, such as wood.
- Keep the drilling scraps from falling into the inside of inverter during the installation.
- Mount the product vertically in the electric control cabinet, mount the cooling fan or air conditioner to prevent the ambient temperature from rising to above 40 ℃.
- For the sites with hash environment, it is recommended to mount the inverter heat sink outside the cabinet.

2.2 Mounting Direction and Space

In order not to reduce the inverter cooling effect, the inverter must be mounted vertically, and certain space must be maintained, as shown in Fig. 2-1



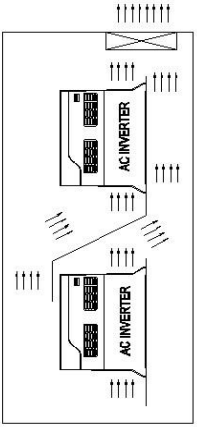


Fig.2−1 Mounting direction and Space

Fig.2−2 Installation diagram

Note:

When installing multiple inverters vertically upside and downside, the air deflector is required.

2.3 Removal and mounting of keypad panel and enclosure

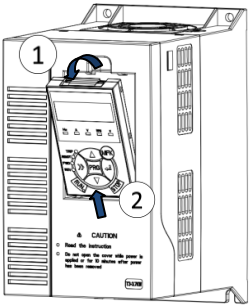
2.3.1 Removal and mounting of operating panel.

◆ Removal of operation panel

As shown in Fig. 2-3, press the keypad buckle in direction 1 until the buckle come out, and then lift the keypad panel in direction 2.

◆ Mounting of operation panel

As shown in Fig.2-4, push the keypad panel carefully in direction 1, until the “crack” sound is heard.



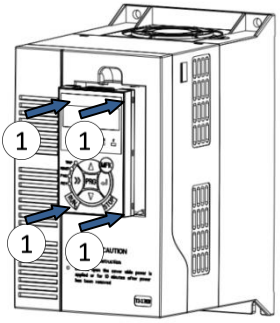


Fig.2-3 Removal of operation panel Fig.2-4 Mounting of operation panel

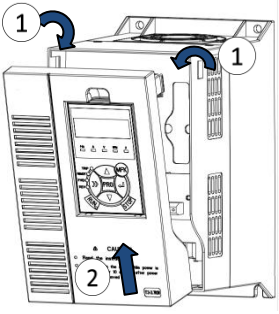
2.3.2 Removal and mounting of inverter plastic enclosure

◆ Removal of cover

Forcefully press the 2 snap joints on the left and right sides as shown direction1 until the upper side of cover comes out. Lift the cover in direction 2, as in Fig. 2-5.

◆ Mounting of cover

After the wiring of main circuit terminals and control circuit terminals, insert the two snap hooks on the bottom part of the facial cover into the groove of the inverter body, as shown in direction 1 in Fig.2-6, and then press the front cover in direction 2 as shown in Fig.2-6, until the “crack” sound is heard.



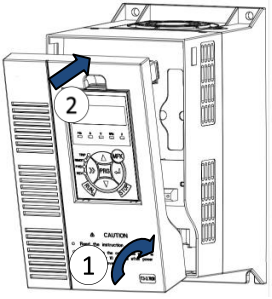
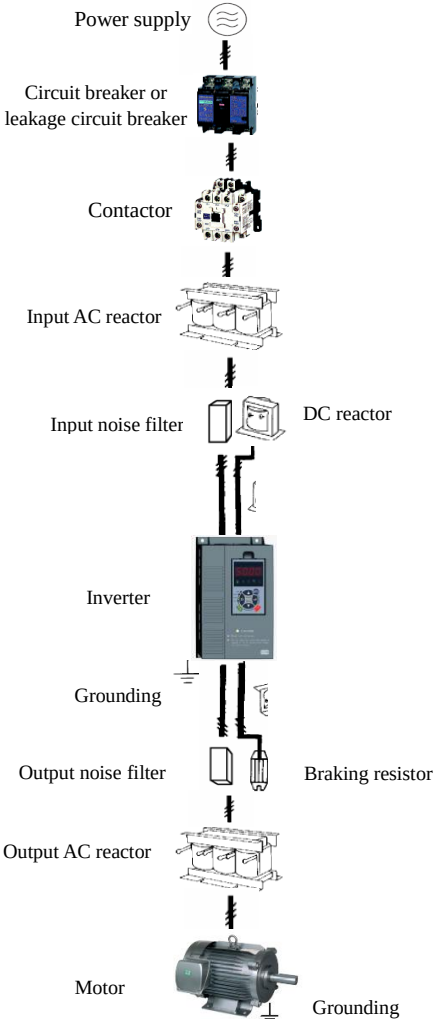


Fig.2-5 Removal of cover Fig.2-6 Mounting of cover

Chapter 3 Wiring of Inverter

3.1 Connection of the Product and Peripheral Devices (Fig-3-1)



3.2 Description of Peripheral Devices for Main Circuit

Circuit breaker	The capacity of the circuit breaker shall be 1.5 ~ 2 time of the rated current of the inverter. The time features of the circuit breaker shall fully consider the time features of the inverter overload protection.
Leakage circuit breaker	Because the inverter output is the high-frequency pulse voltage, there will be high-frequency leakage current. Specialized leakage circuit breaker shall be installed at the input end of the inverter. B type leakage circuit breaker is suggested, and the leakage current value shall be set as 300mA.
Contactor	Frequent open and close of contactor will cause inverter failure, so the highest frequency for the open and close of contactor shall not exceed 10 times/min. When braking resistor is used, to protect the braking resistor from over-heat damage, thermal protection relay shall be installed to control the disconnect of the contactor at power supply side
Input AC reactor or DC reactor	1. The inverter power supply capacity shall be more than 600kVA or 10 times of the inverter capacity. 2. If there is switch type reactive-power compensation capacitor or load with silicon control at the same power line, there will be high peak current flowing into inverter power input circuit, causing the damage of the rectifier components. 3. When the voltage unbalance of the three-phase power supply exceeds 3%, the rectifier component will be damaged. 4. The input power factor of the inverter is required to be higher than 90%. In case of above situations, install the AC reactor at the input end of the inverter or DC reactor to the DC reactor terminal.
Input noise filter	The input noise filter can reduce the noise that flows from the power supply to the inverter or the inverter to power supply.
Thermal protection	Although the inverter has motor overload protection function, when one inverter drives two or more motors or multi-pole

relay	motors, to prevent the motor over temperature failure, thermal protection relay shall be installed between the inverter and each motor, and the motor overload protection parameter FC.00 shall be set as “0” (motor protection disabled).
Output noise filter	When the noise filter is applied to the output side of inverter, the conduction and radiation interference can be reduced.
Output AC reactor	When the cable connecting the inverter and the motor is longer than 100m, it is suggested to install AC output reactor to suppress the high-frequency oscillation to avoid the damage to motor insulation, large leakage current and frequent inverter protective actions.

3.3 Main Circuit Peripheral Devices Guide

Table 3-1 AD300-T4015GB/018PB and below

Inverter Mode	Circuit Breaker（A）	Contactor（A）	R, S, T, P1, (+), PB, (-), U, V, W			Grounding terminal PE ⏚		
			Terminal screw	Tightening torque (N m)	Wire spec. (mm^2)	Terminal screw	Tightening torque (N m)	Wire spec. (mm^2)
AD300−T42R2GB/4R0PB	16	10	M4	1.2～1.5	2.5	M4	1.2～1.5	2.5
AD300−T44R0GB/5R5PB	25	16	M4	1.2～1.5	4	M4	1.2～1.5	4
AD300−T45R5GB/7R5PB	32	25	M4	1.2～1.5	6	M4	1.2～1.5	6
AD300−T47R5GB/011PB	40	32	M4	1.2～1.5	6	M4	1.2～1.5	6
AD300−T4011GB/015PB	63	40	M5	2.5～3	6	M5	2.5～3	6
AD300−T4015GB/018PB	63	63	M5	2.5～3	6	M5	2.5～3	6

Table 3-2 AD300-T4018G/022P and above type

Inverter Mode	Circuit Breaker（A）	Contactor（A）	R, S, T, P1, (+), (-), U, V, W			Grounding terminal PE ⏚		
			Terminal screw	Tightening torque (N m)	Wire spec. (mm^2)	Terminal screw	Tightening torque (N m)	Wire spec. (mm^2)
AD300−T4018G/022P	100	63	M6	4～6	10	M6	4～6	10
AD300−T4022G/030P	100	100	M6	4～6	16	M6	4～6	16
AD300−T4030G/037P	125	100	M6	4～6	25	M6	4～6	16
AD300−T4037G/045P	160	100	M8	10～12	25	M8	10～12	16
AD300−T4045G/055P	200	125	M8	10～12	35	M8	10～12	16
AD300−T4055G/075P	200	170	M10	20～25	50	M8	10～12	25
AD300−T4075G/090P	250	230	M10	20～25	60	M8	10～12	35
AD300−T4090G/110P	315	250	M10	20～25	70	M8	10～12	35
AD300−T4110G/132P	350	330	M10	20～25	100	M8	10～12	50
AD300−T4132G/160P	400	330	M12	40～45	150	M10	20～25	75
AD300−T4160G/200P	500	400	M12	40～45	185	M10	20～25	50×2
AD300−T4200G/220P	630	500	M12	40～45	240	M10	20～25	60×2
AD300−T4220G/250P	800	630	M12	40～45	150×2	M10	20～25	75×2
AD300−T4250G/280P	1000	630	M12	40～45	150×2	M10	20～25	100×2
AD300−T4280G/315P	1000	800	M12	40～45	185×2	M10	20～25	125×2
AD300−T4315G/355P	1200	800	M12	40～45	240×2	M10	20～25	150×2
AD300−T4355G/400P	1280	960	M16	100～120	240×2	M12	40～45	185×2
AD300−T4400G/450P	1380	1035	M16	100～120	185×3	M12	40～45	185×2
AD300−T4450G/500P	1450	1150	M16	100～120	185×3	M12	40～45	240×2
AD300−T4500G/560P	1720	1290	M16	100～120	185×3	M12	40～45	240×2

3.4 Terminal configuration of main circuit

3.4.1 AD300−T42R2GB/4R0PB~AD300−T4015GB/018PB

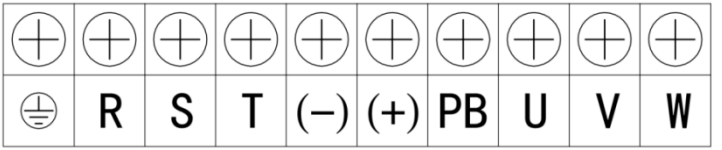


Fig.3-2 Triple phase 400V main circuit wiring terminals
(2R2GB/4R0PB ~ 015GB/018PB)

Terminal symbol	Terminal description
⏚	Grounding terminal PE
R、S、T	Three-phase AC input terminals
(-)、 (+)	DC power input terminals
(+)、PB	Terminals reserved for braking resistor
U、V、W	Three-phase AC output terminals

3.4.2 AD300−T4018G/022P~AD300−T4110G/132P

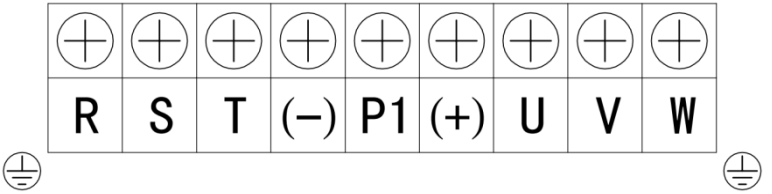


Fig.3-3 Triple phase 400V main circuit wiring terminals
(018G/022P~110G/132P)

Terminal symbol	Terminal description
⏚	Grounding terminal PE
R、S、T	Three-phase AC input terminal
(-)、 (+)	DC power input terminal
P1、(+)	Reserved for DC reactor connecting terminal; Short circuited with copper plate as factor setting
U、V、W	Three-phase AC output terminal

3.4.3 AD300−T4132G/160P~AD300−T4315G/355P

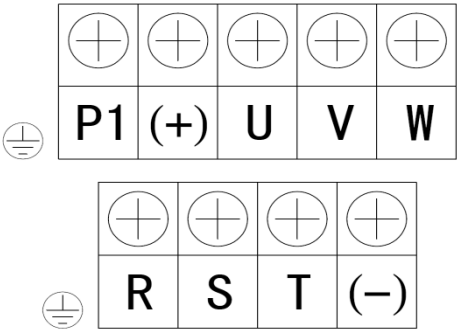


Fig.3-4 Triple phase 400V main circuit wiring terminals
(160G/200P ~ 315G/355P)

Terminal symbol	Terminal description
⏚	Grounding terminal PE
R、S、T	Three-phase AC input terminal
(-)、 (+)	DC power input terminal
P1、(+)	Reserved for DC reactor connecting terminal; Short circuited with copper plate as factor setting
U、V、W	Three-phase AC output terminal

3.5 Attention for Main Circuit Wiring

3.5.1 Power Supply Wiring

- It is forbidden to connect the power cable to the inverter output terminals; otherwise, the internal components of the inverter will be damaged.
- To facilitate the input side over current protection and power failure maintenance, the inverter shall connect to the power supply through the circuit breaker or leakage circuit breaker and contactor.
- Please confirm that the power supply phases, rated voltage are consistent with that of the nameplate, otherwise, the inverter may be damaged.

3.5.2 Motor Wiring

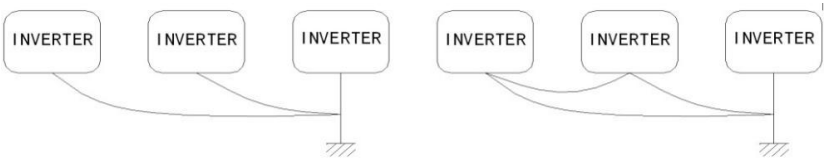
- It is forbidden to short circuit or ground the inverter output terminals; otherwise the internal components of the inverter will be damaged.
- Avoid short circuit the output cable and the inverter enclosure, otherwise there is the risk of electric shock.
- It is forbidden to connect the output terminals of the inverter to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the inverter may be damaged.
- When contactor is installed between the inverter and the motor, it is forbidden to switch on/off the output contactor during the running of the inverter; otherwise, there will be large current flowing into the inverter, triggering the inverter protection action.
- Length of cable between the inverter and motor

If the cable between the inverter and the motor is too long, the higher order harmonic leakage current will cause impact on the inverter and the peripheral devices. It is suggested that output AC reactor be installed when the motor cable is longer than 100m, and that carrier frequency be set as follows:

Cable length between inverter and motor	Less than 50 m	Less than 100 m	More than 100 m
Carrier frequency(F0.15)	Less than 10kHz	Less than 6kHz	Less than 4kHz

3.5.3 Grounding Wiring

- The inverter will produce leakage current. The higher the carrier frequency is, the larger the leakage current will be. The leakage current of the inverter system is more than 3.5mA, and the exact value of the leakage current is determined by the site conditions. To ensure the safety, the inverter and the motor must be grounded.
- The grounding resistance shall be less than 10ohm. For the grounding wire diameter requirement, refer to *3.3 Main circuit peripheral devices guide*.
- Do not share grounding wire with the welding machine and other power equipment.
- In the applications with more than 2 inverters, keep the grounding wire from forming a loop.



Correct Wrong

Fig.3-5 Grounding Wiring

3.5.4 Countermeasures against conduction and radiation interference

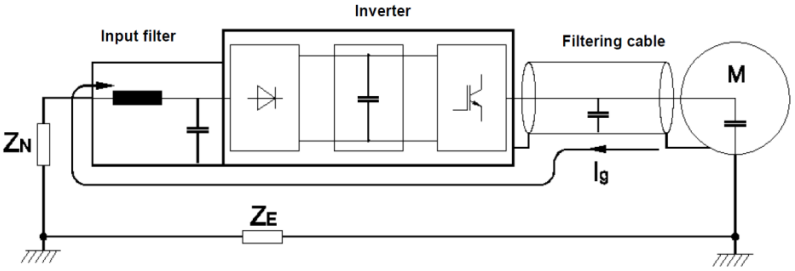


Fig.3-6 Countermeasures for Conduction and Radiation Interference

- When the input noise filter is installed, the wire connecting the filter to the inverter power input terminal shall be as short as possible.
- The filter enclosure and mounting cabinet shall be large area reliably gounded to reduce the back flow impedance of the noise current Ig.
- The wire connecting the inverter and the motor shall be as short as possible. The motor cable adopts 4-core cable, among which the grounding wire shall be one end grounded at the inverter side, the other end connected to the motor enclosure. The motor cable shall be sleeved into the metal tube.
- The input power wire and output motor wire shall be kept away from each other as long as possible.
- The equipment and signal cables vulnerable to interference shall be kept far away from the inverter.
- Key signal cables shall adopt shielding cable. It is suggested that the shielding layer shall be grounded with 360-degree grounding method and sleeved into the metal tube. The signal cable shall be kept far away from the inverter power input wire and output motor wire. If the signal cable must cross the power input wire and output motor wire, they shall be laid orthogonal.
- When analog input of voltage or current is adopted for remote frequency setting, twisted shielding cable shall be used. The shielding layer shall be connected to the grounding terminal PE of the inverter, and the signal cable shall be no longer than 50m.
- The wiring of RA/RB/RC shall be separated from wiring of other main circuit terminals.
- It is forbidden to short circuit the shielding layer and other signal cables or equipment.

3.6 Terminal Wiring

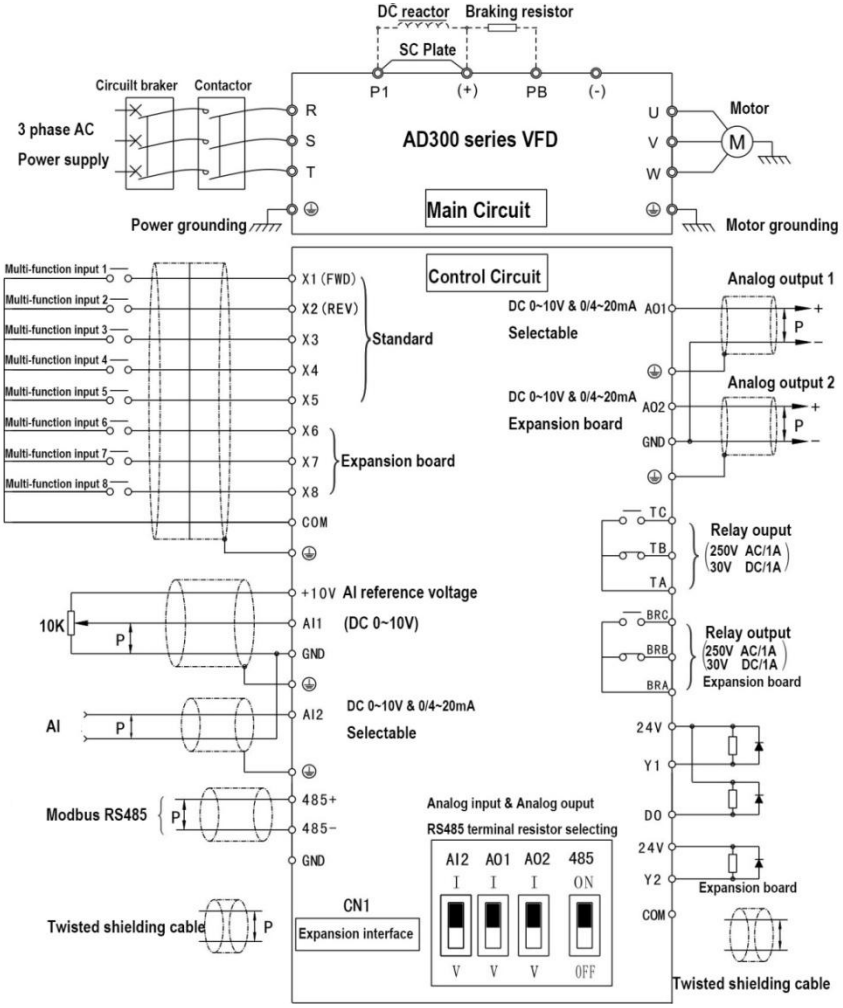


Fig.3-7 Terminal Wiring

3.7 Functions of Control Circuit Terminals

3.7.1 Standard configuration of control circuit terminals

Type	Terminal	Terminal function	Technical specification
Digital input	X1 ～ X3	Multi-functional input terminals 1～3	Optical-isolator input Frequency range:：0～200Hz Voltage range: 0～24V
	X4 X5	Multi-functional input or pulse input 4, 5	Multi-functional input：same as X1～X3 Pulse input:：0.1Hz～50kHz Voltage range：0～24V
	COM	multi-functional input terminals common end	Internal isolated with GND
Digital output	24V	24V	24V ±5%, Maximum load :200mA, with overload and short circuit protection
	Y1	Open collector output 1	Optical-isolator output maximum output current: 50mA Output voltage range：0～24V
	DO	Open collector or high speed pulse output	Output frequency: 0～50kHz Open collector same as Y1
	COM	Open collector output common end	Internal isolated with GND
Analog input	10V	Analog input reference voltage	Open circuit voltage up to 11V; Internal isolated with com; Maximum load 30mA，with overload and short circuit protection
	AI1	Analog input channel 1	Input Voltage range：0～10V Input impedance：100kΩ
	AI2	Analog input channel 2	Input Voltage range：0～10V Input impedance：100kΩ Input current range：0～30mA Current Input impedance： 500Ω, 0~20mA or 0~10V analog input can be selected through DIP switch SW1
	GND	Analog grounding	Internal isolated with COM

Type	Terminal	Terminal function	Technical specification
Analog output	AO1	Analog output 1	0～20mA: Allow output impedance 200~500Ω 0～10V: Allowed output impedance ≥10kΩ. With SC protection; 0~20mA or 0~10V analog output can be selected through DIP switch SW2
	GND	Analog grounding	Internal isolated with COM
Relay output	TA/TB/ TC	Relay output 1	TA－TB：NC; TA－TC：NO Contact capacity：250VAC/1A，30VDC/1A
RS485	485+	485 differential positive	Rate: 1200/2400/4800/9600/19200/38400bps; Max. parallel 127 No.s; SW3 select adapted resistor; Max. Length 500m. (twisted shielding cable)
	485-	485 differential negative	
	GND	486 shielding grounding	Internal isolated with COM

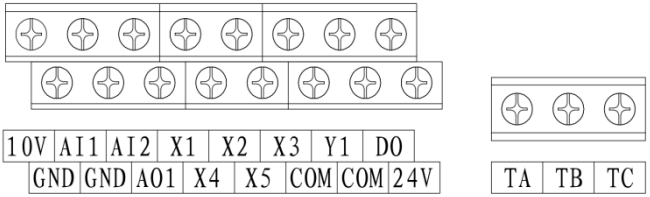


Fig.3-9 Arrangement of Control Circuit Terminals

3.7.2 Expanded control circuit terminals

Type	Terminal	Terminal function	Technical specification
Digital input	X6～X8	Multi-functional input terminals 6～8	Optical-isolator input Frequency range:：0～200Hz Voltage range: 0～24V
	COM	Multi-functional input common end	Internal isolated with GND

Type	Terminal	Terminal function	Technical specification
Digital output	24V	24V	24V±5%， Internal isolated with GND Maximum load: 200mA; with overload and short circuit protection
	Y2	Open collector output 2	Optical-isolator output maximum sink current: 50mA Output Voltage range：0～24V
	COM	Open collector output common end	Internal isolated with GND
Analog input	AO2	Analog output 2	0~10V:Allowable output impedance ≥10kΩ; with short circuit protection function,
	GND	Analog grounding	Internal isolated with COM
Relay output	BRA/BRB/BRC	Relay output 2	TA－TB：Normally closed TA－TC：Normally open Contact capacity：250VAC/1A，30VDC/1A

Note:

Available expanded terminals are decided by different extension cards.

3.7.3 Control Circuit Connection

■ External controller Dry contacts wiring mode is as below. (for X1-X5 multifunction input)

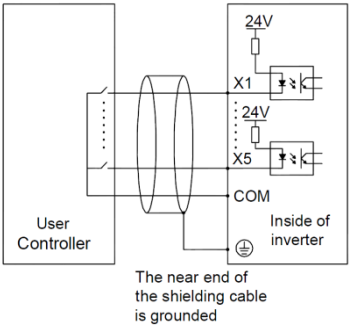


Fig.3-10 Control circuit wiring instruction

- External controller NPN with common emitter wiring mode is as below. (for X1-X5 multifunction input)

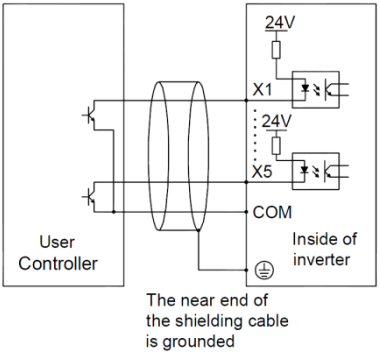


Fig.3-11 NPN common emitter wiring mode

- Y1/Y2, DO: The multi-functional output terminals adopt inverter internal +24V power supply wiring mode.

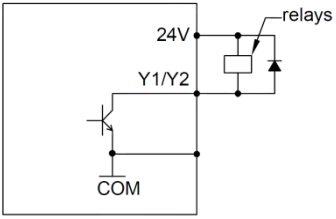


Fig.3-12 wiring mode of internal +24V power supply

- Y1/Y2, DO: The multi-functional output terminals adopts external power supply wiring mode

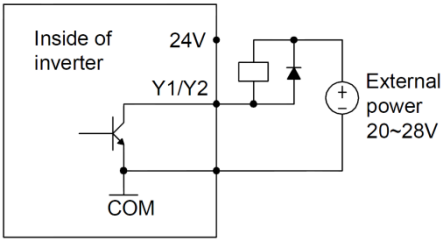


Fig.3-13 External power supply wiring mode

■ Analog input wiring mode

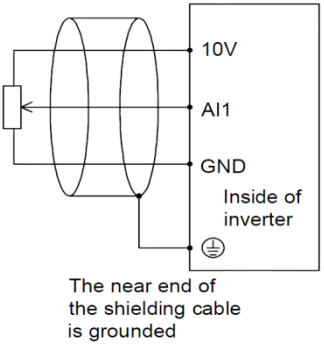


Fig.3-14 Wiring mode of analog input terminal

■ Keyboard Interface

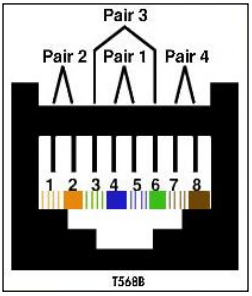


Fig.3-15 T568B standard

Pin No.	Color
1	White/Orange
2	Orange
3	Green/White
4	Blue
5	Blue/ White
6	Green
7	Brown/White
8	Brown

Table 3-3 T568B standard

The cables connecting keyboard and control board use standard RJ-45 Interface, namely both sides are connected according to EIA/TIA568B standard. Users can make the cable by themselves or purchase general internet cable from market as keypad cable.

3.8 Control board schematic drawing

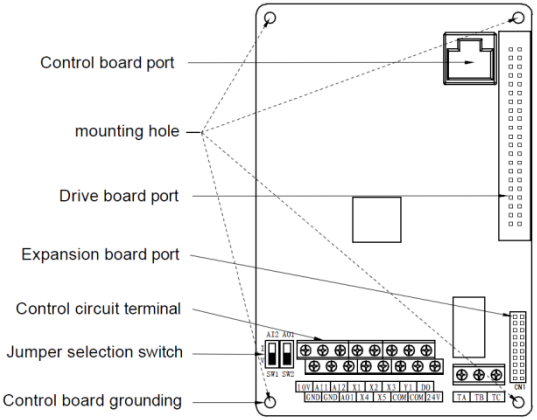


Fig.3-16 Control board schematic drawing

3.9 Control circuit periphery accessories selection

Terminal codes	Terminal screw	Tightening torque(N m)	Wire Spec.mm^2	Type of Wire
10V, AI1, AI2, AO1, GND	M3	0.5～0.6	0.75	Twisted pair Shielded cable
24V, X1, X2, X3, X4, X5, COM, Y1, DO, COM, TA, TB, TC	M3	0.5～0.6	0.75	Shielded cable

3.10 DIP switch setting instruction

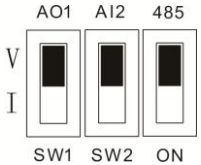


Fig.3-17 DIP switch setting

Terminal	Function	Default
AI2	I for current input(0~20mA); V for voltage input (0～10V)	0～10V
AO1	I for current output(0~20mA); V for voltage output (0～10V)	0～10V
RS485	User selected resistor	ON

Chapter 4 Operation and Display

4.1 Introduction to operation panel display interface

The keyboard of AD300 series inverters is the main unit of accepting command, displaying and modifying parameters. There are 2 types of operation keypad for AD300 series, namely LED and LCD keypads. LED is standard and LCD is optional. The operation for 2 kinds of keypads is the same. We take LED keypad as example for introducing. The keyboard outline is as Fig.4-1.

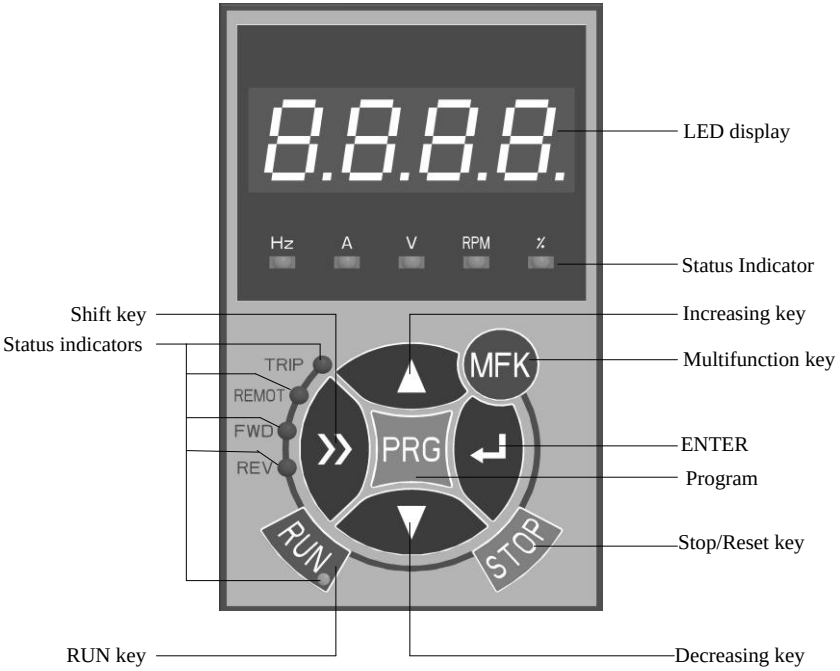


Fig.4-1 Operation Panel Diagram

4.1.1 Keyboard button description

Table 4-1 Keyboard keys description

Keys	Name	Function
PRG	Programming key	Entry and exit of primary menu
ENTER	Confirmation key	Enter the next level menu or confirm the data setting
∧	Increase key	Increase of the value or function code
∨	Decrease key	Decrease of the value or function code
>>	Shift key	Select the to be displayed parameters in turn under stop interface or running interface; Choose the to be modified digits when setting parameters.
RUN	Running key	Run the inverter under keypad operation mode.
STOP	Stop/reset	Stop the inverter at running status; Reset operation in the fault alarm status. Its function is limited to setting of code FE.02.
MFK	Multi-function selection key	This button restricted by FE.01 code. 0: MFK inactive 1: JOG running 2: Switching between forward rotation and reverse rotation 3: UP/DOWN clear 4: Switching between operation panel command channel and remote command channel(terminal command channel or serial port communication command channel)

4.1.2 Descriptions of Indicators

Table 4-2 Descriptions of Indicators

Symbol of Indicator		Meanings
Status indicators	RUN	On: Inverter is running Off: Inverter has stopped Blinking: Inverter is running at zero frequency

	FWD	On: Inverter is running forward steadily Off: Inverter is running reverse or stop Blinking: Speed up or speed down forward
	REV	On: Inverter is running reverse steadily Off: Inverter is running forward or stop Blinking: Speed up or speed down reverse
	TRIP	Off: Inverter is at normal state Flash: Inverter is at fault state
	REMOT	Off: Inverter is controlled by the keyboard On: Inverter is controlled by the terminals Blinking: Inverter is controlled by communication.
Unit indicators	Hz	On: Current frequency is running frequency Blinking: Current frequency is set frequency
	A	Current unit indicator
	V	Voltage unit indicator
	RPM	On: Current speed is running speed Blinking: Current speed is set speed
	%	On: Current value is running data Blinking: Current value is set data
	Hz+A	On: Current value is PID running value Blinking: Current value is set PID value

4.1.3 Digital display zone

It is four-digit LED display. Be able to display setup frequency, output frequency, various monitoring data and alarm code

.

4.2 Instruction of function code viewing and modification

The operation panel of the AD300 inverter adopts three levels menu structure to carry out operations such as parameter setting. The three levels are:

1. Groups of function code (level-1 menu)
2. Function code (level-2 menu)
3. Function code setup value(level-3 menu)

Note:

At level 3 menu, pressing PRG key or ENTER key can return to level-2 menu. The difference between them is that: Pressing ENTER will save the setup and return to the level 2 menu and then automatically shift to the next function code; while pressing PRG key will directly return to level 2 menu without saving the parameter, and stay at current function code.

Below is the example of modifying the function code F9.01 from 10.00Hz to 20.00Hz. (The number of bigger font size refers to the blinking digit),

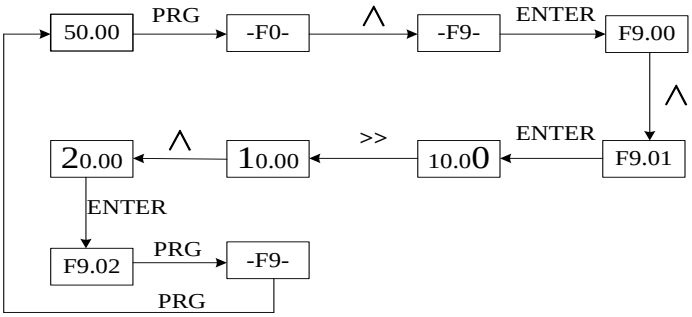


Fig.4-3 Example of 3 levels menu operating

At level-3 menu, if the parameter has no blinking digit, it indicates that this function code cannot be modified. The possible reasons include:

1) The function code is an unchangeable parameter, such as actual detection parameter, running record parameter, etc.

2) The function code cannot be modified in running status. It can be modified only after the inverter running is stopped.

4.3 Display status of keyboard

AD300 series inverters different displaying status include the stopped state parameter display, the running status parameter display, the function code edition display and the fault warning condition display etc.

1) The stop status parameter display

The inverter is at stop state. The LED displays the stop state parameters. You can press “>>” to by turns display different parameters at stop state. (User can set which parameters are to be displayed at stop state in FE group function codes.)

2) The running state parameter display

The inverter is running and the LED displays the running state parameters. You can press “>>” to display by turns the different running state parameters. (User can set which parameters are to be displayed at running state in FE group function codes.)

3) Fault and warning state

If the inverter has detected a warning signal, it comes into warning state and blinks the warning code. If the warning signal disappeared, the warning code will automatically disappear.

If the inverter has detected an error, it comes into fault state and show the fault code steadily. And the indicator TRIP will light up. By pressing the “>>”key, user can view the parameters value of stop state. If you want to see the details of fault information, press the “PRG” key to enter programming state and check parameter group FF.

User can reset the inverter by STOP key, terminal or communication. If the fault signal still exists, the keyboard keeps displaying the fault code.

4) Function code setting state

No matter it is under stop state, running state or warning/fault state, it is valid to press PRG key to enter parameter setting. The detailed setting method is instructed in this manual section-4.2.

4.4 Password Setting

The inverter provides user password setting function. When FP.00 is set to non-zero value, which is the user password, the password protection turns valid after exiting the editing status. When the user goes to FP group again and presses ENTER, it shows “0000”. Correct password should be input to unlock the protection status to enter FP group again. To disable this password protection, user need to input the correct password first and then change FP.00=0.

Chapter 5 List of Parameters

Attention:

“○”means the parameter can be changed during running.

“×”means the parameter cannot be changed during running;

“*” means the parameter is detected value or fixed value and not changeable.

“-” means manufacturer parameter and the users have no access to it.

F0: Basic function group

Code	Description	Setting range	Default	Modify
F0.00	Model	0~1	Depends on model	-
F0.01	Control mode	0: Sensorless vector control-1 1: Sensorless vector control-2 2: Vector control with encoder 3: V/F control	0	×
F0.02	Run command control mode	0: Operation keypad control 1: Terminal control 2: Communication control	0	○
F0.03	Frequency reference1 (Freq. ref.1)	0: Digital reference (keypad, terminal up/down) 1: Al1 2: Al2 3: PULSE setup 4: Communication 5:MS (Multi-step) Speed 6: PLC 7: PID 8:keyboard potentiometer	0	○
F0.04	Frequency reference2 (Freq. ref.2)	1: Al1 2: Al2 3: PULSE setup 4: Communication 5:MS (Multi-step) Speed 6: Reserved 7: Reserved 8:keyboard potentiometer	1	○

Code	Description	Setting range	Default	Modify
F0.05	Frequency setting selection	0:Freq. ref.1 1:Freq. ref.2 2: Freq. ref.1+ Freq. ref.2 3:Terminal switching between Freq. ref.1 & Freq. ref.2 4: Terminal switching between (Freq. ref.1+ Freq. ref.2) & Freq. ref.1 5:MIIN (Freq. ref.1, Freq. ref.2) 6:MAX (Freq. ref.1, Freq. ref.2)	0	○
F0.06	UP/DOWN Preset freq.	0~ Max frequency	50.00Hz	○
F0.07	Terminal UP/ DOWN rate	0.01~ 50.00Hz/s	1.00Hz/s	○
F0.08	UP/DOWN keypad and terminal select	0:Active in both keyboard and terminal UP/DOWN 1:Active only in keyboard UP/DOWN 2: Active only in Terminal UP/DOWN	1	○
F0.09	UP/DOWN data saving selection	0: Setting saved in power failure 1: Setting not saved in power failure 2: Setting cleared to 0 after stop	0	○
F0.10	Basic frequency	0.10～320.0Hz	50.00Hz	×
F0.11	Max frequency	MAX[50.00Hz, Freq. upper limit, Reference frequency]~320.0Hz	50.00Hz	×
F0.12	Freq. upper limit	Freq. lower limit ~ Max frequency	50.00Hz	×
F0.13	Freq. lower limit	0.00~Frequency upper limit	0.00Hz	×
F0.14	Max output voltage	110~440V	380V	×
F0.15	Carrier freq.	1.0~16.0KHz	Depends on model	○
F0.16	Carrier freq. auto-adjust	0: No adjust 1: Auto adjust	0	○

Code	Description	Setting range	Default	Modify
F0.17	Keypad direction	0: Forward 1: Reverse	0	○
F0.18	Motor wiring direction	0: Positive sequence 1: Reversed sequence	0	×
F0.19	Acc. time1	0.1～3600s	Depends on model	○
F0.20	Dec. time1	0.1～3600s	Depends on model	○

Group F1: Start and stop control

Code	Description	Setting range	Default	Modify
F1.00	Start mode	0: Start directly 1: DC injection brake first and then start at start freq. 2: Speed tracking and start	0	○
F1.01	Start freq.	0.10~60.00Hz	0.50Hz	○
F1.02	Start freq. hold time	0.0~10.0s	0.0s	○
F1.03	DC injection brake current at start	G: 0.0~100.0% rated current P: 0.0~80.0% rated current	0.00%	○
F1.04	DC injection brake time at start	0.0～30.0s	0.0s	○
F1.05	Acc./Dec. mode	0: Linear 1: S-curve	0	○
F1.06	Time of S-curve initial stage	10.0～50.0% (Acc./ Dec. time) F1.06+F1.07≤90%	30.00%	○
F1.07	Time of S-curve rising stage	10.0~80.0%（Acc./ Dec. time） F1.06+F1.07≤90%	40.00%	○
F1.08	Stop mode	0: Deceleration to stop 1: Coast to stop 2: Deceleration +DC braking	0	×
F1.09	DC brake trigger frequency at stop	0.00～320.0Hz	0.00Hz	○
F1.10	DC brake waiting time at stop	0.00～10.00s	0.00s	○
F1.11	DC brake current at stop	Type G: 0.0~100.0% rated current Type P: 0.0~80.0% rated current	0.00%	○

Code	Description	Setting range	Default	Modify
F1.12	DC brake time at stop	0.0～30.0s	0.0s	○
F1.13	Energy consume brake validity	0: Disabled 1: Enabled	0	○
F1.14	Energy consume brake action voltage	380V: 650~750V 220V: 360~390V	700V 380V	○
F1.15	Power failure and fault restart	0: Disable 1: Enabled for power failure 2: Enabled for fault 3: Enabled for both Note: Power recovery restart is only valid for terminal 2-lines mode. Fault restart is invalid for over-voltage fault.	0	○
F1.16	Restart waiting time	0.0～3600s	0.0s	○

Group F2: Auxiliary running function

Code	Description	Setting range	Default	Modify
F2.00	Jog running freq.	0.10～50.00Hz	5.00Hz	○
F2.01	Jog Acc. time	0.1～3600s	6.0/20.0s	○
F2.02	Jog Dec. time	0.0～3600s	6.0/20.0s	○
F2.03	Acc. time2	0.1～3600s	20.0s	○
F2.04	Dec. time2	0.1～3600s	20.0s	○
F2.05	Acc. time3	0.1～3600s	20.0s	○
F2.06	Dec. time3	0.1～3600s	20.0s	○
F2.07	Acc. time4	0.1～3600s	20.0s	○
F2.08	Dec. time4	0.1～3600s	20.0s	○
F2.09	Skip frequency 1	0.00～320.0Hz	0.00Hz	×
F2.10	Skip frequency 2	0.00～320.0Hz	0.00Hz	×
F2.11	Skip frequency amplitude	0.00～15.00Hz	0.00Hz	×
F2.12	Anti-Reverse control	0: Reverse rotation allowed 1: Reverse rotation not allowed	0	○
F2.13	Fwd/ Rev switch dead-zone time	0.0～3600s	0.0s	○

Code	Description	Setting range	Default	Modify
F2.14	frequency lower limit treatment	0: Run with frequency lower limit 1: Zero frequency operation	0	×
F2.15	Reserved	Reserved	0	×
F2.16	Energy saving control	0: Disabled 1: Enabled	0	×
F2.17	AVR Function	0: Disabled 1: Enabled 2: Disabled only at speed-down	2	×
F2.18	Over modulation	0: Enabled 1: Disabled	1	×
F2.19	Droop control	0.00～10.00Hz	0.00Hz	○
F2.20	Fan control mode	0: Auto mode 1: Always Running	0	×
F2.21	Instant power failure treatment	0: Disabled 1: Drop frequency 2: Stop directly	0	○
F2.22	Power failure freq. drop point	210～600V	380V:420V 220V:230V	○
F2.23	Power failure freq. drop rate	0.00～max frequency /s	10.00Hz/s	○
F2.24	Motor speed display ratio	0.00～500.0%	100.00%	○
F2.25	UP/DOWN drop to minus frequency	0: Enabled 1: Disable	1	○
F2.26	ENTER key function	0: No special action 1: FWD/REV switching 2: RUN for forward: ; Enter for reverse; STOP for stop 3: Jog running	0	○
F2.27	Freq. resolution	0: 0.01Hz 1: 0.1Hz	0	×
F2.28	Acc./Dec. time unit	0: 0.1second 1: 0.01second	0	×
F2.29	High frequency modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0	×

Group F3: Vector Control Parameters

Code	Description	Setting range	Default	Modify
F3.00	Speed loop proportional gain 1	1~3000	1000	○
F3.01	Speed loop integral time 1	1~3000	300	○
F3.02	Switching frequency 1	0.0～60.00Hz	5.00Hz	○
F3.03	Speed loop proportional gain 2	1~3000	800	○
F3.04	Speed loop integral time 2	1~3000	200	○
F3.05	Switching frequency 2	0.0～60.00Hz	10.00Hz	○
F3.06	Speed loop filter time constant	0～500ms	3ms	○
F3.07	Current loop proportional coefficient	0～6000	3000	○
F3.08	Current loop integral coefficient	0～6000	1500	○
F3.09	VC Slip compensation	0.0～200.0%	100.00%	○
F3.10	Torque control	0:Torque control Disabled 1:Torque digital setting(F3.11) 2:AI1 3:AI2 4:PULSE 5:communication 6:keypad potentiometer	0	○
F3.11	Torque digital setting	0.0～200.0%	50.00%	○
F3.12	Torque control speed limit	0: digital setting(F3.13) 1: AI1 2: AI2 3: PULSE 4: communication 5: keyboard potentiometer	0	○
F3.13	Torque control speed limit digital setting	0.00～320.0Hz	50.00Hz	○

Code	Description	Setting range	Default	Modify
F3.14	Encoder pulse number	1～9999	1000	○
F3.15	Motor and PG reduction ratio	0.010～50.00	1	○
F3.16	PG direction	0: Positive 1: Negative	0	○
F3.18	SVC speed calculation filter	0~15	5	○
F3.19	SVC mode	0: SVC mode1 1: SVC mode2	0	○
F3.20	Reserved	Reserved		○
F3.21	Field weakening	0:Disable 1:Enable	0	×
F3.22	Torque limit compensation coefficient	60.0～300.0%	200.00%	○
F3.23	Reserved	Reserved		○
F3.24	Torque ref. terminal single modulation	0.0~10%	0.00%	○
F3.25	Torque ref. terminal total modulation	0.0~100%	50%	○

Group F4: V/F Control Parameters

Code	Description	Setting range	Default	Modify
F4.00	V/F curve setting	0: Constant torque load V/F 1: 2.0 order decreasing torque 2: 1.5 order decreasing torque 3: 1.2 order decreasing torque 4: Multiple dots V/F	0	×
F4.01	V/F freq. point1	0.0～F4.03	10.00Hz	×
F4.02	V/F voltage point1	0.0～100.0%	20.00%	×
F4.03	V/F freq. point2	F4.01～F4.05	25.00Hz	×
F4.04	V/F voltage point2	0.0～100.0%	50.00%	×
F4.05	V/F freq. point3	F4.03～F0.10	40.00Hz	×
F4.06	V/F voltage point3	0～100.0%	80.00%	×

Code	Description	Setting range	Default	Modify
F4.07	Torque boost	0.0%: Auto boost 0.1～30.0%: Manual boost	0.00%	○
F4.08	Manual torque boost cutoff point	0.00～60.00Hz	50.00Hz	○
F4.09	Slip compensation	0.0～200.0%	0.00%	○
F4.10	Slip compensation filtering time	0.01～2.55s	0.20s	○
F4.11	V/F separation control voltage source	0: Disabled 1: Digital setting (F4.12) 2: AI1 3: AI2 4: Pulse 5: Communication	0	×
F4.12	V/F separation voltage digital setting	0V～max output voltage	0V	○
F4.13	V/F separation voltage rising time	0.0s～1000.0s	0.0s	○
F4.14	V/F oscillation suppression	0~500	Depends on model	○

Group F5: Motor Parameters

Code	Description	Setting range	Default	Modify
F5.00	motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: PM motor (Reserved)	0	×
F5.01	Motor polarity number	2～56	4	×
F5.02	rated power	0.4～999.9kW	Depends on model	○
F5.03	rated current	0.1～999.9A	Depends on model	○
F5.04	rated speed	0～24000rpm	Depends on model	
F5.05	No-load current I0	0.1～999.9A	Depends on model	○

Code	Description	Setting range	Default	Modify
F5.06	Stator resistance R1	1~65535mΩ(inverter ≤22kW) 0.1~6553.5mΩ(inverter >22kW)	Depends on model	○
F5.07	Leakage inductive reactance X	0.01~655.35mH(inverter ≤ 22kW) 0.001~65.535mH(inverter >22kW)	Depends on model	○
F5.08	Rotor resistance R2	1~65535mΩ(inverter ≤ 22kW) 0.1~6553.5mΩ(inverter >22kW)	Depends on model	○
F5.09	Mutual Inductive reactance Xm	0.1~6553.5mH(inverter ≤ 22kW) 0.01~655.35mH(inverter >22kW)	Depends on model	○
F5.10	Auto tune	0: No operation 1: Static tuning 2: Rotary tuning	0	×

Group F6: Input terminals

Code	Description	Setting range	Default	Modify
F6.00	Terminal Command mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	×
F6.01	X1 terminal Function selection	0: NULL 1: FWD 2: REV 3: RUN 4: F/R direction 5: HLD self-hold 6: FWD jog run (FJOG) 7: REV jog run (RJOG) 8: RESET 9: Freq. source switching 10: Terminal UP 11: Terminal DOWN 12: UP/DOWN setup clear 13: Coast to stop 14: DC injection braking 15: Acc./Dec. prohibit 16: Inverter running prohibit	1	×
F6.02	X2 terminal Function selection		2	×
F6.03	X3 terminal Function selection		8	×
F6.04	X4 terminal Function selection		17	×
F6.05	X5 terminal Function selection		18	×
F6.06	X6 terminal Function selection		0	×
F6.07	X7 terminal Function selection		0	×
F6.08	X8 terminal Function selection		0	×
F6.09	AI1 used as X9		0	×

Code	Description	Setting range	Default	Modify
		17: Multi-step terminal 1 18: Multi-step terminal 2 19: Multi-step terminal 3 20: Multi-step terminal 4 21: torque control disable 22: Acc./Dec. time selector 1 23: Acc./Dec. time selector 2 24: Running pause normally open 25: Running pause normally closed 26: External fault normally open 27: External fault normally closed 28: Run command switch to terminal 29: Run command switch to keypad 30: External stop terminal; same to STOP key in keypad control mode. 31: Reserved 32: PLC status reset 33: Wobble freq. pause 34: Wobble freq. status reset 35: PID pause 36: PID parameters switching 37: PID direction reversion; Active this terminal to reverse PID direction set by 8.04. 38: Timing drive input 39: Counter signal input 40: Counter clear 41: Actual length clear 42: FWD running (FWD NC) 43: REV running (REV NC) 44: HLD (Normally open) 45: Torque increase 46: Torque increase clear		

Code	Description	Setting range	Default	Modify
		47: Torque decrease 48: One key recover user parameters(Valid in stop state) 49~56: Reserved 57: Pulse input (Take X4 in case 2 inputs) 58: Single phase measuring speed input (Take X4 in case 2 inputs) 59: Speed measuring input A (only for X4) 60: Speed measuring input B (only for X5)		
F6.10	Analog Nonlinear Selection	0: none 1: AI1 2: AI2 3: Pulse	0	×
F6.11	AI1 Min. input	0.00～F6.13	0.00V	○
F6.12	AI1 Min. input corresponding setup	-200.0～200.0%	0.00%	○
F6.13	AI1 Max. input	F6.11～10.00V	10.00V	○
F6.14	AI1 Max. input corresponding setup	-200.0～200.0%	100.00%	○
F6.15	AI1 input filter time	0.01～50.00s	0.05s	○
F6.16	AI2 Min. input	0.00～F6.18	0.00V	○
F6.17	AI2 Min. input corresponding setup	-200.0～200.0%	0.00%	○
F6.18	AI2 Max. input	F6.16～10.00V	10.00V	○
F6.19	AI2 Max. input corresponding setup	-200.0～200.0%	100.00%	○
F6.20	AI2 input filter time	0.01～50.00s	0.05s	○
F6.21	PULSE Min. input	0.00～F6.23	0.00kHz	○
F6.22	PULSE Min. input corresponding setup	-200.0%～200.0%	0.00%	○
F6.23	PULSE Max. input	F6.21～50.00kHz	50.00kHz	○
F6.24	PULSE Max. input corresponding setup	-200.0%～200.0%	100.00%	○
F6.25	Pulse filter time	0.01～50.00s	0.05s	○

Code	Description	Setting range	Default	Modify
F6.26	Terminal up/down initial increment	0.00~10.00Hz	0.01Hz	○
F6.27	Freq. ref.2 datum	0: Max. freq. 1: Freq. ref.1	0	○

Group F7: Output terminal

Code	Description	Setting range	Default	Modify
F7.00	DO terminal output definition	0: NULL 1: RUN 2: Frequency arrival(FAR) 3: Freq.level detection 1 (FDT1) 4: Freq.level detection 2 (FDT2) 5: Freq. detection when speed-up 6: Freq. detection when speed-down 7: Zero-speed running 8: Zero-speed 9: PLC circulation completion 10: Indicate the running steps (Co-setting in DO\Y1\Y2) 11: Ready for running 12: Timing arrival 13: counting arrival 14: Reserved 15: Preset torque value arrival 16: Inverter fault output 17: Under voltage status output 18: Inverter overload pre-warning 19: Fixed-length arrived, level signal 20: PID in dormancy 21: AI1>AI2 22: AI1<F7.16 23: AI1>F7.16 24: F7.16<AI1<F7.17 25: Frequency lower limit arrival 26: Multi-pumps system auxiliary pump control signal 27: Communication setting 28: inverter running time arrival	0	○
F7.01	Y1 terminal output selection		1	○
F7.02	Y2 terminal output selection		0	○
F7.03	Relay 1 (TA/TB/TC) output selection		16	○
F7.04	Relay 2 (BRA/BRB/BRC) output selection		0	○

Code	Description	Setting range	Default	Modify
F7.05	Freq. arrival detection width	0.00～10.00Hz	2.50Hz	○
F7.06	Frequency detection value 1 (FDT1 level)	0.00～320.0Hz	5.00Hz	○
F7.07	Freq. detection lag1 (FDT1-lag)	0.00～10.00Hz	1.00Hz	○
F7.08	Frequency detection value 2 (FDT2 level)	0.00～320.0Hz	25.00Hz	○
F7.09	Freq. detection lag2 (FDT2-lag)	0.00～10.00Hz	1.00Hz	○
F7.10	Up detection frequency	0.00～320.0Hz	50.00Hz	○
F7.11	Down detection frequency	0.00～320.0Hz	0.00Hz	○
F7.12	Torque detection reference	0.0～200.0%	100.00%	○
F7.13	Preset Counting arrival value	0～9999	0	○
F7.14	Preset Timing arrival value	0.0～6553.0s	0.0s	○
F7.15	Reserved			
F7.16	AI1 compare threshold 1	0.00～10.00v	0.00v	○
F7.17	AI1 compare threshold 2	0.00～10.00v	0.00v	○
F7.18	Analog compare hysteresis error	0.00～3.00v	0.20v	○
F7.19	AO1 output selection	0: NULL 1: Running freq. (0~max frequency) 2: Setting freq. (0~max frequency) 3: Output current(0～2 times of	1	○
F7.20	AO2 output selection		0	○

Code	Description	Setting range	Default	Modify
F7.21	DO output selection	inverter rated current) 4: Output voltage (0～Max Voltage) 5: PID setup (0～10V) 6: PID feedback (0～10V) 7: Calibrating signal (5V) 8: Output torque (0～2 times of motor rated torque) 9: Output power (0～2 times of inverter rated power) 10: Bus voltage (0~1000V) 11: 9: AI1 (0～10V) 12: AI2 (0～10V/4～20mA) 13: Pulse frequency 14: Communication setting	0	○
F7.22	AO1 output range selection	0: 0～10V/0～20mA 1: 2～10V/4～20mA	0	○
F7.23	AO2 output range selection	0: 0～10V/0～20mA 1: 2～10V/4～20mA	0	○
F7.24	Gain of AO1	1～200%	100%	○
F7.25	Gain of AO2	1～200%	100%	○
F7.26	DO Max. output pulse freq.	DO Min. output pulse freq.～50.00kHz	50.00kHz	○
F7.27	DO Min. output pulse freq.	0.00～DO Max. output pulse freq.	0.00kHz	○
F7.28	Auxiliary pump start lag time	0～9999s	0	○
F7.29	Auxiliary pump stop lag time	0～9999s	0	○
F7.30	DO Max. output	0: 50.00KHz 1: 500.0Hz	0	×
F7.31	FDT/RUN signal Jog selection	0: Do not include Jog signal 1: Include Jog signal	0	×
F7.32	Running time arrival setup	0~65530Mins	0	○
F7.33	Running time arrival stop selection	0: Do not stop 1: Stop	0	○

Group F8: PID Parameters

Code	Description	Setting range	Default	Modify
F8.00	PID setup selection	0: PID digital setting（F8.02） 1: AI1 2: AI2 3: Pulse input 4: serial communication	0	○
F8.01	PID feedback selection	0: AI1 1: AI2 2: Pulse input 3: serial communication 4: AI1-AI2 5: AI1+AI2 6: MAX(AI1, AI2) 7: MIN(AI1, AI2)	1	○
F8.02	Analog PID digital setup	0.0～999.9	50	○
F8.03	Analog closed loop measuring range	1.0～999.9	100	○
F8.04	PID action direction	0: Positive 1: Negative	0	○
F8.05	PID proportional gain 1 (KP1)	0.1～9.9	1	○
F8.06	PID integration time 1	0.00～100.0s	10.00s	○
F8.07	PID differential time 1	0.00～1.00s	0.00s	○
F8.08	PID proportional gain 2 (KP2)	0.1～9.9	1	○
F8.09	PID integration time 2	0.00～100.0s	10.00s	○
F8.10	PID differential time 2	0.00～1.00s	0.00s	○
F8.11	PID parameters switching	0: No switching, use the first group parameters 1: switching by terminal 2: auto-switching by deviation	0	○
F8.12	PID parameter switching Deviation 1	0.0～999.9	20	○
F8.13	PID parameter switching Deviation 2	0.0～999.9	80	○
F8.14	PID delay time constant	0.00～100.0s	0.00s	○

Code	Description	Setting range	Default	Modify
F8.15	Deviation limit	0.0～999.9	0.2	○
F8.16	PID output positive limit	0.00～320.0Hz	50.00Hz	○
F8.17	PID output negative limit	0.00～320.0Hz	0.00Hz	○
F8.18	PID preset freq.	0.00～320.0Hz	0.00Hz	×
F8.19	Hold time of PID preset frequency	0.0～3600s	0.0s	×
F8.20	Enable dormancy	0: Disabled 1: Enabled	0	×
F8.21	Dormancy delay	0～2000s	120s	○
F8.22	Dormancy threshold	0.00～320.0Hz	20.00Hz	○
F8.23	Awaken threshold	0.0~100.0% (relative to pre-set value)	80.00%	○
F8.24	PID feedback offline detection range	0.0~100.0% (relative to feedback measuring range, 0.0% no detection)	0.0%	○
F8.25	PID feedback offline detection time	0.0~50.0s	2.0s	○
F8.26	PID feedback offline detection Min. Freq.	0.00~50.00Hz	10.00Hz	○

Group F9: Multi-step speed and PLC

Code	Description	Setting range	Default	Modify
F9.00	Multi-step freq.1	0.00～Max frequency	5.00 Hz	○
F9.01	Multi-step freq.2	0.00～Max frequency	10.00 Hz	○
F9.02	Multi-step freq.3	0.00～Max frequency	15.00 Hz	○
F9.03	Multi-step freq.4	0.00～Max frequency	20.00 Hz	○
F9.04	Multi-step freq.5	0.00～Max frequency	30.00 Hz	○
F9.05	Multi-step freq.6	0.00～Max frequency	40.00 Hz	○
F9.06	Multi-step freq.7	0.00～Max frequency	50.00 Hz	○
F9.07	PLC running mode	0: Single cycle 1: Single cycle and hold final value 2: Continuous cycle	2	×

Code	Description	Setting range	Default	Modify
F9.08	PLC restarting mode after interrupt	0: Restart from first step 1: Continue from the step where the inverter interrupted	0	×
F9.09	PLC status recorded or not at power failure	0: Not save 1: Save	0	×
F9.10	Multi-steps time unit	0: Second 1: Minute	0	×
F9.11	PLC step1 time (T1)	0.1～3600	20	○
F9.12	PLC step2 time (T2)	0.0～3600	20	○
F9.13	PLC step3 time (T3)	0.0～3600	20	○
F9.14	PLC step4 time (T4)	0.0～3600	20	○
F9.15	PLC step5 time (T5)	0.0～3600	20	○
F9.16	PLC step6 time (T6)	0.0～3600	20	○
F9.17	PLC step7 time (T7)	0.1～3600	20	○
F9.18	Step T1 program running setting	1 F/r ～ 4 F/r	1F	○
F9.19	Step T2 program running setting	1 F/r ～ 4 F/r	1F	○
F9.20	Step T3 program running setting	1 F/r ～ 4 F/r	1F	○
F9.21	Step T4 program running setting	1 F/r ～ 4 F/r	1F	○
F9.22	Step T5 program running setting	1 F/r ～ 4 F/r	1F	○
F9.23	Step T6 program running setting	1 F/r ～ 4 F/r	1F	○
F9.24	Step T7 program running setting	1 F/r ～ 4 F/r	1F	○
F9.25	Current running step	1～7	0	*
F9.26	Current step running time	0.0～3600	0	*
F9.27	Multi-step freq.8	0.00～Max frequency	50.00 Hz	○
F9.28	Multi-step freq.9	0.00～Max frequency	50.00 Hz	○
F9.29	Multi-step freq.10	0.00～Max frequency	50.00 Hz	○

Code	Description	Setting range	Default	Modify
F9.30	Multi-step freq.11	0.00～Max frequency	50.00 Hz	○
F9.31	Multi-step freq.12	0.00～Max frequency	50.00 Hz	○
F9.32	Multi-step freq.13	0.00～Max frequency	50.00 Hz	○
F9.33	Multi-step freq.14	0.00～Max frequency	50.00 Hz	○
F9.34	Multi-step freq.15	0.00～Max frequency	50.00 Hz	○
F9.35	PLC Multi-step Freq.1 selection	0:Multi-step digital setting 1: AI1 2: AI2 3: keyboard potentiometer 4: Pulse input	0	○
F9.36	PLC Multi-step Freq.7 selection		0	○

Group FA: Wobble Frequency

Code	Description	Setting range	Default	Modify
FA.00	Wobble amplitude	0.0~50.0%	0.00%	○
FA.01	Jitter frequency	0.0~50.0%（to FA.00）	0.00%	○
FA.02	Jitter Time	5～50ms	5ms	○
FA.03	Wobble freq. up time	0.1～999.9s	5.0s	○
FA.04	Wobble freq. down time	0.1～999.9s	5.0s	○
FA.05	Amplitude mode	0: Relative to the central freq. 1: Relative to Max. frequency	0	○

Group Fb: Fixed Length

Code	Description	Setting range	Default	Modify
Fb.00	Preset length	0～65530	0	○
Fb.01	Actual length	0～65530	0	*
Fb.02	Pulses number per unit	0.1～6553.0	100	○

Group FC: Protection and Fault Parameters

Code	Description	Setting range	Default	Modify
FC.00	Motor overload protection mode	0: Disabled 1: Common motor (with low speed compensation) 2: Variable frequency motor (without low speed compensation)	1	×
FC.01	Electro thermal protection value	20～110%	100%	○
FC.02	Overload Pre-alarm detection level	30.0～200.0%	160%	×
FC.03	Overload Pre-alarm detection time	0.0～80.0s	60.0s	×
FC.04	Current amplitude limit	0:Invalid 1: Acc./Dec. valid; Constant speed invalid 2: Valid all the time	2	○
FC.05	Current amplitude limit level	Type G：80.0～200.0% Type P：60.0～150.0%	G: 160.0% P: 120.0%	○
FC.06	Over voltage stall function	0: Invalid (Recommended if braking resistor mounted) 1: Valid for Acc/Dec. 2: Valid all the time	1	×
FC.07	Overvoltage point for Acc./Dec. suspend	110.0～150.0%(Bus voltage)	380V: 140% 220V: 120%	×
FC.08	Input phase loss detection	1～100%(100% correspond to 800V)	20%	×
FC.09	Input phase loss detection delay time	2～255s	10s	×

Code	Description	Setting range	Default	Modify
FC.10	Output phase loss detection	0: Invalid 1: Valid	1	○
FC.11	Terminal close fault detection	0: Invalid 1: Valid	1	○
FC.12	Fault auto reset times	0～10,“0” means auto reset is disabled. Only 3 faults have auto reset function	0	×
FC.13	Fault auto reset interval	0.1～20.0s/time	5.0s	×
FC.14	Under-voltage fault treatment	0: No treatment 1: Auto reset at power recovery 2: Auto run at power recovery (Auto run time interval is F1.16)	0	○
FC.15	Fast current limit	50.0%~100.0% (100% means this function is disabled.)	Depends on model	○
FC.16	Fast current limit time	0.01~1.00s	0.10s	○
FC.17	Overvoltage suppression freq.	0.00~10.00Hz	0.00Hz	○
FC.18	Overvoltage suppression mode	0: Mode1 1: Mode2 2: Mode3	0	○

Group Fd: Communication Parameters

Code	Description	Setting range	Default	Modify
Fd.00	Communication	0: RS485 disabled 1: RS485 enabled	0	○
Fd.01	Local address	1～247	1	○
Fd.02	Baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	3	○

Code	Description	Setting range	Default	Modify
Fd.03	Parity bit	0: Even parity check 1: Odd parity check 2: No parity check	0	○
Fd.04	Communication Timeout time	Range: 0.0～100.0s 0: No timeout detection Others: Timeout detection time	0.0s	○
Fd.05	Response delay	0～500ms	5ms	○
Fd.06	Communication Freq. setting coefficient	0.0~200.0%	100.00%	○
Fd.07	Communication interrupt detection mode	0: Time interval between 2 packets receiving. 1: Time interval of 0005H Add. data writing	0	○

Group FE: Operation interface & display

Code	Description	Setting range	Default	Modify
FE.00	Parameter display	0: Normal 3-levels menu display 1: Only display modified parameters	0	○
FE.01	MFK Key function selection	0: MFK inactive 1: JOG running 2: FWD/REV switching 3: UP/DOWN clear 4: Running command switch (terminal or communication) 7: RUN for FWD, MFK for REV, STOP for STOP	0	○
FE.02	STOP key function	0: Valid only in keypad control mode 1: Valid in stop state of terminal/ communication control mode 2: Valid in Fault state of terminal/ communication control mode 3: Valid in both stop & fault state of terminal/ communication control mode	2	○

Code	Description	Setting range	Default	Modify
FE.03	Running freq.(Hz) (before compensation)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	2	○
FE.04	Running freq. (Hz) (After compensation)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.05	Reference frequency (Hz blinking)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	1	○
FE.06	Output current(A)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	2	○
FE.07	Bus voltage (V)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	3	○
FE.08	Output voltage (V)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.09	Output torque (%)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.10	Reference torque (% blinking)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.11	Rotate speed (r/min)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○

Code	Description	Setting range	Default	Modify
FE.12	Reference speed (r/min blinking)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.13	Output power (kW)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.14	AI1 (V)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.15	AI2 (V)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.16	Analog PID feedback	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.17	Analog PID setup	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.18	Terminal status (no unit)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.19	Actual length	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.20	Reference length	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○

Code	Description	Setting range	Default	Modify
FE.21	Linear speed (m/s)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○
FE.22	External count value (no unit)	0: No display 1: Display at stop 2: Display at running 3: Display at stop & running	0	○

Group FF: Running History Record

Code	Description	Setting range	Default	Modify
FF.00	Type of latest fault	0: NULL 1: Uu1 bus under-voltage 2: OC1 Acc. over current 3: OC2 Dec. over current 4: OC3 Constant speed over current 5: Ou1 Acc.over voltage 6: Ou2 over voltage in deceleration 7: Ou3 over voltage in constant speed 8: GF Ground Fault 9: SC Load Short-Circuit 10: OH1 Radiator over heat 11: OL1 Motor overload 12: OL2 Inverter overload 13: EF0 communication fault 14: EF1 external terminal fault 15: SP1 Input phase failure or input phases unbalance 16: SPO Output phase failure or Unbalance 17: EEP EEPROM Fault 18: CCF Transmission between the inverter and keyboard cannot be established	NULL	*

Code	Description	Setting range	Default	Modify
		19: bCE Brake unit fault 20: PCE Parameter copy Error 21: IDE Hall current detection fault 22: ECE PG fault 23: LC fast current limit fault 24: EF2 terminal close fault 25: PID feedback offline		
FF.01	Output freq. at latest fault	0～Frequency upper limit	0.00Hz	*
FF.02	Reference frequency at latest fault	0～Frequency upper limit	0.00Hz	*
FF.03	Output current at latest fault	0～2* inverter rated current	0.0A	*
FF.04	Bus voltage frequency at latest fault	0～1000V	0V	*
FF.05	Running status at latest fault	0: **StP** Stop 1: **Acc** acceleration 2: **dEc** deceleration 3: **con** constant speed	0	*
FF.06	Fault history 1 (Last One)	The same as FF.00	NULL	*
FF.07	Fault history 2	The same as FF.00	NULL	*
FF.08	Total power on time	0～65530h	0h	*
FF.09	Total running time	0～65530h	0h	*
FF.10	Reserved	Reserved	Reserved	-
FF.11	Soft Software version number of control board	1.00~10.00	1	-
FF.12	Non-standard version number of software	0~255	0	-
FF.13	IGBT temperature			-
FF.14	Magnet excitation current			*
FF.15	Torque current			*

Group FP Protection Parameters

Code	Description	Setting range	Default	Modify
FP.00	User password	0: No password Others: password protection	0	○
FP.01	Parameter write-in protection	0: All parameters are allowed modifying 1: Only FP.01 and FP.03 can be modified 2: All parameters aren't allowed read	0	○
FP.02	Parameter initialization	0: No operation 1: Clear fault history When FP.02 is set to 1, the fault records of FF.00~FF.07 will be cleared. 2: Restore to defaults	0	×
FP.03	Parameter copy	0: No action 1: Parameters download 2: Parameters upload(except motor's parameters) 3: Parameters upload (all parameters)	0	×
FP.04	Parameter upload protection	0: Protection enabled 1: Protection disabled	0	×
FP.05	G/P model selection	0: Type G 1: Type P	0	×
FP.07	User parameters backup	0: Invalid 1: Valid	0	×
FP.08	User parameters recovery	0: Invalid 1: Valid	0	×

Chapter 6 Parameter description

📖Note:

The value in the "【 】" indicates the factory default value of the parameter.

6.1 Group 0 Basic Function

F0.00 Model	Range: 【Depends on model】

This parameter is provided only for the user to view the factory default model and cannot be modified.

0: G model

1: P model

F0.01 Control mode	Range: 0～2 【0】

0: Sensor-less vector control-1

This mode offers excellent vector control performance while insensitive to motor parameters. It is applicable to most applications.

1: Sensor-less vector control-2

Precise speed sensor-less vector control technology realizes AC motor decoupling, enabling the DC motorization of running control. It's applicable to high performance applications and features high precision of speed and torque and eliminates the need for pulse encoder.

2: Vector control with encoder

It is closed-loop control and encoder and PG card shall be installed. It is applicable to the applications where high-precision speed control or torque control is required such as paper-making machine, lifting equipment and elevator. One inverter can only drive one motor.

3: V/F control

It is applicable to the common applications where load requirement is not high such as fan and pump loads. It can be also used in applications where

one inverter drives multiple motors.

F0.02 Run command control mode	Range: 0～2 【0】

0: Operation keypad control (“LOCAL/REMOT” indicator OFF)

Running commands are controlled by RUN and STOP keys on operation keypad.

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

Running commands are controlled by the multifunctional input terminals such as FWD, REV, JOGF, JOGR, etc.

2: Serial communication control (“LOCAL/REMOT” indicator blinks)

Start & stop is controlled by the communication serial port. Modbus card is inbuilt.

F0.03 Frequency reference 1	Range: 0～8 【0】
F0.04 Frequency reference 2	Range: 1～8 【1】

0: Digital setup

The initial value is the value of F0.06 “UP/DOWN Preset frequency”. The reference frequency value can be changed through the keys “▲” and “▼” on the keyboard or multi-function terminals UP/DOWN (select through F0.08). The modification recording options in case of power failure is determined by the parameter F0.09. If setting is not saved in power failure, the reference frequency value will recover to default value F0.06 “UP/DOWN Preset Frequency” upon power recovery.

1: Terminal AI1

2: Terminal AI2

It means that the frequency is determined by the analog input terminal. AI1 refers to voltage input 0~10V. AI2 can be used as either voltage input of 0V~10V or current input of 4mA ~20mA, which can be selected by the SW1 DIP switch on the control board.

3: PULSE setup

The reference frequency is given by the terminal pulse. Pulse signal reference specification: voltage 9V ~30V and frequency range 0kHz ~50kHz.

4: Communication

It means that the frequency source is given by the host computer via the communication mode.

5: MS (Multi-step) Speed

When this mode is selected, group F6 “Input Terminals” and Group F9 “Multi-step speed and PLC” parameters shall be set to determine the relative relationship between the reference signal and the reference frequency.

6: Programmable Logic Controller (PLC)

When PLC mode is selected, Group F9 “Multi-step Speed and PLC” parameters shall be set to determine the reference frequency.

7: PID

When PID is selected to be reference, Group F8 “PID Parameters” shall be set. The running frequency of the inverter is the value after PID regulation.

8: keyboard potentiometer

📖Note:

- In frequency setting 1, the Multi-step option is prior to other frequency reference options. If the terminal has selected multi-speed and active, the frequency reference-1 is determined by multi-speed no matter what value has F0.03 setup.
- In option of frequency ref. 1+ the frequency ref. 2, the UP/DOWN digital setting of freq. reference-1 will be Up/Down overlapped on Frequency ref.-2. And the F0.06 Up/Down preset value is invalid.
- Pulse reference can only be input from the multifunction input terminals X4 or X5.

F0.05 Frequency setting selection	Range: 0～6 【0】

This parameter is used to select the frequency reference channel. The frequency reference is realized through combination of frequency setting 1 and frequency setting 2.

0: Frequency reference 1

The frequency reference is determined by the selected channel of freq. ref-1.

1: Frequency reference 2

The frequency reference is determined by the selected channel of freq. ref-2

2: Frequency reference 1 + Frequency reference 2

5: MIN (Frequency reference 1, Frequency reference 2)

6: MAX (Frequency reference 1, Frequency reference 2)

The frequency reference is determined by frequency setting 1 and frequency setting 2 after the corresponding arithmetic.

3: Terminal switching between Freq. ref.1 & Freq. ref.2

The frequency reference can switch between the Frequency ref. 1 and Frequency ref.2 through the multifunction input terminal. When the terminal with “Freq. source switching” setting is active, the frequency reference is determined by freq. ref.-2. When the terminal with “Freq. source switching” setting is invalid or the terminal has no setting of “Freq. source switching”, the frequency reference is determined by frequency ref.-1.

4: Terminal switching between (Freq. ref.1+ Freq. ref.2) & Freq. ref.1

When the “Freq. source switching” terminal is invalid, the frequency reference is determined by Freq. ref.1+ Freq. ref.2. When the “Freq. source switching” terminal is active, the frequency reference is determined by Freq. ref.1

F0.06 UP/DOWN Preset frequency	Range: 0.00～Max frequency【50.00Hz】

When the frequency source has selected “Digital setup” or “Terminals UP/DN”, this function code is the initial value of frequency digital setup of the inverter.

F0.07 Terminal UP/DOWN rate	Range: 0.01～50.00Hz/s【1.00Hz/s】

Terminal UP/DOWN rate is the changing rate in terminal or keypad UP/DN setting.

F0.08 UP/DOWN keypad and terminal select	Range: 0～2【1】

This parameter is used to select the UP/DOWN channel in Digital frequency reference setting.

0: Active in both keyboard and terminal UP/DOWN

1: Active only in keyboard UP/DOWN

2: Active only in terminal UP/DOWN

F0.09 UP/DOWN data saving selection	Range: 0～2【0】

0: Setting data saved in power failure

This option means the frequency upon power recovery is the frequency after Up/Down setting before power failure.

1: Setting not saved in power failure

This option means that the frequency upon power recovery is the preset Up/Down frequency value in F0.06. The Up/Down modification before power failure is cleared.

2: Setting cleared to 0 after stop

The Up/Down setting during running will be cleared after the inverter stop. The frequency upon restart will be preset Up/Down frequency value in F0.06. And the modification part is cleared.

F0.10 Basic frequency	Range: 0.10～320.0Hz【50.00Hz】

F0.11 Max frequency	Range: MAX[50.00Hz, Freq. upper limit, Reference frequency]～320.0Hz【50.00Hz】
F0.12 Frequency upper limit	Range: Freq. lower limit～Max freq.【50.00Hz】
F0.13 Frequency lower limit	Range: 0.00～Frequency upper limit【0.00Hz】
F0.14 Max output voltage	Range: 110～440V【380V】

The basic frequency (F_b) is the Min. output frequency when the inverter output the Max. voltage. Usually, the motor rated frequency can be treated as basic frequency.

The max frequency (F_{max}) is the highest frequency that the inverter can output.

The frequency upper limit (f_H) and frequency lower limit (fL) are the maximum and minimum operating frequency of the motor set according to the production process technique requirements.

The maximum output voltage Vmax is the output voltage when the inverter is in basic operating frequency. Normally it is the motor rated voltage.

The relationship of basic frequency, Max output frequency, frequency upper limit, the maximum output voltage and the Max. output voltage is shown in Fig.6-1

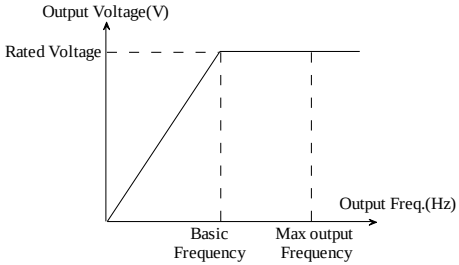


Fig.6-1 V/F characteristic diagram

F0.15 Carrier frequency	Range：1.0～16.0kHz【Depends on model】

This parameter is used to adjust the carrier frequency of the inverter. The inverter power ratings and according carrier frequency value range is show as following Tab.6-1. The adjustment of carrier frequency will have influences on

motor noise, motor temperature rising, and inverter temperature rising as shown on Tab.6-2.

Tab.6-1 Inverter power ratings and according carrier frequency

Model	Range	Factory default value
Type G: 2.2～11kW Type P: 4～15kW	1.0～16.0kHz	8.0kHz
Type G: 15～22kW Type P: 18.5～30kW	1.0～10.0kHz	6.0kHz
Type G: 30～45kW Type P: 37～55kW	1.0～10.0kHz	4.0kHz
Type G: 55～75kW Type P: 75～90kW	1.0～6.0kHz	3.0kHz
Type G: ≥90kW Type P: ≥110kW	1.0～3.0kHz	2.0kHz

Table 6-2 the influences of carrier frequency

Carrier frequency	Low → high
Motor noise	High →low
Motor temperature rise	High → low
Output current waveform	Poor → Good
inverter temperature rise	Low →high
Leakage current	low → high
External radiation interference	low to high

F0.16 Carrier frequency auto-adjust	Range: 0~1【0】

0: No- adjustment

Carrier frequency will not be adjusted automatically according to the

temperature of inverter.

1: Auto-adjustment

Inverter can automatically adjust carrier frequency through detection of temperature and the weight of load. The auto-adjusts is to keep inverter running at light load with low noise and keep the temperature within control at heavy load, and thus maintain the reliable and continuous running.

F0.17 Keyboard direction	Range: 0~1【0】

This parameter is used to select the motor rotation direction when the inverter running command channel is keyboard.

0: Forward rotation

1: Reverse rotation

F0.18 Wiring direction of motor	Range: 0~1【0】

The inverter output FWD direction might be different from FWD direction of motor. User can change the motor phases wiring sequence or change this parameter to make them agree with each other.

0: Positive sequence

1: Reversed sequence

F0.19 Acceleration time1	Range: 0.1～3600s【6.0/20.0s】
F0.20 Deceleration time1	Range: 0.1～3600s【6.0/20.0s】

Acceleration time: The time that the inverter accelerates from 0Hz to maximum output frequency (F0.11).

Deceleration time: The time that the inverter decelerates from maximum frequency (F0.11) to 0Hz.

This series inverter has defined 4 types of Acc/Dec time. Here, Acc/Dec time 1 is defined, and Acc/Dec time 2~4 can be defined in F2.03～F2.08. User can select different Acc/Dec time by external multifunction input terminal. Acc.1/Dec.1 is

taken as default.

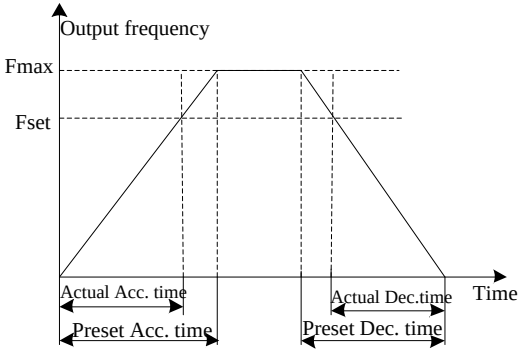


Fig.6-2 Schematic diagram for acceleration/deceleration time

Note:

The default value of acceleration and deceleration time:

7.5kW and below: 6.0 seconds

11kW~22kW: 20.0 seconds

30kW~110kW: 60.0 seconds

132kW and above: 90.0 seconds

6.2 Start and stop group (F1)

F1.00 Start mode	Range: 0～2【0】

0: Start directly

The inverter starts according to the start frequency (F1.01) and the start frequency holding time (F1.02).

1: DC brake first and then start at start frequency

The inverter performs DC braking first and then starts in mode-0. It is applicable to the applications of small inertia loads where reverse rotation is likely to occur.

2: Speed tracking and start

The inverter detects the motor rotation speed firstly and then starts from the detected speed and Acc./Dec. to preset frequency. This realizes the smooth starting without impact.

📖Note:

The 18.5kW and above ratings has inbuilt speed tracking card.

F1.01 Start frequency	Range: 0.10～60.00Hz【0.50Hz】
F1.02 Start frequency holding time	Range: 0.0～10.0s【0.0s】

Start frequency is the initial frequency at which the inverter starts, see F_S as shown in Fig.6-3; holding time of starting frequency is the time during which the inverter operates at the start frequency, see t1 as shown in Fig.6-3:

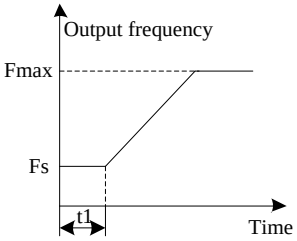


Fig.6-3 Start frequency and Start frequency holding time

📖Note:

Starting frequency is not restricted by the frequency lower limit.

F1.03 DC injection brake current at start	Range: 0.0~100.0%Inverter rated current【0.0%】
F1.04 DC injection brake time at start	Range：0.0~30.0s【0.0s】

These parameters are only valid when the start mode selects “DC injection brake first and then start at start frequency” (F1.00=1). The higher the DC brake current is, the higher the brake force.

📖Note:

If DC injection braking time or brake current is zero, the DC injection braking is invalid.

F1.05 Acceleration /Deceleration mode	Range: 0～1【0】

0: Linear

The output frequency increases or decreases linearly. The speed changes according to preset acceleration/ deceleration time. AD300 series has 4 types of Acc./Dec time which can be selected via multifunctional input terminals.

1: S-curve

The output frequency increases or decreases along the S curve. S curve is generally used in the applications where smooth start and stop is required such as elevator and conveyor belt. Refer to F1.06 and F1.07 for S curve parameter setting.

F1.06 Time of S-curve initial	Range: 10.0～50.0%【30.0%】
F1.07 Time of S-curve rising	Range: 10.0～80.0%【40.0%】

The parameters of F1.06 and F1.07 are valid only when Acceleration /Deceleration mode is S-curve (F1.05=1) and P1.06+P1.07≤90%.

Starting stage of S-curve is shown in Fig.6-4 as “①”, where the changing rate of output frequency increases from 0;

Rising stage of S-curve is shown in Fig.6-4 as “②”, where the changing rate of output frequency is constant;

Ending stage of S-curve is shown in Fig.6-4 as “③”, where the changing rate of output frequency decreases to zero.

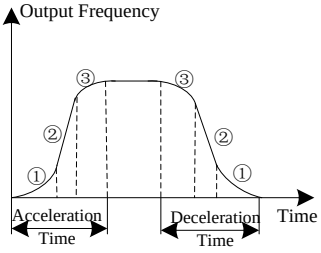


Fig.6-4 S-curve acceleration/deceleration

F1.08 Stop mode	Range: 0~2【0】

0: Deceleration to stop

After receiving the stop command, the inverter reduces its output frequency according to the Dec time, and stops when the frequency decreases to zero.

1: Coast to stop

After receiving the stop command, the inverter stops PWM output immediately and the load gradually stop under the effect of mechanical inertia.

2: Deceleration +DC braking

After receiving the stop command, the inverter reduces its output frequency according to the Dec time and performs DC injection braking when its output frequency reaches the preset trigger frequency for DC braking. The relative parameters are defined in F1.09~F1.12.

F1.09 DC brake trigger frequency at stop	Range: 0.00~max frequency【0.00Hz】
F1.10 DC brake waiting time at stop	Range: 0.00~10.00s【0.00s】
F1.11 DC brake current at stop	Range:0.0~100.0%Inverter rated current【0.0%】
F1.12 DC brake time at stop	Range: 0.0~30.0s【0.0s】

DC injection braking trigger frequency at stop is the frequency at which DC injection braking action begins during Dec-to-stop process.

DC brake waiting time at stop: The holding time before doing the DC injection braking. During this holding time the inverter stops the output. It is used to prevent the over-current or over-voltage faults caused by DC braking when the speed is relatively high.

DC brake current at stop: It refers to the DC braking injection amount. The higher this value, the stronger the DC brake effect.

DC brake time at stop: It refers to the time span when DC braking is acting.

📖Note:

When DC brake current or DC brake time at stop is zero, it indicates there is no DC brake process.

F1.13 Energy consumption brake validity	Range: 0~1【0】

0: Disabled

1: Enabled

For large rotary inertia applications where rapid stop is required, the inverter can be equipped with matched braking unit and braking resistors and proper braking parameters setting to realize fast braking and stop.

F1.14 Energy consumption braking action voltage	Range: 380V: 650~750V【700V】 220V: 360~390V【380V】

This parameter is to set the action DC bus voltage for energy consumption braking. The proper setting can get effective braking of the load.

F1.15 Power failure and fault restart	Range: 0~1【0】

0: Disable

Inverter will not automatically restart after power recovery until run command is given.

1: Enabled for power failure

In case of power failure and power-on again, if STOP command is not given during restart waiting time (F1.16), inverter will automatically;

2: Enabled for fault

After inverter get faults during running, if the stop command is not given during fault stage or restart waiting time (F1.16), the inverter will restart automatically after fault reset.

3: Enabled for both power failure and fault

The automatic restart function is enabled for both power failure recovery and faults reset situations as explained above.

📖Note:

The user shall be very caution in using this function. The inappropriate setting might causes damage of machinery or injury of human.

F1.16 Waiting time for restart	Range: 0.0~3600s【0.0s】

This parameter defines the waiting time before restart and over-voltage reset delay time.

6.3 Auxiliary running function group (F2)

F2.00 Jog running frequency	Range: 0.00~50.00【5.00Hz】
F2.01 Jog Acceleration time	Range: 0.0~3600s【6.0/20.0s】
F2.02 Jog Deceleration time	Range: 0.0~3600s【6.0/20.0s】

These parameters define the frequency and Acc/Dec time of the JOG operation. In JOG operation, the inverter starts according to starting mode 0 (F1.00=0 direct start) and stops according to stopping mode 0 (F1.08=0 Deceleration to stop). The Jog acceleration time refers to the time the inverter takes to accelerate form 0Hz to Max. output frequency F0.11; the jog deceleration time refers to the time the inverter takes to decelerate from Max. output frequency F0.11 to 0Hz.

📖Note:

When the jog Acc./Dec. time is set to 0, the inverter jog deceleration mode is “coast to stop”.

F2.03 Acceleration time2	Range: 0.1~3600s【20.0s】
F2.04 Deceleration time2	Range: 0.1~3600s【20.0s】
F2.05 Acceleration time3	Range: 0.1~3600s【20.0s】
F2.06 Deceleration time3	Range: 0.1~3600s【20.0s】
F2.07 Acceleration time4	Range: 0.1~3600s【20.0s】
F2.08 Deceleration time4	Range: 0.1~3600s【20.0s】

These parameters are to define Acc/Dec time 2, 3 and 4 respectively (Acc/Dec time 1 is defined in F0.19 and F0.20). Acc/Dec time 1, 2, 3 and 4 can be selected via external multifunction input terminals. If all terminals related with Acc/Dec time are invalid, the inverter will take Acc/Dec time 1 as Acc/Dec time. However, when the inverter chooses PLC or JOG operation, Acc/Dec time will not be controlled by external terminals, but be set by parameter of PLC or JOG.

F2.09 Skip frequency 1	Range: 0.00~320.0Hz【0.00Hz】
F2.10 Skip frequency 2	Range: 0.00~320.0Hz【0.00Hz】
F2.11 Skip frequency amplitude	Range: 0.00~15.00Hz【0.00Hz】

To avoid mechanical resonant, the inverter can skips some running points, which is called Jump frequency. As shown in Fig.6-5.

This series inverters can set two jump frequency points, and the jump frequency amplitude can overlap or nesting. If overlapped, the range broadens. When all two jump frequency set to 0.00 Hz, the jump function will be disabled.

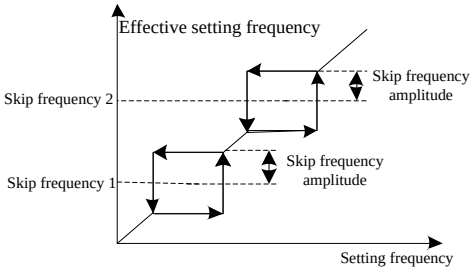


Fig.6-5 Jump Frequency

F2.12 Anti-reverse control	Range: 0~1【0】

For some production equipment, reverse operation may cause equipment damage. This function can be used to prevent reverse operation.

0: Reverse rotation allowed

1: Reverse rotation not allowed

F2.13 Fwd/ Rev switch dead-zone time	Range: 0.0~3600s【0.0s】

It refers to the transition waiting time at zero frequency in process of rotation direction switching, i.e. from forward to reverse or from reverse to forward, as shown Fig.6-6.

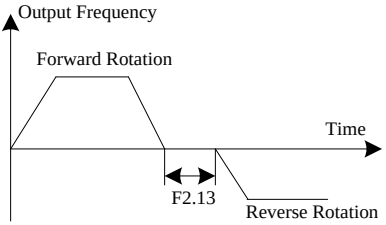


Fig.6-6 FWD/REV switching

F2.14 frequency lower limit treatment	Range: 0~1【0】

This parameter is used to select the running status of the inverter when the setup frequency is lower than the frequency lower limit.

0: Run with frequency lower limit

1: Zero frequency operation

F2.15 Reserved	Range:

F2.16 Energy saving control	Range: 0~1【0】

0: Disabled

1: Enabled

The inverter automatically decreases the output voltage when the detected loads current is small, and thus maximally decreases reactive power to offer further energy savings.

📖Note:

This function is valid only when the Control Mode is V/F control (F0.01 = 3).

F2.17 AVR function	Range: 0~2【2】

0: Disabled

1: Enabled

2: Disabled only at speed-down

AVR means automatic output voltage regulation. When the input voltage deviates from rated value, AVR function can maintain constant voltage output. Normally AVR function is recommended to be active. At process of “deceleration to stop”

F2.18 Over modulation	Range: 0~1【1】

0: Enabled

1: Disabled

When the over modulation function is enabled, the inverter voltage output capacity can be improved. However, if the output voltage is too high, the output current harmonics will increase.

F2.19 Droop control	Range: 0.00～10.00Hz【0.00Hz】

When multiple inverters drive the same load, the unbalanced load distribution due to difference speed causes the inverter with faster speed to carry heavier load. The droop control characteristics makes the speed droop change along with the addition of load, which can lead to balanced load distribution.

This parameter is used to adjust the frequency change value of the inverter with droop speed.

F2.20 Fan control mode	Range: 0～1【0】

0: Auto mode

The fan always runs when the inverter is running. After the inverter stops three minutes, the internal temperature detection program will be activated to stop the fan or keep the fan running according to the IGBT's temperature.

1: Always Running

The fan always runs when the inverter is power on.

F2.21 Instant power failure treatment	Range：0～2【0】

0: Disabled

1: Drop frequency

When the inverter has instant power off or input voltage fall abruptly, the inverter maintains short time running by decreasing the output frequency to get feedback energy from the rotating load motor.

2: Stop directly

When the bus voltage is lower than the instant power failure frequency drop point, the inverter stops according to stop mode (F1.08).

F2.22 Instant power failure f frequency drop point	Range: 380V: 410～600V【420V】 220V: 210～260V【230V】
F2.23 Instant power failure frequency drop rate	Range: 0.00～max frequency/s【10.00Hz/s】

These parameters define the value of the power failure frequency drop point and power failure frequency drop rate.

F2.24 Motor speed display ratio	Range：0.0～500.0%【100.0%】

The motor speed display on the keypad is the actual motor speed×F2.24.

F2.25 UP/DOWN drop to minus frequency	Range：0～1【1】

0: Enabled

1: Disable

F2.26 ENTER key action	Range：0～3【0】

0: No special action

1: Fwd/Rev switching: When the keypad control the start and stop, press ENTER key under monitoring status will switch the rotation direction.

2: Under monitoring status, Run for forward; Enter for Reverse; STOP for stop.

3: Jog running

📖Note:

When MFK key defines RUN as forward, MFK as reverse, and STOP as stop (FE.01=7), the ENTER key shall not switch the rotation direction.

F2.27 Freq. resolution	Range：0～1【0】

0: 0.01Hz. The inverter Max running frequency can be up to 320.00Hz

1: 0.1Hz. The inverter Max running frequency can be up to 3200Hz.

F2.28 Acc./Dec time unit	Range：0～1【0】

0: 0.1s. The inverter longest Acc./Dec time is 3600 seconds

1: 0.01s. The inverter longest Acc./Dec time is 360 seconds

F2.29 High freq. modulation mode	Range：0～1【0】

0: Asynchronous modulation

1: Synchronous modulation

When the frequency resolution is 0.01Hz, the regulation is fixed to be asynchronous modulation. When the frequency resolution is 0.1Hz, the regulation is asynchronous if this parameter F2.29=0; if this parameter F2.29=1, the carrier frequency will be modulated according to present running frequency.

6.4 Vector Control Parameters (F3)

F3.00 Speed loop proportional gain 1	Range: 1~3000【1000】
F3.01 Speed loop integral time 1	Range: 1~3000【300】
F3.02 Switching frequency 1	Range: 0.0～60.00Hz【5.00Hz】
F3.03 Speed loop proportional gain 2	Range: 1~3000【800】
F3.04 Speed loop integral time 2	Range: 1~3000【200】
F3.05 Switching frequency 2	Range: 0.0～60.00Hz【10.00Hz】

F3.00 and F3.01 are PI adjustment parameters when the running frequency is lower than switching frequency 1 (F3.02). F3.03 and F3.04 are PI adjustment parameters when the running frequency is higher than switching frequency 2. PI parameter of frequency range between the switching frequency 1 and switching frequency 2 is the linear conversion from two groups of PI parameters, as shown in the fig.6-7:

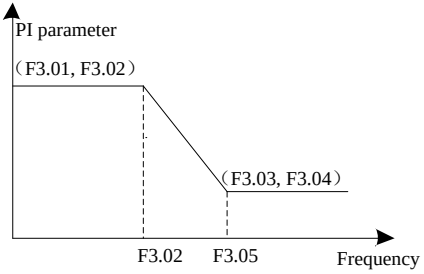


Fig.6-7 Schematic diagram of speed loop PI parameter

The speed dynamic response characteristics of the vector control can be adjusted by setting the proportional coefficient and integration time of the speed regulator. Increasing the proportional gain or reducing the integration time can accelerate the dynamic response of the speed loop. However, if the proportional gain is too large or the integration time is too short, it will cause the oscillation of the system.

F3.06 Speed loop filtering time	Range: 0.0～500.0ms【3ms】

This parameter determines the value of speed loop filtering time and needs no adjustment generally.

F3.07 Current loop proportional coefficient	Range: 0～6000【3000】
F3.08 Current loop integral coefficient	Range: 0～6000【1500】

These function codes define the current loop PID parameters; they influence directly the control precision and speed dynamic response and needs no adjustment generally.

F3.09 VC Slip compensation	Range: 0.0～200.0%【100.0%】

When the load increase, the motor slip increases, and motor speed drops down.

Using this slip compensation parameter, the motor speed can be maintained constant. The adjustment is instructed as follows:

When the motor speed is lower than the target value, increase the vector control slip compensation value.

When the motor speed is higher than the target value, decrease the vector control slip compensation value.

F3.10 Torque control	Range: 0～5【0】

0: Torque control disabled

When the torque control is disabled, the inverter performs speed control. The inverter outputs frequency according to the setup frequency command; and the output torque automatically matches the load torque.

1: AI1 as torque reference.

2: AI2 as torque reference.

3: Pulse input as torque reference.

4: Communication as torque reference.

5: Keypad digital setting as torque reference.

1~5: Torque control is active

When the inverter is in torque control, the inverter output the torque according to the torque command which is defined in this parameter. And the output frequency will automatically matches to the load speed. But the output frequency is limited F3.12.

📖Note:

- Analog and pulse input physical quantity is corresponding to torque setup
- Torque control is valid only when the Control Mode is sensor-less vector control-2 or vector control with encoder speed feedback.

F3.11 Torque digital setting	Range: 0.0～200.0%【50.0%】

This parameter is used to define the value of torque digital setting.

F3.12 Torque control speed limit	Range: 0～5【0】

This parameter is used to define the value of speed limit when the inverter is running in torque control mode.

0: digital setting (F3.13)

1: AI1

2: AI2

3: PULSE input

4: Serial communication

5: Keypad potentiometer

F3.13 upper speed limit setting	Range: 0.00～320.0Hz【50.00Hz】

Setting the value of torque control upper limit digital setting (F3.12 =0).

F3.14 Encoder pulse number	Range: 1～9999【1000】

It is used to set the number of pulses of each rotation of encoder.

📖Note:

When the inverter adopts vector control with sensor feedback, the pulse number of the encoder shall be set correctly; otherwise the motor will run abnormally. If the motor cannot operate normally even though the encoder pulses number has been set correctly, exchange the wiring of Phase A and Phase B of the encoder or change the parameter value of F3.16.

F3.15 Deceleration ratio between motor and encoder	Range: 0.010～50.00【1.000】

If the encoder is directly mounted on the motor shaft, set this parameter to 1. If the encoder is not directly mounted on the motor shaft, there exists deceleration ratio between motor shaft and encoder.

F3.16 PG direction selection	Range: 0～1【0】

0: Positive

1: Negative

The factory default value is 0. If the wiring sequence of encoder to inverter does not match the wiring sequence of inverter to motor, this parameter may be set to “1” to adjust the direction to avoid correcting wiring again.

F3.17 Reserved	Range:
F3.18 Reserved	Range:
F3.19 Reserved	Range:
F3.20 Reserved	Range:

F3.21 Field-weakening function	Range: 0～1【0】

0: Disabled

1: Enabled

F3.22 Torque limit compensation coefficient	Range: 60.0～300.0%【200%】

This parameter is used to compensate the torque limit in constant power zone. Appropriate setting can improve the inverter Acc/Dec time and output torque.

F3.23 Reserved	Reserved

F3.24 Torque reference terminal single modulation	Range: 0.00~10.00%【0.00%】
F3.25 Torque reference terminal total modulation	Range: 0.0~100% 【50.0%】

When the torque reference is digital mount, this parameter sets the single time modulation amount and total modulation amount.

6.5 V/F Control Parameters (F4)

F4.00 V/F curve setting	Range: 0～4【0】

0: Straight line V/F. It is suitable for common constant torque load.

1~3: Multi-order decreasing torque. It is suitable for the centrifugal loads such as fan and pump, as shown Fig.6-8.

4: Multiple-points V/F. It can be defined by setting F4.01~F4.06 parameters.

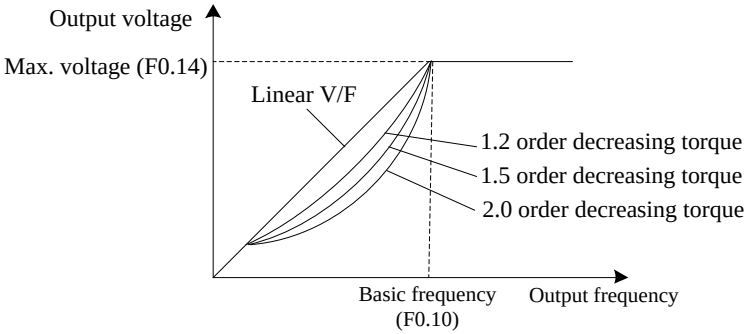


Fig.6-8 Torque-reducing curve

F4.01 V/F frequency point 1	Range: 0.0~F4.03【10.00Hz】
F4.02 V/F voltage point 1	Range: 0~100.0%【20.0%】
F4.03 V/F frequency point 2	Range: F4.01~F4.05【25.00Hz】
F4.04 V/F voltage point 2	Range: 0~100.0%【50.0%】
F4.05 V/F frequency point 3	Range: F4.03~F0.10【40.00Hz】
F4.06 V/F voltage point 3	Range: 0~100.0%【80.0%】

Six parameters of F4.01 to F4.06 define multi segments V/F curve, shown as Fig.6-9. The V/F curve is generally set in accordance with the load characteristics of the motor.

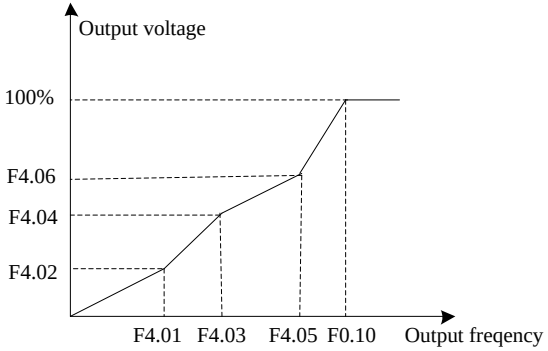


Fig.6-9 V/F-curve defined by user

F4.07 Torque boost	Range: 0.0~30.0%【0.0%】
F4.08 Manual torque boost cutoff point	Range: 0.00~60.00Hz【50.00Hz】

To compensate the low frequency torque characteristics of V/F control, it can boost the output voltage when the inverter is running at low frequency.

When the torque boost is set to 0.0, the inverter will adopt auto torque boost.

Torque boost cutoff point frequency: Under this frequency, the torque boost is valid. If it exceeds this frequency point, the torque boost is inactive. Refer to Fig.6-10 for details.

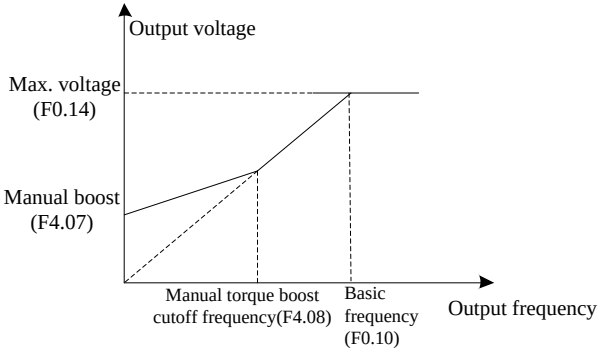


Fig.6-10 Schematic Diagram for torque boost

📖Note:

- If the torque boost is set to be too large, the motor may be over heat, and the inverter might get over-current fault.
- When the inverter drives synchronous motor, manual torque boost function is recommended to be used and V/F curve should be adjusted according to the motor parameters

F4.09 Slip compensation coefficient	Range: 0.0~200.0%【0.0%】
F4.10 Slip compensation filtering time	Range: 0.01～2.55s【0.20s】

Setting the parameters can compensate the motor rotation slip due to change of load torque in the V/F control. With this compensation, the inverter regulates the output frequency according to the change of load torque and thus increases the motor mechanical performance.

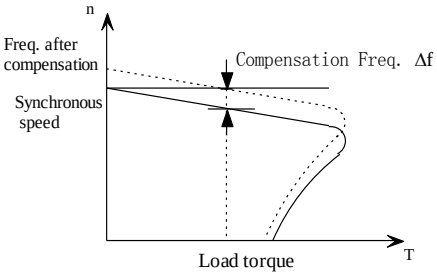


Fig.6-11 Auto slip compensation

In rated torque state, the value of slip compensation is: Slip compensation gain (F4.09) ×Rated slip (Synchronous speed- Rated speed)

Motoring state: Increase the gain of slip compensation (F4.09) gradually when the actual speed is lower than the reference speed.

Generating state: Increase the gain of slip compensation (F4.09)) gradually when the actual speed is higher than the reference speed.

📖Note:

- The value of automatic slip compensation is related to the motor’s rated

slip; therefore, the motor rated speed (F5.04) must be set correctly.

- Slip compensation is disabled when Slip compensation coefficient is set to “0”.

F4.11 V/F separation control voltage source	Range: 0~4【0】

0: Disabled

V/F separation control is disabled. The inverter adopts common V/F control.

1~4: The output voltage and frequency are controlled separately.

The inverter outputs frequency according to the frequency setup and runs according to Acc./Dec time. But the voltage is regulated independently by the voltage reference source defined in this parameter and Acc./Dec according to F4.13(V/F separation voltage rising time).

📖Note:

- Analog and pulse input maximum physical quantity is corresponding to maximum output voltage (F0.14).

F4.12 V/F separation voltage digital setting	Range: 0～maximum output voltage【0V】

This parameter is used to set the value of the output voltage when voltage source is digital setting in V/F separation control.

F4.13 V/F separation voltage rising time	Range: 0.0s～1000.0s【0.0s】

This parameter is used to set the value of the output Voltage acceleration time when the voltage is controlled independently. The acceleration time is the time that the voltage accelerates from 0 to maximum voltage.

F4.14 V/F oscillation suppression	Range: 0.0s～1000.0s【0.0s】

When this parameter is set to be 0, the V/F oscillation suppression is invalid. The larger this value, the stronger the suppression effect. Normally setting value of 100~300 will take suppression effect.

6.6 Motor parameters group (F5)

F5.00 Motor type	Range: 0～2【0】
F5.01 Motor polarity	Range: 2～56【4】
F5.02 Rated power	Range: 0.4～999.9kW【Depends on model】
F5.03 Rated current	Range: 0.1～999.9A【Depends on model】
F5.04 Rated rotation speed	Range: 0～24000rmp【Depends on model】

F5.00～F5.04 are used to set the controlled motor parameters. In order to ensure the control performance, please set F5.00～F5.04 correctly by referring to values on motor nameplate.

Note:

On V/F control, the motor power shall be matched to the inverter power. Normally the motor power is only allowed to be 2 steps lower than that of the inverter or 1 step higher. While in SVC or VC control, the motor power must exactly match that of the inverter, otherwise, the control performance could not be ensured.

F5.05 No-load current I0	Range: 0.1～999.9A【Depends on model】
F5.06 Stator resistance R1	Range: 0.00%～50.00%【Depends on model】
F5.07 Leakage Inductive reactance X	Range: 0.00%～50.00%【Depends on model】
F5.08 Rotor resistance R2	Range: 0.00%～50.00%【Depends on model】
F5.09 Mutual Inductive reactance Xm	Range: 0.0%～200.0%【Depends on model】

The above parameters are instructed in the fig.6-12 as below:

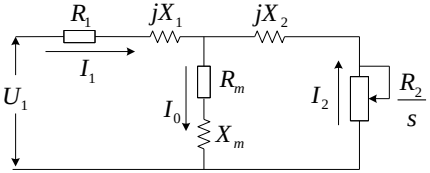


Fig. 6-12 Asynchronous motor equivalent circuit

In the Fig.6-12, R1, Xl, R2, X2, Xm, and I0 represent resistance of stator, leakage inductance of stator, resistance of rotor, leakage inductance of rotor, mutual inductance and no-load current respectively. The setting of F5.07 is the sum of leakage inductance of stator and leakage inductance of rotor.

After motor rated power (F5.02) is changed, the inverter will automatically change F5.03～F5.09 to adapt to the rated motor power.

F5.10 Auto tune selection	Range: 0~2【0】

0: No operation

1: Static tuning, it is suitable to the situation as the motor is not easy to disconnected from the load.

Action description: Set the function code to 1 and press RUN key for confirmation, and then the inverter will conduct static tuning.

2: Rotary tuning

To ensure the dynamic control performance of the inverter, please select rotary

tuning. During the rotary tuning, the motor must be disconnected with the loads (i.e. no-load).

Action description:

Set the function code to 2 and press RUN key for confirmation, the inverter will conduct static rotary first, and then accelerate to 80% of motor rated frequency according to the acceleration time set in F0.19, holding this frequency for a while, and finally decelerate to zero speed according to deceleration time set in F0.20.

6.7 Input terminals group (F6)

F6.00 Terminal Command mode	Range: 0～3【0】

This parameter defines four different control modes that control the inverter operation through external terminals.

0: Two-wire mode 1

This mode is the most commonly used two-line mode. The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals, as shown in Fig.6-13.

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

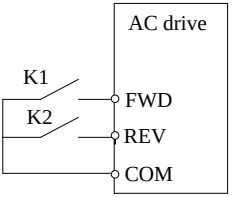


Fig.6-13 Two-wire mode 1

1: Two-wire mode 2

In this mode, both function RUN (Run command) and F/R (Running direction) are used: If RUN is enabled, the inverter will startup. If F/R is selected but disabled, the inverter will run forward. If F/R is selected and enabled, the inverter will run reverse. When F/R is not selected, the running direction is defined by function code (F0.17) Terminals wiring is show in Fig.6-14.

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

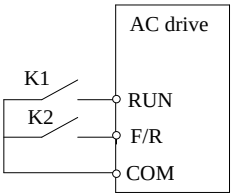


Fig.6-14 Two-wire mode 2

2: Three-wire mode 1

In this mode, FWD and REV terminal control the forward and reverse direction of the motor; but the pulse signal is effective. HLD is holding terminal, i.e. when HLD is ON, the pulse signal of FWD and REV is hold; when HLD is OFF, the holding of FWD and REV is removed. The inverter is stopped by disconnecting the HLD terminal. As shown in Fig.6-15

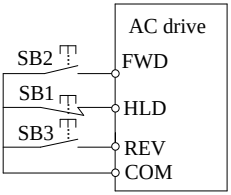


Fig.6-15 Three-wire mode 1

3: Three-wire mode 2

In this mode, RUN terminal control run command; while F/R decides the motor rotation direction. When HLD is ON, the RUN pulse signal is hold; when the HLD is off, the holding of RUN is removed. Stop command is conducted by disconnecting the HLD terminal. As shown in Fig.6-16. When F/R is not selected, the running direction is defined by function code (F0.17).

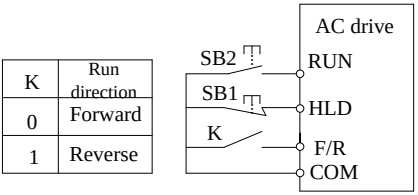


Fig.6-16 Three-wire mode 2

F6.01 X1 terminal function selection	Range: 0～58【1】
F6.02 X2 terminal function selection	Range: 0～58【2】
F6.03 X3 terminal function selection	Range: 0～58【8】
F6.04 X4 terminal function selection	Range: 0～60【17】
F6.05 X5 terminal function selection	Range: 0～60【18】

F6.06 X6 terminal function selection	Range: 0～56【0】
F6.07 X7 terminal function selection	Range: 0～56【0】
F6.08 X8 terminal function selection	Range: 0～56【0】
F6.09 Reserved	Range: 0～56【0】

These parameters are used to set the functions of the multifunctional digital input terminals. Refer to table 6-3 for details.

📖Note: X6～X9 are on the IO expansion card.

Table 6-3 Function list for digital input terminals

Value	Function	Description
0	NULL	This is to define invalidity of the terminal. The inverter shall have no action even there is pulse input. The undefined terminals can be set into NULL to avoid mistaken action.
1	Forward (FWD)	Control the forward rotation and reverse rotation of the inverter via the external terminals
2	Reverse (REV)	
3	RUN	Control the inverter running via the external terminal.
4	F/R running direction	Control the direction of the inverter. inactive state: Forward; Active state: Reverse rotation.
5	HLD self-hold selection	Running signal self-hold terminal, refer to F6.00 terminal command modes setup.
6	Forward rotation Jog (FJOG)	Terminals JOG running. FJOG is prior. For details regarding frequency and Jog acceleration/deceleration time during the Jog running, refer to F2.00, F2.01 and F2.02 function codes.
7	Reverse rotation Jog (RJOG)	
8	RESET (RST)	The terminal defined as RST can be used to do fault reset under fault status; In running status, activating this terminal will stop the inverter according to preset stop mode.
9	Frequency source switching	When the frequency reference selection (F0.05) is set to 3, this terminal is used to switch Freq. reference1 and Freq. reference2. When the frequency source selection (F0.05) is set to 4, it

Value	Function	Description
		performs switching between frequency ref. 1 and (freq. ref.1 + freq. ref.2)
10	Terminal UP	When the frequency is given by the external terminals, it is used to modify increment and decrement commands of frequency. When the frequency source is set to digital setup, it can be used to adjust up & down the setup frequency.
11	Terminal DOWN	
12	UP/DOWN setup clear	When the frequency reference is digital frequency reference, this terminal can be used to clear the frequency value modified by UP/DOWN and thus restore the reference frequency to the setup value of F0.06.
13	Coast to stop	The inverter locks the output, and the motor stop process is beyond the inverter control. It is the general method adopted when the load has high inertia and no requirement for the stop time.
14	DC injection braking	Once his terminal is enabled, the inverter directly switches to the DC brake status. Intensity of DC brake follows DC braking current preset in F1.11.
15	Acceleration/deceleration prohibit	Protect the inverter from affecting by the external signals (except stop command), and maintain the current frequency.
16	Inverter running prohibit	Once this terminal is enabled, if the inverter is on running status, the inverter will coast to stop immediately, if the inverter is on stop status, the inverter cannot start. This is mainly used in applications where needs safety linkage.
17	Multi-step terminal 1	It can realize 16 steps of speed through the combination of digital status of these four terminals. Refer to attached table 6-4 for multi-speed setting details. K1~K4 correspond to terminals 17~20.
18	Multi-step terminal 2	
19	Multi-step terminal 3	
20	Multi-step terminal 4	
21	Torque control disabled	The torque control of inverter is inactive.
22	Acc/Dec time selector 1	It can select four types of speed-up/speed-down time through the combination of digital status of these two terminals. Refer to table 6-5 for details.
23	Acc/Dec time selector 2	

Value	Function	Description
24	External pause normally open input	The inverter decelerates to stop, but al l the running parameters are saved in memory, such as PLC parameter, wobble frequency parameter and PID parameters. After this pause signal disappears, the inverter restores to the status before stop.
25	External pause normally closed input	
26	External fault normally open	After the external fault signal is sent to the inverter, the inverter reports fault and stops.
27	External fault normally closed	
28	Run command switching to terminal	When Run command (F0.02) is 0 or 2, this terminal forces the run command switching to terminal control.
29	Run command switching to Keyboard	When Run command (F0.02) is 1 or 2, this terminal forces the run command switching to keypad control.
30	External stop terminal; same to STOP key in keypad control mode.	This is to define an external stop terminal. In keypad control mode, this terminal can stop the inverter. It is same as STOP key on keypad.
31	Reserved	Reserved
32	PLC status reset	Inverter reset to the first step of PLC running.
33	Wobble freq. pause	The inverter pause at the present frequency. Once this terminal is disabled, the inverter resumes the wobble frequency running.
34	Wobble freq. status reset	The inverter returns to wobble center frequency.
35	PID pause	PID is inactive temporarily, and the inverter maintains the current frequency output.
36	PID parameters switching	If the terminal is valid, PID control switches to second group PID parameters.
37	PID direction reversion	If this terminal is enabled, PID action direction is opposite to the direction set in F8.04.
38	Timing drive input	If the terminal is valid, inverter starts the timing, otherwise zero-clear.
39	Counter signal input	The input terminal of counting pulse.
40	Counter clear	Clear the counter status.
41	Actual length clear	When the function terminal is enabled, actual

Value	Function	Description
		length in fixed length control will be cleared to zero.
42	FWD running (FWD NC)	Control the inverter forward or reversed by external terminals.
43	REV running (REV NC)	
44	HLD (Normally Open)	Running signal self-hold terminal, refer to F6.00 terminal command modes setup.
45	Torque increase	When the torque reference is given by discrete signal, this function realizes the torque increasing, decreasing, and increment clearing. Refer to F3.24 and F3.25 for torque increment and adjustment range.
46	Torque increase clear	
47	Torque decrease	
48	One key recover user parameters (Valid in stop state)	If the user has done the parameter backup operation before, inverter can be reset to those parameters setting by this terminal under stop state.
49~56	Reserved	Reserved
57	Pulse input	High speed pulse input. This function is only valid for X4 & X5. And X4 has priority when there are 2 routes input.
58	Single phase measuring speed input	Single phase measuring speed input. Only valid for X4 and X5. Take X4 as priority when there are 2 routes input.
59	Speed measuring input A	Measuring speed input A. It is only valid for X4
60	Speed measuring input B	Measuring speed input B. It is only valid for X5

Table 6-4 Multi-steps running selection guide

K4	K3	K2	K1	Frequency Setup	Parameter
OFF	OFF	OFF	OFF	F0.06	F0.06
OFF	OFF	OFF	ON	Multi-step freq.1	F9.00
OFF	OFF	ON	OFF	Multi-step freq.2	F9.01
OFF	OFF	ON	ON	Multi-step freq.3	F9.02
OFF	ON	OFF	OFF	Multi-step freq.4	F9.03
OFF	ON	OFF	ON	Multi-step freq.5	F9.04

OFF	ON	ON	OFF	Multi-step freq.6	F9.05
OFF	ON	ON	ON	Multi-step freq.7	F9.06
ON	OFF	OFF	OFF	Multi-step freq.8	F9.27
ON	OFF	OFF	ON	Multi-step freq.9	F9.28
ON	OFF	ON	OFF	Multi-step freq.10	F9.29
ON	OFF	ON	ON	Multi-step freq.11	F9.30
ON	ON	OFF	OFF	Multi-step freq.12	F9.31
ON	ON	OFF	ON	Multi-step freq.13	F9.32
ON	ON	ON	OFF	Multi-step freq.14	F9.33
ON	ON	ON	ON	Multi-step freq.15	F9.34

Table 6-5 Acc/Dec time selection table

Terminal 2	Terminal 1	Acc/Dec time selection
OFF	OFF	Acc time 1/ Dec time 1
OFF	ON	Acc time 2/ Dec time 2
ON	OFF	Acc time 3/ Dec time3
ON	ON	Acc time 4/ Dec time4

F6.10 Analog Nonlinear Selection	Range: 0~3【0】

0: None

F6.11～F6.15 are used to define AI1 inputs, F6.16～F6.20 are used to define AI2 inputs, and F6.21～F6.25are used to defined pulse inputs. They are independent and do not interfere to each other.

1: AI1

All the parameters from F6.11 to F6.25 are nonlinear setting points for the AI1 channel, as shown in Fig.6-17. The AI1 filter time F6.15 is taken. And AI2 setting points F6.16~6.20 are taken as 0.00~10.00V input and its

corresponding 0.00~100.00%.setup value. And pulse input setting points are taken as 0.00~50.00 kHz and its corresponding 0.00~100.00% setup value.

2: AI2

All the parameters from F6.11 to F6.25 are nonlinear setting points for the AI2 channel, as shown in Fig.6-17. The AI2 filter time F6.20 is taken. And AI1 setting points F6.16~6.20 are taken as 0.00~10.00V input and its corresponding 0.00~100.00%.setup value. And pulse input setting points are taken as 0.00~50.00 kHz and its corresponding 0.00~100.00% setup value.

3: Pulse input

All the parameters from F6.11 to F6.25 are nonlinear setting points for the PULSE input channel, as shown in Fig.6-17. The pulse filter time F6.25 is taken. And AI1 setting points F6.16~6.20 are taken as 0.00~10.00V input and its corresponding 0.00~100.00%.setup value. AI2 setting points F6.16~6.20 are taken as 0.00~10.00V input and its corresponding 0.00~100.00%.setup value.

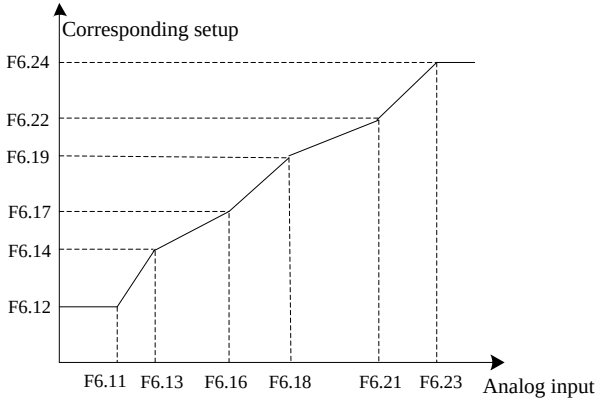


Fig.6-17 Analog input non-linear curve

F6.11 AI1 minimum input	Setting range: 0.0~F6.13【0.00V】

F6.12 AI1 minimum Input corresponding setup	Setting range: -200%~ 200.0%【0.0%】
F6.13 AI1 maximum input	Setting range:F6.11～10.00V【10.00V】
F6.14 AI1 maximum Input corresponding setup	Setting range: -200%~ 200.0%【100.0%】
F6.15 AI1 input filter time	Setting range: 0.01～50.00s【0.05s】
F6.16 AI2 minimum input	Setting range: 0.00～F6.18【0.00V】
F6.17 AI2 minimum Input corresponding setup	Setting range: -200%~ 200.0%【0.0%】
F6.18 AI2 maximum input	Setting range: F6.16～10.00V【10.00V】
F6.19 AI2 maximum Input corresponding setup	Setting range: -200%~ 200.0%【100.0%】
F6.20 AI2 input filter time	Setting range: 0.01～50.00s【0.05s】
F6.21 Pulse Min. input frequency	Setting range: 0.00～F6.23 【0.00kHz】
F6.22 Pulse Min. input frequency Corresponding setup	Setting range: -200%~ 200.0%【0.0%】
F6.23 PULSE Max. input frequency	Setting range:F6.21~50.00kHz【50.00kHz】
F6.24 PULSE input Maximum Frequency Corresponding setup	Setting range: -200%~ 200.0%【100.0%】
F6.25 Pulse filter time	Setting range: 0.01～50.00s【0.05s】

The above function codes define the relationship between the analog input (AI1, AI2, Pulse input) voltage and their corresponding value. When the analog input voltage exceeds the setup maximum input or minimum input range, the excess part will be calculated as maximum input or minimum input, as shown in Fig.6-18.

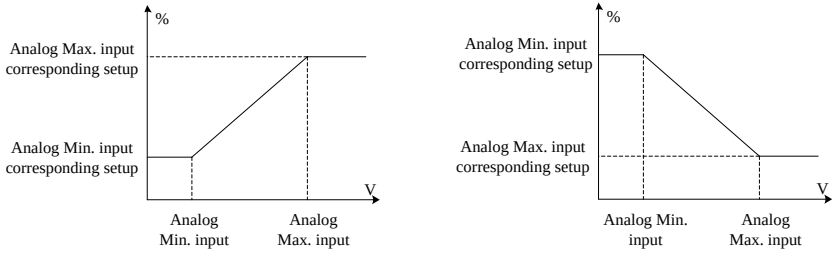


Fig.6-18 Analog input linear curve

F6.26 Terminal up/down initial increment	Range: 0.00~10.00kHz【0.01Hz】

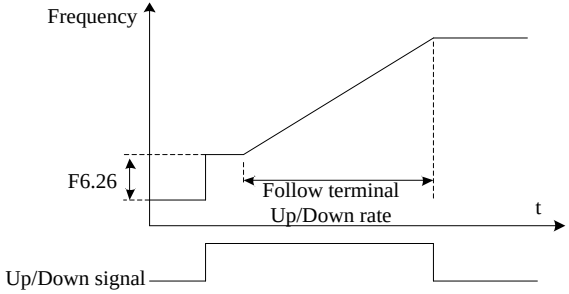


Fig.6-19 Terminal up/down initial increment

F6.27 Frequency reference 2 datum	Range: 0~1【0】

When the frequency reference 2 is analog or pulse setting, its base frequency is defined by this parameter.

0: Maximum frequency

1: Frequency reference-1

6.8 Output terminals group (F7)

F7.00 DO terminal output definition	Range: 0～27【0】
F7.01 Y1 terminal output selection	Range: 0～27【1】
F7.02 Y1 terminal output selection	Range: 0～27【0】
F7.03 Relay 1 (TA/TB/TC) output selection	Range: 0～27【16】
F7.04 Relay 2 (BRA/BRB/BRC) output selection	Range: 0～27【0】

Multifunctional output terminal function selection details are shown in Table 6-6.

📖Note:

DO terminal can be used as multifunction output terminal only if F7.21=0.

Table6-6: Multifunction output terminals selection

Value	Function	Description
0	NULL	The output terminal does not have any function.
1	Running	It indicates the inverter is running, and there is output frequency (can be zero), terminal outputs ON signal
2	Frequency arrival (FAR)	Please refer to F7.05 for details.
3	Freq. level detection 1 (FDT1)	Please refer to F7.06 and F7.07 for details.
4	Freq. level detection 2 (FDT2)	Please refer to F7.08 and F7.09 for details.
5	Frequency detection when speed-up	When the output frequency increases to the Up detection frequency (F7.10), terminal outputs ON signal.
6	Frequency detection when speed-down	When the output frequency decreases to Down detection frequency (F7.11), terminal outputs ON signal.
7	Zero-speed running	When the inverter output frequency is zero and is still in running, the terminal outputs ON signal.
8	Zero-speed	When output frequency is zero, terminal outputs ON signal.
9	PLC circulation	When the simple PLC running completes one cycle,

Value	Function	Description
	completion	the terminal outputs ON signal.
10	Indicate the running step (Co-setting in DO\Y1\Y2)	It indicates the present running step. Refer to table 5-7 for details.
11	Ready for running	When the main circuit and control circuit is power up and there is no fault protection action, the inverter is ready for running and then terminal output ON signal.
12	Timing arrival	When multi-function input terminal defined as No.38 is active, the inverter starts timing. And when the running time exceeds the F7.14 preset time, it output ON signal. The timing is cleared to zero if the input terminal is invalid.
13	counting arrival	When the counting value reach the value defined in F7.13, it output ON signal.
14	Reserved	Reserved
15	Preset torque value arriving	When motor's torque exceeds reference value (set by P7.12), terminal outputs ON signal.
16	Inverter fault output	When the inverter is faulty, it outputs ON signal.
17	Under voltage status output	When the inverter is in under voltage status, terminal outputs ON signal.
18	Inverter overload pre-warning	If the output current is higher than the value defined by FC.02 (Overload Pre-alarm detection level), terminal outputs ON signal.
19	Fixed-length arrived, output a high level signals	If the actual length exceeds the preset length, terminal outputs ON signal.
20	PID in dormancy	When PID is in dormancy, terminal outputs ON signal.
21	AI1>AI2	When AI1>AI2 value, terminal outputs ON signal.
22	AI1<F7.16	When AI1<F7.16, terminal outputs ON signal.
23	AI1>F7.16	When AI1>F7.16, terminal outputs ON signal.
24	F7.16<AI1<F7.17	When F7.16<AI1<F7.17, terminal outputs ON signal.
25	Frequency lower limit arrival	When the running frequency reaches frequency lower limit, terminal outputs ON signal.

Value	Function	Description
26	Multi-pumps system auxiliary pump control signal	Auxiliary pump control signal for constant pressure water supply, refer to the parameter F7.28&F7.29 instruction for details.

Table 6-7 PLC Running Steps

Y2	Y1	D0	Running Step
OFF	OFF	ON	T1
OFF	ON	OFF	T2
OFF	ON	ON	T3
ON	OFF	OFF	T4
ON	OFF	ON	T5
ON	ON	OFF	T6
ON	ON	ON	T7

F7.05 Freq. arrival detection width	Range: 0.00～10.00Hz【2.50Hz】

If the inverter's output frequency is within the detection width of frequency, a pulse signal will be output, as shown in Fig.6-20.

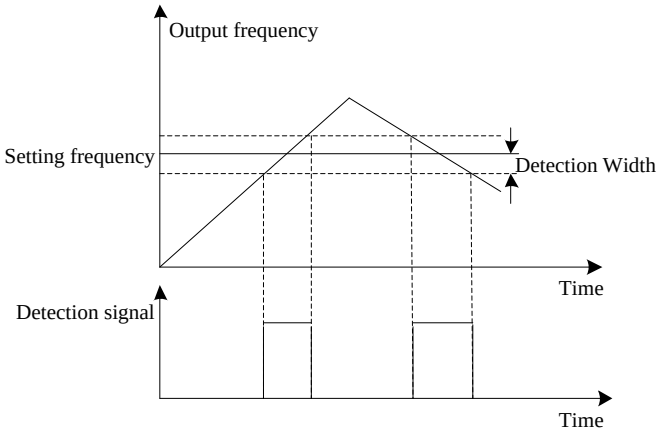


Fig.6-20 FAR detection diagram

F7.06 Frequency detection value 1 (FDT1 level)	Range: 0.00～300.0Hz【5.00Hz】
F7.07 Frequency detection hysteresis1(FDT1-lag)	Range: 0.00～10.0Hz【1.00Hz】
F7.08 Frequency detection value 2 (FDT2 level)	Range: 0.00～300.0Hz【25.00Hz】
F7.09 Frequency detection hysteresis1(FDT2-lag)	Range: 0.00～10.0Hz【1.00Hz】

The setting of 2 frequency arrival detection values and the action relief lag value are shown asFig.6-21 below.

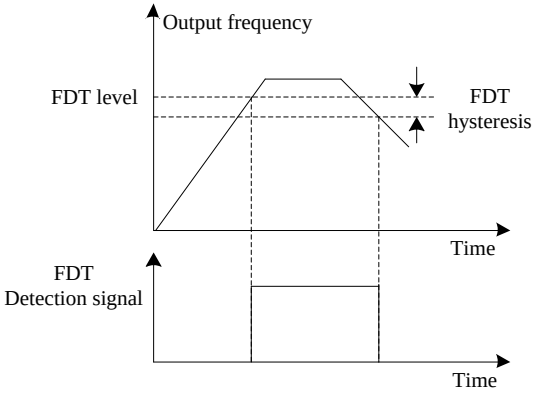


Fig.6-21 FDT level and lag diagram

F7.10 Up detection frequency	Range: 0.00～320.0Hz【50.00Hz】
F7.11 Down detection frequency	Range: 0.00～320.0Hz【0.00Hz】

These two parameters define the detection trigger frequency value for increasing stage and decreasing stage respectively.

F7.12 Torque detection reference	Range: 0.0~200.0%【100.0%】
F7.13 Preset Count value	Range: 0~9999【0】

F7.14 Preset Timing value	Range: 0.0~6553.0s【0.0s】
F7.15 Reserved	Reserved

The above parameters define the detection trigger value for torque arrival detection, counting arrival detection, and timing arrival detection.

F7.16 AI1 compare threshold 1	Range: 0.00～10.00【0.00V】
F7.17 AI1 compare threshold 2	Range: 0.00～10.00【0.00V】
F7.18 Analog compare hysteresis error	Range: 0.00～30.00【0.20V】

These parameters define the value of the analog comparison. Please refer to table 6-6 (value 22-24) for details.

F7.19 AO1 output selection	Range: 0～14【1】
F7.20 AO2 output selection	Range: 0～14【0】
F7.21 DO output selection	Range: 0～14【0】

AO1 can output either 0~10V or 0/4~20mA, which can be selected by the jumper on the control board. AO2 can only output 0~10V. DO output range is defined by the parameters F7.26 and F7.27. These output selection details are shown as table 6-8:

Table 6-8 Analog output terminals selection

Value	Function	Description
0	NULL	NULL
1	Running frequency	0~maximun frequency
2	setting frequency	0~maximun frequency
3	output current	0～2* inverter rated current
4	Output voltage	0～Maximum Voltage
5	PID setup	0～10V
6	PID feedback	0～10V
7	Calibration signals	5V
8	Output torque	0～2*motor rated torque

9	Output power	0～2*Inverter rated power
10	DC Bus voltage	0～1000V
11	AI1	0～10V
12	AI2	0～10V
13	Pulse input	0.1～50.0KHz
14	Communication setup	See Communication appendix

F7.22 AO1 output range selection	Range: 0～1【0】
F7.23 AO2 output range selection	Range: 0～1【0】

0: 0～10V / 0～20mA

1: 2～10V / 4～20mA

📖Note: AO2 output is only voltage.

F7.24 Gain of AO1	Range: 1～200%【100%】
F7.25 Gain of AO2	Range: 1～200%【100%】

The inverter output and user's instrument systems are likely to produce error; you can adjust the output gain (AO1or AO2) for the meter calibration and the change of measuring range.

F7.26 DO Maximum output pulse freq.	Range: DO Minimum output pulse freqrequency~50.00kHz【10.00kHz】
F7.27 DO Minimum output pulse freq.	Range: 0.00～ DO Maximum output pulse frequency【0.00kH】

The above parameters define output pulse frequency range.

F7.28 Auxiliary pump start lag time	Range: 0～9999【0s】
F7.29 Auxiliary pump stop lag time	Range: 0～9999【0s】

The above parameters define the delay time for auxiliary pump start and stop. Refer to Fig.6-21 for details.

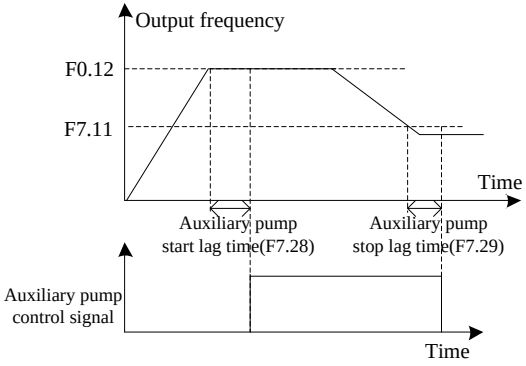


Fig.6-22 Constant pressure water supply auxiliary pump control signal

F7.30 DO Maximum output	Range: 0~1【0】

0: 50.00 kHz, Maximum output is 50kHz.

1: 500.0Hz, Maximum output is 500Hz

F7.31 FDT/RUN signal Jog selection	Range: 0~1【0】

0: Include jog signal

1: Do not include jog signal

F7.32 Running time arrival selection	Range: 0~65530 min【0】

When the inverter starts running, the counting starts. Once the counting reach the value preset in this parameter F7.32, the inverter stop and internal counter remains. But the run command rising edge conducts the clearance to the counting.

F7.33 Running time arrival stop selection	Range: 0~1【0】

0: Do not stop 1: Stop

When the internal counter value ⩾F7.32, the inverter can be set to stop or not by this parameter.

🕮Note: When F7.32=0, this function is invalid.

6.9 PID Parameters (F8)

F8.00 PID setup selection	Range: 0～4【0】

This parameter defined the given channel of PID target quantity。

0: PID digital setting, Determined by F8.02.

1: AI1 terminal

Taken as 0~10V analog voltage input.

2: AI2 terminal

Taken as 0 ~ 10V analog voltage or 0 ~ 20mA current input, which can be selected by DIP switch setting.

3: Pulse input

4: Serial communication

The input value should in 0~100.00% (0~10000). 100.00% corresponds to the full scale of PID.

🕮 Note:

The relationship between AI1, AI2 & pulse frequency and the actual physical quantities can be seen in F6.10 ~ F6.26. Its full range (100.0%) of actual physical quantities correspond to the PID full range

F8.01 PID feedback selection	Range: 0～7【1】

This parameter defined the PID feedback channel。

0: AI1 terminal

Taken as 0~10V analog voltage input.

1: AI2 terminal

Taken as 0 ~ 10V analog voltage or 0 ~ 20mA current input, which can be selected by DIP switch setting.

2: Pulse input

3: serial communication

The input value should in 0~100.00% (0~10000). 100.00% corresponds to the full scale of PID.

4: AI1-AI2

AI1-AI2 as PID feedback, if the result is negative the feedback value is negative

5: AI1+AI2

AI1+ AI2 as PID feedback, if the result is bigger than the actual physical quantities (100%) the PID feedback quantity is the 100% full range.

6: MAX (AI1, AI2)

Take the larger one between AI1 and AI2 as the PID feedback.

7: MIN (AI1, AI2)

Take the smaller one between AI1 and AI2 as the PID feedback.

F8.02 Analog PID digital setup	Range: 0.0～999.9【50.0】

When analog PID setting channel select the digital setting (F8.00 = 0), this parameter decide the setting value of the PID.

F8.03 Analog closed loop measuring range	Range: 1.0～999.9【100.0】

It is the setting range for analog PID setting and PID feedback value, it must match the actual measuring range. The 100% physical quantity of AI1, AI2 and pulse input correspond to analog PID range.

F8.04 PID action direction	Range: 0～1【0】

0: Positive

When the PID reference increases, the output frequency will increase and the controlled physical value will increase, such as water supply system.

1: Negative

When the PID reference increases, the motor speed decreases with setting value such as refrigeration system.

F8.05 PID proportional gain 1 (KP1)	Range：0.1～9.9【1.0】
F8.06 PID integration time 1	Range：0.00～100.0s【3.00s】
F8.07 PID differential time 1	Range：0.00～1.00【0.00s】
F8.08 PID proportional gain 2 (KP2)	Range：0.1～9.9【1.0】
F8.09 PID integration time 2	Range：0.00～100.0【10.00s】
F8.10 PID differential time 2	Range：0.00～1.00【0.00s】

The proportional gain (KP) is the parameter that decides the sensitivity of P action in response to the deviation. The bigger the proportional gain KP is, the more sensitive the system acts and the faster the inverter responses. However, oscillation may easily occur and regulation time extends. When KP is too big, the system tends to instability. When KP is too small, the system will slow, and responses lag.

Use integration time to decide the effect of integral action. The longer the integration time, the slower the response, and the worse the ability of control external disturbance variation. The smaller the integration time is, the stronger the integral take effect. The smaller integration time can eliminate the steady state error and improve control precision, fast response. However, oscillation may easily occur, and the system stability decrease, if the integration time is too small.

Differential time define the effect of differential action. The bigger differential time can attenuate the oscillation caused by P action more quickly when deviations occurs and short the regulation time. However, if differential time is too big, oscillation may occur. If the differential time is small, the attenuation effect will be small when deviations occur and the regulation time is longer. Only the right differential time can reduce regulation time.

🕮 Note:

AD300 inverter has two sets of PID parameters, determined by F8.11. The first group PID parameters are taken as default.

F8.11 PID parameters switching	Range: 0～2【0】

0: No switching, use the first group parameters

1: Switching by terminal，to defined the multi-function terminals to switch two groups of PID parameters.

2: Auto-switching by deviation，Refer to the F8.12, F8.13 instructions.

F8.12 PID para. switching Deviation 1	Range: 0.0～999.9【20.0】
F8.13 PID para. switching Deviation 2	Range: 0.0～999.9【80.0】

Two groups of PID parameters can be switched by feedback deviation from the preset PID value. It is shown in figure 6-22 as below.

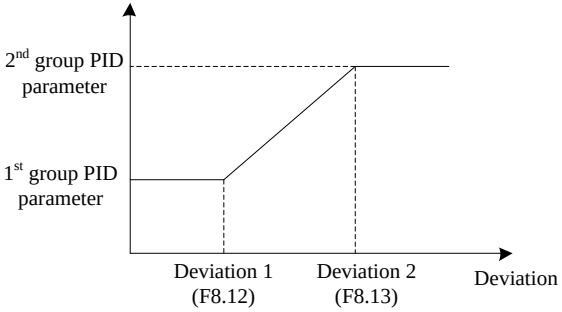


Figure 6-23 PID parameters switching

F8.14 PID delay time constant	Range: 0.00～100.0s【0.0s】

The PID control frequency output delay time setting.

F8.15 Deviation limit	Range: 0.0～999.9s【0.2】

When the deviation of feedback value from preset value lies within the deviation limit range, PID regulator stops adjustment. The proper settings of this function can reach a balance between system output accuracy and stability.

F8.16 PID output positive limit	Range: 0.00～600.0Hz【50.00Hz】
F8.17 PID output negative limit	Range: 0.00～600.0Hz【0.00Hz】

The two parameters are used to limit the output range of the PID regulator. When PID regulating is set to be the frequency reference, user can adjust the negative limit of the PID for reverse control, e.g. setting F8.17=30.00Hz to limit the reversed rotation within 30Hz. When PID and other channels are combined as frequency reference, the PID positive and negative limit can be adjusted according to actual application needs. For example, when PID and AI1 is overlapped to be frequency reference, and if system requires PID to conduct fine adjust of ±5V based on AI1, both F8.16 and F8.17 are to be set as 5.00Hz.

F8.18 PID preset frequency	Range: 0.00～320.0Hz【0.00Hz】
F8.19 Hold time of PID preset frequency	Range: 0.0～3600s【0.0s】

When the PID operation is start, the frequency will ramp up to the PID preset frequency (F8.18) according to the Acc time. The inverter will keeps running at this preset frequency for a period of time set by F8.19, and then starts to conduct PID characteristic regulating as shown in Fig.6-24.

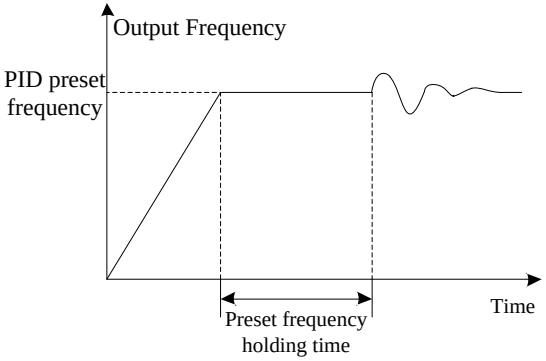


Fig. 6-24 PID preset frequency and holding time

📖 Note:

If you do not need the preset frequency function, set the preset frequency =0.

F8.20 Enable dormancy	Range: 0～1【0】

0: Disabled

1: Enabled

F8.21 Dormancy delay	Range: 0～999s【120s】
F8.22 Dormancy threshold	Range: 0.00～600.0Hz【20.00Hz】
F8.23 Awaken threshold	Range: 0.0～100.0%【80%】

When the output frequency is lower than the dormancy threshold value and keeps under this threshold for a lag time defined in F8.21, PID will enter the dormant state, which means the output frequency goes to 0Hz. The inverter will quit the dormant state if PID feedback value is lower than awaken threshold (F8.23).

F8.24 PID feedback offline detection range	Range: 0~100.0%【0.0%】
F8.25 PID feedback offline detection time	Range: 0.0~50.0s【2.0s】
F8.26 PID feedback offline detection Min. Frequency	Range: 0.00~50.00Hz【10.00Hz】

When the running frequency is higher than F2.26 and feedback signal is lower than F8.24 for a period of time defined by F8.25, the inverter will give alarm (PID offline).

6.10 PLC and Multi-steps group (F9)

F9.00 Multi-step frequency 1	Range: 0.00～Max frequency【5.00Hz】
F9.01 Multi-step frequency 2	Range: 0.00～Max frequency【10.00Hz】
F9.02 Multi-step frequency 3	Range: 0.00～Max frequency【15.00Hz】
F9.03 Multi-step frequency 4	Range: 0.00～Max frequency【20.00Hz】

F9.04 Multi-step frequency 5	Range: 0.00～Max frequency【30.00Hz】
F9.05 Multi-step frequency 6	Range: 0.00～Max frequency【40.00Hz】
F9.06 Multi-step frequency 7	Range: 0.00～Max frequency【50.00Hz】

Define Multi-steps frequency respectively, which can be used in Multi-step speed running and simple PLC running.

For Multi-steps speed running, Multi-step speed frequency can be selected by multi-step terminals. While in simple PLC running, Multi-step speed frequency is decided by present running step. It is shown in Fig.6-23.

F9.07 PLC running mode	Range: 0～2【2】

0: Single cycle 1

The inverter stops automatically after one cycle of operation and will start when receiving RUN command again.

1: Single cycle and hold the final value

The inverter will hold the operating frequency and direction of last step after completing one cycle of operation.

2: Continuous operation

The inverter will start next cycle of operation automatically after completing one cycle of PLC operation until receiving STOP command.

F9.08 PLC restarting mode	Range: 0～1【0】

0: Restart from first step

If the inverter stops during PLC operation because of receiving STOP command or fault, or power loss, it will restart from the first step after restarting.

1: Continue from the step where the inverter was interrupted

When the inverter stops during PLC operation because of receiving STOP command or fault, it will record the already running time of the present step. After restart, the inverter automatically enters the specific step where it was

interrupted and run the left time of this step with the step frequency.

F9.09 PLC status recorded or not at power failure	Range: 0～1【0】

If F9.09 is set to 1, the PLC operating parameters such as the PLC operating step and PLC operating time will be saved when power loss.

0: Not save　　1: save

F9.10 Multi-steps time unit	Range: 0～1【0】

Define the unit of PLC running time.

0: Second　　1: Minute

F9.11 PLC step1 time (T1)	Range: 0.1～3600【20.0】
F9.12 PLC step2 time (T2)	Range: 0.0～3600【20.0】
F9.13 PLC step3 time (T3)	Range: 0.0～3600【20.0】
F9.14 PLC step4 time (T4)	Range: 0.0～3600【20.0】
F9.15 PLC step5 time (T5)	Range: 0.0～3600【20.0】
F9.16 PLC step6 time (T6)	Range: 0.0～3600【20.0】
F9.17 PLC step7 time (T7)	Range: 0.1～3600【20.0】

Configure the running time of each PLC running step. If the running time of the step is set to 0, the inverter will skip the step and run the next step, as shown in Fig 6-25.

F9.18 PLC Step T1 program running setting	Range: 1F/r～4F/r【1F】
F9.19 PLC Step T2 program running setting	Range: 1F/r～4F/r【1F】
F9.20 PLC Step T3 program running setting	Range: 1F/r～4F/r【1F】
F9.21 PLC Step T4 program running setting	Range: 1F/r～4F/r【1F】
F9.22 PLC Step T5 program running setting	Range: 1F/r～4F/r【1F】
F9.23 PLC Step T6 program running setting	Range: 1F/r～4F/r【1F】

F9.24 PLC Step T7 program running setting	Range: 1F/r～4F/r【1F】

F9.18~F9.24 are used to configure the direction and Acc/Dec time of each PLC running step. There are total 8 kinds of combinations could be selected, please refer to Table 6-9 for the details.

Table6-9 PLC program running setting

Combination	Acc/Dec time	Direction
1F	Acc/Dec time 1	F：Forward
1r		r：Reverse
2F	Acc/Dec time 2	F：Forward
2r		r：Reverse
3F	Acc/Dec time 3	F：Forward
3r		r：Reverse
4F	Acc/Dec time 4	F：Forward
4r		r：Reverse

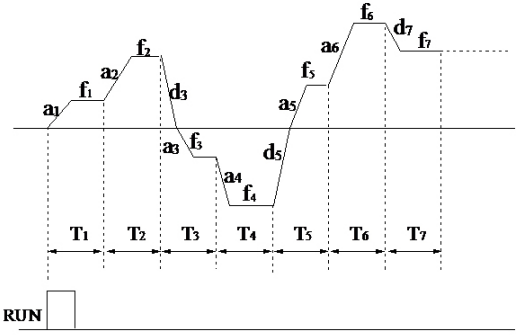


Fig.6-25 Simple PLC running

Note:

In Fig.6-25, f1～f7, a1～a7, d1～d7 and T1～T7 respectively correspond to step frequency, Acc Time, Dec Time and running time.

F9.25 Current running step	Range: 1～7【0】

F9.26 Current step running time	Range: 0.0～3600【0】

F9.25 records the step that the PLC currently operating at.

F9.26 records the operating time of the step that the PLC currently running at.

F9.27 Multi-step frequency 8	Range: 0.00～Max frequency【50.00Hz】
F9.28 Multi-step frequency 9	Range: 0.00～Max frequency【50.00Hz】
F9.29 Multi-step frequency 10	Range: 0.00～Max frequency【50.00Hz】
F9.30 Multi-step frequency 11	Range: 0.00～Max frequency【50.00Hz】
F9.31 Multi-step frequency 12	Range: 0.00～Max frequency【50.00Hz】
F9.32 Multi-step frequency 13	Range: 0.00～Max frequency【50.00Hz】
F9.33 Multi-step frequency 14	Range: 0.00～Max frequency【50.00Hz】
F9.34 Multi-step frequency 15	Range: 0.00～Max frequency【50.00Hz】

Define Multi-steps frequency respectively, which can be used in Multi-step speed running. The terminals defined as multi-steps decide which step to be run. (See table 6-4)

F9.35 PLC Multi-step frequency 1 selection	Range: 0～4【0】
F9.36 PLC Multi-step frequency 7 selection	Range: 0～4【0】

Define Multi-step 1 & 7 frequency source. When the setting is 0, the first step and the 7th step speed is F9.00 and F9.06

0: Multi-steps running

1: AI1 terminal

2: AI2 terminal

3: keyboard potentiometer

4: Pulse input

6.11 Wobble frequency running group (FA)

The wobble frequency running function is to make the inverter output

frequency wobbling up and down with the setup frequency as the center. The trace of running frequency at the time axis is shown in Figure 6-26, of which the swing amplitude is set by FA-00.When FA-00 is set to 0, indicating the swing amplitude is 0, the wobble frequency function is disabled.

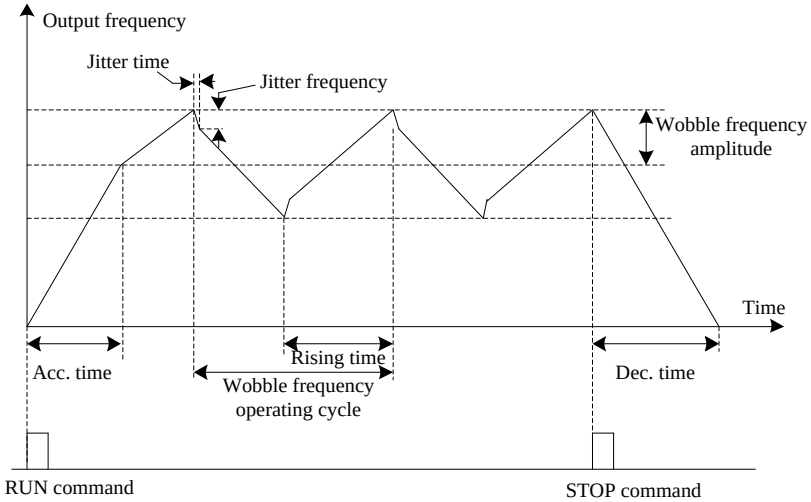


Fig.6-26 Wobble frequency running diagram

FA.00 Wobble frequency amplitude	Range: 0.0~50%【0.0%】
FA.01 Jitter frequency	Range: 0.0~50% (Relative to FA.00)【0.0%】
FA.02 Jitter Time	Range: 5～50ms【5ms】
FA.03 Wobble freq. rising time	Range: 0.1～999.9s【5.0s】
FA.04 Wobble freq. dropping time	Range: 0.1～999.9s【5.0s】

Wobble frequency amplitude: The running amplitude around setup frequency.

Wobble frequency rising time: The time takes from the peak base(lowest frequency in the swing) to the peak height (highest frequency in the swing).

Wobble frequency dropping time: The time takes from the peak height (highest

frequency in the swing) to peak base(lowest frequency in the swing).

FA.05 Amplitude setting mode	Range: 0～1【0】

This parameter is used to select the benchmark quantity of the swing amplitude.

0: Relative to the central frequency

It is variable swing amplitude system. The swing amplitude varies with the change of central frequency (setup frequency).

1: Relative to the maximum frequency

It is fixed swing amplitude system. The swing amplitude is fixed.

6.12 Fixed-length control group (Fb)

FB.00 Preset length	Range: 0~65530 【0】
FB.01 Actual length	Range: 0~65530 【0】
FB.02 Pulse number per unit	Range: 0.1~6553.0【100.0】

The preset length (PB.00), actual length (PB.01) and number of pulse per-unit (FB.02) are mainly used for fixed-length control. The length is calculated via the pulse signal input by the discrete input terminal, which needs to set the corresponding input terminal to length count input terminal. And input terminal X4 or X5 is usually used when the pulse frequency is relatively high.

Actual length = counted terminal input pulse number ÷number of pulse per unit.

When the actual length FB.01exceeds the preset length FB.00, the multifunction digital output terminal defined as “length arrival terminal” will output ON signal.

6.13 Protection and fault parameters group (FC)

FC.00 Motor overload protection mode	Range: 0～2【0】

0: Disabled

The overload protection is disabled. Be cautious to use this function because the inverter will not protect the motor in case of overload.

1: Common motor (with low speed compensation)

Since the cooling effects of common motor deteriorates at low speed (below 30 Hz), the motor's overheat protecting threshold should be lowered, which is called low speed compensation。

2: Variable frequency motor (without low speed compensation)

The cooling effects of variable frequency motor are not affected by the motor's speed, so low speed compensation is not necessary.

FC.01 Electro thermal protective value	Range: 20～110%【100%】

In order to apply effective overload protection to different kinds of motors, the Max output current of the inverter should be adjusted, as shown in Fig.6-27.

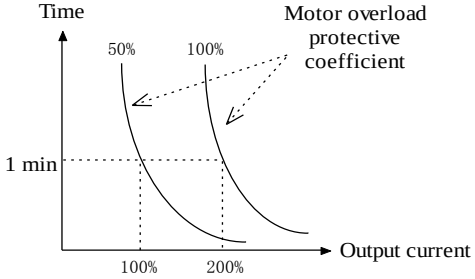


Fig 6-27 Motor overload protection curve

Motor overload protection coefficient calculates：

Motor overload protection coefficient = (the max allowed current of load ÷ rated output current of inverter) ×100%

Generally, the Max load current is the motor rated current.

FC.02 Pre-overload detection Level	Range: 30.0～200.0%【160.0%】
FC.03 Pre-Overload detection time	Range: 0.0～80.0s【60.0s】

FC.02 defines the current threshold for overload pre-alarm protection. The setting range is a percentage value of rated current.

FC.03 defines the time during which the inverter current exceeds FC.02. If the inverter continuous output current lager than FC.02 for a period of time defined in FC.03, the inverter will output pre-alarm signal (OLP2).

FC.04 Current amplitude limit	Range: 0～2【2】

During the Acc/Dec running, if the inverter actual current exceeds the “Current amplitude limiting level” (PC.04), the inverter stops the Acc/Dec process till the current is lower than the limit point.

In the inverter’s constant speed operating process, if PC.04 is set to 2, when the inverter actual current exceeds “Current amplitude limiting level” (PC.05), the inverter will reduce output frequency till the current gets lower than the limit point. Then the inverter will accelerates to the previous constant speed status.

0: Invalid

1: Acc./Dec. valid; Constant speed invalid

2: Valid all the time

FC.05 Current amplitude limit level	Range: Type G: 80.0~200.0%【160.0%】 Type P: 60.0~150.0%【120.0%】

This parameter is used to define the current limiting level.

FC.06 Over voltage stall function	Range: 0～2【1】

Over voltage stall function selection.

In Inverter’s Acc/Dec process, if the bus voltage exceeds the over-voltage stall point defined by FC.07, the inverter will stop Acc/Dec.

In the inverter’s constant speed operating process, if the bus voltage exceeds the stall overvoltage point, the inverter will raise its output frequency. The Acc/Dec time is defined by Acc/Dec time 4.

0: Invalid

1: Acc./Dec. valid; Constant speed invalid

2: Valid

FC.07 Over-voltage point for stall	Range: 110.0~150.0% Bus voltage 【140.0%】

Define the stall over voltage point.

FC.08 Input phase loss detection level	Range: 1～100%【20%】
FC.09 Input phase loss detection delay	Range: 2～255s【10s】

Input phase loss detection function can detect loss of input phase or a serious imbalance in the three-phase input, in order to protect inverter. If the input phase loss detection is too sensitive, you can appropriately increase the detection level (FC.08) and detection delay time (FC.09) and vice versa. When FC.08 is set to 100%, there is no input phase's loss protection.

FC.10 Output phase loss detection	Range: 0~1【1】

Output phase loss detect function can detect loss of output phase or a serious imbalance in the three-phase output, in order to protect inverter and motor

0: Invalid

1: Valid

FC.11 Terminal close fault detection	Range: 0～10【0】

0: Invalid

1: Valid

When the inverter does not allow the restart after power failure recovery (F1.15=0 or 2), and at the same time the inverter run command is controlled by terminal, the inverter will give "terminal close fault" (EF2) if the FWD or REV terminal close after power recovery.

FC.12 Fault auto reset times	Range: 0~10【0】
FC.13 Fault auto reset interval	Range: 2.0~20.0s/time【5.0s】

Auto reset function can reset OC and OU according to preset reset times(FC.12) and reset interval (FC.13). During the reset interval, the inverter stops output and runs at zero-speed. After the reset has been done, the inverter will start according to preset starting mode. When the “reset times” is set to 0, the reset function is disabled, and the inverter directly enters protection status.

📖Note: Only OC, OU has auto reset function.

FC.14 Under-voltage fault treatment	Range:0~2【0】

0: No treatment

1: Auto reset after power recovery (reset the UU fault only, do not run after fault reset.)

2: Auto run after power recovery (Auto run time interval is F1.16)

FC.15 Fast current limit	Range:50.0~100.0%【depends on model】
FC.16 Fast current limit time	Range:0.01~1.00s【0.10s】

This function is to protect the inverter from tripping by fast current limit in case of large impact. If the inverter is in fast current limit for a long time, the inverter will give fast current limit fault (LC).

The smaller the fast current limit value, the smaller loss to the IGBT is. But too small current limit value will also cause the abnormal working of the inverter. When the fast current limit value is set to 100%, there is no fast current limit function.

FC.17 Overvoltage suppression mode	Range:0.01~1.00s【0.20s】

When the motor is in generating status, the inverter will raise the output frequency automatically to avoid tripping with over-voltage fault. When this

parameter is set to 0.00Hz, the suppression function is disabled.

6.14 Communication parameters group (Fd)

Fd.00 RS485 communication	Range: 0～1【0】

Disable 485 communication function can effectively reduce the interference, when MODBUS communication is not used.

0: RS485 Disabled

1: RS485 Enabled

Fd.01 Local address	Range：1～247【1】

Define the inverter's communicating address. The address set to 0 is for the broadcast address to realize the PC broadcasting; when the inverter address is 247, it will serve as the host on the network to broadcast to other slave machines to achieve synchronization function.

📖Note:

1) Local address should be the unique one; it is the foundation to realize point-to-point communication between the host and inverter.
2) When the inverter is set to be host, the broadcasting interval is the response delay time defined in Fd.05. If the response delay time is set to be too short, the communication networking might get abnormal.

Fd.02 Baud rate	Range: 0～5【3】

Select the baud rate of serial communication. The master and the slave must keep the same baud rate setting. Otherwise, they cannot communicate normally. Higher baud rate could have a faster communication.

0: 1200bpS

1: 2400bpS

2: 4800bpS

3: 9600bpS

4: 19200bpS

5: 38400bpS

Fd.03 Parity bit	Range: 0～2【0】

Choose the way of parity check. The master and the slave must keep the same parity check setting. Otherwise, they cannot communicate normally.

0: Even parity check

1: Odd parity check

2: No parity check

Fd.04 Communication Timeout time	Range: 0.0～100.0s【0.0s】

Set communication timeout detecting time. Once establishing communications, if there is no data communicating within timeout detection time (Fd.04), the inverter will report communication error. If Pb.03 is set to 0, this function is disabled.

Fd.05 Response delay	Range：0～500ms【5ms】

When the inverter works as the slave, this parameter refers to the time from inverter receiving the host PC command to returning response frame to it. When the inverter works as the host, it refers to the interval of each broadcast

Fd.06 Communication Freq. setting coefficient	Range：0.0~200.0%【100%】

When the frequency reference is set to be serial communication (F0.03=4), the frequency of the inverter as a slave will be the host frequency by the coefficient defined in this parameter.

Fd.07 Communication interrupt	Range：0~1【0】

detection mode	

0: Time interval between 2 packets receiving.

1: Time interval of 0005H Add. data writing

6.15 Operation interface & display group (FE)

FE.00 Parameter display	Range: 0～1【0】

0: Normal 3-levels menu display

1: Only display modified parameters

FE.01 MFK Key function selection	Range: 0～7【0】

0: MFK inactive

1: JOG running

Used to start Jog running, the direction is set by function code F0.17。

2: FWD/REV switching

MFK key is used to switch the running direction between forward and reverse. It is equivalent to modify F0.17, but it will not be saved when power lost.

3: UP/DOWN clear

Used to Clear the frequency set by external terminals (UN/DOWN) , this is equal to the function of terminal “UP/DOWN clear command”。

4: Running command switch

MFK key is used to switch the run command mode between keyboard control and remote command control (terminal command channel or serial communication command channel). And the current run command mode must be terminal or communications, otherwise this option is invalid

7: RUN for FWD, MFK for REV, STOP for STOP

FE.02 STOP key function selection	Range: 0～3【2】

This parameter is used to define the STOP key functions, including stop and fault reset.

0: Active only in the keyboard control mode

1: STOP key stop function active in the terminal/communication control mode

2: STOP key fault reset function active in the terminal/ communication control mode

3: STOP key stop and fault reset function active in the terminal/ communication control mode

FE.03 Running frequency (Hz) (before compensation)	Range: 0～3【2】
FE.04 Running frequency (Hz) (after compensation)	Range: 0～3【0】
FE.05 Reference frequency (Hz, blinking)	Range: 0～3【1】
FE.06 Output current(A)	Range: 0～3【2】
FE.07 Bus voltage (V)	Range: 0～3【3】
FE.08 Output voltage (V)	Range: 0～3【0】
FE.09 Output torque (%)	Range: 0～3【0】
FE.10 Reference torque (%, blinking)	Range: 0～3【0】
FE.11 Rotate speed (r/min)	Range: 0～3【0】
FE.12 Reference speed (r/min blinking)	Range: 0～3【0】
FE.13 Output power (kW)	Range: 0～3【0】
FE.14 AI1 (V)	Range: 0～3【0】
FE.15 AI2(V)	Range: 0～3【0】
FE.16 Analog PID feedback	Range: 0～3【0】
FE.17 Analog PID setup	Range: 0～3【0】
FE.18 Terminal status (no unit)	Range: 0～3【0】
FE.19 Actual length	Range: 0～3【0】
FE.20 Reference length	Range: 0～3【0】
FE.21 Linear speed (m/s)	Range: 0～3【0】
FE.22 External counting value (no unit)	Range: 0～3【0】

These parameters define the display in stop and running monitoring condition.

0: No display

1: Display only in stop process

2: Display only during running

3: Display in stop and running

📖 Explanation:

- In stop process monitoring, if no parameter is set to show in monitor state, reference frequency will be displayed. In running monitoring state, if no parameter is set to be displayed, the output frequency (before compensation) will be displayed.
- The indication for analog PID reference and analog PID feedback is “Hz” +” A”,

  For PID reference, the Hz+A is blinking; while for PID feedback, the Hz+A is constant ON.
- The terminal status is shown by four digits of LED without unit indicator, the specific meaning shown in figure 6-26.

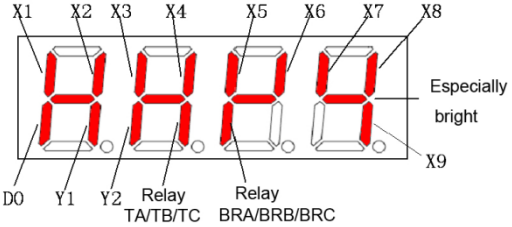


Fig6-28 Terminal status diagram

6.16 Running history record group (FF)

FF.00 Type of latest fault	Setting range: 0～25【NULL】
FF.01 Output frequency at latest fault	Setting range: 0～Frequency upper limit【0.00Hz】
FF.02 Reference frequency at latest fault	Setting range: 0～Frequency upper limit【0.00Hz】
FF.03 Output current at latest fault	Setting range: 0～2* inverter rated current【0.0A】
FF.04 Bus voltage frequency at latest	Setting range: 0～1000V【0V】

fault	
FF.05 Running status at latest fault	Setting range: 0～3【0】
FF.06 Fault history 1 (Last One)	Setting range: 0～25【NULL】
FF.07 Fault history 2	Setting range: 0～25【NULL】

Memorize the types of the latest 3 faults (See “chapter 7: fault/ alarm information table” for the details of faults). And record the output frequency, reference frequency, output current, DC bus voltage and running status of the latest fault for troubleshooting.

FF.08 Total power on time	Range: 0～65530h【0】
FF.09 Total running time	Range: 0～65530h【0】

The total boot time and runtime accumulated automatically by Inverter.

FF.10 Reserved	Range: 0～9999【0】
FF.11 Soft Software version	Range: 1.00～10.00【1.00】
FF.12 Non-standard version	Range: 0～255【0】

These two parameters indicate the software version of the product and also the non-standard version, which helps to identify the product.

6.17 Protection Parameters (FP)

FP.00 User password	Range: 0~9999【0】

Any non-zero number can be set as password to activate the protection function. After this operation, password is required to access to Group PF. Otherwise all parameters of Group PF cannot be accessed.

0000: Clear the previous setup user password and disable the password protection function.

FP.01 Parameter write-in protection	Range: 0~2【0】

0: All parameters are allowed to be modified

1: Only FP.01 and FP.03 can be modified

In addition to this function code and FP.03, all parameters can be read but cannot be modified.

2: All parameters aren't allowed read

In addition to this function code and FP.03, all parameters value is shown as "0000" and cannot be modified, this can prevent irrelevant person to check.

FP.02 Parameter initialization	Range: 0~2【0】

0: No operation

1: Clear fault history

When FP.02 is set to 1, the fault records of FF.00~FF.07 will be cleared.

2: Restore to default setting

When FP.02 is set to 2, the parameters (except running history and user password) are restored to defaults.

FP.03 Parameter copy	Range: 0~2【0】

0: No action

1: Parameters download

According to the type parameter of the operation panel preservation (whether has motor parameters, etc), automatically download to the control board。

2: Parameters upload (except motor's parameters)

All parameters will upload to EEPROM of operation panel except "Running history record" (Group FF) and "motor parameters" (Group F5).

3: Parameters upload (all parameters)

All parameters will upload to the EEPROM of operation panel except "Running history record" (Group FF).

FP.04 Parameter upload protection	Range: 0～1【0】

0: Protection enabled

When the operation panel has stored effective parameters, uploading

parameters to operation panel is invalid and report “copy fault”

1: Protection disabled

No matter the panel has stored effective parameters or not, the uploading operation will upload the present parameters from the control board to the keypad panel.

FP.05 G/P model selection	Range: 0～1【0】

0: Type G　　1: Type P

FP.07 User parameters backup	Range: 0～1【0】

0: Invalid　　1: Valid

With this function, the operator can make backup for the parameters after setup.

FP.08 User parameters recovery	Range: 0～1【0】

0: Invalid　　1: Valid

With this function, the operator can restore the parameters setup to the backup parameters.

Chapter 7 Fault information and trouble shooting

7.1 Fault information and solutions.

Once a fault is detected, the AD300 series of frequency converter would immediately block PWM output and enter the fault protection state; meanwhile TRIP on the keyboard would spark and the digital control area display the fault code. At this point one must identify the cause of failure and its corresponding solutions according to the method suggested in this section, if it does not work, please contact us immediately. The series of frequency converter has 22 kinds of faults, which is shown together with their respective solutions in Table 7-1.

Table 7-1 fault diagnosis and its solutions

Fault code	Fault Type	Possible causes	Solutions
Uu1	Bus Under voltage during running	1.Power grid low voltage	1. Check the input power source.
OC1	Over current in Acceleration	1. Acceleration time too short 2. Power grid low voltage 3. Inverter power too small	1. Increase the acceleration time. 2. Check the input power source. 3. Choose the frequency inverter with higher capacity.
OC2	Over current in Deceleration	1. Deceleration time too short 2. Large load inertia 3. Inverter power too small	1. Increase the deceleration time. 2. Add suitable brake devices. 3. Choose higher capacity drive
OC3	Over current at constant-speed	1 .Abnormal Load mutation 2. Power grid low voltage 3. Inverter power too small	1. Check the load 2. Check the input power source. 3. Choose higher capacity drive

Fault code	Fault Type	Possible causes	Solutions
		4.Encoder sudden offline in closed-loop vector control	4. Check the encoder and its wiring.
Ou1	Over Voltage in Acceleration	1.Acceleration time too short 2.Power supply abnormal	1. Increase the acceleration time 2. Check the input power source.
Ou2	Over voltage in deceleration	1.Deceleration time too short 2.Large load inertia	1. Increase the deceleration time 2. Add suitable brake devices.
Ou3	Over voltage in constant speed	1. Power supply abnormal 2.Large load inertia	1. Check the input power source. 2. Add suitable braking devices.
GF	Ground Fault	1. The output side has one phase got short circuit problem.	1. Check whether the electric motor insulation is weakening. 2. Check whether the wiring between the frequency converter and the electric motor is damaged.
SC	Load short-circuit	1. Wiring of inverter and motor get phase-to-phase short circuit 2.Damage of the inverting module IGBT	1. Check whether the electric motor coil is short circuit. 2. Ask for the services from manufactures.
OH1	Heat-sink over heat	1. Ambient temperature too high 2. Fan is damaged 3. Fan air duct is blocked	1. Lower the ambient temperature. 2. Change the fan 3. Clear the air duct.
OL1	Motor overload	1. Power supply abnormal 2. Motor rated current set wrongly 3.The Curve of V/F is not fit	1. Check the input power source. 2. Check whether the motor’s rated current is correctly set up. 3. Adjust the V/F curve and torque boosting performance.

Fault code	Fault Type	Possible causes	Solutions
		4. Motor always works with heavy load at low speed. 5. Motor blocked to stall or sudden large load change 6.Motor power too low	4. Use specialized electric motor. 5. Check whether the motor or the load is blocked to stall or not. 6. Use motor and inverter of suitable power ratings
OL2	Inverter overload	1. Low voltage in power grid 2. Load too heavy 3. Acceleration too fast 4.Restart the motor still in turning	1. Check the input power source. 2. Select bigger capacity inverter. 3. Increase the acceleration time 4. Avoid restarting when the motor is in rotation.
EF0	Communicatio n fault	1. Baud rate and parity checksum is set incorrect 2. Communication interrupted for long time	1. Check communication parameters correct or not. 2. Check the interface wiring.
EF1	External terminal fault	1. Faults comes from external control circuit	1. Check the external input
SP1	Input phase loss	1. Input R,S,T have phase loss or imbalance	1. Check input voltage
SPO	Output phase loss	1.There is lack of U,V,W when output 2.There is a serious unbalance in output	1. Check U-V-W motor wiring 2. Check the load
EEP	EEPROM error	1.Function code parameter writing error 2. EEPROM damaged	1. Recover factory defaults 2. Ask for service from supplier
CCF	Keypad & control board communication interrupted	1.Connection cable between keyboard and control panel is broken	1. Check the connection cable between keyboard and control panel

Fault code	Fault Type	Possible causes	Solutions
bCE	Brake unit fault	1.The braking line or braking pipe is broken 2.brake resistor is too lower	1. Check the brake unit, change the brake pipe. 2. Choose the suitable braking resistor.
PCE	Parameter copy Error	1. Too long connection cable between keypad and control board leads to interference in parameters transmission. 2. The downloading parameters do not match the existed parameters in the inverter.	1. Shorten the cable between Keyboard and control board to reduce interference. 2. Before downloading, make sure the parameters match the inverter.
IDE	IDE Hall current detection fault	1. The current sensoring or hall device get damaged.	1. Ask for service from supplier
ECE	Encoder fault	1. Encoder signal wires are connected reversely. 2. Encoder signal wires get damaged. 3. Encoder damaged. 4. Dual-way encoder detected motor direction is not match with inverter direction.	1. Check whether the encoder signal is correctly connected. 2. Check whether the encoder wiring is broke. 3. Change the encoder. 4. Change the encoder direction (F3.16) or alter motor wiring sequence.
LC	Fast current limit fault	1. Load too large or motor blocked to stall 2. Inverter power too small 3. Inverter output circuit loop grounded or SC.	1. Decrease the load and check motor and mechanical part status 2. Choose higher power inverter 3. Remove the external fault
EF2	Terminal close fault	1. The FWD or REV terminals close and get power on. But inverter is set to not allow the restart	1. Disconnect the FWD or REV terminal first and then power on the inverter. 2. Close the fault detection

Fault code	Fault Type	Possible causes	Solutions
		after power failure recovery.	function for closed terminal fault (FC.11=0)
PIDE	PID feedback error	1. PID feedback offline	1. Check PID feedback line. 2. Disable PID feedback detection (F8.24=0.0%) 3. Increase PID feedback offline detection time (F8.25)

7.2 Warning information

Once warning information is detected, the AD300 series of frequency converter would immediately enter the warning indicating state and giving out warning codes on LED display. During warning the inverter keeps running and returns to previous normal status once the warning is gone. Specific warning information is shown in Table 7-2

Table 7-2 warning information

Warning Code	Type	Description
Uu	Warning of under-voltage	The bus voltage is below the voltage point
OLP2	The pre-warning about overload of inverter	Operating current exceeded the converter overload pre-detection level and maintained more than pre-overload detection time
OH2	Heat-sink temperature is high	Temperature in the radiator higher than the OH2 standard
SF3	Function codes setup is not appropriate	Output terminal DO, Y1, Y2 does not simultaneously select No.10 function

7.3 The general fault diagnosis and solutions

Following abnormal situations might happen in using of the inverter. Try to make simple analysis according to the instructions as below.

S.N	Abnormity	Possible causes	Countermeasure
1	Keypad LED no display after power on	1. Inverter power supply absent 2. The keyboard or the connecting cable between keyboard and control board is damaged. 3. The inverter is damaged in the internal.	1. Check the input power supply 2. Change connecting cable between keyboard and control board or change keyboard. 3. Ask for service from supplier
2	Motor does not run after inverter give run command	1.The motor is damaged or block up 2. The anti-reverse function is set and rotation direction conflicts with this setting. 3. The frequency reference signal is zero. 4.The wiring of motor has phase loss	1. Replace the electric motor or rule out the mechanical failure. 2. Remove “Anti-reverse” setting or change the motor running direction. 3. Check frequency reference signal. 4. Check the electric motor wiring.
3	Motor running reversely	1. The motor wiring sequence is not correct.	1. Alter the sequence of the motor wiring 2. Adjust the function code F0.18.
4	Motor gets serious vibration	1.mechanical resonance 2.The legs of the machine not stable 3.Output phases imbalance	1. Adjust the machine 2. Adjust the machine legs 3. Check the load.
5	The noise of motor is too loud	1.Lubrication is not good or bearing wear 2.Carrier frequency is too low	1. Repair or replace the electric motor. 2. Increase the carrier frequency of the inverter

Chapter 8 Routine Repair and Maintenance

The application environment (such as temperature, humidity, dust and powder, wool, smoke and oscillation), burning and wearing of internal devices and other factors may increase the possibilities of inverter failure. To reduce the failures and prolong the service life of the inverter, it needs to conduct routine repair and periodic maintenance.

⚠ Note:

1. Only the personnel with professional training can dismantle and replace the inverter components.

2. Before inspection and maintenance, please make sure that the power supply to the inverter has been shut down for at least ten minutes or the CHARGER indictor is OFF, Otherwise there may be risks of electric shock.

3. Do not leave metal components and parts in the inverter, or it may damage the equipment.

8.1 Routine Maintenance

The inverter shall be used under the allowable conditions as recommended in this manual and its routine maintenance shall be conducted as per the table below.

Item	Inspection contents	Inspection method	Inspection Criteria
Operating Environment	Temperature	Thermometer	-10 ~ +40 ℃ De-rating at 40 to 50 ℃, and the rated output current shall be decreased by 1% for every temperature rise of 1 ℃.
	Humidity	Hygroscope	5 ~ 95%, no condensing
	Dust, oil, and water drop	Visual check	There are no dust, oil, and water drops.
	Vibration	Special test instrument	3.5mm，2～9Hz； 10m/s2，9～200Hz;

Item	Inspection contents	Inspection method	Inspection Criteria
			15m/s2，200～500Hz
	Gas	Special test instrument, smell and visual check	3.5mm, 2~ 9Hz; 10m/s2,9~ 200Hz; 15m/s2,200~ 500Hz
Inverter	Overheat	Special test instrument	Exhaust normal
	Sound	Listen	There is no abnormal sound.
	Gas	Special test instrument	There are no abnormal smell and smoke.
	Physical appearance	Visual check	The physical appearance is kept intact.
	Heat-sink fan ventilation	Visual check	There are no fouling and wool that block the air duct.
	Input current	Ampere meter	In the allowable operating range. Refer to the nameplate.
	Input voltage	Voltmeter	In the allowable operating range. Refer to the nameplate.
	Output current	Ampere meter	In the rated value range. It can be overloaded for a short while.
	Output voltage	Voltmeter	In the rated value range.
Motor	Overheat	Special test instrument and smell.	There are no overheat fault and burning smell.
	Sound	Listen	There is no abnormal sound.
	Vibration	Special test instrument	There is no abnormal oscillation.

8.2 Periodic Maintenance

It needs to perform periodic inspection on the inverter once every three to six months according to the application environment and work conditions.

Item	Inspection content	Inspection method	Inspection criteria
Inverter	Main circuit terminal	Screwdriver/sleeve	The screws are tightened and the cables are kept well.
	PE terminal	Screwdriver/sleeve	The screws are tightened and the cables are kept well.
	Control circuit terminal	Screwdriver	The screws are tightened and the cables are kept well.
	Internal wiring and connectors	Screwdriver and hands	Connection is firm and reliable.
	Expansion card connector	Screwdriver and hands	Connection is firm and reliable.
	Mounting screws	Screwdriver/sleeve	The screws are tightened.
	Cleaning the dusts and powders	Cleaner	There are no dusts and wools.
	Internal foreign objects	Visual check	There are no foreign objects.
Motor	Insulation test	500VDC megohmmeter	Normal

8.3 Component Replacement

Different types of components have different service span. The service spans of the components are subject to the environment and application conditions. Better working environment may prolong the service lives of the components. The cooling fan and electrolytic capacitor are vulnerable components and shall be conducted routine inspection as per the table below. If any fault occurs, please conduct immediate replacement.

Vulnerable parts	Damage Causes	Solutions	Items for Routine Inspection
Fan	Bearing wear, blade aging	Change	The fan blade has no cracks and rotates normally. The screws are tightened.
Electrolytic capacitor	Ambient temperature is relatively high and electrolyte volatilizes.	Change	There are no electrolyte leakage, color change, crack and shell inflation. The safety valve is normal. Static capacity ≥the initial value*0.85.

⚠ Note:

When the inverter is stored for a long period of time, power on test shall be conducted once within two years and last at least five hours. Use voltage regulator to gradually increase the voltage to the rated value when power connection is performed.

8.4 Warranty

The inverter's warranty period is 18 months (from date of shipping), during which the company would offer free repair or replacement if the fault or damage occurred under normal use.

During the warranty period, the maintenance will be charged a reasonable cost due to fault caused by the following reasons.

1) The fault is caused by not following the operation manual or exceeding the operating standards.

2) The fault is caused by repairing or modifying the inverter without permission.

3) The fault is caused by using the inverter in a wrong way, such as wiring mistakes.

4) The fault is caused by fire, salt corrosion, gas corrosion, earthquake, storms, floods, lightning, abnormal voltage, or other force majeure causes.

Appendix A: Modbus Communication Protocol

The inverter support Modbus protocol, RTU format, Broadcast address 0, slave address “1-247”. Interface mode: RS485: Asynchronous, half duplex.

1. Protocol Format

Start	The initial space of frame is 3.5 characters or above
Slave address	1～247
Function Code	03: Read parameters from slave 06: Write parameters to slave 08: Loopback Test
Data(N)	2×N data, this is the main content of Modbus communication.
……	
Data(0)	
Error check	CRC check
End	The End space of frame is 3.5 characters or above

2. Function Code and Data

Function Code 03H: Reads parameters and status words of one parameters of the inverter.

Example：Read parameter (register address: 0100H) from the slave 1, the format is as follows:

The Master Request

Slave address	01H
Function code	03H
Register address Hi	01H
Register address Lo	00H
Number of registers Hi	00H
Number of registers Lo	01H
CRC Hi	85H
CRC Lo	F6H

The Slave Response

Slave address	01H
Function code	03H
Byte Count	02H
Data Hi	00H
Data Lo	01H
CRC Hi	79H
CRC Lo	84H

Function Code 06H: Write parameters and status words of one parameters of the inverter.

Example：Write parameter (F0.19 register address: 0113H) to the slave 1, the format is as follows:

The Master Request

Slave address	01H
Function code	06H
Register address Hi	01H
Register address Lo	13H
Data Hi	00H
Data Lo	64H
CRC Hi	78H
CRC Lo	18H

The Slave Response

Slave address	01H
Function code	06H
Register address Hi	01H
Register address Lo	13H
Data Hi	00H
Data Lo	64H
CRC Hi	78H
CRC Lo	18H

Function Code 10H: Write parameters and status words of one parameters of the inverter.

Example: Write parameter (F0.19 register address: 0113H) to the slave 1, the format is as follows:

The Master Request

Slave address	01H
Function code	10H
Register address Hi	01H
Register address Lo	13H
Number of registers Hi	00H
Number of registers Lo	01H
Byte Count	02H
Data Hi	00H
Data Lo	64H
CRC Hi	B5H
CRC Lo	D8H

The Slave Response

Slave address	01H
Function code	06H
Register addres Hi	01H
Register address Lo	13H
Number of registers Hi	00H
Number of registers Lo	01H
CRC Hi	F1H
CRC Lo	F0H

Function Code 08H: The transmitted message is returned unchanged as a response message. This test is used for checking the signal communication between master and slave. The format is as follows:

The Master Request

Slave address	01H
Function code	08H
Register address Hi	00H
Register address Lo	00H
Data Hi	12H
Data Lo	34H
CRC Hi	EDH
CRC Lo	7CH

The Slave Response

Slave address	01H
Function code	08H
Register address Hi	00H
Register address Lo	00H
Data Hi	12H
Data Lo	34H
CRC Hi	EDH
CRC Lo	7CH

If the operation request is rejected, the response will be error code and abnormal function code. Error function code equals to function code +0x80, abnormal code shows the error cause in detail. The format is as follows:

The slave response for the rejected request

Slave address	01H
Function code	83H
Error Code	02H
CRC Hi	C0H
CRC Lo	F1H

Examples for abnormal codes:

Error Code	Definition
01H	Illegal function code: is not 03H,06H,10H,08H

02H	Register address error
03H	Register number error
21H	Data error: beyond data limit
22H	Error when data is written: The register is not written when the inverter is running, or writing data to the only read-out register address. Data is written during EPPROM fault. Data is written when data is edited by keypad.
23H	Data is written when the inverter is under voltage.
24H	CRC check error

3. Inverter Register Address Distribution

1) The corresponding relationship between the function codes of the inverter and the Modbus protocol register address. The bytes at higher orders refer to function code group number + 1, the bytes at lower orders refer to function code number, express with HEX a decimal. For example, the modbus register address of function code F0.02 is 0102H. The parameters are saved upon power failure when the highest bit of the register address is set. For example, when the register address 8012H is written, the parameter F0.02 is saved to eeprom.

Note: The life of EEPROM is about 100000 times, if change setting frequency frequently, several days or several weeks may damage EEPROM, adopt write RAM, it can avoid to damage EEPROM.

2)The other parameter registers address

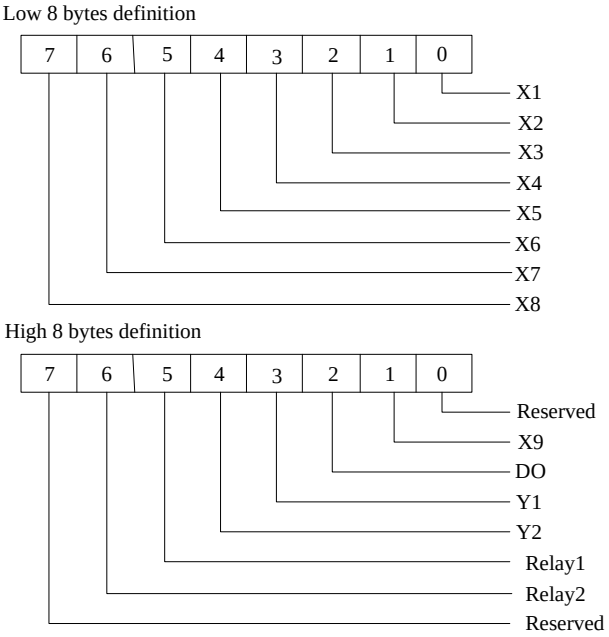
Function description	Register Address	Data definition and instruction	R/W
Reserved	0000H	Reserved	Reserved
Communication Run Command	0001H	0001H: Forward rotation	W
		0002H: Reverse rotation	
		0003H: Stop	
		0004H: Coast to stop	

Function description	Register Address	Data definition and instruction	R/W
		0005H: Fault reset	
Communication Setting	0002H	Range(-10000～10000)	W/R
		Note: Communication Setting is percentage. (-100.00～100.00%) When it is used to frequency setting, it's relative to the maximum frequency. When it's used to torque setting, it's relative to the 2*rated torque. When it's used to PID setting or feedback, it's relative to the analog input corresponding setup	
Reserved	0003H～001FH	Reserved	Reserved
Inverter Status	0020H	Bit0---1:Run 0: Stop	R
		Bit1---1:Reverse rotation 0:Forward rotation	
		Bit2---1:Fault 0:No Fault	
		Bit3---1:Warning 0:No warning	
		Bit4---1:On fault reset 0:no on fault reset	
Fault Content	0021H	0: NULL	R
		1: Uu1 bus Under voltage fault	
		2: OC1 over current in acceleration	
		3: OC2 over current in deceleration	
		4: OC3 over current in constant speed	
		5: Ou1 over voltage in acceleration	
		6: Ou2 over voltage in deceleration	
		7: Ou3 over voltage in constant speed	
		8: GF Ground Fault	
		9: SC Load Short-Circuit	
		10: OH1 Radiator over heat	
		11: OL1 Motor overload	
		12: OL2 Inverter overload	
		13: EF0 communication fault	
		14: EF1 external terminal fault	
		15: SP1 Input phase failure or Unbalance	

Function description	Register Address	Data definition and instruction	R/W
		16: SPO Output phase failure or Unbalance	
		17: EEP EEPROM Fault	
		18: CCF Transmission between the inverter and keyboard cannot be established	
		19: bCE Brake unit fault	
		20: PCE Parameter copy Error	
		21: IDE Hall current detection fault	
		22: ECE PG fault	
Warning Content	0022H	0：No warning	R
		1：uu Bus under voltage warning	
		2：OLP2Inverter overload warning	
		3：OH2Inverter overheat warning	
		4：SF3Output Terminal function selection 10 not reach to 3	
Running/Stop Monitor parameters	0023H	Output frequency	R
	0024H	Frequency reference	R
	0025H	Bus voltage	R
	0026H	Output voltage	R
	0027H	Output current	R
	0028H	Rotate speed of motor	R
	0029H	Output power	R
	002AH	Output torque	R
	002BH	PID reference	R
	002CH	PID feedback	R
	002DH	AI1	R
	002EH	AI2	R
	002FH	High pulse input	R
	0030H	Terminal status	R
	0031H	PLC current steps	R
	0032H	length reference	R
	0033H	Actual length	R
	0034H	External count	R
Running/ Stop Monitor parameters	0035H	X1 terminal status 0: Invalid 1: Valid	R
	0036H	X2 terminal status 0: Invalid 1: Valid	R

Function description	Register Address	Data definition and instruction	R/W
	0037H	X3 terminal status 0: Invalid 1: Valid	R
	0038H	X4 terminal status 0: Invalid 1: Valid	R
	0039H	X5 terminal status 0: Invalid 1: Valid	R
	003AH	X6 terminal status 0: Invalid 1: Valid	R
	003BH	X7 terminal status 0: Invalid 1: Valid	R
	003CH	X8 terminal status 0: Invalid 1: Valid	R
	003DH	Reserved	R

3) Terminals status (0030H) definition.



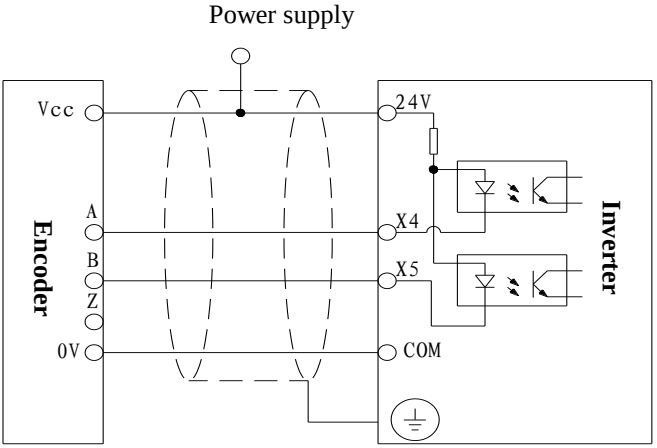
4. CRC16 calculation method

```
unsigned int    CRC16（unsigned char *data，unsigned char length）
{
        int i，crc_result=0xffff；

        while（length--）
        {
            crc_result^=*data++；
            for（i=0；i<8；i++）
            {
                if（crc_result&0x01）
                    crc_result=（crc_result>>1）^0xa001；
                else
                    crc_result=crc_result>>1；
            }
        }

    return  （crc_result=（（crc_result&0xff）<<8）|（crc_result>>8））；
}
```

Appendix B: Adapted encoder instruction



Above figure is the encoder wiring method in Push-pull output or voltage output modes. The encoder power supply Vcc is 24V and inverter's 24V is recommended.

Note:

The above instruction is for standard inbuilt PG card, the highest pulse frequency AD300 series can take is 50kHz.

If higher requirement closed-loop control is needed, please order extra professional PG card and its matched control board for AD300 series.

Appendix C: Extension cards instruction

Extension card	Model No.	Terminals	Function
I/O extension card	IO-EXT03	X6	Multi-function input terminal 6 (to PLC)
		X7	Multi-functions input terminal 7 (to PLC)
		X8	Multi-functions input terminal 8 (to PLC)
		Y2	Multi-functions input terminal Y2 (to COM)
		BRA/BRB/ BRC	Relay output 2
		PLC	PLC common end (to PLC)
		AO2	Analog output 2 (0~10V, 0/4~20mA)
		GND	Analog output common end
	Adapted inverter: AD300-T42R2GB/4R0PB ~ AD300-T4800G/900P-H		
Injection molding extension card	ZS-EXT01	+A1	0-1A current input
		-A1	0-1A current output
		+A2	0-1A/2A current input
		-A2	0-1A/2A current output
		X6	Multi-function input terminal 6 (to PLC)
		COM	Multi-function input common end
	Adapted inverter: AD300-T4011GB/015PB ~ AD300-T4800G/900P-H		
±10V extension card	AN-EXT0 1	485+	485 differential signal +
		485-	485 differential signal -
		-10V	Provide -10V to external (to GND)
		AI3	±10V analog input (to GND)
		GND	Analog input common end
	Adapted inverter: AD300-T42R2GB/4R0PB ~ AD300-T4800G/900P-H		
Speed tracking card	SP-EXT01	U	Connect to inverter U phase output
		W	Connect to inverter W phase output
	Adapted inverter: AD300-T41R5GB/2R2PB ~ AD300-T4800G/900P-H		

Note: When using ±10V extension card, the AI1 on control board is invalid.