



A⁺、P⁺、H⁺ SERIES

Users manual

Thank you for using A、P、H series multifunctional, high performance, universal AC motor speed controller.

In order to make use of the functions full on the AC motor speed controller and ensure safety of user, please read this instruction carefully before installing, running, maintaining and checking AC motor speed controller.

This instruction divides safety cautions into Danger and Warning, please pay special attention to the symbols “ Danger ” and “ Warning ” and their related content.

The symbol “ Danger ” indicates incorrect operation, which can cause death or serious injury to personnel.

The symbol “ Warning ” indicates incorrect operation, which can cause personnel injury or AC motor speed controller and mechanical system fault, as determined by different situations, the caution affairs may lead to serious consequence.

The figures in this instruction are for convenience with descriptions; they may have slight differences compared to the products, and the products update can also cause slight differences between the figures and products, the actual sizes are subject to actual products.

Please notice that this operational instruction shall be delivered to the end user, and be kept appropriately for further use of inspecting and maintaining.

If you have questions, please contact us or our agents in time, you will always receive our best attention.

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Chapter 1 Safety Cautions

1-1 Confirmation on Receiving

Warning

All the products have gone by strictly checking and testing before delivery, but considering transportation, please verify:

- Whether AC motor speed controller is distorted or damaged during transportation, do not install broken AC motor speed controller, and it may cause personnel injury, please inform our agent in time.
- Whether the package is integrated, accessories and user's instruction are contained, especially the user's instruction and guarantee card, please keep those for reference of further maintenance
- Whether the product is in accordance with the specifications, and whether there are unusual phenomena inside or outside AC motor speed controller.

1-2 Moving and Installation

Warning

- When moving the product, please use proper moving instruments to prevent AC motor speed controller from damage.
- When moving AC motor speed controller, please fasten the bottom of AC motor speed controller, holding the cover plate directly may lead to dropping and cause personnel injury or AC motor speed controller damaged.

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- Please do not install AC motor speed controller on combustible substance, installing the convert directly on the combustible substance or near to combustible material may cause fire accident.
- Please verify whether installation of AC motor speed controller is correct.
- Please choose a safe location to install AC motor speed controller, and operation environment is shown as follows.

Ambient temperature: -10℃-40℃ (non-freezing).

Ambient humidity: max. 95% relative humidity (non-condensing)

Ambient environment: indoors,(no corrosive gas, combustible gas, oil mist and dust. Please keep off sunlight).

Altitude: lower than 1000m

Vibration: max. 0.5G

- Please make sure that the mounted substance can load with AC motor speed controller's weight and prevent it from falling, and make sure that the installation site is safe and reliable. Do not allow children and unauthorized personnel approaching AC motor speed controller.
- Please make sure that the screws are fixed, fastened and locked firmly in accordance with user's instruction of the manual, to prevent AC motor speed controller from falling.
- During installation, prevent screws, wire pieces and other electricity conductive material from falling in AC motor speed controller. Otherwise, AC motor speed controller may be damaged, or a serious accident may take place.
- If two and more AC motor speed controller is installed in one control cabinet, please install them according to the instruction of the manual. It is required to keep enough space, and add extra heat sinkers for airflow in the cabinet. That will lower 40℃ of the temperature in the cabinet. Overheating may cause AC motor speed controller broken, fire or other

accident.

- AC motor speed controller shall be installed by professional personnel.

1-3 Wiring and Junction

Warning

- Please do not damage the wires. Let the wires bear weight or be clamped may damage the wires and cause an electric shock.
- Do not install the phase-shifting capacitor, surge absorber or noise filter in output terminal of AC motor speed controller, otherwise may cause AC motor speed controller fault.
- Do not install switch devices in the output terminal of AC motor speed controller such as the air switch and contactor. If it is for technologic demand, please ensure that AC motor speed controller is switching without output.
- Please wire separately power wire and control wire for preventing interference.

Danger

- Please ensure that the power is off before Junction.
- The wiring work shall be done by qualified electricians.
- Please wire in accordance with the user's instruction of the manual.
- The grounding connection shall be installed properly in accordance with relative regulations in the user's instruction. Otherwise it may cause an electric shock or fire.
- Please use independent power supply for AC motor speed controller. Never use the same power supply with strong interference equipment like electric welder.
- Please do not touch the bottom plate with wet hand. Otherwise you may

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get an electric shock.

- Please do not touch the terminal directly. Do not connect with AC motor speed controller input/output cables with the cover panel. Otherwise you may get an electric shock.
- Please make sure that voltage of the power supply and voltage of AC motor speed controller are the same, otherwise it may cause AC motor speed controller fault or personnel injury.
- Please make sure that power supply connects with the R•S•T terminal but without the U.V.W terminal, otherwise it may cause the internal fault of AC motor speed controller.
- Please do not test AC motor speed controller on pressure resistance. Otherwise it may cause the internal fault of AC motor speed controller.
- Please install accessories such as brake units, brake resistors in accordance with the user's instruction; otherwise it may cause AC motor speed controller fault or fire.
- Please ensure that the screws of the terminals are firmly locked, otherwise it may cause AC motor speed controller fault.

1-4 Power on and Commissioning

Warning

- Please ensure that the front cover is installed before the power is on. During the power transmission, please do not remove the cover.
- Please ensure that the power cables and signal cables are connected correctly, otherwise it may cause AC motor speed controller damaged.
- Please ensure all of the parameters are set correctly before running.
- Before running, please ensure machine not to damage running equipments. It is recommended to take running with idle load.

- Please provide an emergency stop switch when stop function setting is unavailable.
- Do not use electromagnetic contactor to start up and shut down AC motor speed controller, otherwise it may affect the life of AC motor speed controller

Danger

- When fault restart function is set. Please do not approach equipment because the equipment may automatically restart after running stop.
- Please verify the use range of motors and machines. Exceeding their use range will cause motor and machine fault.
- Please do not change the parameter settings of AC motor speed controller casually during running.
- Please do not touch the heat sink and brake resistor, otherwise you may get burned.
- Do not use wet hands to touch bottom plate and to operate switches and keys. Otherwise you may get an electric shock or injury.
- Please do not link or withdraw motors during AC motor speed controller running, otherwise it may cause AC motor speed controller protected or fault.

1-5 Check and Maintenance

Warning

- Please ensure that the power and indicating light is off before checking and maintaining. Otherwise, you may get an electric shock.
- Before checking and maintaining, please touch a nearby metal substance with your hand to eliminate the static electricity for preventing AC motor speed controller from damage caused by static electricity.

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- Please do not use Megohmmeter (insulation resistance) to test the control circuit of AC motor speed controller.

Danger

- Only authorized professional personnel can do check, maintenance and replacement of the components, no other people are allowed.
- Please do check, maintenance and replacement of the components according to appointed methods in the user's instruction, strictly prohibit modifying by your own. If you do so, you may get an electric shock and injury or AC motor speed controller may get damaged.

1-6 Exception Processing

Danger

- When the protection in AC motor speed controller is on, please follow the fault display of AC motor speed controller to find out causes and eliminate the fault, then reset and restart AC motor speed controller. If the fault is not eliminated. Resetting and restarting AC motor speed controller can cause AC motor speed controller s or machine fault.
- When AC motor speed controller fault takes place, please do not treat it by your own, and contact our company and our distributors.

1-7 Scrapping Processing

Warning

- When AC motor speed controller is scrapped, please dispose it as industrial rubbish, do not burn it up.

Chapter 2 Product Introduction

2-1 Unpacking inspection

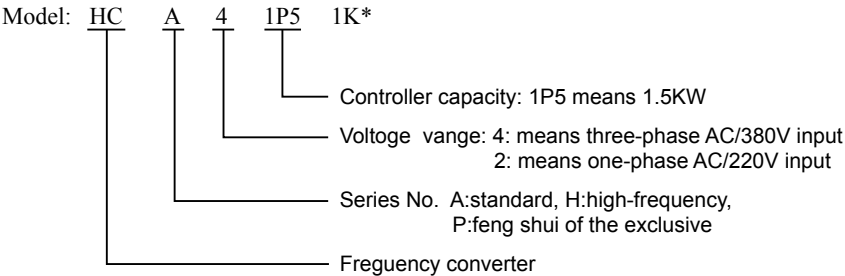
In unpacking, please confirm the following:

- Check whether the model type of AC motor speed controller is in accordance with your order.
- Check whether AC motor speed controller is damaged and related accessories are completed.

If you find an omission or disagreement, please contact the suppliers.

2-2 AC motor speed controller model description

MODE:	HCA41P5
INPUT:	3PH400V50HZ//60HZ
OUTPUT:	3PH400V 4.0A 1.5KW
RAEQ RANGE:	0.1-400HZ



1K*: means one phase for option of 0.4 to 1.5KW-200V

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2-3 Product specifications

Items		Description
Input	Rated Voltage, Frequency	Three-phase 380V 50/60Hz; one-phase 220V 50/60Hz
	Allowed Voltage Range	380V: 330~440V; one-phase 220V: 170V~240V
Output	Voltage	380V: 0~380V; one-phase 220V: 0~220V
	Frequency	0.10~400.0Hz
Control mode		Space vector, V/F control
Display		Five-digit LED display, Indicator display; Display setup frequency, Output frequency, Output current, DC voltage, Module temperature, Running state, and fault
Control Characteristics	Output Frequency Range	0.10Hz~400.00Hz
	Frequency Setup Definition	Digital setting: 0.01 Hz. Analog setup: 0.1% of maximum output frequency
	Output Frequency Accuracy	0.01Hz
	V/F Control	Setting V/F curve can satisfy various load requirements.
	Torque Control	Auto increase: auto raise torque by loading condition; Manual increase: enable to set 0 to 20 % of raising torque
	Multifunctional Input Terminal	8 multi-function input, take 15 speed control, process, 4 acceleration/deceleration speed, up and down function, scram
	Multifunctional Output Terminal	Three multi-function output take working, zero speed, external fault, signal and alarm
	Accel. /decel. Time Setup	0~6000s acceleration/deceleration time can be respectively set.
Other Functions	PID Control	Built-in PID control
	RS485	Standard RS485 communication function (MODBUS)
	Frequency Setup	Analog 0~10V, 0~20mA, direct set operating panel, RS485 specify value, up/down specify value.

Chapter 2 Product Introduction

Items		Description
Other Functions	Multiple Speed	Eight multifunctional input terminals, 15 section speed can be set
	Auto Stabilizer	Option for auto Stabilizer
	Counter	Built-in 2 group of Counters
Protection Function	Overload	Constant torque 150% 1 minute, blowing machine 120% 1 minute
	Over Voltage	Over voltage protection can be set.
	Under Voltage	Under voltage protection can be set.
	Others	Overheat protection, short-circuit protection, over current protection and parameter lock
Environment	Temperature	-10℃ to 40℃ (non-freezing)
	Humidity	Max. 95% (non-condensing)
	Altitude	Under 1000m
	Vibration	Max. 0.5G
Structure	Cooling mode	Compulsory cooling
	Protection Level	IP 20
Installation	Mode	Below 90 KW wall mounted 110-200 KW wall mounted or in cabinet Above 220 KW in cabinet

2-4 Product series models

Model	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
One-phase 220V•50/60Hz					
HCA20P4	0.4	1.0	2.5	3.75	0.4
HCA20P7	0.75	2.0	5.0	7.5	0.75
HCA21P5	1.5	2.8	7.0	10.5	1.5
HCA22P2	2.2	4.5	11	16.5	2.2
HCA23P7	3.7	7.2	16.5	24.75	3.7

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Model	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
Three-phase 220V•50/60Hz					
HCA25P5	5.5	9.8	25	37.5	5.5
HCA27P5	7.5	13.0	33	49.5	7.5
Three-phase 380V•50/60Hz					
HCA40P7	0.75	2.2	2.7	4.05	0.75
HCA41P5	1.5	3.2	4.0	6.0	1.5
HCA42P2	2.2	4.0	5.0	7.5	2.2
HCA43P7	3.7	6.8	8.6	12.9	3.7
HCA45P5	5.5	10	12.5	18.75	5.5
HCP47P5	7.5	14	17.5	21	7.5
HCA47P5	7.5	14	17.5	26.25	7.5
HCP4011	11	19	24	28.8	11
HCA4011	11	19	24	36	11
HCP4015	15	26	30	36	15
HCA4015	15	26	30	45	15
HCP4018	18.5	32	40	48	18.5
HCA4018	18.5	32	40	60	18.5
HCP4022	22	37	47	56.4	22
HCA4022	22	37	47	70.5	22
HCP4030	30	52	65	78	30
HCA4030	30	52	65	97.5	30
HCP4037	37	64	80	96	37
HCA4037	37	64	80	120	37
HCP4045	45	72	90	108	45
HCA4045	45	72	90	135	45
HCP4055	55	84	110	132	55
HCA4055	55	84	110	165	55
HCP4075	75	115	152	182.4	75
HCA4075	75	115	152	228	75
HCP4090	90	135	176	211.2	90
HCA4090	90	135	176	264	90

Chapter 2 Product Introduction

Model	Output power	Capacity KVA	Output current (A)	Overload capacity (60s) (A)	Applicable motor KW
HCP4110	110	160	210	252	110
HCA4110	110	160	210	315	110
HCP4132	132	193	255	306	132
HCA4132	132	193	255	382.5	132
HCP4160	160	230	305	366	160
HCA4160	160	230	305	457.5	160
HCP4185	185	260	340	408	185
HCA4185	185	260	340	510	185
HCP4200	200	290	380	456	200
HCA4200	200	290	380	570	200
HCP4220	200	320	425	510	220
HCA4220	220	320	425	637.5	220
HCP4250	250	365	480	576	250
HCA4250	250	365	480	720	250
HCP4280	280	427	560	672	280
HCA4280	280	427	560	840	280
HCP4300	300	450	580	696	300
HCA4300	300	450	580	870	300
HCP4315	315	460	605	786.5	315
HCA4315	315	460	605	907.5	315
HCP4345	345	516	680	884	345
HCA4345	345	516	680	1020	345
HCP4375	375	562	740	962	375
HCA4375	375	562	740	1110	375
HCP4400	400	600	790	1027	400
HCA4400	400	600	790	1125	400
HCP4415	415	632	820	1066	415
HCA4415	415	632	820	1230	415
HCP4450	450	638	840	1092	450
HCA4450	450	638	840	1260	450
HCP4475	475	714	940	1222	475

2-5 Product storage

AC motor speed controller must be put in the package before installation. If AC motor speed controller is not used for the moment, during the storage, please pay attention to those as below:

- A. The products must be placed in the dry and dust-free location.
- B. The relative humidity of the environment is within 0~95%, and without condensing.
- C. Storage temperature of environment must be within the range of -26℃ to +65℃.
- D. There are no corrosive gas and liquid in the storage environment, and avoid exposing the product directly to the sunlight.

It is better not to store AC motor speed controller for a long time. Long term storage can lead to the deterioration of the electrolytic capacitor. If it is necessary to store AC motor speed controller for a long time, please notice that make sure AC motor speed controller is electrified at least once not less than 5 hours per year. In operation, use voltage regulator to input current, the voltage increases gradually to the rated voltage .

Chapter 3

Installation of AC motor speed Controller

3-1 Installation environment and requirements

Environment of installation has direct effect on the life span and usage of AC motor speed controller. If AC motor speed controller is used in the environment that does not accord with allowed range of the operational instruction, and may lead to AC motor speed controller protection or fault.

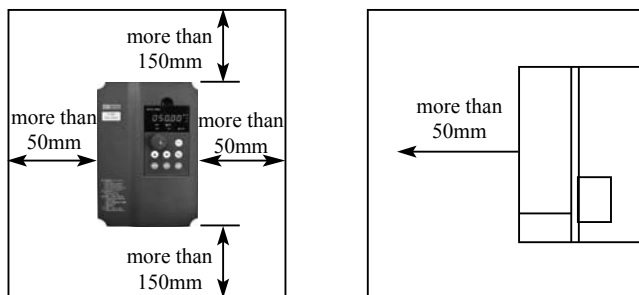
AC motor speed controller shall be mounted on the wall. Please install it vertically for convection, and heat venting

About AC motor speed controller's installation environment, please ensure it is in accordance with:

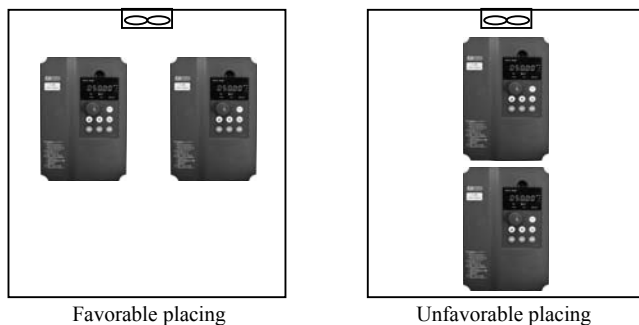
- (1) Environment temperature from -10°C to $+40^{\circ}\text{C}$
- (2) Environment humidity 0~95% without condensing
- (3) Away from direct sunlight
- (4) The environment does not contain corrosive gas and liquid
- (5) The environment does not contain dust, floating fiber, flock and metal dust.
- (6) Far away from radioactive materials and combustible substances
- (7) Far away from electromagnetic interference sources (as welder, high-powered machines)
- (8) The installation surface shall be firm. Without vibration, the vibration cannot be avoided, please add anti-vibration spacer to reduce vibration.
- (9) Please install AC motor speed controller in the location where it is good for ventilation, inspection and maintenance, and in the incombustible substance of solid. Apart from heating unit (as break resistor).
- (10) Preserve enough space for AC motor speed controller installation, especially for multiple AC motor speed controller installation. Please pay attention to the position of AC motor speed controller, and install an extra heat sink to keep environment temperature lower than 45°C .

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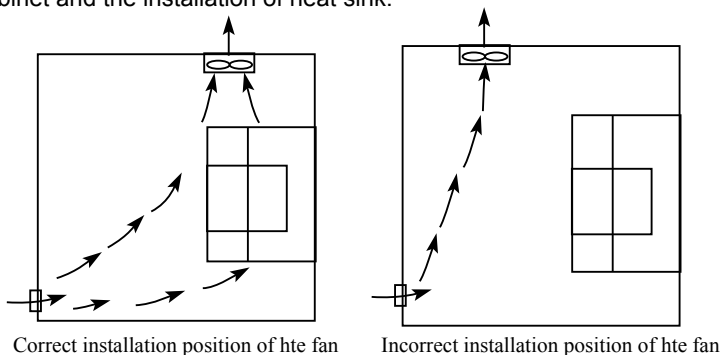
A. Single AC motor speed controller installation



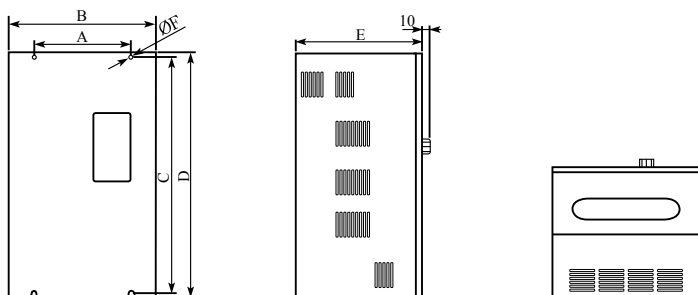
B. Multiple AC motor speed controllers installed in one control cabinet. Please pay attention: When installed “A”, AC motor speed controller shall be placed in parallel



C. If multiple AC motor speed controllers are installed in one control cabinet. Please make sure that there is enough space, and mean while the air convection in the cabinet and the installation of heat sink.



3-2 The outline and installation size



Unit: mm

Model	A	B	C	D	E	F	install	Case
HCA20P4	117	125	162	170	140	5	Wall hang	Plastic
HCA20P7								
HCA21P5								
HCA22P2								
HCA23P7	105	120	208	225	149	5		Semi-plastic
HCA25P5	213	228	230	347	196	6		Plastic
HCA27P5	213	228	230	347	196	6		
HCA40P7	117	125	162	170	140	5		
HCA41P5								
HCA42P2								
HCA43P7	105	120	208	225	149	5		Semi-plastic
HCA45P5	168	185	248	260	170	6.5		Plastic
HCA47P5								
HCA4011	213	228	330	347	196	6		
HCA4015								
HCA4018	147	250	460	480	246	9		IRON
HCA4022								
HCA4030	197	310	482	500	260	9		
HCA4037								
HCA4045	240	360	620	650	280	9		
HCA4055	240	360	620	650.2	280	9		

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Model	A	B	C	D	E	F	install	Case
HCA4075	260	420	775	800	334	11	Wall hang	IRON
HCA4090								
HCA4110	360	552	840	875	410	13	Wall hang or Cabinet	Iron
HCA4132	360	552	840	875	410	13		
HCA4160								
HCA4185	360	552	975	1000	410	13		
HCA4200								
HCA4220	400	600	370	1850	600	15	Cabinet	
HCA4250								
HCA4280	470	700	355	1850	600	16		
HCA4300								
HCA4315								
HCA4345	670	900	355	2030	600	16		
HCA4375								
HCA4400								
HCA4415								
HCA4450								

3-3 The Hole size of the tray for the operating panel

5.5KW and under: 141.5mm x 79.5mm

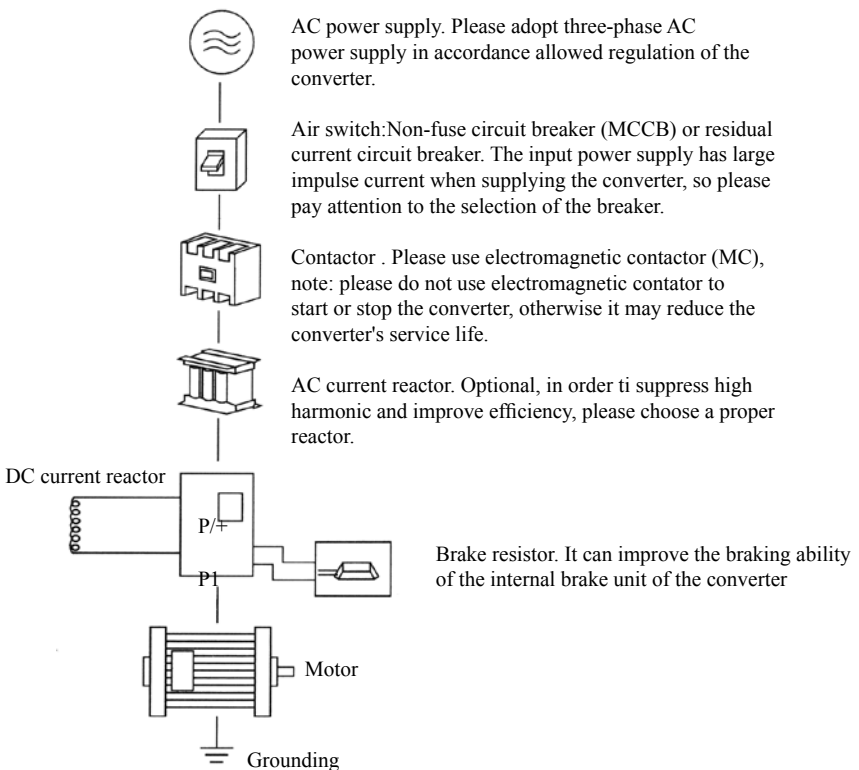
3.7KW and under: 99.5mm x 56mm

Chapter 4 Wiring

The wiring of AC motor speed controller can be divided into main loop and control loop.

4-1 Main loop wiring

4-1-1 External Components Description



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(1) AC power supply

Please supply power with the appointed power supply in the operational instruction.

(2) Non-fuse circuit breaker: (MCCB)

When the power supply voltage is low or short circuit of input terminal takes place, the breaker can provide protection, inspection and maintenance. Or AC motor speed controller does not run, you can cut off breaker to separate AC motor speed controllers from the power supply.

(3) Electromagnetic contractor

The contractor can turn on and turn off power of AC motor speed controller to ensure safety.

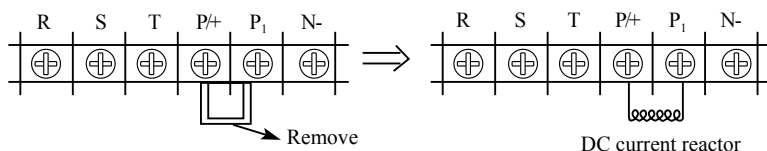
(4) AC current reactor

A: suppress high harmonics for protecting AC motor speed controller.

B: improve the power efficiency.

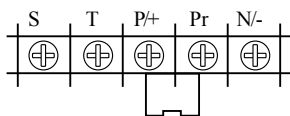
(5) DC current reactor

The DC current reactor is as the same function as AC current reactor. Please remove the connection sheet first between P1 and P/+, shown as the following figures:



(6) Brake resistor

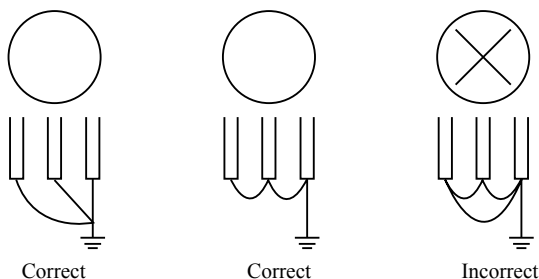
When the motor is braking, brake resistor can avoid DC loop high voltage of AC motor speed controller, and improve the braking ability of the internal brake unit. Below 15W (including 15 W) the brake unit is built-in. The figure of the brake resistor connection is as below:



To select the brake resistor, please refer to section 2, chapter 9: Brake resistor configuration.

4-1-2 Main Loop Wiring Notice

- (1) Specifications of the circuit in wiring shall be in accordance with the regulations of electrical code.
- (2) Please do not connect the AC with the output terminal (u, v, w) of AC motor speed controller; otherwise it may cause AC motor speed controller damage.
- (3) Please use isolated cable and conduit, and connect with the two ends of the shielding layer or conduit with ground.
- (4) Grounding of AC motor speed controller shall not share with the welder, high-powered motor or high current load. Please connect with the ground independently.
- (5) Please adopt a third way to connect with the grounding terminal E with the ground (impedance of the grounding is lower than 100Ω).
- (6) Please use the grounding cable according to the regulations of electric equipment technology. The shorter of the cable will be better.
- (7) If there is more than one AC motor speed controller connecting with the ground, please make sure that it does not form grounding loop, shown as the following figures:

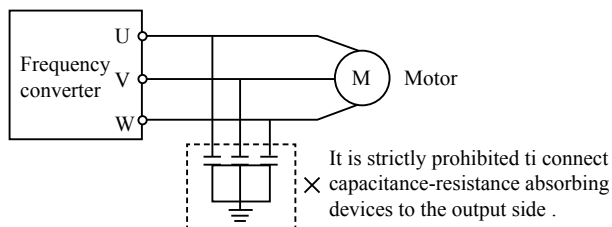


- (8) The main loop power cable and control cable must be laid separately. Keep minimum 10 cm distance in parallel, and vertical in intersection. Do not put the control cable and power cable in the same wire casing, otherwise it may cause interference.

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(9) The distance between AC motor speed controller and the motor shall be shorter than 30 meters. If the distance is a long way, the impulse current which is produced by parasitical capacitance will lead to over current protection, or will produce wrong order may cause AC motor speed controller fault or running abnormity of the equipment. The maximum distance between AC motor speed controller and the motor shall not be over 100 meters. In the long-distance connection, please choose to configure filter in the output terminal, and meanwhile reduce carrier frequency.

(10) Do not add absorption capacitance or other capacitance-resistance absorbing devices in the output terminal (u, v, w) of AC motor speed controller.



(11) Please confirm that the main loop terminal is locked firmly, and the lead wire and terminals have proper contact, to prevent looseness from vibration and creating spark leading.

(12) In order to reduce interference, the surge absorber is recommended to connect with the coil of electromagnetic contactor and relay in the surrounding circuit of AC motor speed controller.

Model code	Input voltage	Motor KW	Cable diameter (mm ²)
HCA20P4	220V	0.4	2.5
HCA20P7		0.75	2.5
HCA21P5		1.5	2.5
HCA22P2		2.2	4
HCA23P7		3.7	6
HCA25P5		5.5	6
HCA27P5		7.5	10

Model code	Input voltage	Motor KW	Cable diameter (mm ²)
HCA40P7	380V	0.75	2.5
HCA41P5		1.5	2.5
HCA42P2		2.2	2.5
HCA43P7		3.7	2.5
HCA45P5		5.5	4
HCA47P5		7.5	6
HCA4011		11	6
HCA4015		15	10
HCA4018		18.5	10
HCA4022		22	16
HCA4030		30	25
HCA4037		37	25
HCA4045		45	35
HCA4055		55	35
HCA4075		75	70
HCA4090		90	70
HCA4110		110	95
HCA4132		132	150
HCA4160		160	185

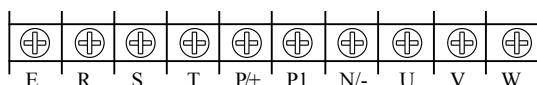
*The above data is only for reference.

4-1-3 Recommending Equipment Specifications

4-1-4 Main loop terminals and description

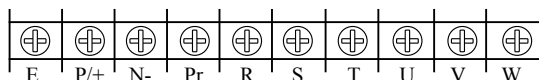
If you open the outer casing of AC motor speed controller, you will see the main loop terminals.

1. Model A, P with three-phase 380V/18.5~160KW and steel casing, the arrangement of main loop terminals is shown as below:

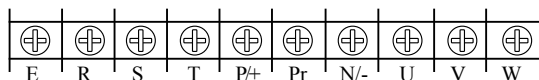


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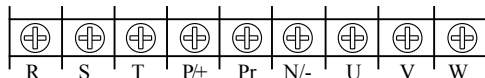
2. Model A with three-phase 380V/11~15KW and plastic casing, and model P with 11~18.5KW and plastic casing, the arrangement of main loop terminals is shown as below:



3. Model A with three-phase 380V/5.5~7.5KW, the arrangement of main loop terminals is shown as below:



4. Model A with three-phase 380V/0.75~3.7KW, the arrangement of main loop terminals is shown as below:

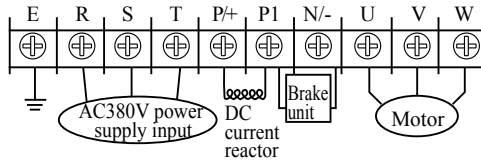


4-1-4-1 Main loop terminals and description

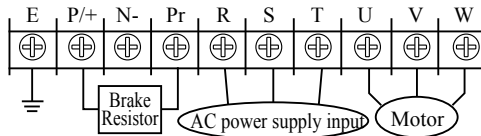
Cable connection examples:

Name	Function description
E	Grounding terminal
R, S, T	Power supply input terminal, one-phase 220V, select any two of the terminals to connect
P/+	DC voltage positive terminal
P1	Remove the connecting sheet between P1 and P/+ to connect with DC reactor.
Pr	The brake resistor can be connected between P1 and Pr (suitable for 15KW below models)
N/-	DC voltage negative terminal, the brake unit can be connected between P1 and N/- (suitable for 18.5 KW above models)
U, V, W	Connect with three-phase AC motor

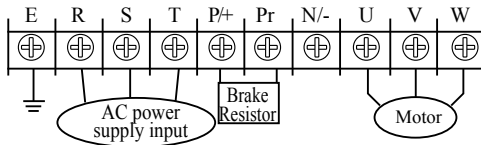
1. Model A. P. H. with three-phase 380V/18.5~160KW, the cable connection is shown as below:



2. Model A with three-phase 380V/5.5~11KW and plastic casing, and model P with 11~18.5 KW, the cable connection is shown as below:

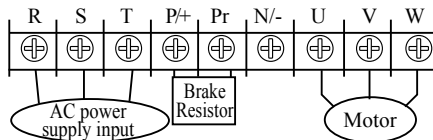


3. Model A with three-phase 380V/5.5~7.5 KW and plastic casing, the cable connection is shown as below:



Note: The grounding terminal is on the casing next to the main loop terminal, and it is a screw hole on the steel plate marked with $\perp$;

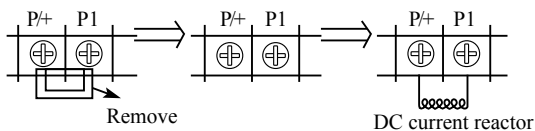
4. Model A with three-phase 380V/0.75~3.7KW, the cable connection is shown as below:



Note: The grounding terminal is on the casing next to the main loop terminal, and it is a fix screw on the casing marked with ;

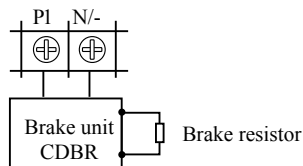
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5. DC current reactor connection



A. remove the short connecting sheet. B. connect DC reactor between P/+ and P1

④ Method of connecting with brake unit (apply to 18.5 KW above machines, including 18.5KW)

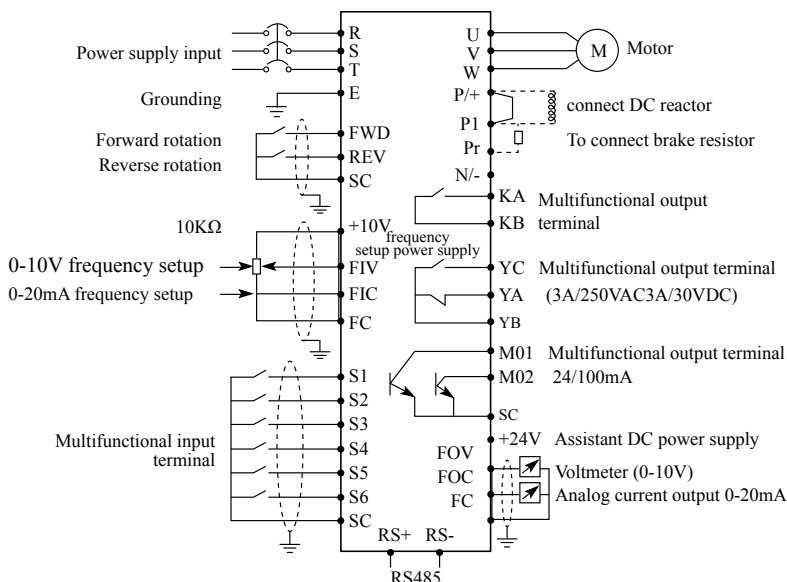


Due to different definitions of the brake unit terminal given by different producers, please refer to the relative instructions.

4-2 Control terminal

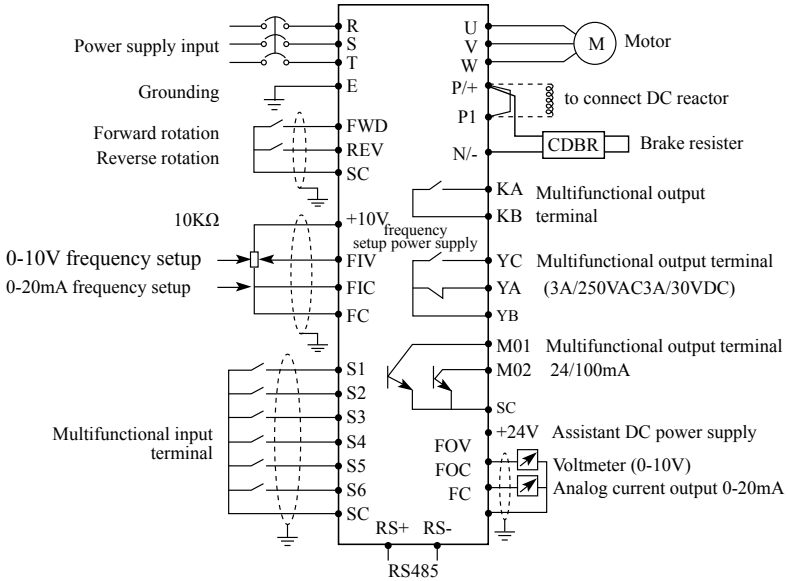
4-2-1 Basic wiring diagram

(1) Models below 15KW (including 18.5KW plastic casing model P)



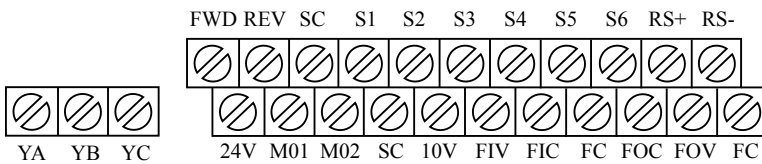
*Option of control board with dual-relay

(2) Model A with 18.5KW above (including 18.5KW) and Model P with 22KW above

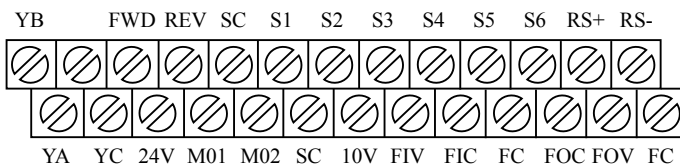


4-2-2 Control terminals arrangement

(1) Model A. P. H. with 3.7 KW above (including one-phase, three-phase, model A and model P)



(2) Model A. P. H. with 2.2 KW below (including one-phase and three phase)



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4-2-3 Control terminal description

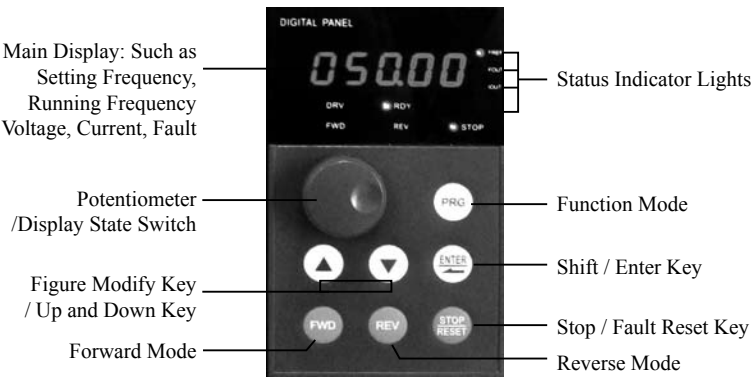
Terminal name	Function description	Note
FWD	Forward rotation command input terminal (multifunctional input terminal)	Multifunctional input terminals S1-S6, FWD and REV can be set by parameters F3.15-F3.22 when the terminals and SC is closed.
REV	Reverse rotation command input terminal (multifunctional input terminal)	
S1	Multifunctional input terminal 1	
S2	Multifunctional input terminal 2	
S3	Multifunctional input terminal 3	
S4	Multifunctional input terminal 4	
S5	Multifunctional input terminal 5	
S6	Multifunctional input terminal 6	
24V	Assistant DC power supply, it supply 24V power for external devices	Max 100mA current
M01	Multifunctional output terminal (optical coupling)	Max 24V DC/100mA
M02	Multifunctional output terminal (optical coupling)	
+10V	Power supply for frequency setup	
FIV	Analog voltage command input terminal	0~10V (recommend using 10K Ω of potentiometer.)
FIC	Analog current command input terminal	0~20mA
FOV	Analog voltage output terminal	0~10V
FOC	Analog voltage output terminal	0~20mA
FC	Analog signal shared terminal	
SC	Digital signal shared terminal	
KA	Multifunctional output terminal	250V AC/3A, 30V DC/3A
KB	Multifunctional output terminal	
YC	Multifunctional output terminal (normally closed)	
YA	Multifunctional output terminal (normally closed)	
YB	Multifunctional YA, YB output contact mutual terminal	
RS+, RS-	RS485 communication port	

4-2-4 Control Loop Wiring Notice

- (1) Please separate the control signal cable from the main loop cable, power cables and power supply cable.
- (2) In order to prevent interference that can cause false operation, please use glue shielding cable or two-ply shielding cable, whose specifications are 0.5-2mm².
- (3) Please confirm allowed requirements for using different terminals, requirements such as power supply, maximum allowed current
- (4) Please connect the grounding terminal E with the ground correctly. The grounding impedance is lower than 100Ω.
- (5) Please select accessories correctly according to the requirements as potentiometer, voltmeter and input current of different terminals.
- (6) Please check it correctly and confirm there is no mistake after wiring.

Chapter 5 Running

5-1 Digital Operating Panel



5-1-1 Key function description

Key name	Function description
	Function selection key, to select and use function menu
	Figures modification key, to modify function code and parameter
	Shift key or Enter key Quick press to switch figures, press-and-hold to confirm setup

Key name	Function description
	①Potentiometer of operating panel, when the frequency is set up as controlled by potentiometer of operating panel, to rotate the potentiometer to get different frequency. ②Display switch, to press gently to display different monitor information
	Stop command key (apply to operating panel control state), fault reset key
	Forward rotation command key
	Reverse rotation command key

5-1-2 LED indicator light description

Indicator light name	Indicator light state	Description
DRV	Light	AC motor speed controller is on running state.
RDY	Light	AC motor speed controller is on standby state.
FREF	Light	Display area shows setup frequency.
FOUT	Light	Display area shows output frequency.
IOUT	Light	Display area shows output current.
FWD	Light	AC motor speed controller is in forward rotation state.
REV	Light	AC motor speed controller is in reverse rotation state.
STOP/RESET	Light	AC motor speed controller is in stop and no output state.

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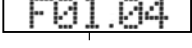
5-1-3 Display Description

	Display	Description
1	FREF • 	Display: Setup frequency 50.00Hz
2	IOUT • 	Display: Output current 0.8A
3	FOUT • 	Display: Output frequency 0.5Hz
4		Display: Parameter F1.50
5	END	Display: Parameter setup is modified and confirmed successfully
6	OC 1	Display: Fault code, over current in acceleration

5-2 Operational Instruction of Digital Operating panel

(1) Parameter setup.(taking modifying F1.04 reverse effective setup as example)

Program	Key name	Display	Description
1	Power on	RDY • 	A. To display setup frequency picture (initial picture) B. AC motor speed controller is on standby state.
2	Press 	RDY • 	To get into parameter setup state, and the first letter blinks (means modifiable item)

3	Press  4 times	RDY • 	The value "0" has been changed to "4".
4	Quickly press  twice (Quick press means shift.)	RDY • 	The flashing is shifted 2 positions to the left. Note: Quick pressing means the pressing time is within 2 seconds.
5	Press  once	RDY • 	The value "0" has been changed to "1".
6	Press and hold 	RDY • 	Display: "1"
7	Press  	RDY • 	Change "1" to "0"
8	Press and hold 	After flashing END, it displays F01.05 	Confirm that the value F1.04 has been modified
9	Press 	RDY • 	Return to the original display picture

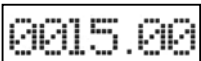
Notice: Press  to put away modification and directly return to the main picture state.

(2) Different state displays and inquiry

Assume that the parameter is set up: the operating panel controls AC motor speed controller to start and then stop (F1.02=0), and the frequency is given by the potentiometer of the operating panel (F1.01=3).

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Program	Key name	Display	Description
1	Power on	RDY FREF • • 000.00	Setup frequency display state
2	Rotate 	RDY FREF • • 005.00	Setup frequency 5.0Hz
3		DRV FREF • • 005.00	Forward running of the frequency is on.
4	Press  once	DRV FOUT • • 005.00	Shift to actual running frequency display picture
5	Rotate 	DRV FOUT • • 015.00	Modify setup frequency, the actual running frequency has been changed from 5Hz to 15Hz
6	Press  once	DRV IOUT • • 010.00	Shift to output current display picture, the current output current is 10.00A
7	Press  once	DRV • 020.00	Shift to output voltage state, the current output voltage is 20.00
8	Press  twice	DRV • F00.00	Shift to parameter setup state
9	Press 	DRV • F00.04	Select code F00.04 for modifying access parameter

Program	Key name	Display	Description
10	Press and hold 	DRV 	Display F00.04 which means the running rotation speed is 140
11	Press 	DRV FREF 	Return to main display picture, the setup frequency is 15Hz
12	Press 	RDY FREF 	Stop AC motor speed controller, the setup frequency is 15Hz

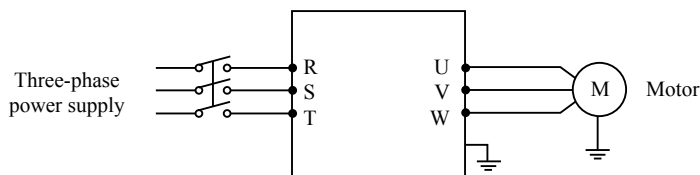
Notice: Through shift key, you can monitor setup frequency, running frequency, output current, and output voltage in running AC motor speed controller. The display of the main picture can be customized by your actual need, and you can modify it by F0.00 setup. At the same time, you can monitor the content of relative display by F0.01-F0.18.

5-3 Simple Running and Relative Items

5-3-1 Setup, installation and wiring

According to detailed requirements to conduct installation and wiring

The figure is the simplest wire connection for the running as below:



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5-3-2 Wiring inspection

According to the wiring requirements of AC motor speed controller, check if there are errors. After confirming there is no mistake, turn on power supply to set up parameters.

5-3-3 Parameter setup

The basic parameter setup of running AC motor speed controller must have frequency setup and running signal source setup, in order that they can start AC motor speed controller on one hand, and indicate running speed of AC motor speed controller on the other hand.

Set up parameter F1.01 and F1.02 according to the requirements. About the setting-up method, please read chapter 5-2.

5-3-4 Running

Confirm that there is no mistake in wiring and parameter setup according to requirements

Assume F1.01=3 (the frequency source coming from the potentiometer of operating panel)

F1.02=0 (running signal source coming from the operating panel)

Press “FWD” to start AC motor speed controller, and then rotate the potentiometer, AC motor speed controller accelerates gradually.

Press “STOP” to stop AC motor speed controller

Notice: Observe state of the motor in running. If an abnormality takes place, please stop running immediately (to press STOP key) and turn off the power and check it.

Chapter 6 Table of Functional Parameters

	Code	Name	Description	Unit	Default	Page
Display	F0.00	The screen displays option setup	0-32	1	1	42
	F0.01	Frequency setup	Read only			43
	F0.02	Output frequency	Read only			43
	F0.03	Output current	Read only			43
	F0.04	Rotation rate	Read only			43
	F0.05	Voltage of DC bus	Read only			43
Parameters for basic running	F0.06	Temperature of AC motor speed Controller	Read only			44
	F0.07	PID display	Read only			44
	F0.10	Fault record 1	Read only			44
	F0.11	Fault record 2	Read only			44
	F0.12	Fault record 3	Read only			44
	F0.13	Fault record 4	Read only			44
	F0.14	The setup frequency in last fault	Read only			44
	F0.15	The output frequency in last fault	Read only			44
	F0.16	The output current in last fault	Read only			44
	F0.17	The output voltage in last fault	Read only			44
	F0.18	The output DC voltage in last fault	Read only			44
	F1.00	Setup of main frequency	0.00-uppper limit frequency	0.01	0.00	46

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	Code	Name	Description	Unit	Default	Page
Parameters for basic running	F1.01	Option for frequency setup	0: digital frequency setup 1: Analog voltage setup 2: Analog current setup 3. Keyboard POT setup 4. UP/DOWN setup 5.RS485 communication frequency setup	1	3	47
	F1.02	Option for running setup	0: Keyboard 1: IO terminal 2: Communication	1	0	49
	F1.03	Setup when stop key is effective	0: Stop key is ineffective 1: Stop key is effective	1	1	52
	F1.04	Setup for reverse	0: Reverse prohibited 1: Reverse allowed	1	1	53
	F1.05	Maximum running frequency	Minimum running frequency~400.00Hz	0.01	0.00	53
	F1.06	Minimum running frequency	0.00~maximum running frequency	0.01	0.00	53
	F1.07	Acceleration time 1	0~6000.0S	0.1	Change	53
	F1.08	Deceleration time 1	0~6000.0S	0.1	Change	53
	F1.09	VF maximum voltage	VF intermediate voltage ~500.0V	0.1	400.0	54
	F1.10	VF fundamental frequency	VF intermediate frequency ~ maximum running frequency	0.01	50.00	54
	F1.11	VF intermediate voltage	VF minimum voltage ~ VG maximum voltage	0.1	Change	54
	F1.12	VF intermediate frequency	VF minimum frequency ~ VF fundamental frequency	0.01	2.50	54
	F1.13	VF minimum voltage	0~VF intermediate voltage	0.1	15.0	54
	F1.14	VF minimum frequency	0~VF intermediate frequency	0.01	1.25	54
	F1.15	Carrier frequency	1.0K-15.0K	0.1	Change	57
	F1.16	Auto adjust carrier	Retain	1	0	
	F1.17	Initialization of parameters	8: Initialization of default	1	0	58

Chapter 6 Table of Functional Parameters

	Code	Name	Description	Unit	Default	Page
Parameters for basic running	F1.18	Locked up of parameters	0: Unlocked of parameters 1: Locked up of parameters	1	0	58
	F2.00	Option of start mode	0/1 regular start/re start after inspection	1	0	59
	F2.01	Option for stop mode	0/1 ~ slow down/auto stop	1	0	59
	F2.02	Setup of start frequency	0.10~10.00Hz	0.01	0.5	60
	F2.03	Setup of stop frequency	0.10~10.00Hz	0.01	0.5	61
	F2.04	Current for DC braking in start	0~150% pole rated current	1%	100%	
	F2.05	Time for direct braking in start	0~25.0S	0.1	0	62
	F2.06	Current of DC braking in stop	0~150% pole rated current	1%	100%	62
	F2.07	Time for DC braking in stop	0~25.0S	0.1	0	62
	F2.08	Automatic torque compensation	0~20.0%	1	0	62
	F2.09	Rated voltage of motor	0~500.0V	0.1	380.0	63
	F2.10	Rated current of motor	0 setup current of system	0.1	Change	63
	F2.11	No load current ratio of motor	0-100%	0.1	40%	63
	F2.12	Rated rotation rate of motor	0-6000r/min	1	1420	63
	F2.13	Number of poles	0-20	2	4	63
	F2.14	Rated slip of motor	0~10.00Hz	0.01	2.50	63
	F2.15	Rated frequency of motor	0-400.00Hz	0.01	50.00	64
	F2.16	Resistance of stator	0-100ohm	0.01	0	64
	F2.17	Resistance of rotor	0-100ohm	0.01	0	64
	F2.18	Self inductance of rotor	0-1.000H	0.01	0	64

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	Code	Name	Description	Unit	Default	Page
	F2.19	Mutual inductance of rotor	0~1.000H	0.01	0	66
	F2.20	Time for torque compensate filter	0~10.00S	0.01s	0.10	
Input and output application	F3.00	FIV minimum voltage input	0~FIV maximum voltage	0.1	0	65
	F3.01	FIV maximum voltage input	FIV minimum voltage~10V	0.1	10.0	65
	F3.02	FIV input filter time	0~25.0S	0.1	1.0	65
	F3.03	FIC minimum current input	0~FIC maximum current	0	0	65
	F3.04	FIC maximum current input	FIC minimum current input~20mA	0.1	20.0	65
	F3.05	FIC input filter time	0~25.0S	0.1	1.0	65
	F3.06	FOV minimum voltage output	0~FOV maximum voltage	0.1	0	66
	F3.07	FOV maximum voltage output	FOV maximum voltage output~10V	0.1	10.0	66
	F3.08	FOC minimum current output	0~FOC maximum current	0.1	0	67
	F3.09	FOC maximum current output	FOC minimum current~20mA	0.1	20.0	67
	F3.10	Frequency of low analog	0~600.00		0.00	68
	F3.11	Direction of low analog	0/1	1	0	68
	F3.12	Frequency of high analog	0~600.00	0.01	50.00	68
	F3.13	Direction of high analog	0/1	1	0	68
	F3.14	Options for reverse of analog	0/1	1	0	68
	F3.15	Input terminal FWD (0~32)	0: Ineffective 1: Jogging forward 2: Jogging reverse 3: Jogging reverse 4: forward/reverse 5: Run 6: forward 7: Reverse	1	6	71

Chapter 6 Table of Functional Parameters

	Code	Name	Description	Unit	Default	Page
Secondary application	F6.01	PID running mode	0: Negative feedback mode of PID 1: Negative and positive feedback mode of PID	1	0	97
	F6.02	Option for PID target value	0: Select figure as target value 1: Take FOV as target value 2: Pick up FOC as target value	1	0	98
	F6.03	Option for PLD feedback value	0: Take FOV as feedback value 1: Take FOC as feedback value 2: Take balance of FOV_FOC as feedback value	1	0	98
	F6.04	PID figure target value	0.0~100.0%	0.1%	0.0%	99
	F6.05	Upper limit value for PID alarm	0.0~100.0%	1%	100%	100
	F6.06	Lower limit value for PID alarm	0.0~100.0%	1%	0%	101
	F6.07	Value for P of PID	0.0~200.0%	0.1%	100%	101
	F6.08	Value for I of PID	0.0~200.0S, 0 is closed	0.1s	0.1s	101
	F6.09	Value for D of PID	0.00.0~20.00 S, 0 is closed	0.1s	0.0	101
	F6.10	Step of each PID actuating	0.00~1.00Hz	0.01	0.10Hz	101
	F6.11	PID sleep frequency	0.00~120.0Hz (0.00Hz) 0.00Hz means sleep function is closed	0.01	0.00Hz	102
	F6.12	Time when PID sleep is active	0~200s	1S	10s	102
	F6.13	Value for awoken PID from sleep	0~100%	1%	0	102
	F6.14	Corresponding value of PID display	0~10000	1	1000	103
	F6.15	Digital number PID display	1~5	1	1	103

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	Code	Name	Description	Unit	Default	Page
Input and output application	F3.16	Input terminal REV (0~32)	8: Stop 9: Multi-section speed terminal 1	1	7	71
	F3.17	Input terminal S1(0~32)	10: Multi-section speed terminal 2	1	1	71
	F3.18	Input terminal S2(0~32)	11: Multi-section speed terminal 3 12: Multi-section speed terminal 4 13: 13: Acc/De terminal 1 14: 13: Acc/De terminal 2 15: Frequency increase signal (UP) 16: Frequency decrease signal (DOWN) 17: Emergency stop signal	1	18	71
	F3.19	Input terminal S3 (0~32)	18: Fault reset signal 19: PID in running	1	15	71
	F3.20	Input terminal S4 (0~32)	20: PLC in running 21: Start signal for timer 1 22: Start signal for timer 2	1	16	71
	F3.21	Input terminal S5 (0~32)	23: Counter pulse signal 24: Counter reset signal	1	8	71
	F3.22	Input terminal S6 (0~32)	25: Memory clear 26: Start winding movement	1	9	71
	F3.23	Output terminal M01 (0~32)	0: Ineffective 1: In running	1	01	76
	F3.24	Output terminal M02 (0~32)	2: Frequency reached 3: Fault 4: Zero speed	1	02	76
	F3.25	Alarm output terminal YA,YB, YC (0~32)	5: Frequency 1 reached 6: Frequency 2 reached 7: Acceleration	1	03	76
	F3.28	Alarm output terminal KA, KB (0~32) (*The board with KA,KB terminal only)	8: Deceleration 9: Indication for low voltage 10: Timer 1 reached 11: Timer 2 reached 12: Indication for completion of phase	1	0	76

Chapter 6 Table of Functional Parameters

	Code	Name	Description	Unit	Default	Page
Input and output application	F3.28	Alarm output terminal KA, KB (0~32) (*The board with KA,KB terminal only)	13: Indication for completion of procedure 14: PID upper limit 15: PID lower limit 16: 4-20mA disconnection 17: Detection of overload 18: Examination for over torque 26: Completion of winding 27: Counter reached 28: Intermediate counter reached 29: Water supply by constant voltage "1" effective "2" ineffective	1	0	76
	F3.26	Output terminal FOV (0~32)	0: Frequency output 1: Current output	1	0	79
	F3.27	Output terminal FOC (0~7)	2: DC voltage 3: Ac voltage 4 pulse output, 1impulse/HZ 5.pulse output, 2impulse/HZ 6 pulse output, 3impulse/HZ 7.pulse output, 6impulse/HZ	1	1	79
	F3.29	Terminal scan time	0.001~1.000S	0.001	0.02	79
Secondary application	F4.00	Jogging frequency setting	0.00~max frequency	0.01	5.00	81
	F4.01	Acceleration time 2	0~6000.0S	0.1S	10.0	81
	F4.02	Deceleration time 2	0~6000.0S	0.1S	10.0	81
	F4.03	Acceleration time 3	0~6000.0S	0.1S	20.0	81
	F4.04	Deceleration time 3	0~6000.0S	0.1S	20.0	81
	F4.05	Acceleration time 4/jogging acceleration time	0~6000.0S	0.1S	2.0	81

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	Code	Name	Description	Unit	Default	Page
Secondary application	F4.06	Deceleration time 4/jogging deceleration time	0~6000.0S	0.1S	2.0	81
	F4.07	Designated value of counter	0~65000	1	100	81
	F4.08	Intermediate value of counter	0~65000	1	50	81
	F4.09	Limitation of acceleration torque	0~200%	1%	150%	82
	F4.10	Limitation of constant speed torque	0~200%	1%	00	82
	F4.11	Prevent over-voltage in deceleration	0/1	1	1	83
	F4.12	Option for automatic voltage regulation	0~2	1	1	84
	F4.13	Option for automatic energy saving	0~100%	1%	00	84
	F4.14	Actuate voltage of brake-pipe	Change	0.1	Change	84
	F4.15	Actuate ratio of brake-pipe	40~100%	1	50%	84
	F4.16	Option for restart after power off	0~1	1	0	85
	F4.17	Time for power off allowed	0~10S	1	5.0S	86
	F4.18	Limitation of torque in racing start	0~200%	1	150%	87
	F4.19	Time for racing start	0~25.0S	1	0.0	87
	F4.20	Restart time in fault	0~5	1	0	87
	F4.21	Restart time in fault	0~100.0S	2	2	87
	F4.22	Option for actuating in over torque	0~3	1	0	88
	F4.23	Horizontal detection of over torque	0~200%	1	00	88
	F4.24	Time of detection of over torque	0~20.0S	0.1	00	88
	F4.25	Reach frequency 1	0.00-upper limit frequency	0.01	100	89

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	Code	Name	Description	Unit	Default	Page
Secondary application	F4.26	Reach frequency 2	0.00-upper limit frequency	0.01	5.0	89
	F4.27	Setup timer 1	0~10.0S	0.1	0	89
	F4.28	Setup timer 2	0~100.0S	1	0	89
	F4.29	Time for torque of constant speed	0~6000.0S	0.1	Change	90
	F4.30	Frequency reach width	0.00-2.00	0.01	0.50	90
	F4.31	Jump frequency 1	0.00-upper frequency	0.01	0	90
	F4.32	Jump frequency 2	0.00-upper frequency	0.01	0	90
	F4.33	Jump frequency width	0.00-2.00	0.01	0.50	90
	F4.34	Up/Down frequency step length	0~10.00Hz	0.01	0.1	90
	F4.35	Up/Down frequency record	0:record 1:not record	1	0	90
	F5.00	PLC memory mode	0~1	1	0	91
	F5.01	PLC start mode	0~1	1	0	91
	F5.02	PLC running mode	0: PLC stops after running in a cycle 1: PLC stop mode, it stops after running in a cycle 2: PLC circular running 3: PLC stop mode, circular running mode 4: PLC operates at the last frequency after running in a cycle.	1	0	92
	F5.03	Multi-section speed terminal 1/Start frequency	0.00~maximum running frequency	0.01	10.0	93
	F5.04	Multi-section speed terminal 2/wind start frequency	0.00~maximum running frequency	0.01	15.00	93
	F5.05	Multi-section speed terminal 3/wind stop frequency	0.00~maximum running frequency	0.01	20.00	93
	F5.06	Multi-section speed terminal 4	0.00~maximum running frequency	0.01	25.00	93

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	Code	Name	Description	Unit	Default	Page
Secondary application	F5.07	Multi-section speed terminal 5	0.00~maximum running frequency	0.01	30.00	93
	F5.08	Multi-section speed terminal 6	0.00~maximum running frequency	0.01	35.00	93
	F5.09	Multi-section speed terminal 7	0.00~maximum running frequency	0.01	40.00	93
	F5.10	Multi-section speed terminal 8	0.00~maximum running frequency	0.01	45.00	93
	F5.11	Multi-section speed terminal 9	0.00~maximum running frequency	0.01	50.00	93
	F5.12	Multi-section speed terminal 10	0.00~maximum running frequency	0.01	10.00	93
	F5.13	Multi-section speed terminal 11	0.00~maximum running frequency	0.01	10.00	93
	F5.14	Multi-section speed terminal 12	0.00~maximum running frequency	0.01	10.00	93
	F5.15	Multi-section speed terminal 13	0.00~maximum running frequency	0.01	10.00	93
	F5.16	Multi-section speed terminal 14	0.00~maximum running frequency	0.01	10.00	93
	F5.17	Multi-section speed terminal 15	0.00~maximum running frequency	0.01	10.00	93
	F5.18	PLC running time 1/winding time	0~65000	1S	100	93
	F5.19	PLC running time 2	0~65000	1S	100	93
	F5.20	PLC running time 3	0~65000	1S	100	93
	F5.21	PC running time 4	0~65000	1S	100	93
	F5.22	PLC running time 5	0~65000	1S	100	93
	F5.23	PLC running time 6	0~65000	1S	0	93
	F5.24	PLC running time 7	0~65000	1S	0	93
	F5.25	PLC running time 8	0~65000	1S	0	93
	F5.26	PLC running time 9	0~65000	1S	0	94
	F5.27	PLC running time 10	0~65000	1S	0	94
	F5.28	PLC running time 11	0~65000	1S	0	94
	F5.29	PLC running time 12	0~65000	1S	0	94
	F5.30	PLC running time 13	0~65000	1S	0	94

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	Code	Name	Description	Unit	Default	Page
Secondary application	F5.31	PLC running time 14	0~65000	1S	0	94
	F5.32	PLC running time 15	0~65000	1S	0	94
	F5.33	PLC running direction	0~32767	1	0	94
	F5.34	Wind function	0: switch off 1:switch on	1	0	97
	F6.00	PLD start mode	0: PLD prohibited 1: PLD open 2: Conditional running of PLD. PLD is open when external terminal is effective.	1	0	97
	F6.01	PID running mode	0: Negative feedback mode of PID 1: Negative and positive feedback mode of PID	1	0	97
	F6.02	Option for PID target value	0: Select figure as target value 1: Take FIV as target value 2: Pick up FIC as target value	1	0	98
	F6.03	Option for PLD feedback value	0: Take FIV as feedback value 1: Take FIC as feedback value 2: Take balance of FIV-FIC as feedback value 3. Take balance of FIC-FIV as feedback value	1	0	98
	F6.04	PID figure target value	0.0~100.0%	0.1%	0.0%	99
	F6.05	Upper limit value for PID alarm	0.0~100.0%	1%	100%	100
	F6.06	Lower limit value for PID alarm	0.0~100.0%	1%	0%	101
	F6.07	Value for P of PID	0.0~200.0%	0.1%	100%	101
	F6.08	Value for I of PID	0.0~200.0S, 0 is closed	0.1s	0.1s	101
	F6.09	Value for D of PID	0.00.0~20.00 S, 0 is closed	0.1s	0.0	101
	F6.10	Step of each PID actuating	0.00~1.00Hz	0.01	0.10Hz	101

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	Code	Name	Description	Unit	Default	Page
Secondary application	F6.11	PID sleep frequency	0.00~120.0Hz (0.00Hz) 0.00Hz means sleep function is closed	0.01	0.00Hz	102
	F6.12	Time when PID sleep is active	0~200s	1S	10s	102
	F6.13	Value for awoken PID from sleep	0~100%	1%	0	102
	F6.14	Corresponding value of PID display	0~10000	1	1000	103
	F6.15	Digital number PID display	1~5	1	1	103
	F6.16	Digital number of decimal figure of PID display	0~4	1	1	103
	F6.17	PID upper limit frequency	0~maximum running frequency	0.01	48.00	104
	F6.18	PID lower limit frequency	0~maximum running frequency	0.01	20.00	104
	F6.19	PID work mode	0: Always in work mode, when PID is open 1: When feedback reaches P6.05, it will work at minimum running frequency. When feedback reaches F6.06, PID will begin to work..	1	0	104
	F6.20	Deviation limitation	0~10%	0.1%	1.0%	104
Parameters of communication	F7.00	Speed for communication data	0: 4800 1: 9600 2: 19200 3: 38400		0	105
	F7.01	Communication mode	0: 8N1 FOR ASC 1: 8E1 FPR ASC 2: 8O1 FOR ASC 3: 8N1 FOR RTU 4: 8E1 FOR RTU 5: 8O1 FOR RTU		0	105
	F7.02	Local address of communication	0~240	1	0	105
	F8.00	Parameters for superior applications	0: Locked 1: Unlocked	1	0	112

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	Code	Name	Description	Unit	Default	Page
Parameters of communication	F8.01	Setup of system	0:50Hz 1:60Hz	1	0	112
	F8.02	Option of constant torque or changing torque	0: Constant torque 1: Changeable torque	1	0	112
	F8.03	Setup of guaranteed level of over voltage	Change	1	Change	112
	F8.04	Setup of guaranteed level of low voltage	Change	1	Change	113
	F8.05	Setup of guaranteed level of over temperature	40~120℃	1	85/95℃	113
	F8.06	Setup of displaying current filter time	0~10.0S	0.1	2.0	113
	F8.07	0-10V analog output of low calibration coefficient	0-65535	1	-	113
	F8.08	0-10V analog output of high calibration coefficient	0-65535	1	-	113
	F8.09	0-20mA analog output of low calibration coefficient	0-65535	1	-	113
	F8.10	0-20mA analog output of high calibration coefficient	0-65535	1	-	113
	F8.11	Forward /Reverse operation compensation frequency point	0~maximum running frequency	0.01	0.00	113
	F8.12	Up/Down frequency record	0: record 1: not record	1	0	113
	F8.12	Up/Down frequency record	0: record 1: not record	1	0	113

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7-1 Parameters for Monitoring

F0.00	Display option setup default 00		
	Range 00-32	00	Display frequency setup
		01	Display frequency output
		02	Display current output
		03	Display rotation rate output/ PID target value
		04	Display main loop DC voltage
		05	Display temperature of module in AC motor speed controller
		06	Display of PID feedback

User can set the initial image of AC motor speed controller as the image which the user most desires through F0.00 setup so as to make monitoring more convenient.

For example, if the user wants to monitor rotation rate by main display image, the user can make the image display rotation rate by setting F0.00 as 03. The default of the parameter is 00. Therefore, it displays frequency setup directly when the power is on.

F0.01	Frequency setup
	Display the current frequency of AC motor speed controller.

You can monitor current frequency setup of AC motor speed controller by examining the content of the parameter.

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F0.02	Output frequency
	Display the present output frequency of AC motor speed controller.

You can monitor present output frequency of AC motor speed controller by examining parameter F0.02.

F0.03	Current output
	Display the present output current of AC motor speed controller.

You can monitor present output current by examining parameter F0.03.

F0.04	Rotation rate
	Display the present rotation rate of motor.

You can monitor actual rotation rate of motor by examining parameter F0.04.

F0.05	Voltage of DC bus
	Display the voltage of DC bus in main loop of AC motor speed controller.

You can monitor present voltage of DC bus of main loop in AC motor speed controller by examining parameter F0.05.

F0.06	Temperature of AC motor speed controller
	Display the present temperature of AC motor speed controller module.

You can monitor present temperature of AC motor speed controller module by examining parameter F0.06, which will help you make a judgment on the running condition of AC motor speed controller.

F0.10	Error record 1
F0.11	Error record 2
F0.12	Error record 3
F0.13	Error record 4
	Record the latest four errors of AC motor speed controller.

You can check condition of latest four errors by examining F0.10 to F0.13. These four parameters can help user make a judgment on the running condition of AC motor speed controller and find the cause of production error and eliminate concealed trouble.

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You can check detailed state when the latest error takes place by examining the content of F0.14-F0.18. You can examine the setup frequency, actual output frequency, and actual output current and actual output voltage, DC voltage of main loop. According to the above data, you can analyze the cause of errors and

F0.14	The frequency at which the last error takes place
F0.15	The output frequency in last error
F0.16	The output current in last error
F0.17	The output voltage in last error
F0.18	The DC voltage in last error
	They display the detailed status of the latest error:. You can check the actual setup frequency, actual output frequency, and DC voltage of main loop in AC motor speed controller by examining these parameters respectively.

find a solution quickly, which will help maintenance personnel in repairing work.

What more important is that for the Model A. P. H., you can use setup mode to choose main image freely and to monitor related content directly through F0.01-F0.08, but also you can examine related content by directly switching the operating panel.

When the operating panel is set for the following four conditions, you can check related content by pressing. "  " Take setup frequency as main image for example as below

Procedure	Press key	Press key	Explanation
1	Turn on power	RDY FREE • • 	A. AC motor speed controller is in standby mode. B. The main image is displaying setup frequency. C. the main image is displaying setup frequency when FREE light is on

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Procedure	Press key	Press key	Explanation
2	Press 	DRV • 50.00	Start AC motor speed controller A. AC motor speed controller is in running and DRV light is on. B. The image is displaying setup frequency. C. AC motor speed controller is in forward state when forward light is on.
3	Press  once	DRV FOUT • • 50.00	Switch display image; switch to actual output frequency. A. AC motor speed controller is in forward state. B. The actual output frequency is 50.00Hz. C. FOUT light is on.
4	Press  once	DRV IOUT • • 002.50	Switch display image; switch to actual output current. A. The actual current output is 2.5A B. The current image is displaying actual output current when IOT light is on.
5	Press  once	DRV • 380.00	Switch display image; switch to actual output voltage. A. The current actual output voltage is 380V.
6	Press  once	DRV • 50.00	Switch to main image A. Return to main image which will display setup frequency. B. The setup frequency is 50.00Hz

7-2 Parameters for basic running

F1.00	Setup of dominant frequency default: 0.00Hz			
	Range	0.00-uppper frequency	Unit	0.01

When F1.01 is set for 0, which is frequency setup option. When the setup mode is figure digital frequency, running frequency of AC motor speed controller is decided by F1.00.

In running, you can change frequency by modifying content of parameter F1.00 or by pressing upward key or downward key. If you change frequency by modifying F1.00, the modified content will be stored when AC motor speed controller stops running or power is off.

If you change frequency by pressing upward or downward key, the modified content will not be stored when AC motor speed controller stops running or power is off. Stored F1.00 will be worked when AC motor speed controller is started next time.

F1.01	Frequency setup option default: 0			
	Range	0.00-uppper frequency	Unit	0.01
	Content	0: Digital frequency setup 1: Analog voltage setup 2: Analog current setup 3. Keyboard POT setup 4 UP/DOWN setup 5: RS485 communication setup		

Frequency setup option is used in selecting running frequency of AC motor speed controller.

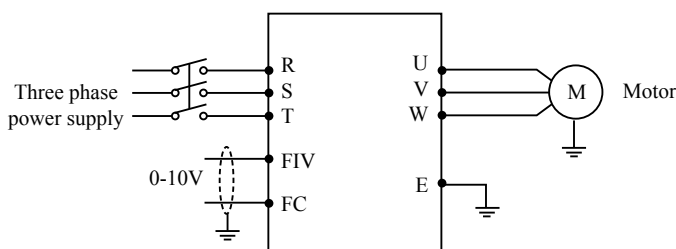
0: Digital frequency setup

Running frequency of AC motor speed controller is decided by F1.00. You can change running frequency by pressing upward or downward key on operating panel. Refer to F1.00 in detail.

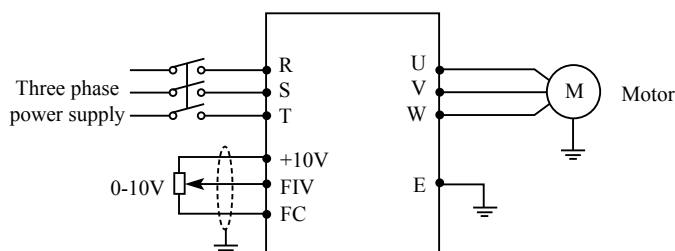
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1: Analog voltage setup

Running frequency of AC motor speed controller is decided by external voltage signal (0-10V), put into AC motor speed controller through FIV terminal. There are two modes of external voltage signal: one is designated signal ranging from 0 to 10V; the other is designated by POT. Refer to the following diagram for connection method.



Explanation: control the running frequency of AC motor speed controller from 0 to 10V by FIV or FC

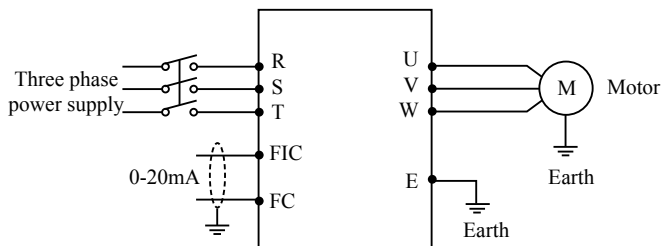


Explanation: control running frequency of AC motor speed controller been sent FIV voltage signal by external POT (10Kohm)

2: Analog current setup

The running frequency of AC motor speed controller is decided by external current signal (0-20mA). Control the running frequency of AC motor speed controller by external terminal FIC.

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3: Keyboard POT setup

You can control running of AC motor speed controller by the POT knob on operating panel. That would be very convenient. Pay attention to the POT knob on operating panel with function of switching monitor images. Please be careful to use it.



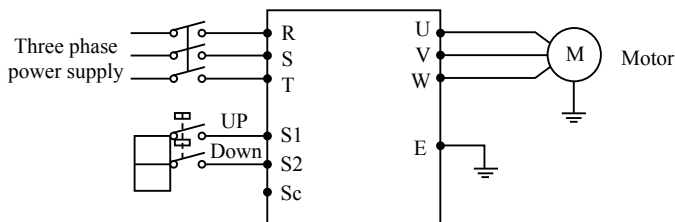
Turn: change running frequency



Press: switch between monitoring images

4 UP/DOWN setup

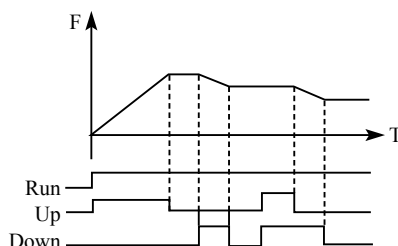
The running frequency is controlled by external UP/DOWN terminal. External terminals can be selected from F3.15 to F3.22, been selected one of external terminals as UP/DOWN. When UP is Effective, the frequency will go up. When DOWN is effective, the frequency will go down. When both UP and DOWN are effective, the frequency will be the same.



Parameter: F3.17=15, S1 terminal will be set in UP mode.

F3.18=16, S2 terminal will be set in DOWN mode.

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Explanation: When Up is effective (Up is connected), frequency will go up.

When Down is effective (Down is connected), frequency will go down.

F1.02	Running setup option				default
	Range	0-2	Unit		1
	Content	0: Operating panel 1: IO terminal 2: RS485			

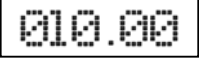
Running setup option is used in setting signal source.

0: Operating panel

Operating panel sends running signal. The running of AC motor speed controller can be controlled by the FWD key (Forward) and REV (Reverse) key in operating panel of AC motor speed controller. Press stop key to stop running of AC motor speed controller.

Procedure	Press key	Display	Explanation
1	Turn on power	RDY 	Presume the frequency is set at 10.0Hz
2		DRV 	A. AC motor speed controller is in running mode. B. AC motor speed controller is in forward C. The running frequency is 10.00Hz

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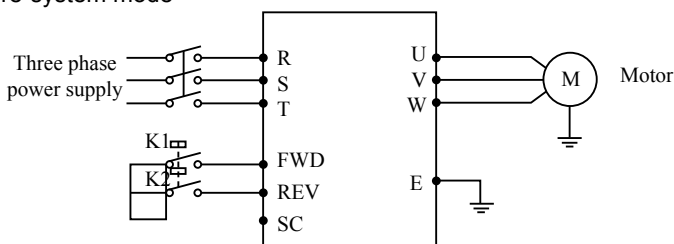
3		DRV 	A. AC motor speed controller is in reverse running mode. B. Switch between forward and reverse of AC motor speed controller C. The running frequency is 10.00Hz
4		DRV 	A. AC motor speed controller stops running B.AC motor speed controller is in standby mode.

1: IO terminal

IO terminal sends running command. You can setup external terminal at will. The default of FWD terminal is forward and the default of REV is reverse.

You can form two-wire-system or three-wire-system control mode by using IO terminal.

A. Two-wire-system mode



Parameter: F3.15=6

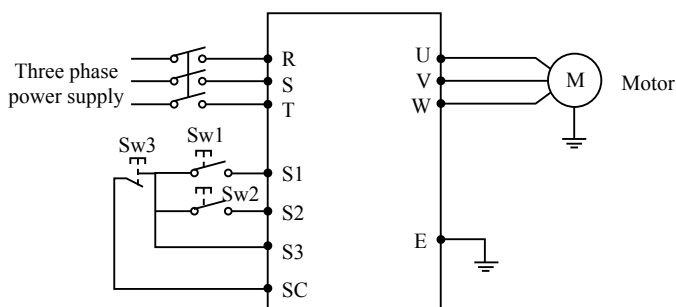
F3.16=7

Actuating explanation:

Shape and condition		Condition of AC motor speed controller
K1	K2	
ON	OFF	Forward
OFF	OFF	Stop
OFF	ON	Reverse
ON	ON	Keep running condition

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B. Three-wire-system mode



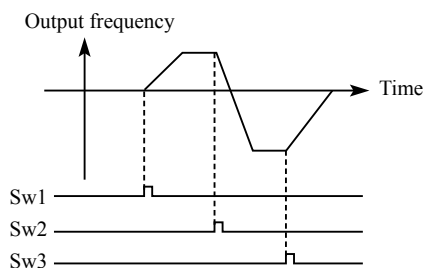
Use S1, S2, or S3 as input terminal for external signal

Parameter: F3.17=6 S1 is in forward

F3.18=7 S2 is in reverse

F3.19=9 S3 is in stop mode

F1.02=1 external terminal input



2: RS485

Serial interface sends running command to AC motor speed controller. AC motor speed controller will receive command from upper computer by serial interface.

F1.03	Setup of stop key		default 1	
	Range	0-1	Unit	1
	Content	0: stop key is ineffective 1: stop key is effective		

When the running setup option is 1 or 2, equals the running command coming

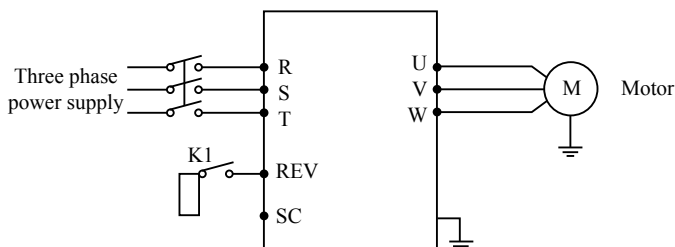
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from external terminal or RS485, you can set stop key  on operating panel as ineffective or effective to prevent wrong running.

When F1.03 is set for 0, equals stop key is ineffective, stop key cannot stop running of AC motor speed controller.

When F1.03 is set for 1, equals stop key is effective, stop key can stop running of AC motor speed controller.

Attention: please dismiss running signal after you stop AC motor speed controller with pressing stop key. And restart AC motor speed controller then.



Procedure	Key and state	Explanation
1	K1 connected	Forward of AC motor speed controller starts
2	(K1 still connected) press stop key	AC motor speed controller stops
3	K1 disconnected	Running signal is removed
4	K1 connected	Forward of AC motor speed controller starts

F1.04	Setup of reverse default 1			
	Range	0-1	Unit	1
	Content	0: Reverse prohibited 1: Reverse allowed		

Many machines only allow one single direction of rotation but not reverse; otherwise, mechanical fault or accident may take place. You can set machines in one single rotation mode by the parameter.

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0: Reverse prohibited

Reverse of motor is prohibited. When F1.04 is set at reverse prohibited, switching between forward and reverse will be ineffective.

1: Reverse allowed

Motor allows reverse, switching between forward and reverse will be effective.

F1.05	Maximum running frequency default 50.00	
	Range	Minimum running frequency ~400.00Hz

The running range of AC motor speed controller is between 0.1~400.00Hz. Therefore, AC motor speed controller tends to run high speed. Generally, motor and other machine run at 50Hz of the frequency. Over running may get mechanical fault or accident.

You can limit maximum running frequency of motor by the parameter preventing motor from high speed, wear of machine, and concealed trouble. You can set a maximum running frequency for AC motor speed controller according to actual need in production and techniques preventing wrong running.

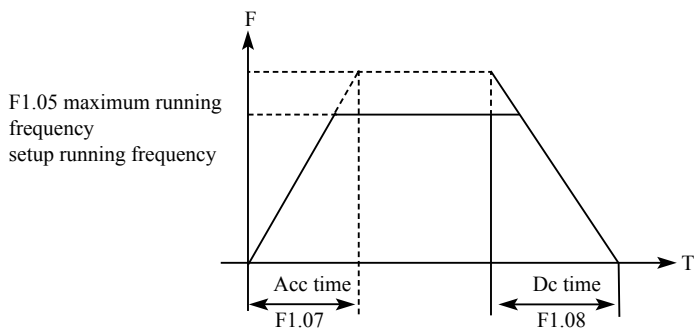
F1.06	Minimum running frequency default 0.00	
	Range	0.00~maximum running frequency

Some machines and devices cannot be operated below a certain rotation speed in techniques. Especially, POT tends to get false operation. You can put a limit to the minimum running frequency by the parameter. If the setup frequency signal is below that limit, AC motor speed controller will still output minimum frequency. AC motor speed controller operates at frequency between minimum running frequency and maximum running frequency, which can prevent false actuating and prevent overheat of motor caused by low running frequency.

F1.07	Acc time default *	
F1.08	DC time default *	
	Range	0.1~6000.0

ACC time is the time which reaches maximum running frequency from 0.00Hz in AC motor speed controller. DC time is the time which lowers minimum running frequency from maximum running frequency in AC motor speed controller.

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The default of acceleration/deceleration time of AC motor speed controller is the primary acceleration/deceleration time. If you need to use other acceleration or deceleration time, you will have to set by external terminal.

F1.09	V/F maximum voltage		default 400
	Range	V/F intermediate voltage~500.00	Minimum unit 0.01
F1.10	V/F fundamental frequency		default 50
	Range	V/F intermediate frequency ~ maximum running frequency	Minimum unit 0.01
F1.11	V/F intermediate voltage		default *
	Range	V/F minimum voltage ~ V/F maximum voltage	Minimum unit 0.1
F1.12	V/F intermediate frequency		default 2.5
	Range	V/F minimum frequency ~ V/F fundamental frequency	Minimum unit 0.01
F1.13	V/F minimum voltage		default 15.0
	Range	0.0 ~ V/F intermediate voltage	Minimum unit 0.1
F1.14	V/F minimum frequency		default 1.25
	Range	0.00.0~ V/F intermediate frequency	Minimum unit 0.01

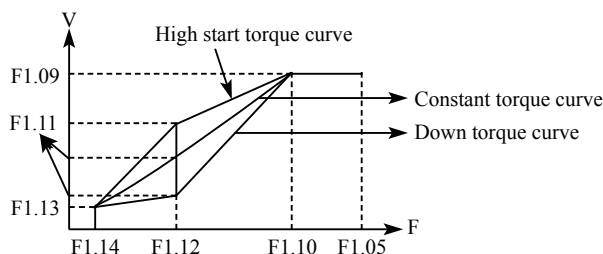
F1.09 to F1.14 of the parameters determine V/F curve of AC motor speed controller. Set. V/F curve corresponds with different load.

Constant torque curve: apply to constant torque load, output voltage and output frequency in linear.

Down torque curve: apply to double torque load, like fan and pump. Load which will increase as increasing of rotation rate is low in beginning.

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High start torque curve: apply to heavy machine, whose load will quickly decrease to a certain value in beginning.



F1.09: Maximum V/F voltage.

Maximum V/F voltage which is set according to the parameter of motor brand will be at the rated voltage of motor in general. When motor is far away from AC motor speed controller, over 30m, it should be set for higher value.

F1.10: Standard V/F frequency

Please set according to the rated running voltage frequency of motor. Do not change standard V/F frequency setup. Otherwise, that may damage motor.

F1.11: intermediate V/F voltage

Set intermediate V/F voltage according to the specific load. Improper setup will cause over current of motor or insufficient output of torque, or even will cause protection of AC motor speed controller. Increasing the value of F1.11 will increase output torque. Meanwhile, output current will increase as well. Please monitor output current while changing the value of F1.11. The general requirement for setup is as the following: For start smoothly of AC motor speed controller, the current must be in the limit of AC motor speed controller in starting. Adjust up value of the parameter slowly until ideal value. Do not try to increase the value greatly. Otherwise, it may cause protection of AC motor speed controller or fault.

F1.12: intermediate V/F frequency

V/F intermediate frequency determines the intermediate point of V/F curve. Improper setup will cause insufficient torque or over current protection of AC motor speed controller. Do not change the setup value of the parameter in using.

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F1.13: minimum V/F voltage

V/F minimum voltage setup is related to start torque. Increasing the value properly for the parameter may increase the torque of starting, and also cause over current. Generally, do not change the value of

F1.14: minimum V/F frequency

V/F minimum frequency determines the initial point of V/F curve, which is the minimum start value of AC motor speed controller.

Different loads have different V/F curves. According to the actual situation, adjust the V/F curve setup properly for AC motor speed controller. Refer to the following table for the specific default of each model of AC motor speed controller.

Parameter Model	F1.07	F1.08	F1.11	F1.15
HCA20P4	7	7	15	10
HCA20P7	8	8	14	10
HCA21P5	9	9	14	9
HCA22P2	10	10	13	9
HCA23P7	12	12	13	5
HCA25P5	15	15	12	5
HCA27P5	18	18	11	5
HCA40P7	8	8	27	10
HCA41P5	9	9	26	9
HCA42P2	10	10	25	8
HCA43P7	12	12	24	8
HCA45P5	15	15	23	7
HCA47P5	18	18	22	6
HCA4011	20	20	22	5
HCA4015	22	22	20	5
HCA4018	28	28	20	4
HCA4022	30	30	19	4
HCA4030	35	35	18	4
HCA4037	38	38	18	4
HCA4045	40	40	17	4

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Parameter Model	F1.07	F1.08	F1.11	F1.15
HCA4055	45	45	17	3
HCA4075	50	50	16	3
HCA4090	60	60	16	2
HCA4110	80	80	15	2
HCA4132	100	100	15	2
HCA4160	120	120	14	1
HCA4185	150	150	13	1
HCA4200	200	200	12	1
HCA4220	200	200	12	1
HCA4250	220	220	12	1
HCA4280	250	250	12	1
HCA4300	280	280	11	1

F1.15	Carrier frequency	default *
	Range	1-15 unit 1

Carrier frequency decides the switch frequency of power module in AC motor speed controller. AC motor speed controller with different frequency has different default because carrier frequency is affected by noise, heat effect and disturbance.

Carrier frequency F1.15	Noise	Heat rate	Effect on environment
Higher → Lower	Higher → Lower	Lower → Higher	Lower → Higher

Learning from the content of the above table, higher carrier frequency, lower noise, and higher heat rate will cause greater effect on environment.

Therefore, when environment does not allow AC motor speed controller running with noise, you shall increase the value of F1.15. The maximum load of AC motor speed controller will decrease. For further occasion between motor and AC motor speed controller, you shall lower the value of F1.15 to decrease power leakage in wires and between wire and ground.

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When the temperature of environment and load of motor are higher, you shall lower the value of F1.15 to improve the thermal property of AC motor speed controller. Refer to table in F1.14 for the default of F1.15.

F1.17	Initialization of parameters default 0	
	Range 0-8	Unit 1
	Content	8: Initialization of parameters

When improper parameter setup or wrong operation, you may set F1.17 for 08 to restore all parameters to the default, and then you can set them again according to actual need.

Attention: when locked parameters are effective, that is F1.18=1, you cannot carry out and change initialization of parameters. Please unlock first, and then set these parameters.

F1.18	Initialization of parameters default 0	
	Range 0-1	Unit 1
	Content	0: Unlocked 1: Locked

You can lock up parameter by F1.18 to prevent unrelated personnel from improper changing and running.

When F1.18 is effective, that is parameters are locked. Parameters cannot be changed except this parameter and dominant frequency setup.

7.3 Parameters of basic applications

F2.00	Options of start mode default 0			
	Range	0-1	minimum unit	1
	Content	0: Start at start frequency 1: Racing start		

There are two start modes for Model A. P. H. You can select from F2.00 according to the condition of machinery.

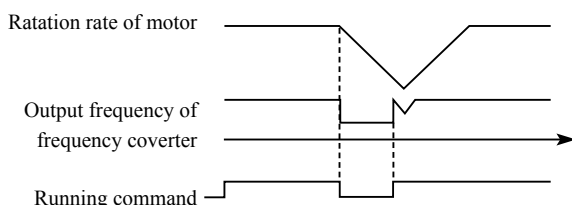
0: Start at start frequency

Most loads do not need special requirement in start. In general, start the machine at start frequency that is the regular start mode.

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1: Racing start

Racing start is suitable for restart in fault reset. In this situation, AC motor speed controller can automatically judge the rotation rate and direction of motor when you use racing start. And also start up the stopped motor directly according to the result of measurement and follow-up.



Attention: when AC motor speed controller starts in racing start mode, AC motor speed controller will keep track of the speed from high to low frequency. High current may be in start, and meeting over current is possible. Therefore, please notice over current level setup (4.09 setup) the specific value depends on the load.

Besides, when the value of 4.09 is set too low, it will start up follow-up slowly. In the follow-up process, if current surpasses follow-up level, AC motor speed controller will stop follow-up. Once the current is decrease down the level, AC motor speed controller will resume follow-up again.

F2.01	Options of stop mode			default 0	
	Range	0-1		unit	1
	Content	0: Decelerate to stop 1: Free running stop			

You can choose a suitable stop mode according to the actual load.

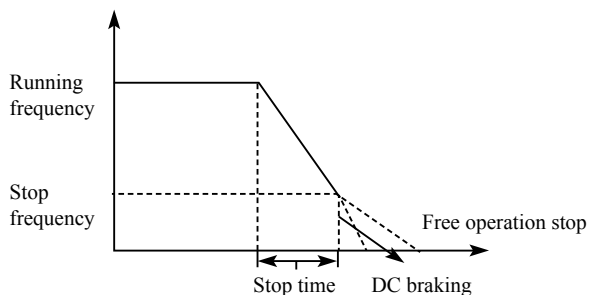
0: Deceleration stop

Once AC motor speed controller receives stop command, it will carry out deceleration according to the deceleration time and decrease output gradually until the output frequency reaches the frequency for stop.

In stop mode after stop frequency is reached, you can choose DC braking and

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other options. If you do not choose DC braking, it will stop in free running stop mode.

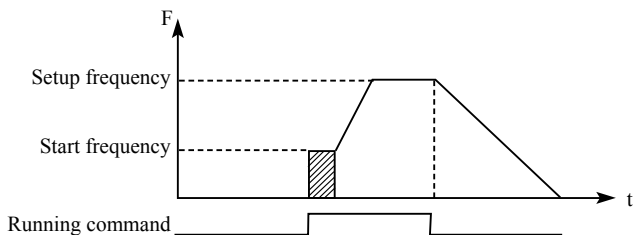


1: Free running stop

When AC motor speed controller receives stop command, it will stop frequency output and it will have free running with load until it stops.

F2.02	Start frequency setup		default 0.5	
	Range	0.10-10.00	unit	0.01

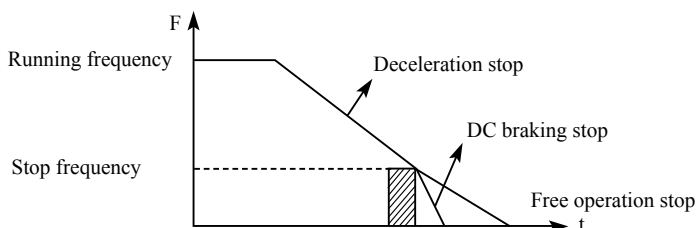
Start frequency is the initial frequency when AC motor speed controller starts. For inertia, heavy load, and device which demands large torque, increasing start frequency can get them started easily. However, if the start frequency is set the value too high, it may cause over current protection.



F2.03	Stop frequency setup		default 0.5	
	Range	0.10-10.00	unit	0.01

When AC motor speed controller receives stop command, it will begin to carry out deceleration and decrease output gradually according to the fixed time until reaching stop frequency. Then it will have free running stop or DC braking stop according to the setup.

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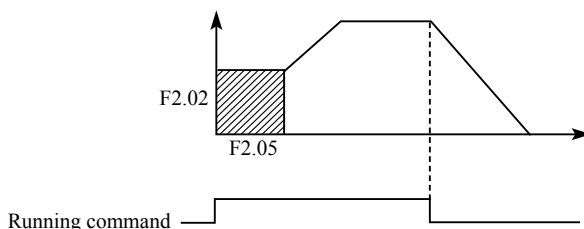
When DC braking is ineffective, AC motor speed controller decreases rotation rate until reaching stop frequency. AC motor speed controller will stop output by free running stop.

F2.04	DC braking current in start			default 100	
	Range	0-150	unit	1	
F2.05	DC braking time in start			default 0	
	Range	0-250	unit	1	

DC braking in start is suitable for fan in stop mode and moving load. Before AC motor speed controller starts, motor is in free running mode and the rotation direction is not specified, AC motor will tend to get over current protection in start. Therefore, you shall open DC braking to let load stay in stop mode before starting, and then start AC motor speed controller. This procedure can prevent over current protection.

DC braking current in start means that is the ratio of rated current of AC motor speed controller. Adjusting F2.04 will get different braking torque. While setting value of parameter, you can adjust it from low to high until reaching sufficient braking torque according to the actual load.

DC braking time is lasting. And when it is 0, DC braking is ineffective.



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F2.06	DC braking current in stop			default 100
	Range	0-150	unit	1
F2.07	DC braking time in stop			default 0
	Range	0-250	unit	1

DC braking in stop is suitable for site which needs braking in strict requirement.

DC braking current in stop is the ratio of rated current of AC motor speed controller. Adjusting the parameter has different braking torque.

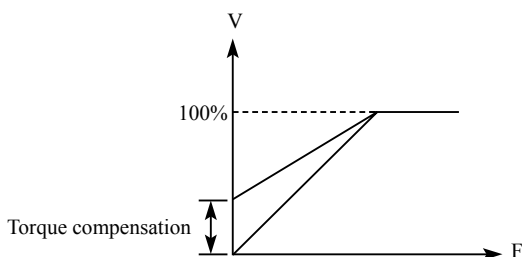
DC braking time is lasting. And when it is 0, DC braking is ineffective.

Refer to the explanations of F2.03, F2.04 and F2.05 for related details.

F2.08	Automatic torque compensation			default 5%
	Range	0.1-20%	unit	0.1

Adjusting parameter F2.08 will increase voltage and obtain higher torque.

Attention: increasing torque by a great margin may make motor heated. Set proper increasing voltage according to the actual load.



F2.09	Rated voltage of motor			default 380.00V
	Range	0-500.00V	Unit	0.01
F2.10	Rated current of motor			default *
	Range		Smallest unit	0.1
F2.11	Rated no load current of motor			default 40
	Range	0-100	Unit	1
F2.12	Rated rotation rate of motor			default 1420
	Range	0-6000	Unit	1

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F2.13	Relative number of motor			default 4
	Range	0-10	Unit	1
F2.14	Rated slip of motor			default 2.5
	Range	0-100	Unit	0.1

The above parameter groups are the motor nameplate. Please follow the nameplate while setting parameters.

F2.09 rated voltage of motor

Please set rated voltage of motor according to voltage value on nameplate.

F2.10 rated current of motor

Please set rated current of motor according to the current value on the nameplate. If the running current exceeds the value of rated current, AC motor speed controller will activate protection to protection motor.

F2.11 rated no load current of motor

The value of no load current of motor would affect slip compensation. No load current is the percentage of motor current.

F2.12 rated rotation rate of motor

The value of parameter F1.12 is related to 50Hz of the rotation rate for displaying. Generally, it shall be set according to the value on the nameplate.

Display the actual rotation rate of motor. You can set parameter F2.12 for actual rotation rate at 50Hz.

F2.13 number of poles

Set the number of pole pairs of motor by adjusting this parameter according to the value on nameplate

F2.14 rated slip

When AC motor speed controller drives a motor, the more slip increase the more load increase. Adjusting F2.14 will set compensation rate and decrease slip and make motor approach simultaneous rotation rate.

F2.15	Rated frequency of AC motor speed controller			default 50Hz
	Range	0.00-400.00	Unit	0.01

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F2.16	Resistance of stator			default 0
	Range	0-100.00	Unit	0.01
F2.17	Resistance of rotor			default 0
	Range	0-100.00	Unit	0.01
F2.18	Self inductance of rotor			default 0
	Range	0-1.000	Unit	0.001
F2.19	Mutual inductance of rotor			default 0
	Range	0-1.000	Unit	0.001

The above parameters are of motor.

F2.15 Rated frequency of motor

Please set rated frequency of motor according to motor nameplate.

F2.16 Resistance of stator

F2.17 Resistance of rotor

F2.18 Self inductance of rotor

F2.19 Mutual inductance of rotor

Set the above parameters according to the actual condition of motor.

7.3 Parameters for input and output application

F3.00	FIV minimum voltage input			default 0
	Range	0~FIV maximum voltage input	Unit	0.1
F3.01	FIV maximum voltage input			default 10.0
	Range	FIV minimum voltage input~110.0V	Unit	0.1
F3.02	FIV input filter time			default 1.0
	Range	0-25.0	Unit	1

F3.00 FIV minimum voltage input

FIV minimum voltage input value is related to frequency of low analog. Voltage signal below the value is as ineffective one.

F3.01 FIV maximum voltage input

FIV maximum voltage input value is related to frequency of high analog. For voltage higher than the value, the machine will still operate by value.

The value of F3.00 and F3.01 which are suitable for upper computer with different
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output deciding the range of input voltage. Due to disturbance and other reasons, error running is apt to take place with signal no more than 1V. Set F3.00 to avoid the signal below 1V for improving the anti-disturbance capacity.

F3.02 input filter time

Value of input filter time decides the analog response speed of AC motor speed controller. With the increasing value of F3.02, AC motor speed controller will get slower for responding of analog change.

F3.03	FIC minimum current input			default 0	
	Range	0~FIC maximum current input	Unit	0.1	
F3.04	FIC maximum current input			default 20.0	
	Range	FIC minimum current input-20.0mA	Unit	0.1	
F3.05	FIC input filter time			default 1.0	
	Range	0-25.0 S	Unit	0.1	

F3.03: FIC minimum current input

FIC minimum current input is related to frequency of low analog. AC motor speed controller will take current signal below value of F3.03 as ineffective.

F3.04: FIC maximum current input

FIC maximum current input is related to frequency of high analog. For current command higher than value of F3.04, AC motor speed controller will operate by value.

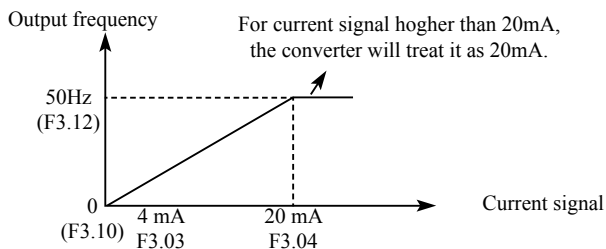
F3.05: FIC input filter time

FIC input filter time decides how fast AC motor speed controller responds is in analog change. With the increase of value of F3.05, AC motor speed controller will respond more and more slowly in analog change. The output of AC motor speed controller will be relatively stable.

Refer to explanation of F3.00 to F3.02 for related parameters. If the external input is voltage signal, please refer to F3.00-F3.02. If the external input is current signal, please refer to F3.03-F3.05.

For example, if the output signal of upper computer is 4-20mA, the corresponding frequency shall be within the range of 0-50Hz.

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The Parameters: F3.03=4 F3.04=20 F3.10= 0 F3.12= 50

F3.06	FOV minimum voltage output			default 0
	Range	0-FOV maximum voltage output	Unit	0.1
F3.07	FOV maximum voltage output			default 10.0
	Range	FOV minimum voltage output-10.0V	Unit	0.1

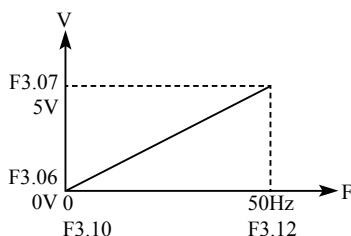
The value of F3.06 and F3.07 decide the range of output voltage of FOV terminal.

F3.06: FOV minimum voltage output is related to frequency of low analog.

F3.07: FOV maximum voltage output is related to frequency of high analog. You can connect with voltmeters of various measurement ranges by setting parameter F3.06 and F3.07.

For example, use a frequency meter with input voltage of 0-5V and measurement range of 0-50Hz to monitor the output frequency of AC motor speed controller.

Then you need to set them like as following: F3.06-F3.07=5.



F3.08	FOC minimum current output			default 0	
	Range	0-FOC maximum current output		Unit	0.1
F3.09	FOC maximum current output			default 20.0	
	Range	FOC minimum current output-20.0mA		Unit	0.1

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F3.08 and F3.09 decide the range of output current of FOC terminal. F3.08 and F3.09 correspond to frequency of low analog and frequency of high analog respectively. Refer to explanation of F3.06 and F3.07 for related parameters.

F3.10	Frequency of low analog default 0.00			
	Range	0.0-600.00 Hz	Unit	0.01
F3.11	Direction of low analog default 0			
	Range	0-1	Unit	1
	Content	0: Positive direction 1: Negative direction		
F3.12	Frequency of high analog default 50			
	Range	0.00-600.00Hz	Unit	0.01
F3.13	Direction of high analog default 0			
	Range	0-1	Unit	1
	Content	0: Positive direction 1: Negative direction		
F3.14	Analog reverse options default 0			
	Range	0-1	Unit	1
	Content	0: No reverse at negative bias voltage 1: Reverse allowed at negative bias voltage		

The parameter groups of F3.10-F3.14 decide the running condition of analog, including running frequency and direction. According to actual need of user, they can form various control curves.

F3.10 frequency of low analog

Frequency of lower analog decides the running frequency of low analog, corresponding to analog minimum voltage (current) input.

F3.11 direction of lower analog

Direction of lower analog decides the running condition (forward or reverse) in low frequency.

F3.12 Analog high-end frequency

Analog high-end frequency determines high-end running frequency, and is corresponding to analog maximum voltage (current) input.

F3.13 Analog high-end direction

Analog high-end direction determines whether the running status of high-end

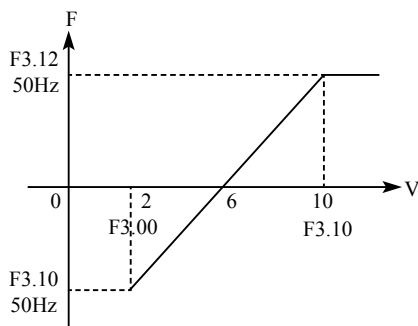
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frequency is forward or reverse.

F3.14 Analog reverse selection

Analog reverse selection determines running status of analog negative bias voltage, using above parameters can make up satisfied curve by customers.

Example 1: upper computer outputs 2-10 V signal to control AC motor speed controller, 50Hz reverse to 50Hz forward running.



Introduction: F3.00=2 FIV minimum voltage input: 2V (AC motor speed controller regards signals below 2V as ineffective signals);

F3.01=10 FIV maximum voltage input: 10V (signals over 10V are regarded and handled as 10V);

F3.10=50 Analog low-end frequency: 50Hz;

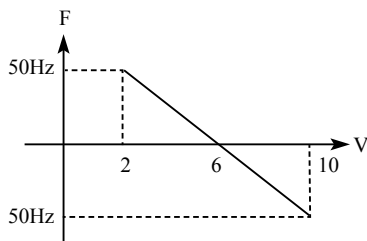
F3.11=1 Analog low-end direction: 1 (reverse);

F3.12=50 Analog high-end frequency: 50Hz;

F3.13=0 Analog high-end direction: 0 (forward);

F3.14=1 Analog reverse option: 1 (negative bias voltage can be reversed).

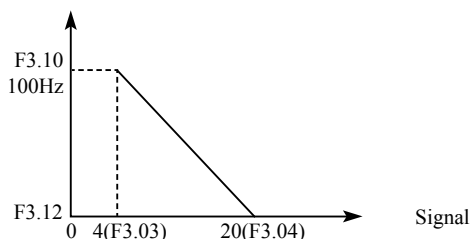
Attention: In various curves, switching instructions of forward and reverse remains effective. When forward and reverse are switched, the curve will be reversed, and the diagram of curve is as follows:



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Example 2, upper computer outputs 4-20mA, and control running of AC motor speed controller

Running frequency is 100Hz-0Hz



Parameter:

F3.3=4 FIC minimum current input
 F3.04=20 FIC maximum current input
 F3.10=100.00 Analog low-end frequency
 F3.11=0 Analog low-end direction (forward)
 F3.12=0 Analog high-end frequency
 F3.14=0 Analog high-end direction (forward)
 F3.10 ~ F3.14 can make up special inverted curve.

Introduction: signal input below 4mA is regarded as ineffective signal by AC motor speed controller.

F3.15	Multifunction input terminal---FWD terminal			Default 6
F3.16	Multifunction input terminal---REV terminal			Default 7
F3.17	Multifunction input terminal---S1 terminal			Default 1
F3.18	Multifunction input terminal---S2 terminal			Default 18
F3.19	Multifunction input terminal---S3 terminal			Default 15
F3.20	Multifunction input terminal---S4 terminal			Default 16
F3.21	Multifunction input terminal---S5 terminal			Default 8
F3.22	Multifunction input terminal---S6 terminal			Default 9
	Setup range	0-32	Unit	1
	Content	0: Ineffective 2: Jog motion forward 4: Forward/ reverse 6: Forward 1: Jog motion 3: Jog motion reverse 5: Run 7: Reverse		

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	Content	8: Stop 9: Multi-speed selection one 10: Multi-speed selection two 11: Multi-speed selection three 12: Multi-speed selection four 13: Acceleration/ deceleration selection one 14: Acceleration/ deceleration selection two 15: Frequency increasing signal Up 16: Frequency decreasing signal Down 17: Free stopping 18: Fault reset 19: PID put into running 20: PLC put in 21: Timer 1 start up 22: Timer 2 start up 23: Counter pulse input 24: Counter reset 25: PLC memory removal 26: Winding action begins
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0: Ineffective

Set as empty terminal, non-function

1: Jog

Set as jog, usually used in trial running, common jog is operated at 5Hz,

2: Jog forward

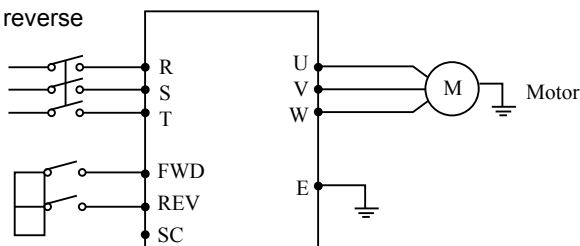
Set as jog forward

3: Jog reverse

Set as jog reverse

4: Forward/ reverse

Set as forward/ reverse switching. When the terminal is defined to be effective, running status will reverse



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The parameters: F1.02=1, F3.15=6, F3.16=4

Terminal status		Running condition
FWD	REV	
ON	OFF	Forward
ON	ON	Reverse
OFF	OFF	Stop

5: Run

Set terminal as running signal.

6: Forward

Define terminal as forward. When the terminal is effective, AC motor speed controller will forward.

7: Reverse

Define terminal to be reversing, when terminal is defined as effective, AC motor speed controller reverses

8: Stopping

Define terminal to be stopping, when terminal is effective, AC motor speed controller decelerates and stops

9: Multi-speed one

10: Multi-speed two

11: Multi-speed three

12: Multi-speed four

15-speed can be integrated by multi-speed one, two, three and four. The concrete speed is determined by status of multi-speed one, two, three and four.

Multi-function terminal				Status and Explanation
Multi-speed one	Multi-speed two	Multi-speed three	Multi-speed four	
0	0	0	0	Primary frequency, determined by F1.00 or potentiometer
1	0	0	0	Multi-speed terminal one (F5.03)
0	1	0	0	Multi-speed terminal two (F5.04)

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Multi-function terminal				Status and Explanation
Multi-speed one	Multi-speed two	Multi-speed three	Multi-speed four	
0	0	1	0	Multi-speed terminal four (F5.06)
1	0	1	0	Multi-speed terminal five (F5.07)
0	1	1	0	Multi-speed terminal six (F5.08)
1	1	1	0	Multi-speed terminal seven (F5.09)
0	0	0	1	Multi-speed terminal eight (F5.10)
1	0	0	1	Multi-speed terminal nine (F5.11)
0	1	0	1	Multi-speed terminal ten (F5.12)
0	0	1	1	Multi-speed terminal twelve (F5.14)
1	0	1	1	Multi-speed terminal thirteen (F5.15)
0	1	1	1	Multi-speed terminal fourteen (F5.16)
1	1	1	1	Multi-speed terminal fifteen (F5.17)

Remark: 0: ineffective terminal 1: effective terminal

13: acceleration/ deceleration option one

14: acceleration/ deceleration option two

Four kinds of acceleration/ deceleration time can be combined by acceleration/ deceleration selection one, two.

Multi-function terminal		Acceleration/ deceleration time and result
Acceleration/ deceleration option first	Acceleration/ deceleration option second	
0	0	Acceleration/ deceleration one (F1.07, F1.08)
1	0	Acceleration/ deceleration two (F4.01, F4.02)
0	1	Acceleration/ deceleration three (F4.03, F4.04)
1	1	Acceleration/ deceleration four (F4.05, F4.06)

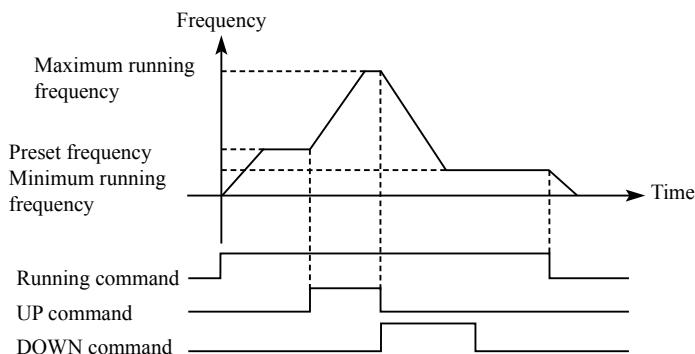
15. Frequency is increasing signal (Up signal)

When this terminal is effective, the frequency increases with even speed until operational frequency is the highest.

16. Frequency is decreasing signal (Down signal)

When this terminal is effective, the frequency decreases with even speed until operational frequency is the lowest.

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Attention: After Adjusting frequency with up/down, electric power is off, and reset again, adjusted frequency will not be stored. AC motor speed controller still stores value of F1.00.

17: Free stop

When terminal is effective, AC motor speed controller stops outputting and free stop.

18. Reset

When AC motor speed controller gets error, reset will restore the setting.

19. PID put into running

When this contact closes, PID will open. When F6.01 is set for 2, means PID condition is running, PID will be ineffective in contact point with disconnection.

20. PLC put into running

When this contact closes, PLC function starts up, and corresponding PLC function opens.

21. Timer 1 starts up

22. Timer 2 starts up

When this contact closes, timer starts up and begins counting, when the timer reaches set value, corresponding multifunction outputs contacting action.

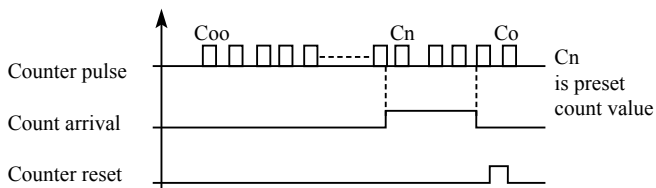
23. Counter pulse input

This terminal may accept pulse signals no more than 250 Hz.

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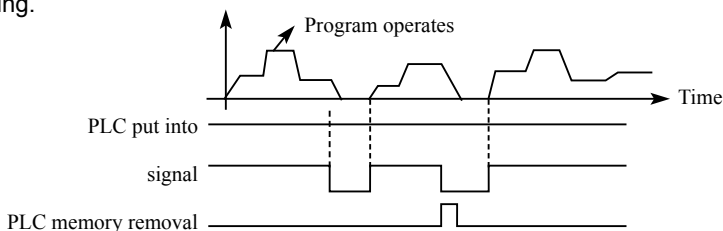
24. Counter resetting

The counted values may be reset and cleared through this terminal.



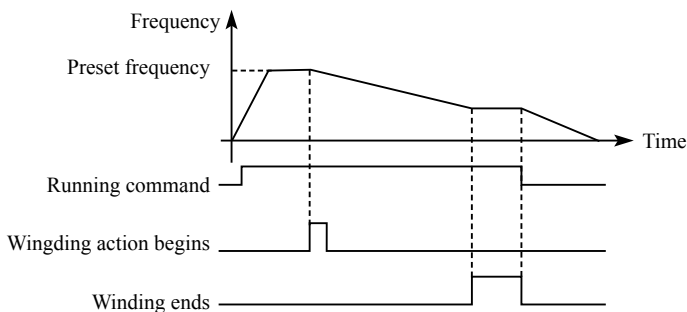
25. PLC memory removal

In the running process of PLC program, due to fault or stop, AC motor speed controller will record status of the program automatically after the fault is cured and AC motor speed controller is switched on again, AC motor speed controller will continue running according to the program, when memory removal is effective, program may be reset, and AC motor speed controller operates from the beginning.



26. Winding action begins

When this contact is activated, winding begins.



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Introduction: A. Detonating winding before winding action begins;

B. When winding ends, AC motor speed controller will output

C. When AC motor speed controller stops, winding ends of multi-terminal output will reset automatically.

F3.23	Output terminal M01	default 01		
F3.24	Output terminal M02	default 02		
F3.25	Alarm Output terminal YA, YB, YC	default 03		
F3.28	Alarm Output terminal KA, KB	default 00		
	Range	0-32	Unit	1
	Content	0: Ineffective 1: In running 2: Fault arrival 3: In fault 4: Zero-speed 5: Frequency 1 arrival 6: Frequency 2 arrival 7: Accelerate 8: Decelerate 9: Low-voltage alarm 10: Timer 1 arrival 11: Timer 2 arrival 12: Stage completion indication 13: Process completion indication 14: PID upper limit 15: PID lower limit 16: 4-20mA disconnection 17: Overload detection 18: Over torque detection 26: Winding ends 27: Set counter arrival 28: Middle counter arrival		

0: Ineffective

Set as empty terminal, prevent false running.

1: In running

Terminal is set in running, when AC motor speed controller output or command, the terminal will take action.

2: Frequency arrival

When frequency arrives at preset value, this contact will take action.

3: In fault

When AC motor speed controller detects abnormal point, the contact will take action. The contact can be alarming.

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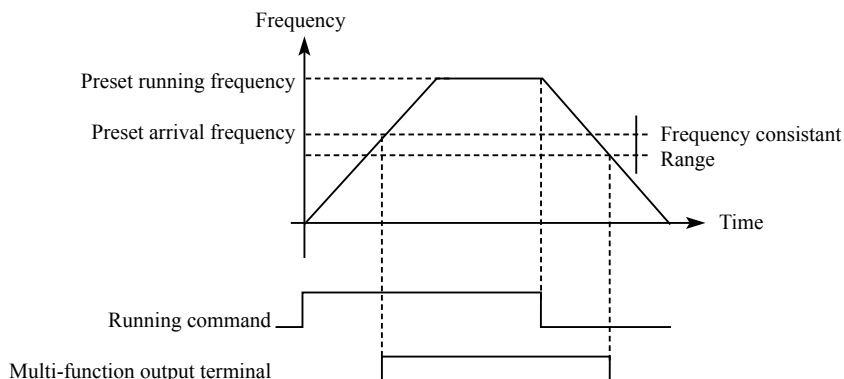
4: Zero-speed

When frequency output is less than start frequency, the contact will take action.

5: Frequency 1 arrival

6: frequency 2 arrival

When frequency arrives at preset value, the contact will take action.

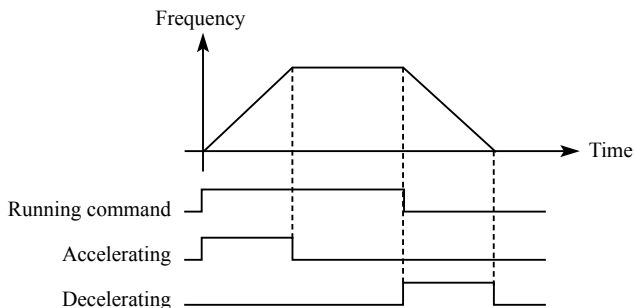


7: Acceleration

When AC motor speed controller is in acceleration, the contact will take action.

8: Deceleration

When AC motor speed controller is in deceleration, the contact will take action.



9. Low-voltage alarm

When AC motor speed controller detects that DC bus is lower than preset value, this contact will take action and alarm, low-voltage alarming preset value can be

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set through advanced application parameter group.

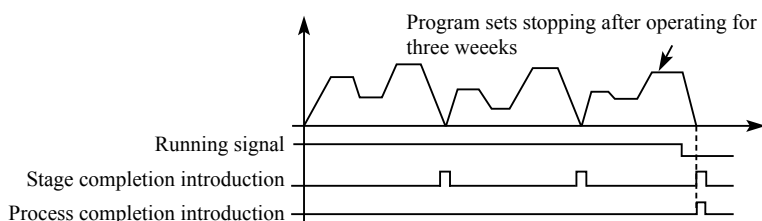
10: Timer 1 arrival

11: Timer 2 arrival

When AC motor speed controller arrives at preset value, the contact will take action. When timer start signal is removed, the contact will reset.

12: Stage completion indication

When program of AC motor speed controller is running, multi-function output contact will output a pulse in every finished stage.



13. Process completion indication

When all procedure of AC motor speed controller completed, the pulse can be alarming signal to notify operational personnel, or can be start signal in next procedure.

14. PID upper limit

When PID feedback quantity exceeds preset value of upper limit, this contact will take action, it is usually taken by alarming output, or emergent stopping to prevent accidents.

15: PID lower limit

When PID feedback quantity is lower than preset value, the contact will take action.

16: 4-20mA disconnection

When FIC input signal is disconnected, the contact will take action and alarm.

17: Overload detection

When AC motor speed controller detects the motor with overload, the contact will

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take action.

18: Over torque detection

When AC motor speed controller detects over torque, the contact will take action.

26: Winding ends

When winding action ends, the contact will take action. When AC motor speed controller stops, winding ends and contact will reset.

27: Set counter arrival

When running external counter in AC motor speed controller, the contact will take action in the value arriving at preset value (F4.25).

28: Middle counter arrival

When AC motor speed controller is counting, the contact will take action in the value (F4.26).

F3.26	Output terminal FOV default 0			
	Setup range	0-7	Minimum unit	1
F3.27	Output terminal FOC default 1			
	Content	0: Output frequency 1: Output current 2: Direct voltage 3: Across voltage	4: pulse output, 1pulse/HZ 5: pulse output, 6: pulse output, 7: pulse output,	

F3.26 output terminal FOV

FOV terminal can output 0-10V voltage through F3.06 and F3.07 corresponded to output frequency, output current, direct voltage, across voltage.

F3.27 output terminal FOC

FOC terminal can output 0-20m current through F3.08 and F3.09 corresponded to output frequency, output current, direct voltage, alternating voltage.

0: Output frequency:

Current (voltage) output is corresponded to minimum running frequency
-----maximum running frequency.

1: Output current

Current (voltage) output is corresponded to 0---2×rated current of AC motor speed

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controller.

2: Direct voltage

Current (voltage) output is corresponded to 0---1000V.

3: Across voltage

Current (voltage) output is corresponded to 0---510V.

4. Pulse output, corresponding with running frequency: 1pulse/HZ (50%)

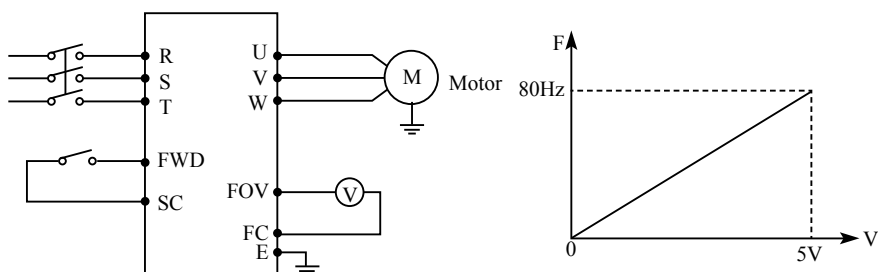
5. Pulse output, corresponding with running frequency: 2pulse/HZ (50%)

6. Pulse output, corresponding with running frequency: 3pulse/HZ (50%)

7. Pulse output, corresponding with running frequency: 6pulse/HZ (50%)

For example: select a frequency meter of 0-5V, monitor output frequency, set the minimum running frequency of AC motor speed controller as 0.00Hz, and the highest running frequency is 80Hz.

Then:



The parameter: F1.05=80.00 maximum running frequency

F1.06=0.00 minimum running frequency

F3.06=0.00 FOV minimum voltage output

F3.07=5.00 FOV maximum voltage output

7.4 Auxiliary application group

F4.00	Jog frequency setting		default 5.00	
	Setup range	0.00---maximum running frequency	Unit	0.01

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Jog frequency setting is suitable for test running. Jog function can run only by external terminal selected at will.

When jog function is running, other instruction cannot be accepted. AC motor speed controller will decelerate and stop off running jog. Acceleration/ deceleration of Jog accept Acceleration/ Deceleration time 4.

Prior level in Control:

Jog → External multi-speed → PLC running mode → PID mode → Triangular wave running mode → winding → setup mode.

Several control modes input and operate at same time by the highest prior level.

F4.01	Acceleration time 2	default 10.0		
F4.02	Deceleration time 2	default 10.0		
F4.03	Acceleration time 3	default 20.0		
F4.04	Deceleration time 3	default 20.0		
F4.05	Acceleration time 4	default 2.0		
F4.06	Deceleration time 4	default 2.0		
	Setup range	0-6000.0	Minimum unit	0.1

AC motor speed controller preset four acceleration/ deceleration time. In general, AC motor speed controller only accepts the first acceleration/ deceleration time. Jog accepts the fourth acceleration/ deceleration time. User may select acceleration/ deceleration time at will by requirement. In external multi-speed, external terminal decides acceleration/ deceleration time. In internal multi-speed, different acceleration/ deceleration time may be selected by simple PLC.

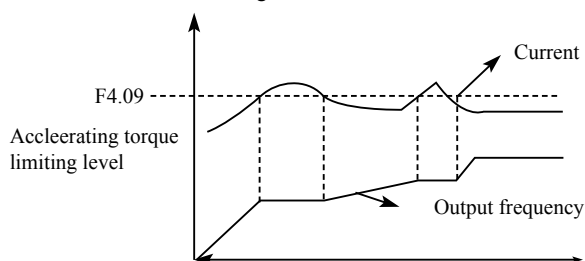
F4.07	Designated value of counter	default 100		
F4.08	Middle value of counter	default 50		
	Setup range	0-6500	unit	1

2 groups of counter in AC motor speed controller can accept pulse signal less than 250Hz through multi-function terminal. When the value reaches presetting in counter, corresponding multi-function output terminal will take action, and input terminal of counter will reset signal through the counter, witch will recounting again. Pulse signal may use proximity switch and photoelectric switch to be input signals.

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F4.09	Accelerating torque limiting level		default 150	
	Setup range	0-200	Unit	1

In the acceleration of AC motor speed controller, output current of AC motor speed controller may be higher than the protection range. Limiting level of overage current may be set by F4.09. When electric current reaches set value, AC motor speed controller will stop accelerating. Not until the under set value, AC motor speed controller continues accelerating

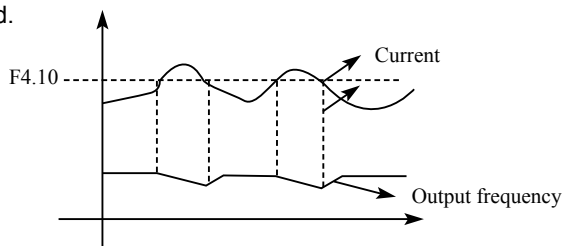


100% current is the rated current of AC motor speed controller. When F4.09 is set for 0, then acceleration torque limit is ineffective, without protection.

F4.10	Constant-speed torque limiting level		default 00	
	Range	0-200	Unit	1

In the constant-speed running of AC motor speed controller, AC motor speed controller will be without protection in over current. With non-limitation, constant-speed torque limiting level can be set by F4.10. When the current exceeds set value of F4.10, AC motor speed controller will auto reduce output frequency. Not until coming back normal level, AC motor speed controller accelerates to set frequency (100% current is rated current of AC motor speed controller).

When F4.10 is set for 0, constant-speed torque limited level is ineffective and cannot be protected.



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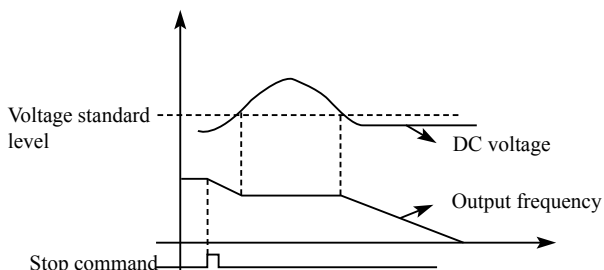
F4.11	Over-voltage prevention in deceleration		default 1
	Range	0-1	Unit
	Content	0:Ineffective 1:Effective	

0: Ineffective

In the decelerating process of AC motor speed controller, rapid deceleration may increase the DC-bus voltage of AC motor speed controller. When Over-voltage prevention in deceleration is ineffective, AC motor speed controller will meet over-voltage protection if non-measure.

1: Effective

Over-voltage prevention in deceleration is effective. When voltage reaches set value, AC motor speed controller stops decelerating first in the stopping process of AC motor speed controller. Not until DC-bus voltage returns to permissible value, AC motor speed controller continues decelerating.



F4.12	Automatic voltage stabilizer		default 1
	Range	0-2	Unit
	Content	0: Ineffective 1: Effective 2: Ineffective in deceleration	

When motor runs under the condition of instable input electric, temperature will increase, insulation will be damaged, and output torque will be instable in motor

0: Ineffective

Choose ineffective of automatic voltage stabilizer, AC motor speed controller output voltage will fluctuate.

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1: Effective.

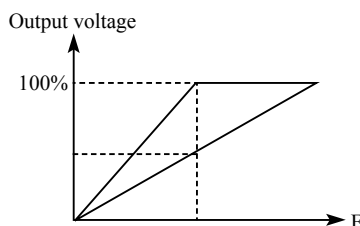
Choose effective of automatic voltage stabilizer, voltage of AC motor speed controller output will be stable automatically in condition of instable input electric.

2: Ineffective in deceleration: this function will enhance braking function of AC motor speed.

F4.13	Automatic stored energy			default 0.0
	Range	0-100	Minimum unit	1
F4.14	Brake-pipe action voltage			default 800
	Range	: 650.0V~800.0V : 360.0V~400.0V	Unit	0.1
F4.15	Brake-pipe action ratio			default 50
	Range	40-100	Unit	1

F4.13 Automatic stored energy

In constant-speed running of automatic stored energy, the best voltage value which provided to load may be calculated by loading condition in order to saving energy.



Attention: When load changes frequently or almost full load, this function will not be suitable.

F4.14 and F4.15 are only for built-in braking unit in AC motor speed controller, not for external braking unit.

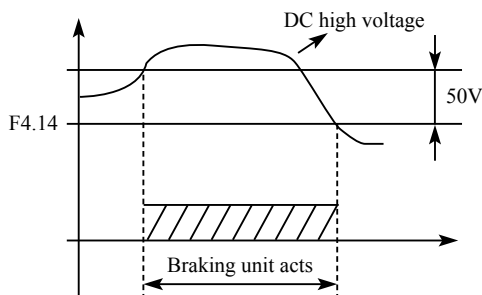
The two parameters above set internal DC high voltage standard level and ratio of braking action of AC motor speed controller.

F4.14 Brake-pipe action voltage

When DC high voltage is higher than set value of F4.14, built-in braking unit will

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take action. Energy would release and DC voltage would come back by braking resistance. Built-in braking unit closes until DC voltage falls to a certain value



Please pay attention to setting the parameter. DC voltage may be over to cause protection in high value of this parameter. Braking resistance may be heated in low value.

F4.15 Ratio of brake-pipe action

Ratio of brake-pipe action is suitable for braking unit. Using average voltage value of braking resistance will adjust pulse-duration modulation. Duty ratio is equal to ratio of braking action, almost equal to ratio of switching tube. The bigger the ratio the quicker energy releases and the more power consumes on resistance.

F4.16	Restart after instant power off				default 0
	Setup range	0-1	Unit		1
	Content	0: Ineffective: no restart after instant power off 1: Effective: frequency tracking start			

0: Ineffective

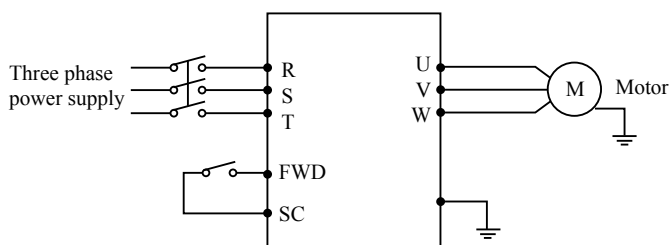
In effectivity, AC motor speed controller auto removes running commands after power is off. It would start regularly on recovery power

1: Effective

In effectivity, AC motor speed controller will keep commanding in a period time (in allowable time of power cut) after power is off. AC motor speed controller starts by frequency tracking start in power on. AC motor speed controller will auto remove running commands over a period time. It would start regularly on recovery power

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Attention: when “restart after instant power off” works, AC motor speed controller will suddenly start up. Please pay attention to safety. Besides, when a terminal control start and stop of AC motor speed controller, external terminal condition must be paid attention to. In power cut, external terminal is still closed, so AC motor speed controller will suddenly start when power is on. Please be careful.



For example: Use K1, control running.

K1 is closed, K1 will be cut off in running, and AC motor speed controller will stop then. K1 remains closed in power cut. When power is on, AC motor speed controller starts up suddenly. It is very dangerous. Please use other controlling methods such as three-wire system connection method.

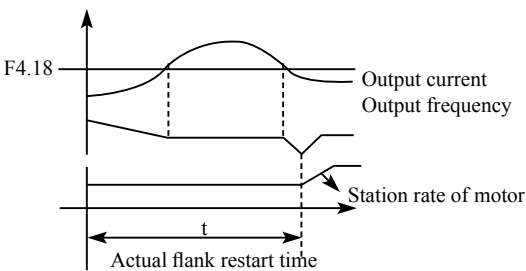
F4.17	Allowable time of power cut			default 5.0
	Setup range	0-10.0	Minimum unit	0.1

F4.17 in setting allowable time of power cut, if time of power cut is over set value, “restart after instant power off” will be ineffective.

F4.18	flank restart current limited level			default 150
	Range	0-200	Minimum unit	1

When AC motor speed controller drives flank restart, AC motor speed controller will track downward from set frequency immediately. Output current of AC motor speed controller will increase more rapidly up to exceed protection unit. Meanwhile, AC motor speed controller would stop tracking, and output current of AC motor speed controller would come back to common. AC motor speed controller will continue tracking. Value 100% of this parameter is rated current of AC motor speed controller. The protection of AC motor speed controller in track may be set by F4.18.

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F4.19	Flank restart time			default 5
	Range	0-10	Unit	

When AC motor speed controller drives flank restart, AC motor speed controller will track downward from set frequency immediately. Complete tracking in setup range of time. If it does not finished in setup time, AC motor speed controller will be protected.

In illustration of F4.18, when $t > F4.19$ setup value, AC motor speed controller will be protected.

F4.20	Restart frequency with error			default 0
	Range	0-5	Unit	1
F4.21	Restart time with error			default 2
	Range	0-100	Unit	1

After abnormity (such as over current, over-voltage) takes place, AC motor speed controller will auto reset (effectively in non-zero of F4.20). After the period time set by F4.21, AC motor speed controller will start up according to presetting start mode (F2.00).

After start, if no abnormity happens in 60 seconds, AC motor speed controller will auto reset F4.20.

If abnormity happens again within 60 seconds, AC motor speed controller will record number of times. Once reaching set value of F4.20. AC motor speed controller will stop outputting, not to auto reset or restart again.

Attention: when the number of restart times in error is set for zero, restart in error

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will be ineffective. When restart in error is effective, AC motor speed controller will suddenly restart. It is very dangerous to use this function. Please be careful.

F4.22	Over torque action default 0			
	Range	0-3	Minimum unit	1
	Content	0: Frequency arrives. AC motor speed controller begins detecting over torque. AC motor speed controller continues running 1: Frequency arrives. AC motor speed controller begins detecting over torque. AC motor speed controller stops running 2: In running, AC motor speed controller detects over torque, AC motor speed controller continues running 3: In running, AC motor speed controller detects over torque, AC motor speed controller stops running		

Introduction: 0: when running frequency reaches set frequency, AC motor speed controller will begin detecting over torque. When detection of AC motor speed controller reaches over torque, AC motor speed controller will continue running, and detect over torque in acceleration.

1: When running frequency reaches set frequency, AC motor speed controller will begin detecting over torque. When AC motor speed controller detects over torque, AC motor speed controller will stop.

2: AC motor speed controller begins to detect over torque on running. When over torque is detected, AC motor speed controller will not handle it and continue running.

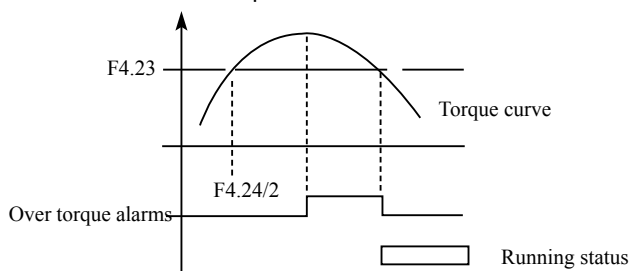
3: AC motor speed controller begins to detect over torque on running. When over torque is detected, AC motor speed controller will stop.

F4.23	Over torque detection level default 0			
	Range	0-200	Minimum Unit	1
F4.24	Over torque detection time default 0			
	Range	0-200	Minimum Unit	1

When output current of AC motor speed controller exceeds set value of F4.23 (over torque detection level), AC motor speed controller will figure out torque time.

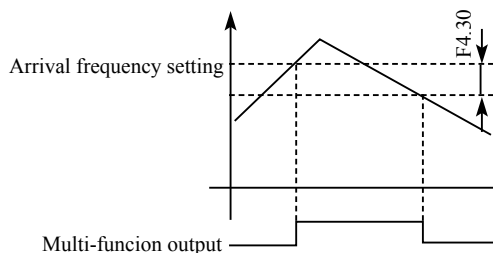
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When the duration exceeds half of set value of F4.24 (over torque detection time), corresponding multi-function terminal will take action, over torque will alarm, and frequency conversion will continue running. If the duration exceeds set value of F4.24, AC motor speed controller will be protected and be taken action by F4.22. When over torque detection level is set for zero, over torque detection will be ineffective, and 100% is AC motor speed controller rated current.



F4.25	Reaching frequency one			default 100	
	Range	0-Maximum running frequency	Minimum unit	0.1	
4.26	Reaching frequency two			default 5.0	
	Range	0-maximum preset frequency	Unit	0.1	

Set two groups of reaching frequency. When running frequency arrives at set value of F4.25 and F4.26, corresponding multi-function output terminal will take action. Width of arrival of frequency is a hysteretic loop set by F4.30.



F4.27	No. 1 timer			default 0	
	Range	0.0-6000.0S	Minimum unit	0.1	
F4.28	No. 2 timer			default 0	
	Range	0.0-6000.0S	Minimum unit	0.1	

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When two timers which are common one reaches set value (set by F4.27 and F4.28), corresponding multi-function terminal will take action. The timers are started by external multi-function input terminal.

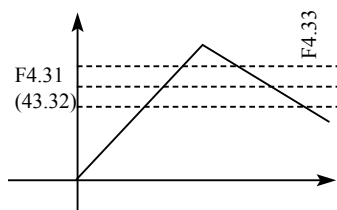
Some of simple program actions may be made with two timers.

F4.29	Constant-speed torque limiting time			default 0.50
	Range	0-6000.0S	unit	0.1
F4.30	Width of arrival of frequency in hysteric loop			default 0.50
	Range	0.00-2.00	unit	0.01

This parameter sets frequency arrival width. For details, please refer to F4.25-F426 introductions.

F4.31	Jump frequency one			default 0
	Range	0.00-frequency upper limit	unit	0.01
F4.32	Jump frequency two			default 0
	Range	0.00-frequency upper limit	unit	0.01
F4.33	Jump frequency hysteric loop width			default 0.50
	Range	0.00-2.00	unit	0.01

Due to machinery reason and other reasons, in running of AC motor speed controller, there is a certain frequency caused resonance. For avoiding resonance point, resonance frequency may be overleaped through F4.31-F4.33 to achieve the purpose of avoiding resonance. Set two jump frequencies totally. To provide convenience for customer, jump broad width can be set at will by F4.33 as follows:



F3.34	Terminal UP/DOWN frequency range			default 0.1Hz
	Range	0-6000.0S	unit	0.1Hz
F3.35	UP/DOWN frequency memory selection			default 0
	Range	0.00-2.00	unit	0.01
	Content	0: stored 1: not stored		

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Control UP/DOWN to raise and low down the speed. When the terminal is effective, to increase or decrease set frequency F3.34 every 40ms. The selection of UP/DOWN frequency memory, please refer to F8.12 function.

7.5 Application function group

F5.00	PLC store mode			default 0
	Range	0-1	Unit	1
	Content	1: Stored 0: Non-stored		

Pause of program running function can be run by F5.00 to achieve saving program running.

0: Non-stored

In the operational process of PLC program, F5.00 will choose not to store. When machinery stops because of error or other reasons, AC motor speed controller will not store status before the stopping. After restarting, running status will begin from initial state.

1: Stored

In the running of PLC program, F5.00 will choose to store. When it stops because of error or other reasons, AC motor speed controller will store status before running. After restarting, AC motor speed controller will continue running. Attention: power cannot be cut off.

Stop, power cut and power on, AC motor speed controller will not store status before power cut. After restarting, AC motor speed controller will run according to initial state of program.

F5.01	PLC start mode			default 0
	Range	0-1	Minimum unit	1
	Content	0: Ineffective (PLC does not start) 1: Effective (PLC starts)		

F5.01: option for running mode of AC motor speed controller:

F5.01=0, PLC will not start, AC motor speed controller will run in common mode. When F5.01=1, PLC will start, AC motor speed controller select programs to run.

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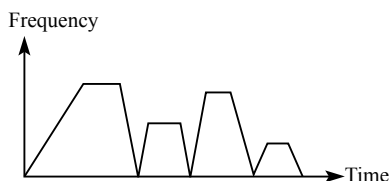
Under the status of PLC start, when there are various running orders and programs, AC motor speed controller will choose the highest level to run according to priority level.

Precedence level	Priority level	Item
High→ low	1	Jog
	2	External multi-speed
	3	Internal multi-speed
	4	PID
	5	Triangular wave
	6	Winding
	7	Setting mode

F5.02	PLC running mode default 0			
	Range	0-4	Unit	1
	Content	0: PLC stops after running for a week 1: PLC pause mode, stops after running for a week 2: PLC cycle running 3: Cycle running of PLC pause mode 4: After running for a week, PLC continues running by the end of running frequency		

PLC running mode decides running status of internal multi-speed, either running one circle or cycle running. F5.02 is only effective when PLC starts up.

PLC pause mode means that when completing every speed in the running process of internal multi-speed, the speed will be down, stop, and accelerate to the next speed. The illustration is as below:



User may select proper running mode according to actual conditions.

F5.03	Multi speed terminal 1	default 10.0
F5.04	Multi speed terminal 2	default 15.0
F5.05	Multi speed terminal 3	default 20.0

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F5.06	Multi speed terminal 4	default 25.0
F5.07	Multi speed terminal 5	default 30.0
F5.08	Multi speed terminal 6	default 35.0
F5.09	Multi speed terminal 7	default 40.0
F5.10	Multi speed terminal 8	default 45.0
F5.11	Multi speed terminal 9	default 50.0
F5.12	Multi speed terminal 10	default 10.0
F5.13	Multi speed terminal 11	default 10.0
F5.14	Multi speed terminal 12	default 10.0
F5.15	Multi speed terminal 13	default 10.0
F5.16	Multi speed terminal 14	default 10.0
F5.17	Multi speed terminal 15	default 10.0
	Range	0.00-----Maximum running frequency
	Unit	0.01

F5.03 - F5.17 is set of 15 speed of rated frequency in the running. Regarding relationship Multi speed and external terminal please refer to rated instruction 1, 2, 3, 4 of multifunctional end.

F5.18	PLC running period 1	default 100
F5.19	PLC running period 2	default 100
F5.20	PLC running period 3	default 100
F5.21	PLC running period 4	default 100
F5.22	PLC running period 5	default 100
F5.23	PLC running period 6	default 0
F5.24	PLC running period 7	default 0
F5.25	PLC running period 8	default 0
F5.26	PLC running period 9	default 0
F5.27	PLC running period 10	default 0
F5.28	PLC running period 11	default 0
F5.29	PLC running period 12	default 0
F5.30	PLC running period 13	default 0
F5.31	PLC running period 14	default 0
F5.32	PLC running period 15	default 0
	Range	0 ----- 65000
	Unit	1

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PLC running period decides duration of internal multi speed in every part of speed. The running duration in every part is corresponding to its rate.

F5.33	PLC running duration 15		default 0	
	Range	0 ----- 32767	Unit	1

F5.33 set running direction of every part

Method of setting running direction:

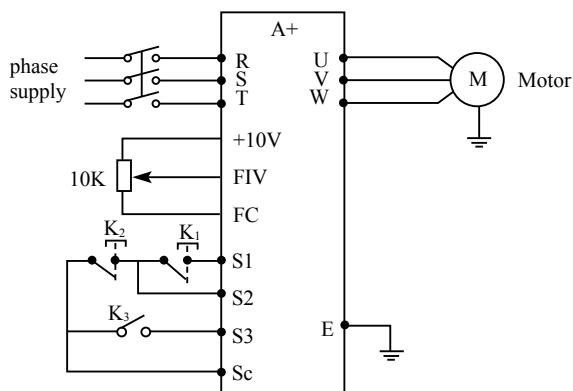
The way of running direction is 16-bit binary system, and then transfer to decimal system value. Every bit decides the corresponding running direction: 0 is forward and 1 is reverse. This parameter will be only effective when the PLC is on.

For example: there is a five-part rate, the circling running is required as follow:

Items	Running frequency	Running direction	Running period
Dominant frequency	Adjustable potentiometer	Forward	
Part 1	20.0	Reverse	20
Part 2	60.0	Forward	25
Part 3	40.0	Reverse	30
Part 4	15.0	Forward	20

Two buttons, one of which is for running, the other one is for stop. The main frequency must be with adjustable potentiometer.

(1)Connection illustration



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(2) The parameter setting

Setting of PLC running direction: (F5.33 setting)

Rate of part 4	Rate of part 3	Rate of part 2	Rate of part 1	Dominant frequency	
4	3	2	1	0	→ position (bit)
0	1	0	1	0	→ changing direction <0 is forward, 1 is reverse>
0×2^4	1×2^3	0×2^2	1×2^1	0×2^0	→ change into decimal system

The binary system number 01010 is changed into decimal system number:

$$1 \times 2^1 + 1 \times 2^3 + 8 = 10$$

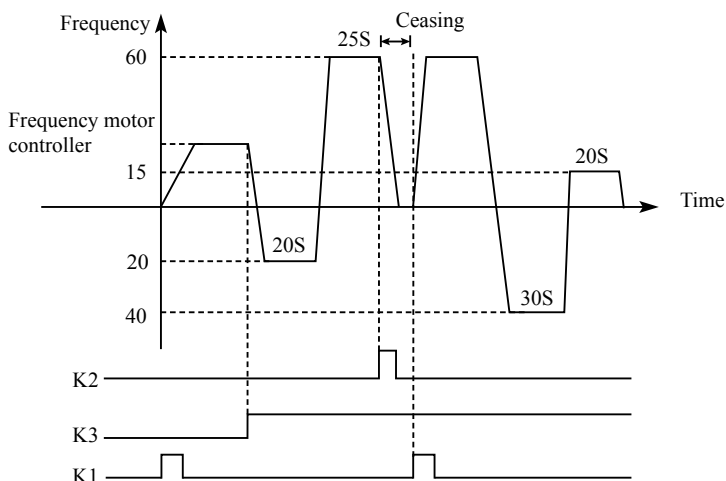
F5.33=10

The parameter defines to:

- F1.01=3 (Keyboard potentiometer setting mode: dominant frequency is controlled by potentiometer)
- F1.02=1 (Running setting option: multifunctional terminal input)
- F1.05=60 (The maximum running frequency is 60HZ)
- F1.07=10 F1.08=10 (acceleration/deceleration 10S)
- F3.17=6 (S1 terminal as forward)
- F3.18=8 (S2 terminal as stop)
- F3.19=20 S3 terminal is that PLC start to run
- F5.00=1 PLC programming memory
- F5.01=1 PLC is on
- F5.02=0 PLC running a circle and then stop
- F5.03=20 Part1 is set for 20Hz
- F5.04=60 Part1 is set for 60Hz
- F5.05=40 Part1 is set for 40Hz
- F5.06=15 Part1 is set for 15Hz
- F5.18=10 Part1 is set for running duration 10s
- F5.19=20 Part1 is set for running duration 20s
- F5.20=25 Part1 is set for running duration 25s
- F5.21=30 Part1 is set for running duration 30s

• 100 •

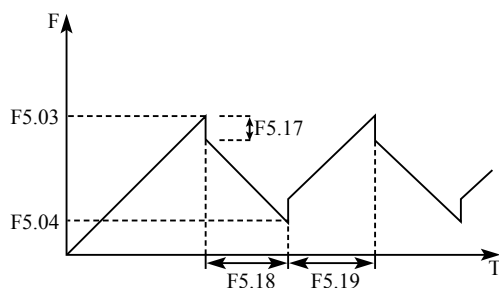
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Instruction:

- Press K1 to start running with the frequency by potentiometer.
- Press K3 to start PLC running from first part by program until run a circle, and the stop.
- If the program is running, press K 3. If there is an error, stop AC motor speed controller, then the error is removed, press K1 then AC motor speed controller will run by program.
- If F5.00 is set for 1 and the program is not stored, running will start from very beginning.

Triangle wave function: The function for textile and printing field to make traverse function.



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Instruction:

- 1.The frequency of every turning point: decide by F5.03、F5.04
- 2.The jump frequency is decided by F5.17.
- 3.Running time is decided by F5.18、F5.19.
- 4.F5.35=1start this function.

7.6 Auxiliary application group (PID)

F6.00	PID start mode default 0			
	Range	0-1	Unit	1
	Content	0: Ineffective PID off 1: Effective PID on 2: PID works on terms		

0: Ineffective: PID function will not work.

1: Effective: PID will work without external input terminal.

2: PID work on terms: PID will work, with external terminal PID input operating is effective status, will turn on PID and start working function.

F6.01	PID start mode default 0			
	Range	0-1	Unit	1
	Content	0: Ineffective negative feedback mode 1: Effective positive feedback mode		

0: Negative feedback mode

If feedback value is bigger than target value, when set F6.01 = 0 to choose negative feedback mode, the controller will decelerate speed. If feedback value is smaller than target value, then it will accelerate speed.

1: Positive feedback mode

Positive feedback mode is contrary to negative feedback mode. If feedback value is bigger than target value, when set F6.01 = 1 to choose positive feedback mode, the controller will accelerate speed. If feedback value is smaller than target value, then it will decelerate speed.

F6.02	PID target value default: 0			
	Range	0-2	Unit	1
	Content	0: Select numeric target value 1: Choose FIV as target value 2: Choose FIC as target value		

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F6.02 is set the source of target value, model A. P. H. can choose three ways. Target value can set by AC motor speed controller, external terminal, voltage, current input, and etc.

0: Select numeric target value.

Target value is to be given by F6.04.

1: Choose FIV as target value.

Target value is given by voltage signal or potentiometer through FIV.

2: Choose FIC as target value.

Target value is given by current signal through FIC.

F6.03	PID target value selection				default: 0
	Range	0-2	Unit		1
	Content	0: Choose FIV as feedback value 1: Choose FIC as feedback value 2: Choose the difference between FIV and FIC as feedback value 3: Choose the difference between FIC and FIV as feedback value			

Notes: F6.03 parameter setting: Select PID feedback channel

0: Choose FIV as feedback value

Feedback would be voltage signal

1: Choose FIC as feedback value

Feedback would be current signal

2: Choose the difference between FIV and FIC as feedback value

Choose FOV and FOC as feedback channel

3: Choose the difference between FIC and FIV as feedback value

Choose FIC and FIV as feedback channel

F6.04	PID numeric target value				default: 0.0
	Range	0.0-100%	Unit		0.01
	Content	0: Choose FIV as feedback value			

Numerical target value is completely corresponding to analog +10V voltage.

PID closed-loop control is used in the process of physical quantity with dull

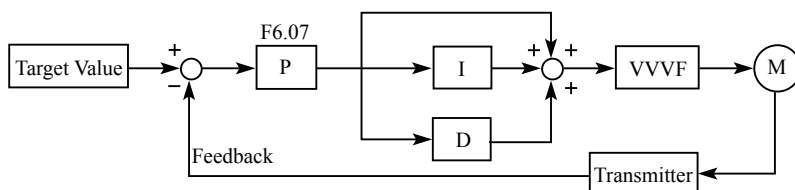
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change such as control of pressure, temperature.

Feedback signal is given from temperature transmitter, pressure transmitter. In case of PID control, the channel of feedback signal input is of analog current signal 4 – 20mA or 0 – 10V. There are two channels available for setting.

PID closed-loop control is effective in multi-functional input of PID.

The diagram of PID control:

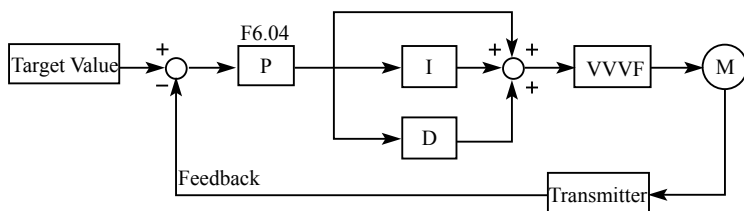


General regulation method for PID control:

- (1) Select proper transmitter, whose input specification shall be 4 – 20mA or 0 – 10V.
- (2) Set proper target value.
- (3) Increase proportionality constant (P), in case of non-oscillating output;
- (4) Decrease integration time (Ti), in case of non-oscillating output;
- (5) Increase derivative (Td), in case of non-oscillating output;

	1. Restraint output from exceeding specific value - a: Decrease differentiation time (D value) - b: Extend integration time (I value)
	2. Restraint output from oscillating - a: Decrease derivative time (D value) or set it as 0 - b: Decrease the value of proportionality constant (P)

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F6.05	PID upper alarm value			default: 0
	Range	0.0 – 100%	Unit	0.1

PID upper alarm value is suitable for abnormality alarming. When PID feedback signal value is more than PID upper alarm value, the corresponding multi-functional output will inform user to handle, and AC motor speed controller will not stop as well.

F6.06	PID lower alarm value			default: 0
	Range	0.0 – 100%	Unit	0.1

PID lower alarm value is suitable for abnormality alarming. When PID feedback value is less than the lower setting value, the corresponding multi-functional output will be for alarming, and will not shut down AC motor speed controller.

F6.07	PID P value			default: 100%
	Range	0 – 200%	Unit	0.1

P value (proportionality constant) sets error value gain, which will be for proportional control if the value of I and D is set as 0.

F6.08	PID I value			default: 0.3s
	Range	0.0 – 200.0S	Unit	0.1s

I value (integration time) sets the response speed of action. The more I value is, the slower the response speed is. If I value is set litter, oscillation will happen by rapid response. While I value is set as 0, which indicates shut-down.

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F6.09	PID D value			default: 0
	Range	0.00 – 20.0	Unit	0.01

D value (differentiation time) sets the attenuation in PID. The more D value is. The more the attenuation effect is. If D value is set as 0, which indicates shut-down.

F6.10	PID action step-length			default: 0.10
	Range	0.00 – 1.00HZ	Unit	0.01

PID is figured out once every 10ms. Frequency increment will be figured out (Δ FHz) every time. While frequency increment is more than the value of F6.10 in maximum of frequency increment, F6.10 will work.

F6.11	PID stand by frequency			default: 0.00
	Range	0.00 – 120.00HZ	Unit	0.01
F6.12	PID stand by duration			default: 10.0
	Range	0.0 – 200.0s	Unit	0.1
F6.13	PID wake-up value			default: 00%
	Range	0.0 – 100%		

F6.11 PID stand-by frequency.

F6.11 must reach minimum frequency in PID stand-by. When running frequency is less than value of F6.11, PID stand-by duration will begin counting.

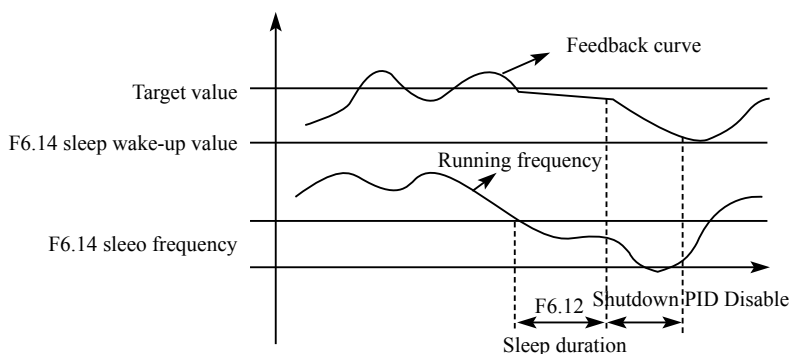
F6.12 PID stand-by duration.

When this setting enters into stand-by situation, the controller needs to operate the duration in stand-by frequency. Under such situation when it's running time over F6.12 setting value (stand-by duration), controller will enter stand-by status and stop outputting, turn off PID. But still continually to monitor F6.13 PID feedback status.

F6.13: PID wake-up value.

After controller entered stand-by status, it still monitors PID feedback. But when controller detects that feedback value is lesser than wake-up value (F6.13), PID function will turn on, and the controller starts operating.

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Example: target value is 60% (0 – 100% is corresponding to 0 – 10V), and wake-up value is 80%, which is actually corresponding to 0 – 10V, then the actual wake-up value is $60\% \times 80\% = 48\%$ (corresponding to 0 – 10V).

F6.14	PID corresponding value of display			default: 1000
	Range	0 – 1000	Unit	1
F6.15	PID digit of display			default: 4
	Range	0 – 5	Unit	1
	0: Not display PID feedback value 1: Display 1 digit 2: Display 2 digits 3: Display 3 digits 4: Display 4 digits 5: Display 5 digits			
F6.16	PID decimal digit of display			default: 1
	Range	0 – 4	Unit	1
	Content	0: Not display after decimal point 1: Display 1 digit after decimal point 2: Display 2 digits after decimal point 3: Display 3 digits after decimal point 4: Display 4 digits after decimal point		

F6.14 sets PID corresponding value of display.

F6.14 setting value is corresponding to + 10V analog voltage.

If F6.14 is set as 200, which indicates full span are 200, corresponding to + 10V voltage.

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F6.15 sets PID digit of display

0 indicates not to display feedback value. User may select the digit of display according to actual need.

F6.16 sets PID decimal digit of display.

Example: Four-digit display is required for displaying 1 digit after decimal point, and target value is set as 50%, and PID corresponding value of display is 200.

Then, the display value is $200 \times 50\% = 100.0$. The parameter group is convenient for user to monitor.

Parameter: F6.14 = 200; F6.15 = 4; F6.16 = 1.

F6.17	PID upper limit frequency			default: 48.00
	Range	0~maximum frequency	Unit	0.01
F6.18	PID lower limit frequency			default: 20.00
	Range	0~maximum frequency	Unit	0.01
F6.19	PID working mode			default: 0
	Range	0: PID turn on, nonstop working 1:PID turn on, when feedback achieves F6.05, will use the Minimum of frequency to work; when it turn down to F6.06, PID will return counting.		
F6.20	Bias limitation			default: 0
	Range	0~10.0%	Unit	0.1%

F6.20 parameter instruction:

Limitation of pressure regulation deviation: the maximum deviation of pressure regulating output value in correspondence with sett pressure loop value.

F6.17 PID upper limit frequency

When turn on PID and the controller running, if output frequency (FOUT) bigger than its parameter F6.17, and its duration more than one minutes. The multi-function output symbol- 29(Constant pressure and water supplying) as 1, represent turn on. If F3.25 set as 29, then the relay terminal YB and YC will take action.

F6.18 PID lower limit frequency

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When turn on PID and the controller running, if output frequency (FOUT) smaller than its parameter F6.18, and its duration more than one minutes. The multi-function output symbol- 29(Constant pressure and water supplying) as 0, represent turn off. If F3.25 set as 29, then the relay terminal YB and YC will not take action. Application example: application of F6.17、F6.18 can carry out supplying water with constant pressure in single-split type, one is variable frequency' another is industrial frequency. F3.25 set as 29, relay contact YB、YC control the running of industrial frequency motor.

Running procedure: when the output frequency of running reach F6.17 and last more than one minute, the relay contact YB、YC connect' and the industrial frequency motor runs to increase the hydraulic pressure. When controlling output frequency of running low down to F6.18 and last for more than one minute, relay contact YB、YC disconnected, the industrial frequency motor stops.

F6.17 PID working mode

To set as 0: When turn on PID, begin to read the target and feedback values and PID counting then will revise running frequency.

To set as 1: When turn on PID, begin to read the target and feedback value, and PID counting then will revise running frequency. However, when feedback achieves F6.05, PID will not start counting, but will choose minimum of frequency to working. But when it turns down F6.06, PID will start counting again.

7-7 Communication parameter group

F7.00	Rate of communication data				default: 0
	Range	0 – 3	Unit	1	
	Content:	0: 4800bps 2: 19200bps	1: 9600bps 3: 38400bps		

F7.0 is used in transferring rate of serial communication. Note: in adopting serial communication, the same transfer rate must be guaranteed for both parties in communication

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F7.01	Mode of communication data default: 0			
	Range	0 – 5	Unit	1
	Content	0: 8N1 For ASC 2: 8O1 For ASC 4: 8E1 For RTU	1: 8E1 For ASC 3: 8N1 For RTU 5: 8O1 For RTU	

F7.01 sets the format of communication data. Please see related communication specification in detail.

F7.02	IP address of communication default: 0			
	Range	0 – 240	Unit	1

Every AC motor speed controller must have an address, which will be defined by F7.02. Communication control of AC motor speed controller can connect with 240 others.

F7.02 is set as 0, communication function is ineffective.

A⁺ Series MODBUS communication agreement

Communication agreement is with MODBUS ASCII (American standard code for information interchange) mode: Every byte consists of 2 ASCII characters. For example: The expression of the numerical value of 54Hex ASCII is that “54” consists of “5” (35Hex) and 4(34 Hex).

1. Definition of coding

Communication agreement belongs to hexadecimal system, of which each character represents the following information.

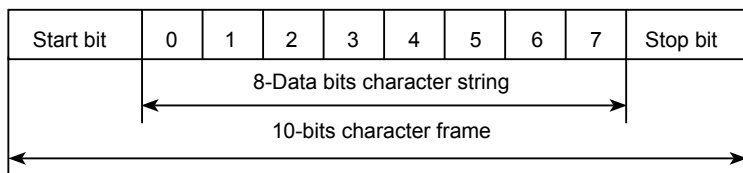
Character	“0”	“1”	“2”	“3”	“4”	“5”	“6”	“7”
ASCII code	30H	31H	32H	33H	34H	35A	36A	37A
Character	“8”	“9”	“A”	“B”	“C”	“D”	“E”	“F”
ASCII code	38A	39H	41H	42H	43A	44A	45H	46H

2. Character structure

10 – Bit character box (For ASCII)

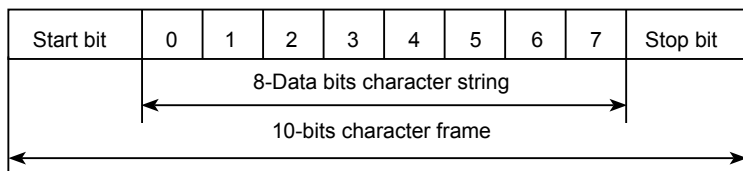
Data type: 8N1 For ASCII

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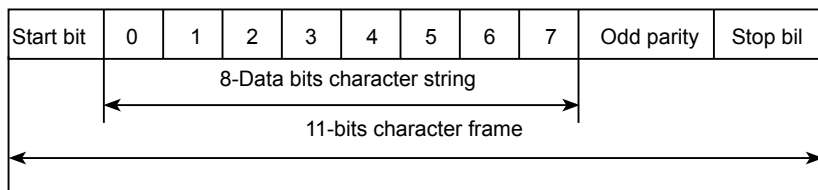


10 – Bit character frame (For RTU)

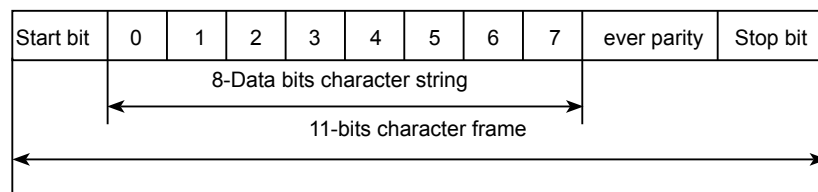
Data type: 8N1 For RTU



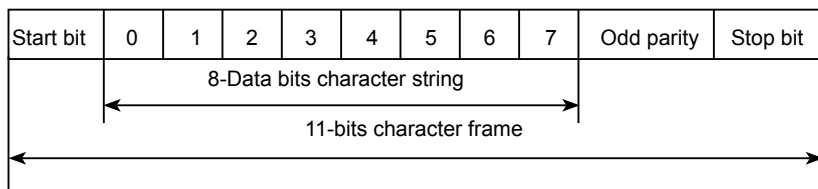
Data type: 8O1 For ASCII



Data type: 8E1 For ASCII

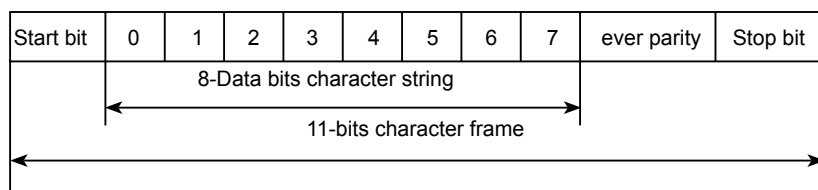


Data type: 8O1 For RTU



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Data type: 8E1 For RTU



3. Structure of communication data

Data format frame

ASCII mode:

STX	Start character = ':'(3AH)
Address Hi	Communication address: 8-bit address consists of 2 ASCII codes
Address Lo	
Function Hi	Function code: 8-bit function code consists of 2 ASCII codes
Function Lo	
DATA (n-1)	Data characters: $n \times 8$ -bit data content consists of $2n$ ASCII codes $n \leq 16$, with the maximum of 32 ASCII codes
.....	
DATA 0	
LRC CHK Hi	LRC Check: 8-bit LRC Check consists of 2 ASCII codes
LRC CHK Lo	
END Hi	End character: END Hi = CR (0DH), END Lo = LF (0AH)
END Lo	

RTU mode:

START	Keep that zero-input signal is more than or equal to 10 ms
Address	Communication address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA (n-1)	Data characters: $n \times 8$ -bit data, $n = 16$
.....	
DATA 0	
CRC CHK Low	CRC Check: 16-bit CRC Check consists of 2 8-bit binary systems
CRC CHK High	
END	Keep that zero-input signal is more than or equal to 10 ms

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Communication Address

00H: All driver Broadcasts

01H: For AC motor speed controller with 01st address

0FH: For AC motor speed controller with 15th address

10H: For AC motor speed controller with 16th address, by analogy, the maximum can reach 240.

Function code and Data Characters

03H: Read out content of temporary storage

06H: Write a WORD into temporary storage. Function code 03H: Read out content of temporary storage.

For example: For driver address 01H, read out the data characters in 2 successive temporary storages as follows: Initial temporary storage address is 2102H

ASCII mode:

Format of enquiry message character Format of response message character

string:

STX	‘.’
Address	‘1’
	‘0’
Function	‘0’
	‘3’
Starting address	‘2’
	‘1’
	‘0’
	‘2’
Number of data (count by word)	‘0’
	‘0’
	‘0’
	‘2’
IRC Check	‘D’
	‘7’
END	CR
	LF

string:

STX	‘.’
Address	‘0’
	‘1’
Function	‘0’
	‘3’
Number of data (count by byte)	‘0’
	‘4’
Content of starting address 2102H	‘1’
	‘7’
	‘7’
	‘0’
Content of address 2103 H	‘0’
	‘0’
	‘0’
	‘0’
LRC Check	‘7’
	‘1’
END	CR
	LF

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RTU mode:

Format of enquiry message:

Address	01H
Function	03H
Starting data address	21H
	02H
Number of data (count by word)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

Format of response message:

Address	01H
Function	03H
Number of data (count by byte)	04H
Content of data address 8102H	17H
	70H
Content of data address 8103H	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

Function code 06H: Write a WORD into temporary storage.

For example: For driver address 01H, write 6000 (1770H) into the internal parameter 0100H of driver.

ASCII mode:

Format of enquiry message character string:

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
STX	':'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

Format of response message character string:

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
STX	':'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

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RTU mode:

Format of enquiry message:

Address	01H
Function	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Format of response message:

Address	01H
Function	06H
Data address	01H
	00U
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

LRC Check of ASCII mode

LRC Check is the value added from Address to Data Content. For example, the LRC Check of the above 3.3.1 inquires message: $01H + 03H + 21H + 02H + 00H + 02H = 29H$, then the complement of 2 (D7H) is taken.

CRC Check of RTU mode

CRC Check is from Address to Data content, and its running rule is as follows:

Step 1: Make 16-bit temporary storage (CRC temporary storage) = FFFFH.

Step 2: Exclusive OR first 8-bit byte message instruction and low 16-bit CRC temporary storage: Perform Exclusive OR, and store the result into CRC temporary storage.

Step 3: Shift right CRC temporary storage and fill 0 into high bit position.

Step 4: Check right shift value. If being 0, store the new value for step 3 into CRC temporary storage. Otherwise in case of Exclusive OR A001H and CRC temporary storage will store the result into CRC temporary.

Step 5: Repeat Step 3 ~ Step 4, and operate completely for 8-bit.

Step 6: Repeat Step 2 ~ Step 5, and take the message instruction for next 8-bit until all message instructions are operated completely. Finally, the value gotten of CRC temporary storage is CRC Check. CRC Check must be placed into the check mode of message instruction interchangeably.

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The following is the example of CRC Check running written in C language:

```
unsigned char * data ←//Message instruction pointer
unsigned char length ←//Length of message instruction
unsigned int crc_chk (unsigned char*data, unsigned char length)
{
    int j;
    unsigned int reg_crc=0xffff;
    while (length--) {
        reg_crc^=*data ++ ;
        for (j=0; j<8; j++) {
            if (reg_crc & 0x01) { /*LSB (b0) =1 */
                reg_crc= (reg_crc>>1) ^0xa001;
            }else{
                reg_crc=reg_crc>>1;
            }
        }
        return reg_crc; //Finally feedback the value of CRC temporary storage
    }
}
```

7-8 Parameters for Advanced Application

F8.00	Advanced application of Lock-in parameter			default: 1
	Range	0 – 1	Unit	1
	Content	0: Lock 1: Unlock		

Set F8.00, Advanced application of Lock-in parameter avoids misoperating, which may result in negative consequences.

F8.01	50Hz/60Hz system setting			default: 0
	Range	0 – 1	Unit	1
	Content	0: 50Hz 1: 60Hz		

50Hz/60Hz system can be set by the parameter according the condition of electric network.

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F8.02	Selection of constant and variable torque default: 0			
	Range	0 – 1	Unit	1
	Content	0: Constant torque 1: Variable torque		

F8.02 can work switch constant torque, or variable torque, which is suitable for different loads, protection level and related parameter.

F8.03	Setting of over-voltage protection level default: Three phaseAC380V 650.0 One phaseAC220V 375			
	Range	Three phaseAC380V760K – 820.0V One phaseAC220V370.0V~420.0V	Unit	0.1

F8.03 sets over-voltage protection level. AC motor speed controller tends to meet over-voltage protection in low electric network. For the above situation, the protection level may be adjusted down to guarantee normal running of AC motor speed controller.

F8.04	Setting of low-voltage protection level default: Three phaseAC380V 400 / One phaseAC220V 200			
	Range	Three phaseAC380V:380.0V~450.0V One phaseAC220V: 160.0V~220.0V	Unit	0.1

F8.04 sets voltage protection level. AC motor speed controller tends to meet low-voltage protection in low electric network. Thus the value of F8.04 may be adjusted down to guarantee normal running of AC motor speed controller.

F8.05	Setting of excess-temperature protection level default: 85℃/95℃			
	Range	40 – 120	Unit	1

F8.05 sets the excess-temperature protection level of AC motor speed controller. In high temperature environment, the protection level may be adjusted up to normal running of AC motor speed controller. However, much higher setting will cause damage. The only solution is to increase effect of heat elimination for the goal of cooling-down.

F8.06	Setting display of current filtering time default: 2.0			
	Range	0 – 100	Unit	1

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This parameter setting is related to the stabilization of current display, please do not modify in general situation. If the setting is much lower, current display will fluctuate.

F8.07	0 – 10V Analog output low-end correction factor default: *			
	Range	0 – 65535	Unit	1
F8.08	0 – 10V Analog output high-end correction factor default: *			
	Range	0 – 65535	Unit	1
F8.09	0 – 20mA Analog output low-end correction factor default: *			
	Range	0 – 65535	Unit	1
F8.10	0 – 20mA Analog output high-end correction factor default: *			
	Range	0 – 65535	Unit	1

The above parameters are default settings. Thus shall not be corrected, otherwise it will cause abnormal running of AC motor speed controller.

F8.11	Interval compensation frequency point default: 0.00			
	Range	0 –maximum operation frequency	Unit	1
F8.12	UP/DOWN frequency memory selection default: 0			
	Range	0: stored 1: not stored	Unit	1

F8.11 forward/reverse operation compensation frequency point

The running frequency is lower than the set-up value, which will increase the forward/reverse operation compensation. The suggestion for the set-up value is above 10.00Hz.

F8.12UP/DOWN frequency memory selection

When choosing “UP/DOWN” to set up the frequency, the parameter is set as 0, and the frequency remain the same after stopping. The parameter is set as 1, and the frequency become 0 after stopping.

Chapter 8 Maintenance, Fault Diagnosis and Countermeasure

Please keep regular maintenance of AC motor speed controller for normal condition.

8-1 Daily checking items

- (1) Sound and vibration in motor.
- (2) Heat on motor.
- (3) Completion of power supply wire and machine electrical wire.
- (4) Completion of wire and connection of terminal wire.
- (5) Cleanliness inside AC motor speed controller.
- (6) Fan of AC motor speed controller.
- (7) Air temperature and humidity of installation.
- (8) Cleanliness on radiator.
- (9) AC motor speed controller output electric current and displayed current.
- (10) Sound or vibrating in running.

8-2 Maintenance and checking notice

- (1) When maintaining, please make sure the power supply is off.
- (2) Cutting off the power supply, wait for internal high pressure instructive light goes off, then check and maintain.
- (3) In the process of checking and maintenance, not to leave screws and other fittings in AC motor speed controller.
- (4) Please keep AC motor speed controller clean and dry.
- (5) In checking and mending, please not to mismatch the wires, otherwise it will lead AC motor speed controller not to work or break down.

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8-3 Regular checking items

Checking items	Checking content	Countermeasure
terminal, screw, connective plug	loose	Screw fasten
Radiator	dust	Blow off with dry compressed air (4-6kg/cm ²)
Heat sinker	sound and vibration, and working duration over 20,000 hours	Replace
Circuit board	dust and rust	Blow off with dry compressed air (4-6kg/cm ²) or contact maker.
Electrolysis capacitor	color change, smell and plump up	Replace
Electromotor	Vibration, heat, noise, smell.	Check or replace

8-4 Regular Replacement

AC motor speed controller is made up by many parts, in accordance with condition, some of which need maintenance for normal running of AC motor speed controller. To keep AC motor speed controller working normally in a long term, some fittings need to be replaced regularly according to their life. Replace time for your reference is as follow:

Fitting's name	Replace period	Handling measure
Heat sinker	3-5 years	Replace (decide after checking)
Electrolysis capacitor	5 years	Replace (decide after checking)
Fuse	10 years	Replace (decide after checking)
Relay	---	Decide after checking

The hereinbefore fittings' replace circle is reckoned in the following environment:

- (1) Annual average surrounding temperature is 30°C. There is no corrosive gas, flammable gas, oil fog, dust, drips, or etc;
- (2) The load factor is below 80%;
- (3) The average working time is below 12 hours.

8-5 Protective Information, Fault Diagnosis and Remove.

AC motor speed controller has complete protective functions, such as over voltage, over currency, over load, over heat, short circuit to the ground, short circuit and etc. When AC motor speed controller gets error, there must be some reasons, please find out the reason and remove the error. Restart after dealing with the error. If there are other questions, please contact us in time.

Error code	Content	Possible reason	Solution
OC1 UC1	Over currency in acceleration	1: Much short Acceleration time 2: disarrangement of V/F curve. 3: Motor wire with short circuit to ground 4: Over high of Torsion lift 5: Over low of Electric net voltage. 6: Directly start in running motor 7: Disarrangement of controller 9: Controller failed	1: Extend acceleration time 2: Correct V/F curve. 3: Check insulation of motor wire. 4: Reduce the value of torsion lift. 5: Check electric net 6: Check load 7: Set tracking start 8: Increase capacity of controller 9: Sent for repairing
OC3 UC3	Over currency in running	1: Insulation of motor wire 2: Fluctuation of load 3: Fluctuation of electric net and the low voltage 4: Disarrangement of capacity 5: Higher power motor starting up 6: Disturbing resource	1: Check insulation of motor wire 2: Check blocking or bad lubrication in loading condition 3: Check electric net voltage 4: Increase capacity of controller 5: Resolve capacity of transformer 6: Resolve disturbing resource
OC2 UC2	Over current in deceleration	1: much short deceleration time 2: Disarrangement of capacity 3: Disturbing resource	1: Extend acceleration time 2: Increase capacity of controller 3: Resolve disturbing resource
OU0	Over voltage in stopping	1: Much short Acceleration time 2: Disarrangement of capacity 3: Disturbing resource	1: Check power supply voltage 2: Sent for repairing
OC0 UC0	Over currency in stopping	1: Controller failed	1: Sent for repairing
OU1	Over voltage in acceleration	1: Abnormal power supply 2: improper circuitry 3: Controller failed	1: Check power supply voltage 2: Do not use power supply switch controller on or off 3: Sent for repairing

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Error code	Content	Possible reason	Solution
OU3	Over voltage in running	1: abnormal power supply voltage 2: Energy feedback load 3: Disarrangement of braking resistance	1: Check power supply voltage 2: Install braking unit and resistance 3: Affirm resistance setting again
OU2	Over voltage in deceleration	1: Much short deceleration time 2: abnormal power supply voltage 3: Over load 4: Disarrangement Braking resistance or parameter	1: Extend deceleration time 2: Check power supply voltage 3: Check braking unit and resistance 4: Set braking resistance over again 5: Correctly set parameter, e.g. braking tube voltage, etc.
LU0	Low voltage in stand-by	1: abnormal Power supply voltage 2: Phase missing	1: Check power supply voltage 2: Check power supply and switch
LU1	Low voltage in acceleration running deceleration	1: abnormal power supply voltage 2: Phase missing 3: Over low of Electric net voltage	1: Check power supply voltage 2: Check connection 3: Please use independent power supply
LU2			
LU3			
Fb0 Stop Fb1 Acc. Fb2Dec. Fb3 Run	Broken fuse	1: Controller failed	1: Sent for repairing
OL0 not in running OL1 in acc OL2 in DC OL3 in running	Controller over load	1: Over load 2: Much shorter Acceleration time 3: Much quicker torsion lifting 4: Disarrangement of V/F curve 5: Low voltage of electric net 6: controller starts before motor stops. 7: Fluctuation or blocking in loading	1: Reduce load or replace larger capacity of controller 2: Extend acceleration time 3: Reduce torsion lifting rate 4: Reset V/F curve over 5: Check electric net voltage; increase controller capacity 6: Adopt track start mode 7: Check load condition
	Model A: 150% 60S Model P: 120%,60S		

Chapter 8 Maintenance, Fault Diagnosis and Countermeasure

Error code	Content	Possible reason	Solution
OTO not in running and not reach over torque OT1 in acc OT2 in DC OT3 in running	Motor over load	1: Over load 2: Much shorter acceleration time 3: Much lower Motor protection level 4: Disarrangement of V/F curve 5: Much quicker torsion lifting 6: Bad motor insulation 7: Disarrangement of motor	1: Reduce load 2: Extend acceleration time 3: Extend protection setting 4: Correct V/F curve 5: Reduce torsion lifting rate 6: Check motor insulation and replace motor 7: Use larger controller and motor
OH0 not in running OH1 in acc OH2 in DC OH3 in running	Controller over heat	1: Broken radiator fan 2: Blocked radiator fan pipe 3: High temperature of environment 4: Bad aeration 5: More narrow installation space	1: Replace radiator fan 2: Clean up wind pipe and radiator 3: Improve aeration condition and reduce wave frequency 4: Improve aeration condition and air convection 5: Improve installation location and aeration condition
ES	Emergency stop	1: Under condition of emergency stop	1: After settling emergency stop, start up as regular procedure
CO	Wrong communication	1: Bad connection 2: Disarrangement of communication parameter 3: Wrong transmission format	1: Check connection line 2: Reset parameter 3: Check data transmission format
20	4-20mA broken wire	1: Loose terminal and bad connection	1: Check connection line and link the broken down wire
Pr	Wrong Parameters	1.Parameters are set wrong	1.Correct to set the parameters
Err	Wrong Parameters	1.The parameters are not existent	1.Quite the parameters

8-6 Remove Regular Error

(1)Parameter cannot be set

Reason and solution:

A: Lock the parameter, and set F1.18 for 0, and then set other parameters.

B: Running machine communicates abnormally. Reinstall running machine and check whether the connection line is broken down.

C: Machine is running, and parameter cannot be set. Please stop the machine and set.

Press “run” (external control) but the motor does not run

(2)Reason and solution:

A: Wrong running mode, please check if F1.02 is set for 1.

B: Frequency order is not given or the frequency is below the start frequency.

C: Peripheral connection mistake, please check peripheral connection.

D: The definition of AC motor speed controller input terminal is wrong, and not match peripheral connection. Check 3.15-F3.22 parameter.

E: Start button is fault and controlling wire is broken. Check control wire and button.

F: AC motor speed controller is in protection and is not reset. Please reset and restart.

G: Motor connection is not connected or phase missed. Check motor connection.

H: Motor is fault. Please check if the motor is broken down.

I: AC motor speed controller is fault. Please check the mistake of AC motor speed controller.

(3)Motor over heat

Reason and solution:

A: Higher temperature of environment. Please improve the condition and aeration, and reduce temperature.

B: Much heavier load. The actual load is over the motor rating torsion. Enlarge the motor capacity.

C: The insulation of motor declines. Replace the motor.

D: The distance between AC motor speed controller and motor is too long. Please reduce the distance and install anti-alternating current machine.

E: Voltage resistance between motor phases is not sufficient. AC motor speed

controller will generate impact voltage between motor loops in switching. The maximal impact voltage will reach 3 times more than input voltage. Recommend using specialized motor.

F: When the running motor in a low speed to change the deceleration rate, motor will run in a high speed.

(4) Machine vibration or abnormal sound

Reason and solution:

A: Blocking or bad lubrication of the machine. Please check machine load.

B: The machine has a sympathetic vibration phenomenon. Adjust the carrier wave, change deceleration rate, avoid sympathetic vibration frequency, and install shock absorption level up.

(5)The motor does not allow reverse.

Reason and solution:

A: Reverse is forbidden. Release the forbiddance.

(6)Motor allows reverse.

Reason and solution:

A: Exchange both of three terminals U, V, W. on AC motor speed controller output

B: Reverse the running controlling signal. If the original signal is positive, set it negative.

(7)AC motor speed controller starts up and disturbs other settings

Reason and solution

Reason: AC motor speed controller disturbing

Solution:

A: Reduce carrier frequency

B: Install filter on supply input terminal of AC motor speed controller power

C: Install filter on power supply output terminal of AC motor speed controller

D: Correct grounding from motor and AC motor speed controller

E: Separate main circuit connection and other signal connection

F: Adopt control connection with shield connection. Cable should be covered metal tube

G: The terminals of connection input and output should be installed magnetic loop

8-7 Disturbance solution

The regular disturbance includes two kinds: one is AC motor speed controller disturbs other equipments and instrument, which refers to 8-6; the other is AC motor speed controller is disturbed and make controller take wrong action.

Bringing disturbance must be disturbing resource and channel. The disturbing channel of AC motor speed controller is as the same as other electromagnetic disturbing channel, mainly referred to electromagnetic radiation, transmission, inductance coupling.

(1)Electromagnetic radiation

Generate electromagnetic radiation to the surrounding electron and electronic equipment. The shield can be one of the solutions.

(2)Transmission

Generate electromagnetic noise to directly driving motor and transmit disturbance to power supply, and transmit it to other device through electronic net. Filter wave may solve the problems.

(3)Inductance coupling

Generate inductance coupling to other connections

The concrete solution for disturbance

(1)Insulation

Separate disturbing resource from those easily affected parts. Electric welding machine is a strong disturbing resource. Description of AC motor speed controller says that the electric welding machine and AC motor speed controller cannot share the same power supply.

(2)Wave filter

The filter is installed for restraining the disturbing signal to be transmitted from AC motor speed controller to power supply and motor through power supply wire transmission. The solution is to add filter, reactor or magnetic loop at the input and output ends.

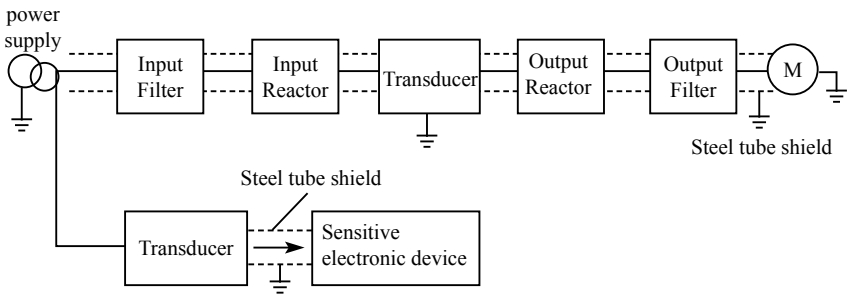
(3)Shield

AC motor speed controller adopts iron casing shield not to let electromagnetic disturbance leak. The output wire adopts iron tube shield; control wire adopts shield wire; power supply wire is separated from control wire, etc.

(4)Grounding

Good grounding may significantly prevent the break of external disturbance, restrain internal coupling and raise the system capability of anti-disturbance.

The following illustration is AC motor speed controller transmission system countermeasure of anti-disturbance:



Chapter 9 External Fittings Selection

9-1 The Purpose of Accessory

Name	Purpose
Circuit breaker Leakage switch	Protect connections of the controller for convenience, installation, protection and maintenance.
Magnetic contactor	Guarantee switching power supply of controller from damage
Surge absorber	Absorb surge electric currency from electromagnetic contact and relay.
Isolating transformer	Insulate input and output of the controller for reducing disturbance.
DC reactor	Protect and restrain high frequency wave.
AC reactor	To protect the controller and restrain high frequency wave and prevent surge voltage impact.
Braking Resistance and Braking Unit	Absorb the regenerate energy.
Noise wave filter	Reduce the disturbance from controller.
Magnetic loop	Reduce the disturbance from controller

9-2 Arrangement

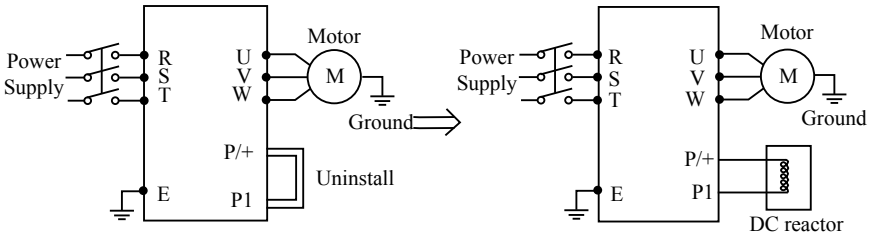
9-2-1 DC reactor

Controller type	Suitable power	DC reactor parameter	
		Rated currency (A)	Inductance value (mH)
HCA4037	37	100	0.7
HCA4045	45	120	0.58
HCA4055	55	146	0.47
HCA4075	75	200	0.35
HCA4090	90	240	0.29
HCA4110	110	290	0.24

Chapter 9 External Fittings Selection

Controller type	Suitable power	DC reactor parameter	
		Rated current (A)	Inductance value (mH)
HCA4132	132	330	0.215
HCA4160	160	395	0.177
HCA4200	200	495	0.142
HCA4220	220	557	0.126
HCA4280	280	700	0.10
HCA4300	300	800	0.08
HCA4315	315	800	0.08

Install connection:



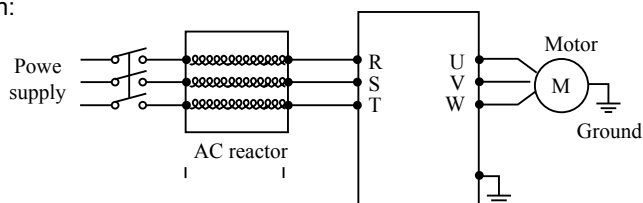
9-2-2 AC reactor

Controller type	Suitable power	DC reactor parameter	
		Rated current (A)	Inductance value (mH)
HCA4011	11	24	0.52
HCA4015	15	34	0.397
HCA4018	18.5	38	0.352
HCA4022	22	50	0.26
HCA4030	30	60	0.24
HCA4037	37	75	0.235
HCA4045	45	91	0.17
HCA4055	55	112	0.16
HCA4075	75	150	0.112
HCA4090	90	180	0.10
HCA4110	110	220	0.09
HCA4132	132	265	0.08
HCA4160	160	300	0.07

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Controller type	Suitable power	DC reactor parameter	
		Rated current (A)	Inductance value (mH)
HCA4200	200	360	0.06
HCA4220	220	400	0.05
HCA4280	280	560	0.03
HCA4300	300	640	0.0215
HCA4315	315	640	0.0215

Installation:



9-2-3 Braking resistance

Controller Type	Braking resistance		CDBR	Torsion (10% ED)	(KW)	Note
	W	Ω				
HCA20P4	80	200	Embedded	125	0.4	
HCA20P7	100	200		125	0.75	
HCA21P5	300	100		125	1.5	
HCA22P2	300	70		125	2.2	
HCA23P7	390W	40		125	3.7	
HCA25P5	520W	30		125	5.5	
HCA27P5	780W	20		125	7.5	
HCA40P7	80	750		125	0.75	
HCA41P5	300	400		125	1.5	
HCA42P2	300	250		125	2.2	
HCA43P7	400	150		125	3.7	
HCA45P5	500	100		125	5.5	
HCA47P5	1000	75		125	7.5	
HCA4011	1000	50		125	11	
HCA4015	1500	40		125	15	plastic
HCA4015	1500	40	4030×1	125	15	plastic
HCA4018	4800	32	4030×1	125	18.5	
HCA4022	4800	27.2	4030×1	125	22	

Chapter 9 External Fittings Selection

Controller Type	Braking resistance		CDBR	Torsion (10% ED)	(KW)	Note
	W	Ω				
HCA4030	6000	20	4030×1	125	30	
HCA4045	1600	13.6	4045×1	125	45	
HCA4055	6000×2	20×2	4045×2	125	55	
HCA4075	9600×2	13.6×2	4045×2	125	75	
HCA4090	9600×3	20×3	4045×3	125	90	
HCA4110	9600×3	20×3	4045×3	125	110	
HCA4132	9600×4	13.6×4	4045×4	125	132	
HCA4160	9600×4	13.6×4	4045×4	125	160	
HCA4185	9600×5	13.6×5	4045×5	125	185	
HCA4200	9600×5	13.6×5	4045×5	125	200	
HCA4220	9600×5	13.6×5	4045×5	125	220	
HCA4300	9600×6	13.6×6	4045×6	125	315	

Calculate of braking resistance value:

The braking resistance value is related to the DC currency when AC motor speed controller braking. For 380V power supply, the braking DC voltage is 800V-820V, and for 220V system, the DC voltage is 400V.

Moreover, the braking resistance value is related to braking torsion Mbr%. The braking resistance values are different for the different braking torsion. The calculation formula is as follow:

$$R = \frac{U_{dc}^2 \times 100}{P_{Motor} \times M_{br}\% \times \eta_{Transducer} \times \eta_{Motor}}$$

Thereinto: U_{dc} ——Braking DC voltage;

P_{Motor} ——Motor power;

M_{br} ——Braking torsion;

η_{Motor} ——Motor efficiency;

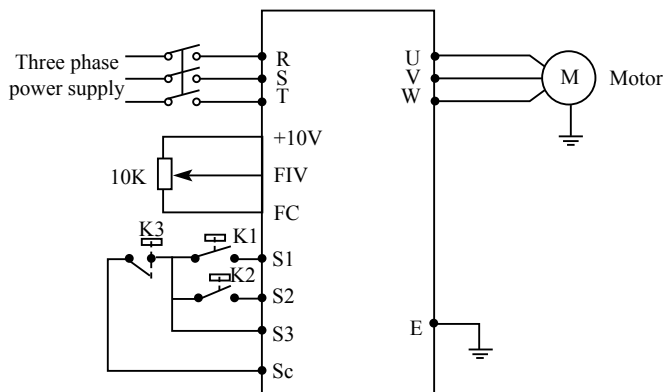
$\eta_{Transducer}$ ——Transducer efficiency.

The braking power is related to braking torsion and braking frequency. The above illustration shows the braking torsion as 125% and the frequency is 10%. The different loading is by situations, the data in the illustration are for reference.

Appendix 1 Simple Application Example

1. Use external end (three phases) to control running of AC motor speed controller. Use external terminal to switch rotation forward or reverse. The potentiometer controls frequency of AC motor speed controller.

A: Basic connection illustration:



B: Parameter setting and instruction:

F1.01=1 the measure of analog voltage setting

(Potentiometer of external terminal)

F1.02=1 external terminal control

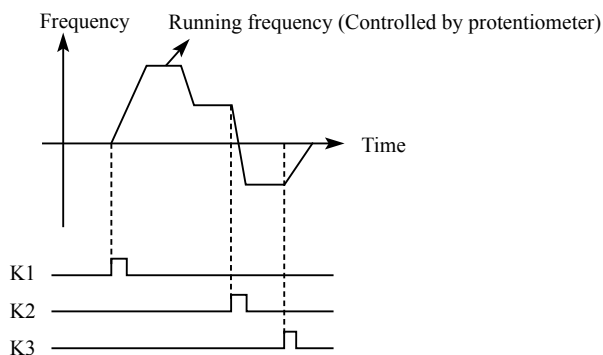
F3.17=6 define the terminal S1 turning forward

F3.18=7 define the terminal turning reverse

F3.19=8 define terminal S3 stopping

Appendix 1 Simple Application Example

C: Action instruction:



K1 running forward

K2 running forward

K3 Stop

Running frequency is controlled by potentiometer.

A⁺、P⁺、H⁺ Series AC Motor Speed Controller

Standard of 220V Three phase Circuit Breaker and Connector

400V								
Capacity (KW)	Non-fuse Circuit Breaker				Magnetic Connector			
	No Reactor		Reactor		No Reactor		Reactor	
	Model	Rated current A	Model	Rated Current A	Model	Rated current A	Model	Rated Current A
0.4	NF32	5	NF32	5	SC-03	11	SC-03	11
0.75	NF32	10	NF32	10	SC-03	13	SC-03	11
1.5	NF32	15	NF32	10	SC-4-0	18	SC-05	13
2.2	NF32	20	NF32	15	SC-N1	26	SC-4-0	18
3.7	NF32	30	NF32	20	SC-N2	35	SC-N1	26
5.5	NF63	50	NF63	40	SC-N2S	50	SC-N2	35
7.5	NF125	60	NF125	50	SC-N3	65	SC-N2S	50
11	NF125	75	NF125	75	SC-N4	80	SC-N4	80
15	NF250	125	NF125	100	SC-N5	93	SC-N4	80
18.5	NF250	150	NF250	125	SC-N5	93	SC-N5	93
22			NF250	150			SC-N6	125
30			NF250	175			SC-N7	152
37			NF250	225			SC-N8	180
45			NF400	250			SC-N10	220
55			NF400	300			SC-N11	300
75			NF400	400			SC-N12	400
90			NF630	500			SC-N12	400
110			NF630	600			SC-N14	600

Appendix 1 Simple Application Example

Standard of 400V Three phase Circuit Breaker and Connector

400V								
Capacity (KW)	Non-fuse Circuit Breaker				Magnetic Connector			
	No Reactor		Reactor		No Reactor		Reactor	
	Model	Rated current A	Model	Rated Current A	Model	Rated current A	Model	Rated Current A
0.4	NF32	3	NF32	3	SC-03	7	SC-03	7
0.75	NF32	5	NF32	5	SC-03	7	SC-03	7
1.5	NF32	10	NF32	10	SC-05	9	SC-05	9
2.2	NF32	15	NF32	10	SC-4-0	13	SC-4-0	13
3.7	NF32	20	NF32	15	SC-4-1	17	SC-4-1	17
5.5	NF32	30	NF32	20	SC-N2	32	SC-N1	25
7.5	NF32	30	NF32	30	SC-N2S	48	SC-N2	32
11	NF63	50	NF63	40	SC-N2S	48	SC-N2S	48
15	NF125	60	NF63	50	SC-N3	65	SC-N2S	48
18.5	NF125	75	NF125	60	SC-N3	65	SC-N3	65
22			NF125	75			SC-N4	80
30			NF125	100			SC-N4	80
37			NF250	125			SC-N5	90
45			NF250	150			SC-N6	110
55			NF250	175			SC-N7	150
75			NF250	225			SC-N8	180
90			NF400	250			SC-N10	220
110			NF400	300			SC-N11	300
132			NF400	350			SC-N11	300
160			NF400	400			SC-N12	400
185			NF630	500			SC-N12	400

DC Reactor

[illegible]

DC Reactor Model for 440V	
Model(KW)	Number
0.75	DCL-H0.75
1.5	DCL-H 1.5
2.2	DCL-H 2.2
3.7	DCL-H 3.7
5.5	DCL-H 5.5
7.5	DCL-H 7.5
11	DCL-H 11
15	DCL-H 15
18.5	DCL-H 18
22	DCL-H22
30	DCL-H30
37	DCL-H37
55	DCL-H55
75	DCL-H75
90	DCL-H90
110	DCL-H110
132	DCL-H132
160	DCL-H160
185	DCL-H185
200	DCL-H200
220	DCL-H 220
250	DCL-H250
280	DCL-H280
300	DCL-H300
315	DCL-H315
375	DCL-H375
415	DCL-H415

Output AC Reactor

Output AC Reactor for400V	
Model(KW)	Number
0.75	ACL-H 0.75 OUT
1.5	ACL-H1.5 OUT
2.2	ACL-H 2.2 OUT
3.7	ACL-H 3.7 OUT
5.5	ACL-H 5.5 OUT
7.5	ACL-H 7.5 OUT
11	ACL-H 11 OUT
15	ACL-H 15 OUT
18.5	ACL-H 18.5 OUT
22	ACL-H 22 OUT
30	ACL-H 30 OUT
37	ACL-H 37 OUT
55	ACL-H 55 OUT
75	ACL-H 75 OUT
90	ACL-H 90 OUT
110	ACL-H 110 OUT
132	ACL-H 132 OUT
160	ACL-H 160 OUT
185	ACL-H 185 OUT
200	ACL-H 200 OUT
220	ACL-H 220 OUT
250	ACL-H 250 OUT
280	ACL-H 280 OUT
300	ACL-H 300 OUT
315	ACL-H 315 OUT
375	ACL-H375 OUT
415	ACL-H415 OUT

Appendix 1 Simple Application Example

Input 3 Phase Filter

Input 3 Phase Filter for 220V	
Model (KW)	Number
0.4~1.5	NFS32010
2.2~3.7	NFS32020
5.5	NFS32040
7.5~11	NFS32060
15~18.5	NFS32090
22	NFS32130
30~37	NFS32180
40	NFS32220
55	NFS32270
75	NFS32400

Input 3 Phase Filter for 400V	
Model (KW)	Number
0.75~3.7	NFS34010
5.5~7.5	NFS34020
11~15	NFS34040
18.5~22	NFS34060
30~37	NFS34090
40~55	NFS34130
75	NFS34180
90	NFS34220
110	NFS34270
132	NFS34320
150	NFS34400

Output 3 Phase Filter

Output 3 Phase Filter for 220V	
Model (KW)	Number
0.4~1.5	RFI 32010
2.2~3.7	RFI 32020
5.5	RFI 32040
7.5~11	RFI 32060
15~18.5	RFI 32090
22	RFI 32130
30~37	RFI 32180
40	RFI 32220
55	RFI 32270
75	RFI 32400

Output 3 Phase Filter for 400V	
Model (KW)	Number
0.75~3.7	RFI 34010
5.5~7.5	RFI 34020
11~15	RFI 34040
18.5~22	RFI 34060
30~37	RFI 34090
40~55	RFI 34130
75	RFI 34180
90	RFI 34220
110	RFI 34270
132	RFI 34320
150	RFI 34400

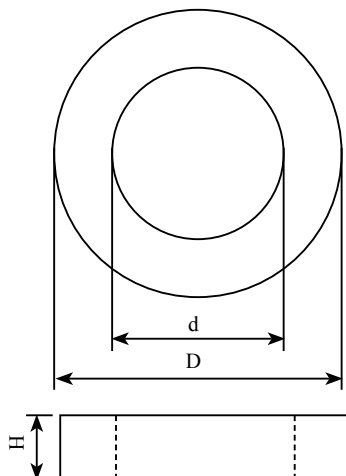
A⁺、P⁺、H⁺ Series AC Motor Speed Controller

Zero-Phase Filter

The model with Base is ZFM5046M

The model without Base is ZFM5038D

Model	d	D	H
ZFM5038D	38	63	12.5
ZFM5050D	50	80	20



Appendix 1 Simple Application Example

A+ Description for communication

RS+ and RS- are individually A, and B for RS485

FUNC 03 → Read 06 → Write

ASCII mode

	START	ADDR	FUNC	DATA	LRC	0D	0A	
Receive	:	01	03	2000, 0001	XX	0D	0A	17bytes
Send in normal	:	01	03	02, 0120	XX	0D	0A	11+2*N N=2, 4, 6, 8
Send in error	:	01	03	00	XX	0D	0A	11 bytes
Receive	:	01	06	2000, 0010	XX	0D	0A	17 BYTES
":010620000010XX",0DH,0AH								
Send in error	:	01	06	2000, 0010	XX	0D	0A	17 BYTES
":010620000010XX",0DH,0AH								
Send in error	:	01	06	00	XX	0D	0A	11 BYTES
":010600XX",0DH,0AH								

RTU mode

	ADDR	FUNC	DATA	CRCL,CRCH	
Receive	01	03	2000, 0001	XX,XX	8BYTES
Send in normal	01	03	02, 0120	XX,XX	5+N N=2,4,6,8
Send in error	01	03	00	XX,XX	5BYTES
Receive	01	06	2000, 0010	XX,XX	8BYTES
Send in normal	01	06	2000, 0010	XX,XX	8BYTES
Send in error	01	06	00	XX,XX	5BYTES

Error conditions :

- 1、None function code
- 2、The function code is lock or protected

A⁺、P⁺、H⁺ Series AC Motor Speed Controller

A+ Description for communication

RS+ and RS- are individually A, and B for RS485

Data address	Local address	Content	Read/write
2000H_48193	BIT0~BIT1	00B: none 01B: stop 10B: start 11B: JOG start	Write
	BIT2~BIT3	00B: none 01B: reverse 10B: forward 11B: change direction	Write
	BIT4	0B: none 1B: reset	Write
	BIT5~BIT15	Reserved	
2001H_48194	BIT0~BIT15	Frequency command 00000~40000 Second position of Decimal point (F1.01=5 this data can work)	Write

Sample of using ASCII mode:

Preset :

F1.01 = 5 (frequency source);

F1.02 = 2 (control mode);

F7.00 = 1 (baud frequency 9600);

F7.01= 0 (8N1 FOR ASCII)

F7.02= 1 (address)

1、Setting frequency:

In 2001H unit to write into 50.00HZ (1388H)

Received word signal HEX :

3A 30 31 30 36 32 30 30 31 31 33 38 38 33 44 0D 0A

Appendix 1 Simple Application Example

2、Operating command

In 2000H unit to write into 02H

Send word signal: ":010620000002 D7"CR LF

Send word signal HEX :

3A 30 31 30 36 32 30 30 30 30 30 32 44 37 0D 0A

Received word signal HEX :

3A 30 31 30 36 32 30 30 30 30 30 32 44 37 0D 0A

3、Stop operating order

In 2000H unit to write into 01H

Send word signal: ":010620000001 D8"CR LF

Send word signal HEX :

3A 30 31 30 36 32 30 30 30 30 30 31 44 38 0D 0A

Received word signal HEX :

3A 30 31 30 36 32 30 30 30 30 30 31 44 38 0D 0A

About the "44 38" calculation please follow the LRC in user's manual.

Sample of using RTU mode :

Preset :

F1.01 = 5 (frequency source);

F1.02 = 2 (control mode);

F7.00 = 1 (baud frequency 9600);

F7.01= 3 (8N1 FOR RTU)

F7.02= 1 (address)

Using RTU mode to control:

1、To set the frequency first:

In 2001H unit to write 50.00HZ (1388H)

Send word signal: 01 06 2001 13 88 CRCL CRCH

2、Operating order

A⁺、P⁺、H⁺ Series AC Motor Speed Controller

In 2000 unit to write 02H

Send word signal: 06 2000 00 02 CRCL CRCH

3、Stop operating order

In 2000H unit to write 01H

Send word signal: 06 2000 00 01 CRCL CRCH

4、To set accelerating time F1.07=20.0S

In 107(6BH) unit to write in 200 (C8H)

Send word signal: 01 06 00 6B 00 C8 CRCL CRCH

