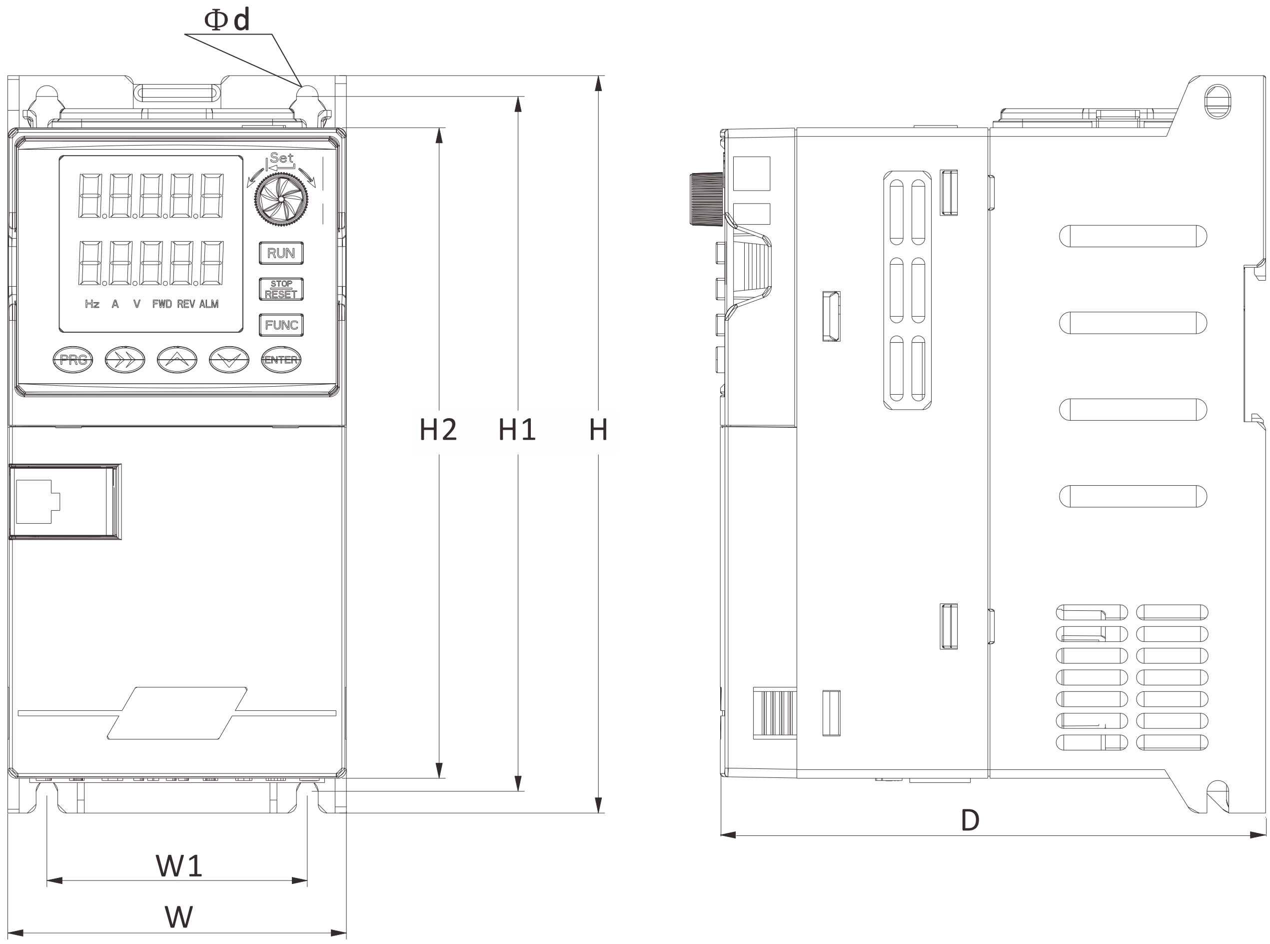
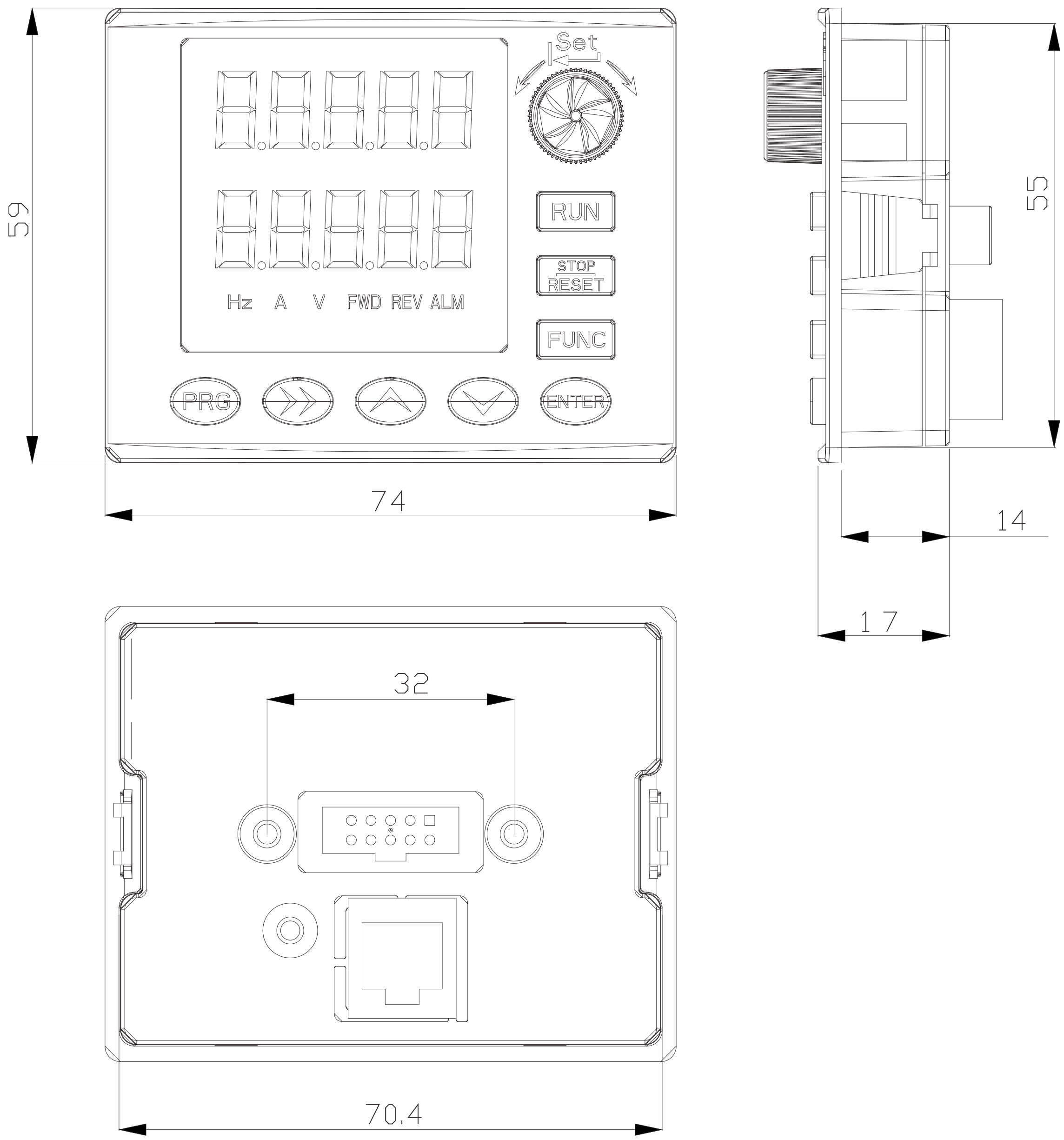
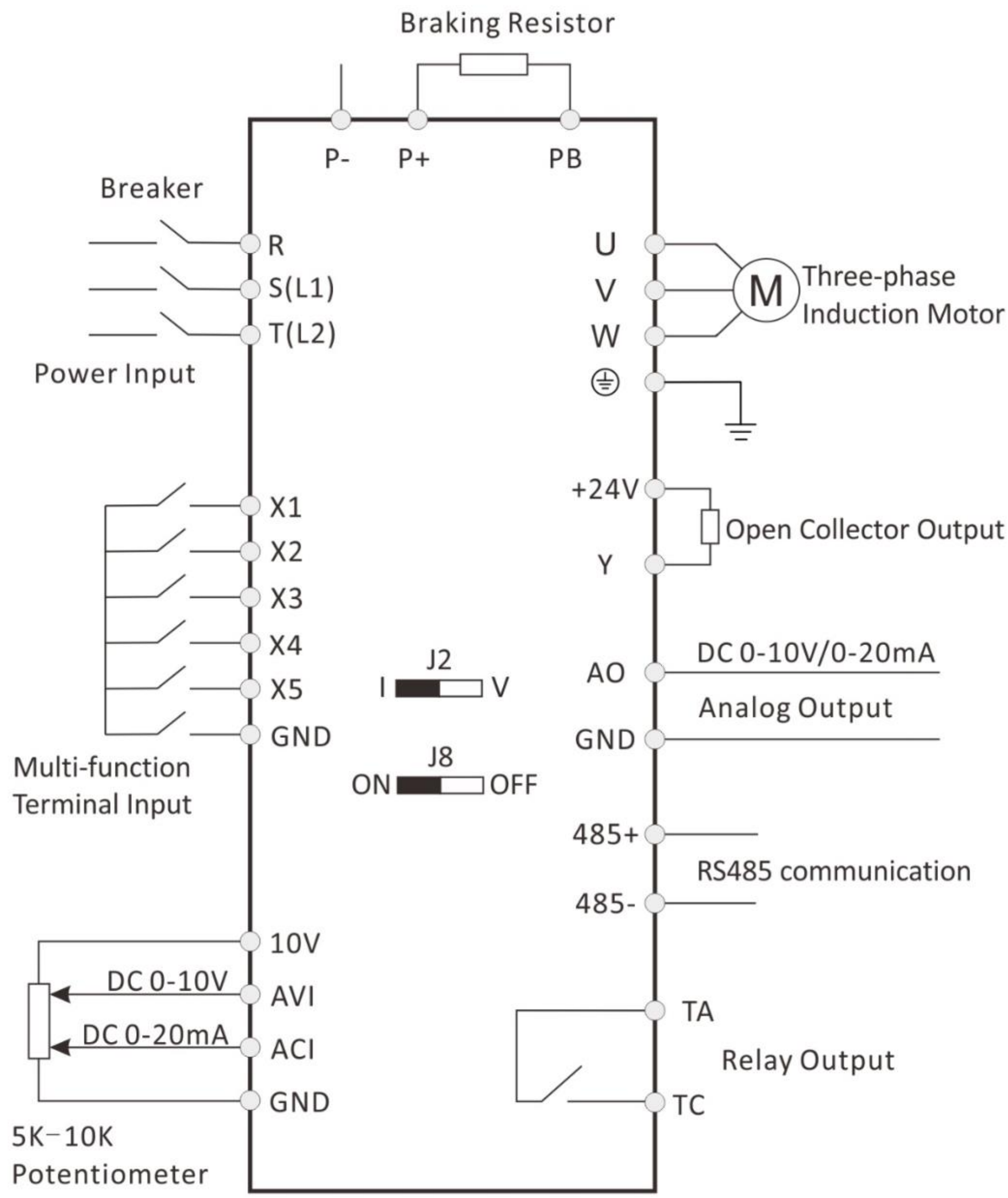
Description of mounting dimensions									
Voltage class	Power (KW)	Current output (A)	W (MM)	H (MM)	D (MM)	H2 (MM)	H1 (MM)	W1 (MM)	Φd (MM)
3AC 380V	0.75	2.1	78	170	125.6	150	160.2	60	5
	1.5	3.8	78	170	125.6	150	160.2	60	5
	2.2	5.1	78	170	125.6	150	160.2	60	5
	3.7	9	95	212	142.7	180	200	78	5
	5.5	13	95	212	142.7	180	200	78	5

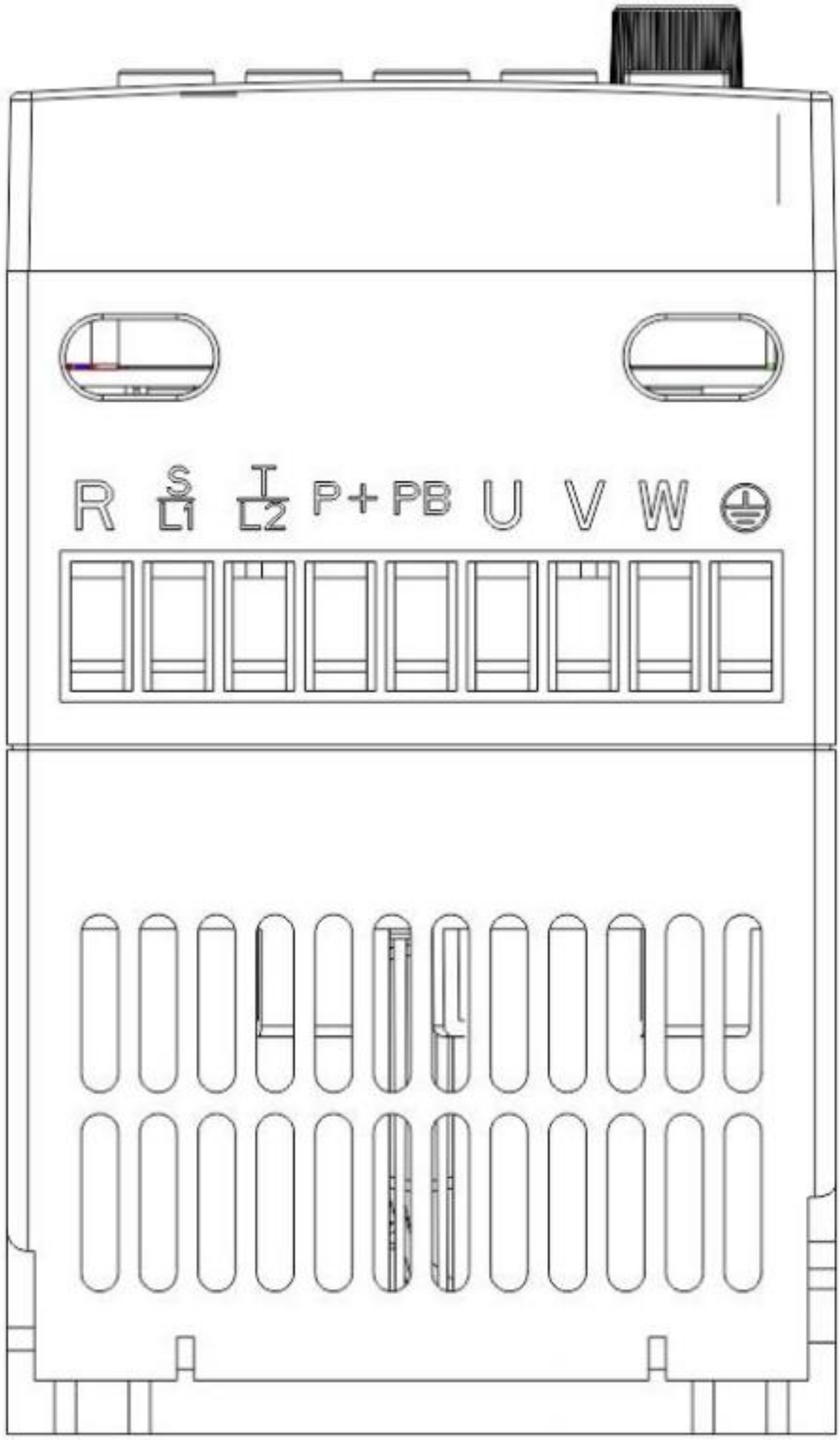


Related dimensions of the keyboard



Wiring Diagram




R
S
L1
T
L2
P+
PB
U
V
W

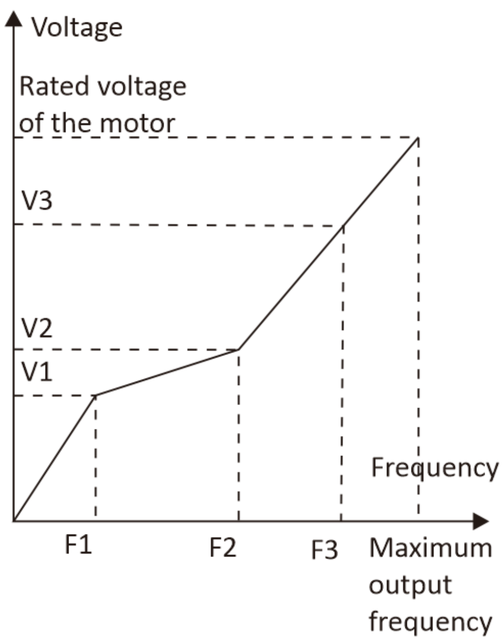
Functional Parameter Table

○—Parameters that can be modified in any state
×—Parameters that cannot be modified in the operating state
◆—Parameters that are actually detected and cannot be modified
◇—Manufacturer's parameter, limited to the manufacturer to modify it, the user is prohibited to modify it

Group F0 - Basic operating parameters

Function Code	Name	Content	Range of Settings	Factory Setting	Change
F0.00	Macro definition of function (temporary reservation)	0: Universal mode 1: Constant pressure water supply mode with single pump 2: Constant pressure water supply mode with -two pumps 3: Back-carried Intelligent small pump mode 4: Carving machine mode 5: Application mode for safety scenarios 6: Application mode for high torque start scenario 7: Application mode for fast start-stop scenarios 8: Application mode for automatic energy saving scenarios 9: Custom mode (please refer to the custom macro parameter set, application combinations of up to 16 parameters are supported)	0-9	0	×
F0.01	Motor control mode	0: VF control 1: Advanced VF control 2: Simple vector control	0-2	1	×
F0.02	Selection of operation command channel	0: Keypad operation command channel 1: Terminal operation command channel 2: Communication operation command channel	0-2	0	○
F0.03	Frequency given selection	0: Keypad potentiometer 1: Given number 1, adjustable by the ▲ and ▼ keys on the operating panel 2: Given number 2, terminal UP/DOWN adjustment 3: AVI Simulation Given (0-10V) 4: Combination given 5: ACI given (0-20mA) 6: Communication given	0-7	0	○

		7:Pulse given Note: When combination given is selected, the combination given is selected in F1.15.			
F0.04	Maximum output frequency	The maximum output frequency is the highest frequency that the frequency converter is allowed to output and is the reference for acceleration and deceleration settings.	MAX {50.0, [F0.05]} -999.9Hz	50.0Hz	×
F0.05	Upper limiting frequency	The operating frequency must not exceed this frequency.	MAX （0.1, [F0.06]}-[F0.04]	50.0Hz	×
F0.06	Lower limit frequency	The operating frequency must not fall below this frequency.	0.0-Upper limiting frequency	0.0Hz	×
F0.07	Arrival treatment of lower limit frequency	0: Running at zero speed 1: Running at the lower frequency limit 2: Stopping	0-2	0	×
F0.08	Digital setting of the operating frequency	The set value is the initial value of the frequency digit.	0.0-Upper limiting frequency	10.0Hz	○
F0.09	Digital frequency control	LED units digit: power-off storage 0: Storage 1: No storage Ten's digit: Hold shutdown 0: Hold 1: No hold LED hundreds digit: UP/DOWN negative frequency regulation 0: Invalid 1: valid LED thousand digit: PID, PLC frequency superimposed selection 0: invalid 1: F0.03+PID 2: F0.03+PLC	0000-2111	0000	○
F0.10	Acceleration time	Time required for the frequency converter to accelerate from zero frequency to maximum output frequency.	0.1-999.9S 0.4-4.0KW 7.5S 5.5-7.5KW 15.0S	Setting of the model	○
F0.11	Deceleration time	The time it takes for the frequency converter to decelerate from the maximum output frequency to zero			

		frequency.			
F0.12	Setting of the running direction	0: Corotation 1: Inversion 2: Inversion prohibited	0-2	0	○
F0.13	V/F curve setting	0: Linear curve 1: Squared curve 2: Multi-point VF curve	0-2	0	×
F0.14	Torque magnificatio n	Manual torque magnification, this setting is a percentage relative to the rated voltage of the motor.	0.0-30.0%	Setting of the model	○
F0.15	The cut-off frequency of torque magnificatio n	This setting is the frequency point for the boost cut-off for manual torque magnification.	0.0-50.0Hz	15.0Hz	×
F0.16	Setting of the carrier frequency	For applications requiring silent operation, the carrier frequency can be increased appropriately to meet the requirements, but the increased carrier frequency will increase the heat generation of the inverter.	2.0-16.0KHz 0.4-3.0KW 4.0KHz 4.0-7.5KW 3.0KHz	Setting of the model	×
F0.17	V/F frequency value F1	 	0.1-frequency value F2	12.5Hz	×
F0.18	V/F voltage value V1		0.0-voltage value V2	25.0%	×
F0.19	V/F frequency value F2		Frequency value F1-frequency value F3	25.0Hz	×
F0.20	V/F voltage valueV2		voltage value V1-voltage value V3	50.0%	×
F0.21	V/F frequency value F3		Frequency value F2-Rated frequency of the motor [F4.03]	37.5Hz	×
F0.22	V/F voltage value V3		Voltage value V2-100.0%*Uoute Rated voltage of the motor[F4.00])	75.0%	×
F0.23	User	Set any non-zero number and wait 3	0-9999	0	○

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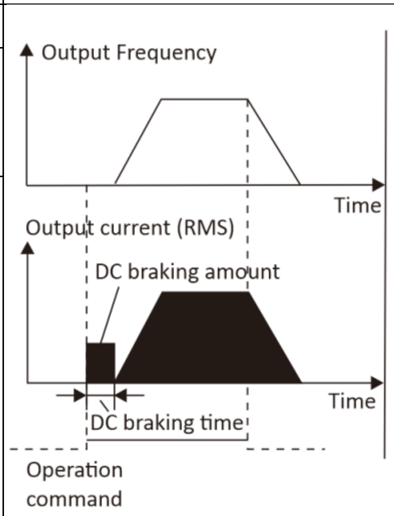
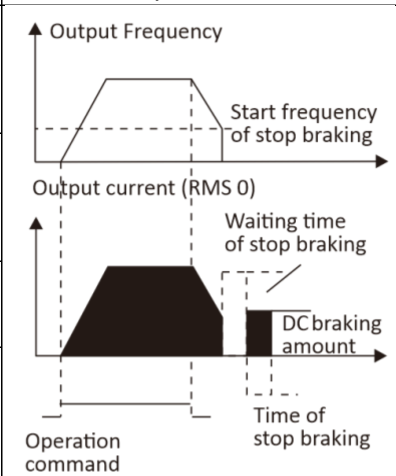
	password	minutes or power down for it to take effect.			
F0.24	Selection of frequency display resolution	0:0.1Hz ; 1:1Hz Note: When you set this parameter, please check the maximum output frequency (F0.04), the upper limit of the frequency (F0.05), the rated frequency of the motor (F4.03) and other frequency-related parameters.	0-1	0	○

Group F1 - Operating parameters of the auxiliary					
Function code	Name	Setting range	Range of Settings	Factory Settings	Change
F1.00	Starting mode	LED units digit: Starting mode 0: Starting from the starting frequency 1: DC braking first and then starting from the starting frequency LED tens digit: Start mode in case of power failure or abnormality 0: invalid 1: Start from starting frequency LED hundreds digit: reserved 1ED thousand digit: reserved	0000-0011	00	×
F1.01	Starting frequency		0.0-50.0Hz	1.0Hz	○
F1.02	DC Braking Voltage at Starting		0.0-50.0%×Rated voltage of the motor	0.0%	○
F1.03	DC Braking Time at Starting		0.0-30.0s	0.0s	○
F1.04	Halt mode	0: Deceleration stop 1: Free stop	0-1	0	×
F1.05	The starting frequency of DC braking at halt mode		0.0-upper limiting frequency	0.0Hz	○
F1.06	DC Braking Voltage at halt mode		0.0-50.0%×Rated voltage of the motor	0.0%	○
F1.07	DC Braking Time at halt mode		0.0-30.0s	0.0s	×
F1.08	DC braking waiting time at halt mode		0.00-99.99s	0.00s	×
F1.09	Setting of corotation inching frequency	The set frequency of corotation and inversion	0.0-50.0Hz	10.0Hz	○

	Setting of inversion inching frequency	of the inching			
F1.11	Acceleration time of inching	The acceleration and deceleration time of the set inching	0.1-999.9S 0.4-4.0KW 10.0S 5.5-7.5KW 15.0S	Setting of the model	○
F1.12	Deceleration time of inching				
F1.13	Hopping frequency	By setting the hopping frequency and range, the inverter can avoid the mechanical resonance point of the load.	0.0-upper limiting frequency	0.0Hz	○
F1.14	Hopping range		0.0-10.0Hz	0.0Hz	○
F1.15	Given method of frequency combination	0: Potentiometer + digital frequency 1 1: Potentiometer + digital frequency 2 2: Potentiometer + AVI 3: Digital frequency 1 + AVI 4: Digital frequency 2 + AVI 5: Digital frequency 1+multi-band speed 6: digital frequency 2 + multi-speed 7: Potentiometer+multi-band speed 8: AVI+PLC (simultaneous superposition) 9: ACI+PLC (same direction superposition)	0-9	0	×
F1.16	Programmable operation control (simple PLC operation)	LED unit digit: PLC enable control 0: invalid 1: valid LED ten digit: selection of operation mode 0:Single cycle 1: Continuous cycle 2: Hold final value after single cycle LED hundred digit: starting mode 0: Restart from the first stage 1:Starting from the stage at the moment of stopping (fault)	0000-1221	0000	×

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		2:Starting from the stage and frequency of the moment of stopping (fault) LED thousand digit: selection of power-down storage 0: No storage 1: Store			
F1.17	Multi-speed frequency 1	Set the frequency of speed 1	-upper limiting frequency-upper limiting frequency	5.0Hz	○
F1.18	Multi-speed frequency 2	Set the frequency of speed 2	-upper limiting frequency-upper limiting frequency	10.0Hz	○
F1.19	Multi-speed frequency 3	Set the frequency of speed 3	-upper limiting frequency-upper limiting frequency	15.0Hz	○
F1.20	Multi-speed frequency 4	Set the frequency of speed 4	-upper limiting frequency-upper limiting frequency	20.0Hz	○
F1.21	Multi-speed frequency 5	Set the frequency of speed 5	-upper limiting frequency-upper limiting frequency	25.0Hz	○
F1.22	Multi-speed frequency 6	Set the frequency of speed 6	-upper limiting frequency-upper limiting frequency	37.5Hz	○
F1.23	Multi-speed frequency 7	Set the frequency of speed 7	-upper limiting frequency-upper limiting frequency	50.0Hz	○
F1.24	Running time of stage 1	Set the running time of speed 1 (unit is selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.25	Running time of stage 2	Set the running time of speed 2 (unit selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.26	Running time of stage 3	Set the running time of speed 3 (unit selected by	0.0-999.9s	10.0s	○

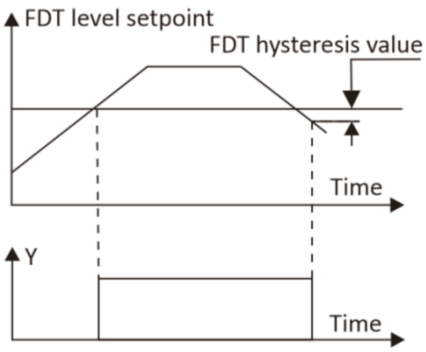
		[F1.35], default is seconds)			
F1.27	Running time of stage 4	Set the running time of speed 4 (unit selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.28	Running time of stage 5	Set the running time of speed 5 (unit selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.29	Running time of stage 6	Set the running time of speed 6 (unit selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.30	Run time of stage 7	Set the running time of speed 7 (unit selected by [F1.35], default is seconds)	0.0-999.9s	10.0s	○
F1.31	Stage acceleration and deceleration	LED unit digit: acceleration and deceleration time of stage 1 0-1 LED ten digit: acceleration and deceleration time of stage 2 0-1 LED hundred digit: acceleration and deceleration time of stage 3 0-1 LED thousand digit: acceleration and deceleration time of stage 4 0-1	0000-1111	0000	○
F1.32	Time option 1	LED unit digit: acceleration and deceleration time of stage 5 0-1 LED ten digit: acceleration and deceleration time of stage 6 0-1	000-111	000	○

		LED hundred digit: acceleration and deceleration time of stage 7 0-1 LED thousand digit: Reserved			
F1.33	Stage acceleration and deceleration	Set acceleration and deceleration time 2	0.1-999.9s 0.4-4.0KW 10.0s 5.5-7.5KW 15.0s	10.0s	○
F1.34	Time selection 2				
F1.35	Acceleration time 2	LED unit digit: time unit of over SPID LED ten digit: time unit for simple PLC LED hundred digit: time unit for regular acceleration and deceleration LED thousand digit: Reserved 0:Unit is 1 second 1: unit is 1 minute 1: unit is 0.1 second	000-211	000	×
F1.36	Deceleration time 2	The transition time that the inverter waits at the output zero frequency during the transition from forward operation to reverse operation or from reverse operation to forward operation.	0.0-999.9s	0.0	○

Group F2 - Parameters for analog and digital inputs and outputs					
Function Code	Name	Setting Range	Range of Settings	Factory Settings	Change
F2.00	Lower limit voltage of AVI input	Set AVI upper and lower limit voltage	0.00-[F2.01]	0.00V	○
F2.01	Upper limit voltage of AVI input		[F2.01] -10.00V	10.00V	○
F2.02	Setting corresponding to AVI lower limit	Set the setting corresponding to the AVI upper and lower limits, which corresponds to the percentage of the upper limit frequency [F0.05].	-100.0%-10 0.0%	0.0%	○
F2.03	Setting corresponding to AVI upper limit			100.0%	○
F2.04	ACI input lower limit current	Set ACI input upper and lower limit currents	0.00-[F2.05]	0.00mA	○
F2.05	Upper limit current of ACI input		[F2.04] -20.00mA	20.00mA	○
F2.06	Setting for ACI lower limit	Set the setting corresponding to the upper and lower ACI limits, which corresponds to the percentage of the upper limit frequency [F0.05].	-100.0%-10 0.0%	0.0%	○
F2.07	Setting for ACI upper limit			100.0%	○
F2.08	Constant for filtering time of analog input signal	This parameter is used for filtering the input signals of AVI, ACI and panel potentiometer to eliminate the effect of interference.	0.1-5.0s	0.1s	○
F2.09	Limit of anti-dither deviation of analog input	When the analog input signal fluctuates frequently around the given value, the frequency fluctuation caused by this fluctuation can be suppressed by setting F2.09.	0.00-0.10V	0.00V	○
F2.10	Function selection of AO analog output terminal	0: Output frequency 1: Output current 2: Motor speed 3: Output voltage 4: AVI 5: ACI	0-5	0	○
F2.11	AO output lower limit	Set the upper and lower limits of the AFM output	0.00-10.00V/ 0.00-20.00mA	0.00V	○
F2.12	AO output upper limit			10.00V	○

	Input terminal X1 function	0: Idle at the control 1:Point-action control for forward rotation 2: Point-action control for reverse rotation 3: Control of forward rotation (FWD) 4: Control of reversing rotation (REV) 5: Three-wire operation control 6: Free stop control 7: External stop signal input (STOP) 8: External reset signal input (RST) 9: Normally open input for external fault 10: Incremental frequency command (UP) 11: Decreasing frequency command (DOWN) 13:Multi-band speed selection S1 14: Multi-speed selection S2 15: Multi-speed selection S3 16:Run command channel is forced to terminal 17: Run command channel forced to communication 18:DC brake command at stop 19:Frequency switch to AVI 20:Frequency switch to digital frequency 1 21:Frequency switch to digital frequency 2 22: Input of pulse frequency (only valid for X5) 23:Counter clear signal 24:Trigger signal of counter 25:Clear signal of timer 26:Trigger signal of timer 27: Time selection for acceleration and deceleration 28: Pendulum frequency pause (stop at the current frequency) 29: Pendulum frequency reset (back to the center frequency)	0-29	3	×
F2.14	Input terminal X2 function		0-29	4	×
F2.15	Input terminal X3 function		0-29	0	×
F2.16	Input terminal X4 function		0-29	0	×
F2.17	Input terminal X5 function		0-29	22	×

F2.18	Control mode of FWD/REV terminal	0: 2-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0-3	0	×
F2.19	Selection of terminal function detection at power-on	0:The terminal operation command is invalid when power is applied 1:The terminal operation command is valid when power is applied	0-1	0	×
F2.20	R output setting	0:Idle 1:Inverter operation is ready 2:Inverter in operation 3:Inverter in zero speed operation 4:Shutdown due to external fault 5: Failure of the inverter 6:Frequency/speed arrival signal (FAR) 7: Level detection signal of frequency/speed (FDT) 8: Output frequency reaches upper limit 9: Output frequency reaches lower limit 10: Pre-alarm of inverter overload 11: Overflow signal of timer 12:Detection signal of counter 13: Reset signal of counter 14: Auxiliary motor 15:Forward rotation 16: Reverse rotation	0-16	5	○
F2.21	Output of Y open collector		0-16	0	○
F2.22	R closed delay	A change in the state of relay R causes a change in the delay time of the output	0.0-255.0s	0.0s	×
F2.23	R open delay time				
F2.24	Frequency arrival FAR detection amplitude	The output frequency is within the positive and negative detection width of the set frequency, and the terminal outputs a valid signal (low level).	0.0Hz-15.0Hz	5.0Hz	○

F2.25	FDT level setting value		0.0Hz-upper limiting frequency	10.0Hz	○
F2.26	FDT hysteresis value		0.0-30.0Hz	1.0Hz	○
F2.27	UP/DOWN Modification rate of the terminals	This function code is the frequency modification rate when setting the set frequency of the UP/DOWN terminal, i.e. the magnitude of the frequency change when the UP/DOWN terminal is shorted to the COM terminal for one second.	0.1Hz-99.9 Hz/s	1.0Hz/s	○
F2.28	Setting of the pulse trigger method for the input terminals (X1-X5)	0: indicates the trigger method of level 1: indicates the trigger method of pulse	0-1FH	0	○
F2.29	Setting of the valid logic for the input terminals (X1-X5)	0: indicates positive logic, i.e. the Xi terminal is connected to the common terminal and is valid, disconnection is not valid 1: indicates anti-logic, i.e. the Xi terminal is connected to the common terminal and is not valid, disconnection is valid	0-1FH	0	○
F2.30	X1 filter coefficient	Used to set the sensitivity of the input terminals. If the digital input terminals are susceptible to interference and cause malfunction, this parameter can be increased to increase the resistance to interference. However, setting it too high will result in a reduction in the sensitivity of the input terminals. 1: represents the unit of 2MS scan time	0-9999	5	○
F2.31	X2 filter coefficient		0-9999	5	○
F2.32	X3 filter coefficient		0-9999	5	○
F2.33	X4 filter coefficient		0-9999	5	○
F2.34	X5 filter coefficient		0-9999	5	○

Group F3 - PI D parameters					
Function Code	Name	Setting Range	Range of Settings	Factory Settings	Change
F3.00	PID function setting	LED unit digits: PID regulation characteristics 0: not valid 1: Positive effect When the feedback signal is greater than the given amount of the PID, the output frequency of the inverter is requested to decrease (i.e. reduce the feedback signal). 2: Negative effect When the feedback signal is greater than the given amount of PID, the output frequency of the inverter is requested to rise (i.e. reduce the feedback signal). LED ten digit: input channel for PID dosing 0: Keypad potentiometer The PID quantity is given by the potentiometer on the operating panel. 1: Digital dosing The PID quantity is given digitally and is set by function code F3.01. 2: Pressure feed (MPa, Kg) The pressure is given by setting F3.01, F3.18.	0000-2122	1010	×
		LED hundred digit: input channel for PID feedback quantity 0: AVI 1: ACI LED thousand digit: PID sleep selection 0: Invalid 1: Normal sleep This method requires specific parameters such as F3.10-F3.13 to be set. 2: Scrambled sleep Same parameter settings as for sleep mode selection 0. If the			

		PID feedback value is within the range of the F3.14 set value, the sleep delay time is maintained and then it enters scrambled sleep. If the feedback value is less than the wakeup threshold (PID polarity is positive), it will wake up immediately.			
F3.01	Digital setting of specified rate	Use the operating keypad to set the amount of feed for PID control. This function is only valid when digital feed is selected for the PID feed channel (1 or 2 in the F3.00 decimal place). If F3.00 decimal is 2, it is used as a pressure feed and this parameter is in the same units as F3.18.	0.0-100.0%	0.0%	○
F3.02	Feedback channel gain	This function can be used to adjust the gain of the feedback channel signal when the feedback channel does not match the level of the set channel.	0.01-10.00	1.00	○
F3.03	Proportional gain P	The speed of the PID adjustment is set by the proportional gain and integration time parameters, which are required to increase the proportional gain and decrease the integration time for fast adjustment, and to decrease the proportional gain and increase the integration time for slow adjustment. In general, the differential time is not set.	0.01-5.00	2.00	○
F3.04	Integration time Ti		0.1-50.0s	1.0s	○
F3.05	Differential time Td		0.1-10.0s	0.0s	○
F3.06	Period of sampling T	The larger the sampling period, the slower the response, but the better the suppression of interference signals, in general, do not need to set.	0.1-10.0s	0.0s	○
F3.07	Limit of deviation	The deviation limit is the ratio of the absolute value of the deviation between the feedback quantity and the given quantity, when the	0.0-20.0%	0.0%	○

		feedback quantity is within the deviation limit, the PID regulation does not act.			
F3.08	Preset frequency for closed loop	Frequency and time at which the frequency converter runs before the PID is put into operation	0.0-上限频率	0.0Hz	○
F3.09	Hold time of preset frequency		0.0-999.9s	0.0s	×
F3.10	Threshold factor for sleeping	If the actual feedback value is greater than this set value, and if the frequency of the inverter output reaches the lower frequency limit, the inverter goes to sleep (i.e. in zero speed operation) after the delayed waiting time defined in F3.12. This value is a percentage of the PID set value.	0.0-150.0%	100.0 %	○
F3.11	Threshold factor for waking up	If the actual feedback value is less than this set value, the inverter comes out of sleep and starts operating after the delay wait time defined in F3.13; this value is a percentage of the PID set value.	0.0-150.0%	90.0%	○
F3.12	Delay time for sleep	Set the sleep delay time	0.0-999.9s	100.0s	○
F3.13	Delay time for waking up	Set the wake up delay time	0.0-999.9s	1.0s	○
F3.14	Deviation of the feedback from the set pressure on entering sleep	This function parameter is only valid for the disturbed sleep mode	0.0-10.0%	0.5%	○
F3.15	Delay time for burst pipe detection	Set burst pipe detection delay time	0.0-130.0s	30.0S	○
F3.16	Threshold value for high pressure detection	When the feedback pressure is greater than or equal to this setting, a burst pipe fault "EPA0" is reported after the F3.15 burst pipe delay time, and the burst pipe fault "EPA0" is automatically reset when the feedback pressure is less than this setting; the threshold is a percentage of the given pressure.	0.0-200.0 %	150.0%	○
F3.17	Threshold value for low pressure	When the feedback pressure is less than this setting value, a	0.0-200.0 %	50.0%	○

	detection	burst pipe fault "EPA0" is reported after the F3.15 burst delay, when the feedback pressure is greater than or equal to this setting value, the burst pipe fault "EPA0" is automatically reset; the valve value is a percentage of the given pressure.			
F3.18	Range of the sensor	Set the maximum range of the sensor	0.00-99.99（MPa、Kg）	10.00MPa	○

Group F4 - Advanced Function Parameters					
Function Code	Name	Setting Range	Range of Settings	Factory Settings	Change
F4.00	Rated voltage of the motor	Setting of motor parameters	0-500V: 380V 0-250V: 220V	Model depend	×
F4.01	Rated current of the motor		0.1-999.9A	Model depend	×
F4.02	Rated speed of the motor		0-60000Krpm	Model depend	×
F4.03	Rated frequency of the motor		1.0-999.9Hz	50.0Hz	×
F4.04	Stator resistance of the motor	Set the motor's stator resistance	0.001-20.000Ω	Model depend	○
F4.05	No-load current of the motor	Set the no-load current of the motor	0.1-[F4.01]	Model depend	×
F4.06	AVR function	0: Invalid 1: valid throughout 2: Invalid only when decelerating	0-2	0	×
F4.07	Control of the cooling fan	0: Automatic control mode 1: Always running during power-on	0-1	0	○
F4.08	Number of automatic resets for faults	If the number of resets for faults is set to 0, there is no automatic reset. Only manual reset is possible, 10 means unlimited number of times, i.e. countless times.	0-10	0	×
F4.09	Time between automatic resets of faults	Set the interval for automatic fault resetting	0.5-25.0s	3.0s	×
F4.10	Start voltage of energy braking	If the voltage on the DC side of the inverter is higher than the starting voltage for energy braking, the built-in braking unit operates. If a braking resistor is connected at this point, the energy from the increased voltage inside the inverter will be released via the braking resistor, causing the DC voltage to return back.	330-380/660-800V	350/780V	○
F4.11	Ratio of energy braking action		10-100%	100%	○

F4.12	Selection of the over-modulation function	0: not valid 1: valid	0-1	0	×
F4.13	PWM mode	0: full frequency seven-band 1: Full-range five-band 2: Seven-band to five-band	0-2	2	×
F4.14	Slip compensation factor	Asynchronous motors with load cause a drop in speed. The use of slip compensation allows the motor speed to be brought close to its synchronous speed, resulting in more accurate control of the motor's speed. This factor is only valid for normal V/F, simple vectoring.	0-200%	100%	×
F4.15	Slip compensation mode	0: Invalid 1: Low frequency compensation Note: This parameter is only valid for advanced V/F	0-1	0	×
F4.16	Self-learning of motor parameters	0: Invalid 1: Static self-learning (STAR is displayed immediately at start, END is displayed at end 1S and then goes out)	0-1	0	×

Group F5 - Parameters of the protection function					
Function Code	**Name**	**Setting Range**	**Range of Settings**	**Factory Settings**	**Change**
F5.00	Protection settings	LED units digit: protection selection in case of motor overload 0: Invalid 1: Valid LED tens digit: protection against PID feedback disconnection 0: Invalid 1: Protection action and free stop LED hundreds digit: Handling of 485 communication failure 0: Protective action and free shutdown 1: Alarm but maintenance of status quo operation 2: Alarm and shutdown as set LED thousand digit: Selection of	0000-1211	0001	×

		oscillation suppression 0: Invalid 1: Valid			
F5.01	Protection factor in case of motor overload	The protection factor for motor overload is the percentage of the rated current value of the motor to the rated output current value of the frequency converter.	30%-110%	100%	×
F5.02	Overvoltage protection level	This function code specifies the lower limit voltage allowed on the DC bus when the frequency converter is operating normally.	50-280/50-480V	180/360V	×
F5.03	Limiting factor for voltage at speed reduction	This parameter is used to regulate the inverter’s ability to suppress overvoltages during deceleration.	0:close，1-255	1	×
F5.04	Limiting level of overvoltage	The limit level of overvoltage defines the action voltage in case of protection due to overvoltage stall	350-400/660-850V	375/790V	×
F5.05	Limiting factor for accelerating current	This parameter is used to regulate the ability of the frequency converter to suppress overcurrents during acceleration.	0:close，1-99	10	×
F5.06	Limiting factor for constant speed currents	This parameter is used to regulate the inverter's ability to suppress overcurrent during constant speed.	0:close，1-10	0	×
F5.07	Limiting level of current	The current limiting level defines the current threshold for the automatic current limiting action, which is set as a percentage relative to the rated current of the frequency converter.	50%-200%	160%	×
F5.08	Feedback disconnection detection value	This value is the percentage of the PID given amount. When the feedback value of the PID is continuously less than the value detected by the feedback break, the frequency converter will make the corresponding protective action according to the setting of F5.00. Not valid when F5.08 = 0.0%.	0.0-100.0%	0.0%	×

F5.09	Detection time of feedback disconnection	The delay time before the protection action after the feedback disconnection has occurred.	0.1-999.9S	10.0s	×
F5.10	Overload of the frequency converter	The current threshold for the pre-alarm action of the inverter's overload is set as a percentage relative to the rated current of the inverter.	0-150%	120%	○
F5.11	Level of pre-alarm	The delay time between the output current of the frequency converter being continuously greater than the horizontal amplitude of the pre-alarm for overload (F5.10) and the signal for the pre-alarm for overload being output.	0.0-15.0s	5.0s	×
F5.12	Overload of the frequency converter	0: Invalid 1: Highest point priority when the inverter is running	0-1	0	×
F5.13	Pre-alarm delay time	In case of motor oscillation, a setting of F5.00 thousand digit valid values is required. Turn on the function for oscillation suppression and then adjust it by setting the coefficient for oscillation suppression. In general, if the oscillation is large, increase the oscillation suppression factor F5.13; F5.14-F5.16 do not need to be set. For special applications, F5.13-F5.16 should be used together.	0-200	30	○
F5.14	Enablement of inching priority		0-12	5	○
F5.15	Coefficient of oscillation suppression		0.0-[F5.16]	5.0Hz	○
F5.16	Coefficient of amplitude suppression		[F5.15]-[F0.05]	45.0Hz	○
F5.17	Selection of wave-by-wave current limiting	LED units digit: selected in acceleration 0: Invalid 1: Valid LED tens digit: selection in deceleration 0: Invalid 1: Valid LED hundreds digit: selected in constant speed 0: invalid 1: valid LED thousand digit: reserved	000-111	011	×

F5.18	Detection factor for open-phase protection	If the ratio of the maximum value to the minimum value of the output current in the three phases is greater than this coefficient and lasts for more than 6 seconds, the inverter will alarm the fault ETUN for unbalanced output current.	0.00-20.00	2.00	○
F8.19	Frequency falling coefficient for instantaneous voltage drop	Set the frequency falling coefficient for instantaneous voltage drop	0:The function is disabled if the instantaneous stop is not stopped 1-100	0	○
F8.20	Frequency reduction for instantaneous voltage drop	Set the frequency reduction for instantaneous voltage drop	220V:180-3 30V 250V 380V:300-5 50V 450V	Model depend	×
Group F6 - Communication parameters					
Function Code	**Name**	**Setting Range**	**Range of Settings**	**Factory Settings**	**Change**
F6.00	Address of the local machine	Set the address of the local machine, 0 is the address of the broadcast.	0-247	1	×
F6.01	Configuration of MODBUS communication	LED units digit: selection of the baud rate 0: 9600BPS 1: 19200BPS 2: 38400BPS LED tens digit: format of the data 0: Non parity 1: Even parity 2: Odd parity LED hundred digit: response method of communication	0000-0322	0000	×
		0: Normal response 1: Respond only to the slave's address 2: No response 3: The slave does not respond to the command of the master in broadcast mode to stop freely LED thousand digit: reserved			

F6.02	Communication timeout detection time	If the local machine does not receive the correct data signal within the time interval defined by this function code, then the local machine considers that a communication failure has occurred and the inverter will decide whether to protect or maintain the status quo operation according to the setting of the communication failure mode. When this value is set to 0.0, the RS485 communication timeout is not detected.	0.1-100.0s	10.0s	×
F6.03	Response delay of local machine	This function code defines the intermediate time interval between the end of data frame reception by the inverter and the sending of an answer data frame to the host computer. If the answer time is less than the processing time of the system, the processing time of the system prevails.	0-200ms	5ms	×
F6.04	Proportional linkage factor	This function code is used to set the weight factor of the frequency command received by the frequency converter as a slave via the RS485 interface. The actual operating frequency of the machine is equal to the value of this function code multiplied by the command value of the frequency setting received via the RS485 interface. In continuous control, this function code sets the ratio of the operating frequencies of multiple inverters.	0.01-10.00	1.00	○
F6.05	Multiple manufacturers' protocols	0: M series 1: 380 series 2: ZC series 3: CHF series Compatible with as many manufacturers' communication protocols as possible,	0-3	0	×

		depending on memory capacity			

Group F7 - Parameters for supplementary function					
Function Code	Name	Setting Range	Range of Settings	Factory Settings	Change
F7.00	Counting and timing modes	LED units digit: processing of count arrivals 0: Single cycle count, stop output 1: Single cycle count, continue output 2: Cycle count, stop output 3: Cycle count, continue output LED tens digit: Reserved LED hundreds digit: Timed arrival handling 0: Single cycle timing, stop output 1: Single cycle timing, continue output 2: Cycle timing, stop output 3: Cycle timing, continue output LED thousand digit: Reserved	000-303	103	×
F7.01	Setting of the counter's reset value	Set the counter reset value	[F7.02] -9999	1	○
F7.02	Setting of the counter's detection value	Set counter detection value	0-[F7.01]	1	○
F7.03	Setting of the timing time	Set timing time	0-9999s	0s	○
F7.04	Lower limit frequency for external pulse X5 input	Set the upper and lower limit frequencies for the external pulse X5 input	0.00-[F7.14]	0.00KHz	○
F7.05	Upper limit frequency for external pulse X5 input		[F7.13] -99.99KHz	20.00KHz	○
F7.06	Setting of the lower limit of the external pulse X5	Set the setting corresponding to the upper and lower limits of the external pulse X5, this setting is a percentage relative to the maximum output frequency.	-100.0%-100.0%	0.0%	○
F7.07	Setting of the upper limit of the external pulse X5		-100.0%-100.0%	100.0%	○
F7.08	Swing frequency	0: disabled	0-1	0	×

	control	1: valid			
F7.09	Swing-scanning control	0: Fixed swing The reference value for the swing is the maximum output frequency (F0.04). 1: Variable swing The reference value for the swing is the given channel frequency.	0-1	0	×
F7.10	Selection of starting methods for swing frequency machines	0: Start as memorised before stop 1: restart start	0-1	0	×
F7.11	Swing frequency amplitude	The swing frequency amplitude is a percentage relative to the maximum output frequency (F0.04).	0.0-100.0 %	0.0%	○
F7.12	Startup frequency	This function code refers to the amplitude of the rapid drop in frequency after the frequency has reached the upper limit swing frequency during the pendulum. It is also, of course, the rapid rise in frequency after the lower limit swing frequency has been reached. This value is a percentage relative to the swing frequency amplitude (F7.11), if set to 0.0% there are no startup frequency.	0.0-50.0%	0.0%	○
F7.13	Rise time of the swing frequency	The running time from the lower limit swing frequency to the upper limit swing frequency.	0.1-3600.0 s	5.0	○
F7.14	Swing frequency fall time	Running time from the upper limit swing frequency to the lower limit swing frequency.	0.1-3600.0 s	5.0	○
F7.15	Delay of the upper swing frequency	Set the delay time for the upper and lower limit swing frequencies.	0.1-3600.0 s	5.0	○
F7.16	Delay of the lower swing frequency		0.1-3600.0 s	5.0	○
Group F8 - Managed and displayed parameters					
Function Code	**Name**	**Setting range**	**Range of Settings**	**Factory Settings**	**Change**
F8.00	Selection of the main parameters for operational monitoring	For example: F8.00 = 2, i.e. output voltage (d-02) is selected, then the default item displayed in the main monitoring screen is the	0-28	0	○

		current output voltage value.			
F8.01	Selection of items for the main parameters of the stopping monitoring	For example: F8.01 = 3, i.e. select busbar voltage (d-03), then the default item displayed in the main monitoring screen is the current busbar voltage value.	0-28	1	○
F8.02	Operating auxiliary display (only available for dual displays)	For example: F8.02 = 4, i.e. output current (d-02) is selected, then the default item displayed in the main monitoring screen is the current output voltage value.	0-28	4	○
F8.03	Auxiliary display for stopping (only available for dual displays)	For example: F8.03 = 3, i.e. the busbar voltage (d-03) is selected, then the default item displayed in the main monitoring screen is the current busbar voltage value.	0-28	3	○
F8.04	Display coefficients for the motor's speed	It is used to correct for errors in the scale display of the speed and has no effect on the actual speed.	0.01-99.99	1.00	○
F8.05	Initialization of parameters	0: no operation The frequency converter is in the normal state of reading and writing of parameters. The set value of the function code. The possibility of changing it is related to the setting state of the user code and the current operating state of the frequency converter. 1: Restore the factory settings All user parameters are restored to their factory settings according to the model. 2: Clear the fault record The contents of the fault record (d-19 - d-24) are cleared for operation. After the operation is completed, this function code is automatically cleared to 0.	0-2	0	X
F8.06	Setting of the JOG key	0: JOG 1: Switching of forward and	0-3	0	X

		reverse rotation 2: Clear the frequency setting of the ▲/▼ keys 3: Reverse rotation operation (at this time the RUN key defaults to forward rotation)			
Group F9 - Manufacturer's parameters					
Function Code	**Name**	**Setting Range**	**Range of Settings**	**Factory Settings**	**Change**
F9.00	Manufacturer's code	1-9999	1	****	◇
Group d - Parameter group for monitoring					
Function Code	**Name**	**Range**	**Range of Settings**	**Factory Settings**	**Change**
d-00	Output frequency (Hz)	0.0-999.9Hz	0.1Hz	0.0Hz	◆
d-01	Set frequency(Hz)	0.0-999.9Hz	0.1Hz	0.0Hz	◆
d-02	Output voltage(V)	0-999V	1V	0V	◆
d-03	Bus voltage(V)	0-999V	1V	0V	◆
d-04	Output current(A)	0.0-999.9A	0.1A	0.0A	◆
d-05	Speed of motor (Krpm)	0-60000Krpm	1Krpm	Model depend	◆
d-06	Analogue input AVI (V)	0.00-10.00V	0.01V	0.00V	◆
d-07	Analogue input ACI (mA)	0.00-20.00mA	0.01mA	0.00mA	◆
d-08	Analogue output AO (V/mA)	0.00-10.00V/0.00-20.00mA	0.01V/0.01 mA	0.00V/ mA	◆
d-09	Reserved	-	-	0	◆
d-10	Input frequency of pulses (KHz)	0.00-99.99KHz	0.01KHz	0.00KHz	◆
d-11	Feedback value for PID pressure	0.00-10.00V/0.00-99.99 （MPa、Kg）	0.01V/ （MPa、Kg）	0.00V/ （MPa、Kg）	◆
d-12	Current count value	0-9999s	1s	0s	◆
d-13	Current timed value (s)	0-9999s	1s	0s	◆
d-14	Status of the input terminals (X1-X5)	0-1FH	1H	0H	◆
d-15	Status of the output (Y/R)	0-3H	1H	0H	◆
d-16	Temperature of the module (°C)	0.0-132.3C	0.1C	0.0	◆
d-17	Upgrade date of the software (year)	2010-2026	1	2020	◆
d-18	Upgrade date of the	0-1231	1	0907	◆

	software (month, day)				
d-19	Second fault code	0-19	1	0	◆
d-20	Most recent fault code	0-19	1	0	◆
d-21	Output frequency at last fault (Hz)	0.0-999.9Hz	0.1Hz	0.0Hz	◆
d-22	Output current at time of latest fault (A)	0.0-999.9A	0.1A	0.0V	◆
d-23	Busbar voltage at time of latest fault (V)	0-999V	1V	0V	◆
d-24	Module temperature at the time of the latest fault (C)	0.0-132.3T	0.1°C	0.0°C	◆
d-25	Cumulative time of operation of the frequency converter (h)	0-9999h	1h	0h	◆
d-26	Status of the frequency converter	0-FFFFH BIT0: Run/Stop BIT1: Reverse/forward rotation BIT2: Inching BIT3: DC braking BIT4: Reserved BIT5: Limitation of overvoltage BIT6: Derating for constant speed BIT7: Limitation of overcurrent BIT8-9: 00-zero speed / 01-acceleration / 10-deceleration / 11-uniform speed BIT10: Pre-alarm for overload BIT11: Reserved BIT12-13 Run command channel: 00-panel / 01-terminal / 10-reserved BIT14-15 Status of busbar voltage: 00-Normal / 01-Low voltage protection / 10-Over-voltage protection	1H	0H	◆
d-27	Version of the software	1.00-99.99	0.01	2.00	◆
d-28	Model of power	0.10-99.9KW	0.01KW	Model depend	◆

Group E - Codes for faults				
Faults Codes	Name	Possible Causes of Failure	Countermeasures for Faults	Code Name
E0C1	Overcurrent in accelerated operation	The acceleration time is too short	Extend acceleration times	1
		Low power of the frequency converter	Select a frequency converter with a large power rating	
		Improper setting of V/F curve or torque boost	Adjust the V/F curve or torque boost	
E0C2	Overcurrent in decelerating operation	Deceleration time too short	Extend the deceleration time	2
		Low power of the frequency converter	Select a frequency converter with a high power rating	
E0C3	Overcurrent in constant speed operation	Low voltage on the grid	Check the input power supply	3
		Sudden or abnormal load changes	Check the load or reduce the load	
		Low power of the frequency converter	Select a frequency converter with a high power rating	
EHU1	Overpressure during accelerated operation	Abnormal input voltage	Check the input power supply	4
		Re-starting of rotating motor	Set it to start after DC braking	
EHU2	Overpressure in decelerating operation	Deceleration time too short	Extend the deceleration time	5
		Abnormal input voltage	Check the input power supply	
EHU3	Overpressure in constant speed operation	Abnormal input voltage	Check the input power supply	6
EHU4	Overvoltage at standstill	Abnormal input voltage	Check the voltage of the power supply	7
ELU0	Undervoltage during operation	Input voltage abnormality or relay not activated	Check the voltage of the power supply or ask the manufacturer for service	8
ESC1	Fault in power module	Short circuit or grounding of the inverter output	Check the wiring of the motor	9
		Momentary overcurrent of the frequency converter	See countermeasures for overcurrent	
		Abnormal control board or severe interference	Seek service from the manufacturer	
		Damage to power devices	Seek service from the manufacturer	

E-OH	Heat sink overheating	High ambient temperature	Reduce ambient temperature	10
		Damage to the fan	Replace the fan	
		Blockage of the air duct	Unclog air ducts	
EOL1	Inverter overload	Improper setting of V/F curve or torque boost	Adjust V/F curve and torque boost	11
		Low voltage on the grid	Check grid voltage	
		Acceleration time too short	Extend acceleration times	
		Excessive load on the motor	Select a more powerful inverter	
EOL2	Overloading of motors	Improper setting of V/F curve or torque boost	Adjust the V/F curve and torque boost	12
		Low voltage on the grid	Check the grid voltage	
		Excessive motor blocking or sudden load changes	Check the load	
		Incorrect setting of motor overload protection factor	Correctly set the protection factor in case of motor overload	
E-EF	Failure of external equipment	Fault in external equipment, input terminals closed	Disconnect the external device fault input terminals and clear the fault (take care to check the cause)	13
EPID	PID feedback disconnection	Loose PID feedback line	Check the feedback connection	14
		Feedback is less than the value of the broken wire detection	Adjust the threshold value of the detection input	
E485	Fault in RS485 communication	Unmatched baud rate with master	Adjust the baud rate	15
		Interference in the RS485 channel	Check that the communication lines are not shielded and that the wiring is reasonable, consider connecting filter capacitors in parallel if necessary	
		Communication timeout	Retry	
ECCF	Current detection fault	Fault in current sampling circuit	Seek service from the manufacturer	16
		Fault in auxiliary power supply		
EEEP	EEPROM read/write rror	EEPROM failure	Seek service from the manufacturer	17
EPAO	Fault of burst tube	Feedback pressure less than low pressure detection threshold or greater than or equal to high pressure detection threshold	Test the feedback line or adjust the threshold for detecting high and low voltages	18
EPOF	Failure of dual	CPU communication fault	Seek service from the	19

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	CPU communication		manufacturer	
ETUN	Output open-phase protection	Outputs U, V, W are out-phase	Check output wiring	20

Communication Protocol

The following data are in hexadecimal.

1. RTU mode and format

When the controller communicates in RTU mode on the Modbus bus, each 8-bit byte of the message is divided into two 4-bit hexadecimal characters. The main advantage of this mode is that it transmits a higher density of characters than ASCII mode at the same baud rate and each message must be transmitted continuously.

1.1Format of each byte in RTU mode

- Coding system: 8-bit binary, hexadecimal 0-9, A-F.
- Data bits: 1 bit start, 8 bits data (low bit first), stop bit occupies 1 bit, parity bit optional (refer to RTU data frame bit sequence diagram)

-Error check area: cyclic redundancy check (CRC)

1.2 RTU data frame sequence diagram

− Parity check

Start	1	2	3	4	5	6	7	8	Par	Stop

-No-parity

Start	1	2	3	4		6	7	8	Stop

2. Description of the read/write function code:

Function code	Description of functions
03	Read register
06	Write register

3. Description of the parameter addresses of the communication protocol:

Description of functions	Definition of address	Description of the meaning of the data	R/W
Commands for communication control	2000H	0001H: Stop	W
		0012H: Forward rotation operation	
		0013H: Operation of forward rotation inching	
		0022H: Reverse operation	
		0023H: Operation of reverse rotation inching	
Setting of the communication	2001H	The set frequency range for communication is -10000 to 10000. (Note: The set frequency for communication is a percentage relative to the maximum frequency, which ranges from -100.00% to 100.00%).	W
Address of the requency	2002H	0001H: Input for external faults	W
		0002H: Reset of fault	
Instrctions for reading the parameters of the run/stop	2102H	Set frequency (two decimal places)	R
	2103H	Output frequency (two decimal places)	R
	2104H	Output current (one decimal place)	R
	2105H	Busbar voltage (one decimal place)	R
	2106H	Output voltage (one decimal place)	R
	2107H	Analogue input AVI (two decimal places)	R
	2108H	Analogue input ACI (two decimal places)	R
	2109H	Current count value	R
	210AH	Speed of the motor	R
	210BH	Analogue input AO (two decimal places)	R

	210CH	Reserved	R
	210DH	Inverter temperature (one decimal place)	R
	210EH	PID feedback value (two decimal places)	R
	210FH	PID setpoint (two decimal places)	R
	2110H	Reserved	R
	2111H	Input frequency of the pulse	R
	2112H	Current fault	R
	2113H	Current timed value	R
	2114H	Input terminal status	R
	2115H	Output terminal status	R
	2116H	BIT0: Run/stop BIT1: forward/reverse BIT2: Inching BIT3: DC braking BIT4: Hold BIT5: Limit for overvoltage BIT6: Derating for constant speed; BIT7: Limiting for overcurrent; BIT8-9: 00-zero speed / 01-acceleration/10-deceleration / 11-uniform speed BIT10: Pre-alarm for overload; BIT11: Reserved; BIT12-13 operating command channels: 00-panel / 01-terminals / 10-communication; BIT14-15 Busbar voltage status: 00-normal / 01-low voltage protection / 10-over-voltage protection	R
	2101H	Bit0: Run Bit1: Stop Bit2: Inching Bit3: Forward rotation Bit4: Reverse rotation Bit5 to Bit7: Reserved Bit8: Given for communication Bit9: Input of analogue signals Bit10: Communication run command channel Bit11: Locking of parameters Bit12:Running Bit13:Inching command Bit14 to Bit15: Reserved	R
Instructions for reading fault codes	2100H	00: No abnormality 01: Fault in module 02: Overvoltage 03: Fault in temperature 04: Overload of the frequency converter 05: Overload of the motor 06: External fault 07 to 09: Reserved 10: Overcurrent in acceleration 11: Overcurrent in deceleration 12: Overcurrent in constant speed 13: Reserved 14: Undervoltage	R

4.03 Reading function mode:

Inquiry information frame format （transmit frame）		
Project	**Address**	**Analysis of this data**
Address	01H	the address of the converter
Function	03H	the read function code
Starting data address	21H	the start address
	02H	
Data（2Byte）	00H	the number of addresses to read and 2102H and 2103H
	02H	
CRC CHK Low	6FH	the 16-bit CRC validation code
CRC CHK High	F7H	
Response information frame format （return frame）		
Project	**Address**	**Analysis of this data**
Address	01H	the address of the converter
Function	03H	the read function code
DataNum*2	04H	the product of read item *2
Data1[2Byte]	17H	the data of reading 2102H (set frequency)
	70H	
Data2[2Byte]	00H	the data of reading 2103H (output frequency)
	00H	
CRC CHK Low	FEH	the 16-bit CRC check digit
CRC CHK High	5CH	

5、06H Writing function mode

Inquiry information frame format （transmit frame）		
Project	**Address**	**Analysis of this data**
Address	01H	the address of the converter
Function	06H	the writing function code
Starting data address	20H	the address of the control command
	00H	
Data（2Byte）	00H	the command to stop
	01H	
CRC CHK Low	43H	the 16-bit CRC validation code
CRC CHK High	CAH	
Response information frame format （return frame）		
Project	**Address**	**Analysis of this data**
Address	01H	If the settings are correct, the same input data will be returned.
Function	06H	
Starting data address	20H	
	00H	
Number of Data（Byte）	00H	
	01H	
CRC CHK Low	43H	
CRC CHK High	CAH	

Preface

Thank you for purchasing HD200B series inverters.

This manual describes how to use HD200B series inverters properly. Please read it carefully before installation, operation, maintenance and inspection. Besides, please use the product after understanding the safety precautions.

Precautions
● In order to describe the product's details, the drawings presented in this instruction are sometimes shown without covers or protective guards. When using the product, please make sure to install the cover or protective guard as specified firstly, and operate the products in accordance with the instructions. ● Since the drawings in this manual are represented examples, some are subject to differ from delivered products. ● This manual may be modified when necessary because of improvement of the product, modification or changes in specifications. Such modifications are denoted by a revised manual No. ● If you want to order the manual due to loss or damage, please contact our company agents in each region or our company customer service center directly. ● If there is still any problem during using the products, please contact our company customer service center directly.

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Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are classified as follows:

Danger: Operations which are not performed according to requirements may cause serious equipment loss or personnel injury.

Caution: Operations which are not performed according to requirements may cause medium hurt or light hurt or material loss.

During the installation, commissioning and maintenance of the system, please make sure to follow the safety and precautions of this chapter. In case of a result of illegal operations, caused any harm and losses is nothing to do with the company.

1.1 Safety Precautions

1.1.1 Before Installation:

Danger	● Do not use the water-logged inverter, damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury. ● Use the motor with Class B or above insulation. Otherwise, there may be risk of electric shock.
Caution	● Carefully handled when loading, otherwise it may damage the inverter. ● Please don't use the damaged driver or inverter with missing parts, there may be risk of injury. ● Do not touch the electronic parts and components; otherwise it will cause static electricity.

1.1.2 During Installation:

Danger	● Install the inverter on incombustible surface such as metal, and keep away from flammable substances. Otherwise it may

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	cause fire. ● Do not loose the set screw of the equipment, especially the screws marked in RED.
Caution	● Do not drop the cable residual or screw in the inverter. Otherwise it may damage the inverter. ● Please install the driver in the place where there is no direct sunlight or less vibratory. ● When more than two inverters are to be installed in one cabinet, due attention should be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the heat sinking effect.

1.1.3 During Wiring:

Danger	● Operation should be performed by the professional engineering technician. Otherwise there will be danger of electric shock! ● There should be circuit breaker between the inverter and power supply. Otherwise, there may be fire! ● Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock! ● The ground terminal should be earthed reliably. Otherwise there may be danger of electric shock.
Caution	● Never connect AC power to output UVW terminals. Please note the remark of the wiring terminals, connect them correctly. Otherwise may cause inverter damaged. ● Ensure the wiring circuit can meet the requirement of EMC and the area safety standard. Please follow the instructions in the manual before wiring. Otherwise may cause injury or electric shock. ● Never connect the braking resistor between DC bus (+), (-) terminals. Otherwise may cause fire. ● Encoder must be used together with shielded wire, and ensure the single terminal of the shielded lay is connected with ground well.

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1.1.4 Before Power-on:

Danger	● Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the inverter. The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused. ● The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur.
Caution	● The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused! ● Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur!

1.1.5 After Power-on:

Danger	● Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock! ● Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock! ● Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock! ● At power-on, the inverter will perform the security check of the external heavy-current circuit automatically. Thus, at the moment please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.
Caution	● If parameter identification is required, due attention should be paid to the danger of injury arising from the rotating motor. Otherwise accident may occur! ● Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During Operation:

Danger	● Do not touch the fan or discharge resistor to sense the temperature. Otherwise, you may get burnt! ● Detection of signals during the operation should only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused!
Caution	● During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment! ● Do not start and shut down the inverter by connecting and disconnecting the contactor. Otherwise, it may damage the equipment!

1.1.7 During Maintain:

Danger	● Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock! ● Be sure to conduct repair and maintenance after the charge LED indictor of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury! ● The inverter should be repaired and maintained only by the qualified person who has received professional training. Otherwise, it may cause personal injury or equipment damage! ● Carry out parameter setting after replacing the inverter, all the plug-ins must be plug and play when power outage.

1.2 Precautions

1.2.1 Motor Insulation Inspection

When the motor is used for the first time, or when the motor is reused after being kept, or when periodical inspection is performed, it should conduct motor insulation inspection so as to avoid damaging the inverter because of the insulation failure of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the

500V megameter, and the insulating resistance measured should be at least 5MΩ.

1.2.2 Thermal Protection of the Motor

If the ratings of the motor does not match those of the inverter, especially when the rated power of the inverter is higher than the rated power of the motor, the relevant motor protection parameters in the in the inverter should be adjusted, or thermal relay should be mounted to protect the motor.

1.2.3 Running with Frequency higher than Standard Frequency

This inverter can provide output frequency of 0Hz to 3000Hz. If the user needs to run the inverter with frequency of more than 50Hz, please take the resistant pressure of the mechanical devices into consideration.

1.2.4 Vibration of Mechanical Device

The inverter may encounter the mechanical resonance point at certain output frequencies, which can be avoided by setting the skip frequency parameters in the inverter.

1.2.5 Motor Heat and Noise

Since the output voltage of inverter is PWM wave and contains certain harmonics, the temperature rise, noise and vibration of the motor will be higher than those at power frequency.

1.2.6 Voltage-sensitive Device or Capacitor Improving Power Factor at the Output Side

Since the inverter output is PWM wave, if the capacitor for improving the power factor or voltage-sensitive resistor for lightning protection is mounted at the output side, it is easy to cause instantaneous over current in the inverter, which may damage the inverter. It is recommended that such devices not be used.

1.2.7 Switching Devices like Contactors Used at the Input and Output terminal

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.. a contactor is installed between the power supply and the input terminal of the inverter, it is not allowed to use the contactor to control the startup/stop of the inverter. If such contactor is unavoidable, it should be used with interval of at least one hour. Frequent charge and discharge will reduce the service life of the capacitor inside the inverter. If switching devices like contactor are installed between the output end of the inverter and the motor, it should ensure that the on/off operation is conducted when the inverter has no output. Otherwise the modules in the inverter may be damaged.

1.2.8 Use under voltage rather than rated voltage

If the HD200B series inverter is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the inverter. When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.9 Change Three-phase Input to Two-phase Input

It is not allowed to change the HD200B series three-phase inverter into two-phase one. Otherwise, it may cause fault or damage to the inverter.

1.2.10 Lightning Impulse Protection

The series inverter has lightning over current protection device, and has certain self-protection capacity against the lightning. In applications where lightning occurs frequently, the user should install additional protection devices at the front-end of the inverter.

1.2.11 Altitude and Derating

In areas with altitude of more than 1,000 meters, the heat sinking effect of the inverter may turn poorer due to rare air. Therefore, it needs to derate the inverter for use. Please contact our company for technical consulting in case of such condition.

1.2.12 Certain Special Use

If the user needs to use the inverter with the methods other than the

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recommended wiring diagram in this manual, such as shared DC bus, please consult our company.

1.2.13 Note of Inverter Disposal

The electrolytic capacitors on the main circuit and the PCB may explode when they are burnt. Emission of toxic gas may be generated when the plastic parts are burnt. Please dispose the inverter as industrial wastes.

1.2.14 Adaptable Motor

1) The standard adaptable motor is four-pole squirrel-cage asynchronous induction motor. If such motor is not available, be sure to select adaptable motors in according to the rated current of the motor. In applications where drive permanent magnetic synchronous motor is required, please consult our company;

2) The cooling fan and the rotor shaft of the non-variable-frequency motor adopt coaxial connection. When the rotating speed is reduced, the cooling effect will be poorer. Therefore, a powerful exhaust fan should be installed, or the motor should be replaced with variable frequency motor to avoid the over heat of the motor.

3) Since the inverter has built-in standard parameters of the adaptable motors, it is necessary to perform motor parameter identification or modify the default values so as to comply with the actual values as much as possible, or it may affect the running effect and protection performance;

4) The short circuit of the cable or motor may cause alarm or explosion of the inverter. Therefore, please conduct insulation and short circuit test on the newly installed motor and cable. Such test should also be conducted during routine maintenance. Please note that the inverter and the test part should be completely disconnected during the test.

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Chapter 2 Product Information

2.1 Product Inspection

Checking the following items when receiving the inverter

Confirmation Items	Method
Confirm if the inverter is what you ordered	Check name plate
Damaged or not	Inspect the entire exterior of the inverter to see if there are any scratches or other damage resulting from shipping
Confirm if the fastening parts (screws, etc.) are loose or not	Check with a screw driver if necessary
User's manual, certification and other spares	User's manual and the relative spares

Please contact the local agent or our company directly if there is any damage on the inverter.

2.2 Model Description

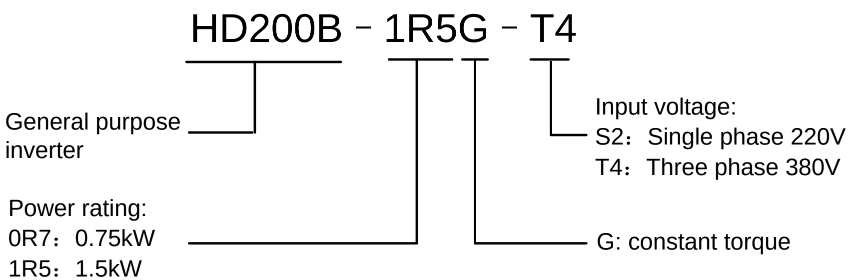

Figure 2-1 HD200B Model description

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2.3 Description of Nameplate

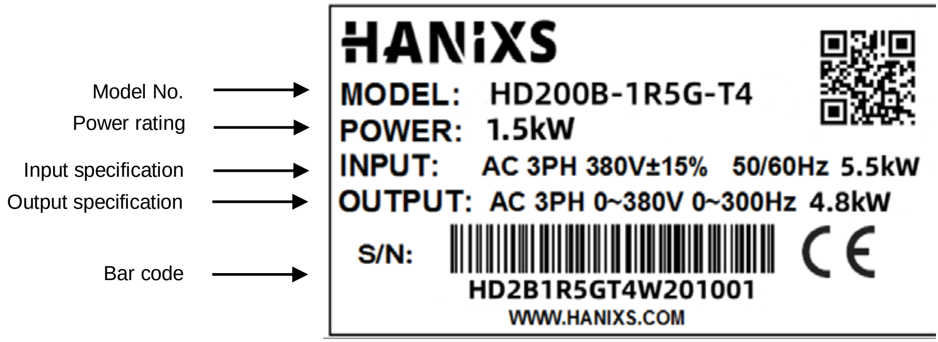

Figure 2-2 Nameplate

2.4 Selection Guide

Table 2-1 HD200B series Inverter Model and Technical Data

Inverter Model	Motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
HD200B 1AC 220~240V ±15%				
HD200B-0R4G-S2	0.4	0.5	6.5	2.6
HD200B-0R7G-S2	0.75	1	11	4.6
HD200B-1R5G-S2	1.5	2	18	8.0
HD200B-2R2G-S2	2.2	3	27	11
HD200B 3AC 380~415V ±15%				
HD200B-0R7G-T4	0.75	1	4.5	3.4
HD200B-1R5G-T4	1.5	2	5.5	4.8
HD200B-2R2G-T4	2.2	3	6.5	6.0
HD200B-004G-T4	4.0	5	11	9.5

2.5 Technical Specifications

Table 2-2 HD200B series Inverter Technical Specifications

Item	Technical Index	Specification
Input	Input voltage	1AC 220V±15%, 3AC 380V±15%

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	Input frequency	47~63Hz
Output	Output voltage	0～rated input voltage
	Output frequency	V/f control: 0~3000Hz Sensorless vector control: 0~300Hz
Control Features	Control mode	V/f control Sensorless vector control (for 3AC 380V only)
	Operation command mode	Keypad control Terminal control Serial communication control
	Frequency setting mode	Digital setting, analog setting, pulse frequency setting, serial communication setting, multi-step speed setting & simple PLC, PID setting, etc. These frequency settings can be combined & switched in various modes.
	Overload capacity	150% 60s, 180% 10s, 200% 3s
	Starting torque	0.5Hz/150% (SVC); 1Hz/150% (V/f)
	Speed adjustment range	1:100 (SVC), 1:50 (V/f)
	Speed control precision	±0.5% (SVC)
	Carrier frequency	1.0~12.0kHz, automatically adjusted according to temperature and load characteristics
	Frequency accuracy	Digital setting: 0.01Hz Analog setting: maximum frequency * 0.05%
	Torque boost	Automatically torque boost; manually torque boost: 0.1%~30.0%
	V/f curve	Three types: linear, multiple point and square type (1.2 power, 1.4 power, 1.6 power, 1.8 power, square)
	Acceleration/deceleration mode	Straight line/S curve; four kinds of acceleration/deceleration time, range: 0.1s~3600.0s

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	DC braking	DC braking when starting and stopping DC braking frequency: 0.0Hz~maximum frequency, braking time: 0.0s~100.0s
	Jog operation	Jog operation frequency: 0.0Hz~maximum frequency Jog acceleration/deceleration time: 0.1s~3600.0s
	Simple PLC & multi-step speed operation	It can realize a maximum of 16 segments speed running via the built-in PLC or control terminal.
	Built-in PID	Built-in PID control to easily realize the close loop control of the process parameters (such as pressure, temperature, flow, etc.)
	Automatic voltage regulation	Keep output voltage constant automatically when input voltage fluctuating
Control Function	Common DC bus	Common DC bus for several inverters, energy balanced automatically
	Torque control	Torque control without PG
	Torque limit	“Rooter” characteristics, limit the torque automatically and prevent frequent over-current tripping during the running process
	Wobble frequency control	Multiple triangular-wave frequency control, special for textile
	Timing/length/ counting control	Timing/length/counting control function
	Over-voltage & over-current stall control	Limit current & voltage automatically during the running process, prevent frequent over-current & over-voltage tripping
	Fault protection function	Up to 30 fault protections including over-current, over-voltage, under-voltage, overheating, default phase, overload, shortcut, etc., can record the detailed running status during failure & has fault automatic reset function

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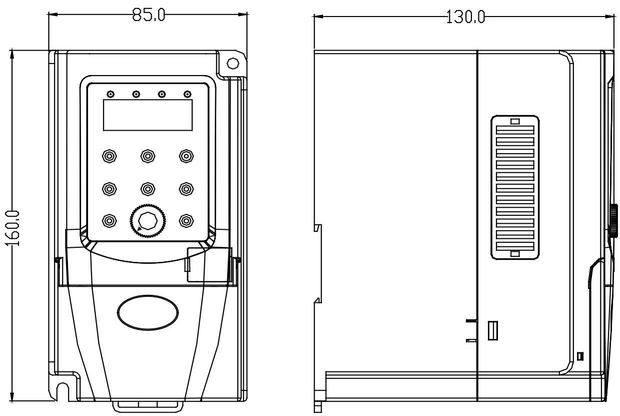
Input/ output terminals	Input terminals	Programmable DI: 4 on-off inputs 1 programmable AI1: 0~10V or 0/4~20mA
	Output terminals	1 programmable open collector output: 1 analog output 1 relay output 1 analog output: 0/4~20mA or 0~10V
	Communication terminals	Offer RS485 communication interface, support MODBUS-RTU communication protocol
Human machine interface	LED display	Display frequency setting, output frequency, output voltage, output current, etc.
	Multifunction key	QUICK/JOG key, can be used as multifunction key
Environ-ment	Ambient temperature	-10℃～40℃, derated 4% when the temperature rise by every 1℃ (40℃～50℃).
	Humidity	90%RH or less (non-condensing)
	Altitude	≤1000M: output rated power, ＞1000M: output derated
	Storage temperature	-20℃～60℃

2.6 External & Installation Dimensions

2.6.1 HD200B External & Installation Dimensions



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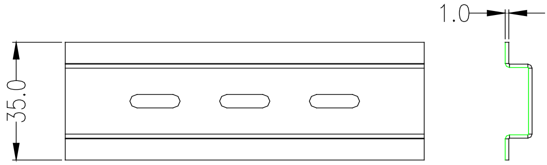
HD200B can be installed on the guide rail; the dimension of the guide rail is as follow:



2.7 Routine Maintenance of Inverter

2.7.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the inverter, which may cause potential fault of the inverter or reduce the service life of the inverter. Therefore, it is necessary to carry out routine and periodical maintenance on the inverter.

Routine inspection Items include:

1) Whether there is any abnormal change in the running sound of the motor;
2) Whether the motor has vibration during the running;
3) Whether there is any change to the installation environment of the inverter;
4) Whether the inverter cooling fan works normally;
5) Whether the inverter has over temperature.

Routine cleaning:

1) The inverter should be kept clean all the time.
2) The dust on the surface of the inverter should be effectively removed, so as to prevent the dust entering the inverter. Especially the metal dust is not allowed.
3) The oil stain on the inverter cooling fan should be effectively removed.

2.7.2 Periodic Inspection

Please perform periodic inspection on the places where the inspection is a difficult thing.

Periodic inspection Items include:

1) Check and clean the air duct periodically;

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2) Check if the screws are loose;
3) Check if the inverter is corroded;
4) Check if the wire connector has arc signs;
5) Main circuit insulation test.

Remainder: When using the megameter (DC 500V megameter recommended) to measure the insulating resistance, the main circuit should be disconnected with the inverter. Do not use the insulating resistance meter to test the insulation of control circuit. It is not necessary to conduct the high voltage test (which has been completed upon delivery).

2.7.3 Replacement of Vulnerable Parts for Inverter

The vulnerable parts of the inverter include cooling fan and filter electrolytic capacitor, whose service life depends on the operating environment and maintenance status. General service life is shown as follows:

Part Name	Service Life
Fan	2~3 years
Electrolytic capacitor	4~5 years

The user can determine the year of replacement according to the operating time.

1) Cooling fan

Possible reason for damage: Bearing is worn and blade is aging.

Judging criteria: Whether there is crack on the blade and whether there is abnormal vibration noise upon startup.

2) Filter electrolytic capacitor

Possible reason for damage: Input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolyte aging.

Judging criteria: Whether there is liquid leakage and whether the safe valve has projected, and measure the static capacitance, and the insulating resistance.

2.7.4 Storage of Inverter

Upon acquiring the inverter, the user should pay attention to the following points

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regarding the temporary and long-term storage of the inverter:

1) Pack the inverter with original package and place back into the packing box of our company.

2) Long-term storage will degrade the electrolytic capacitor. Thus, the product should be powered up once every 2 years, each time lasting at least five hours. The input voltage should be increased slowly to the rated value with the regulator.

2.8 Instructions on Warranty of Inverter

Free warranty only applies to the inverter itself.

1) We provide 12 months warranty (starting from the date of original shipment as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 12 months, reasonable repair expenses will be charged.

2) Reasonable repair expenses will be charged for the following situations within 12 months:

a) The equipment is damaged because the user fails to comply with the requirements of the user's manual;

b) Damage caused by fire, flood and abnormal voltage;

3) Damage caused when the inverter is used for abnormal function.

The service expenses will be calculated according to the standard of the manufacturer. If there is any agreement, the agreement should prevail.

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Chapter 3 Mechanical and Electric Installation

3.1 Mechanical Installation

3.1.1 Installation environment

1) Ambient temperature: The ambient temperature exerts great influences on the service life of the inverter and is not allowed to exceed the allowable temperature range (-10℃ to 50℃).

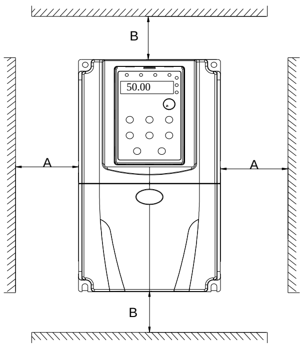
2) The inverter should be mounted on the surface of incombustible articles, with sufficient spaces nearby for heat sinking. The inverter is easy to generate large amount of heat during the operation. The inverter should be mounted vertically on the base with screws.

3) The inverter should be mounted in the place without vibration or with vibration of less than 0.6G, and should be kept away from such equipment as punching machine.

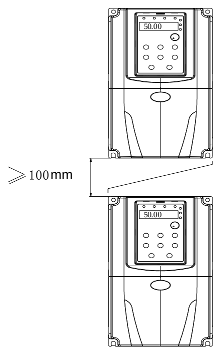
4) The inverter should be mounted in locations free from direct sunlight, high humidity and condensate.

5) The inverter should be mounted in locations free from corrosive gas, explosive gas or combustible gas.

6) The inverter should be mounted in locations free from oil dirt, dust, and metal powder.



Single Unit Installation Diagram



Installation Diagram of Upper and Down Parts

Figure 3-1 Installation Diagram

dissipation should be taken into account during the mechanical installation. Please pay attention the following items:

1) Install the inverter vertically so that the heat may be expelled from the top. However, the equipment cannot be installed upside down. If there are multiple inverters, parallel installation is a better choice. In applications where the upper and lower inverters need to be installed, please refer to Figure 3-1 “Installation Diagram” and install an insulating splitter.

2) The mounting space should be as indicated as Figure 3-1, so as to ensure the heat dissipation space of the inverter. However, the heat dissipation of other devices in the cabinet should also be taken into account.

3) The installation bracket must be flame retardant.

4) In the applications where there are metal dusts, it is recommended to mount the radiator outside the cabinet. In this case, the space in the sealed cabinet should be large enough.

3.2 Electrical Installation

3.2.1 Guide to the external electrical parts

Table 3-1 Selection Guide of External Electrical Parts

Inverter Model	Circuit Breaker (MCCB) (A)	Recommended Contactor (A)	Recommended Conducting Wire of Main Circuit at Input Side (mm^2)	Recommended Conducting Wire of Main Circuit at Output Side (mm^2)	Recommended Conducting Wire of Control Circuit (mm^2)
HD200B 1AC 220V					
HD200B-0R4G-S2	10	9	0.75	0.75	0.5
HD200B-0R7G-S2	16	12	1.5	0.75	0.5
HD200B-1R5G-S2	32	25	2.5	1.5	0.5
HD200B-2R2G-S2	40	32	4.0	2.5	0.5
HD200B 3AC 380V					
HD200B-0R7G-T4	10	9	0.75	0.75	0.5
HD200B-1R5G-T4	10	9	1.5	0.75	0.5
HD200B-2R2G-T4	10	9	2.5	1.5	0.5
HD200B-004G-T4	16	12	4.0	2.5	0.5

3.2.2 Connection to peripheral devices

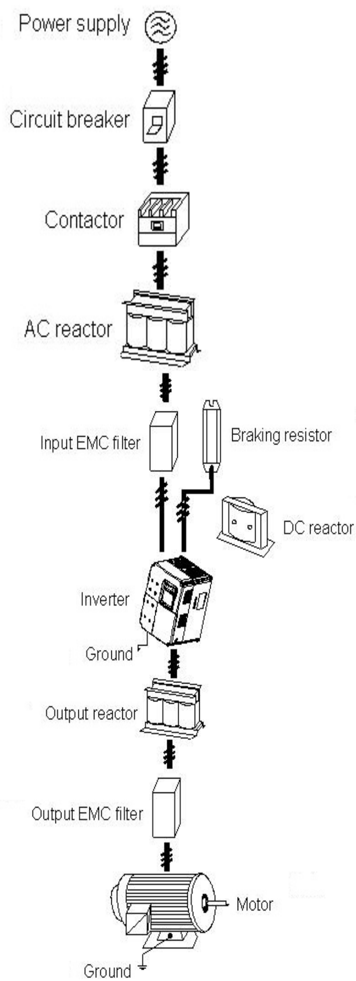


Figure3-2 Diagram of the connection to peripheral devices

- Do not install the capacitor or surge suppressor at the output side of the inverter, otherwise it may cause inverter failure or capacitor and surge suppressor damaged.
- The Inverter input / output (main circuit) contains harmonic components, it

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may interfere with inverter accessories communications equipment. Therefore, please install anti-interference filter to minimize interference.

- The details of external devices and accessories selection refer to the manual of external devices.

3.2.3 Using instruction of the external electrical parts

Table 3-2 Using Instruction of the External Electrical Parts

Part Name	Installing Location	Function Description
Circuit breaker	Front end of input circuit	Disconnect the power supply when the equipment at the lower part is over current.
Contactor	Between the circuit breaker and the inverter input side	Connection and disconnection of inverter. Frequent power-on and power-off operations on the inverter should be avoided.
AC input reactor	Input side of the inverter	Improve the power factor of the input side; Eliminate the higher harmonics of the input side effectively and prevent other equipment from damaging due to distortion of voltage wave. Eliminate the input current unbalance due to unbalance between the power phases.
EMC input filter	Input side of the inverter	Reduce the external conduction and radiation interference of the inverter. Decrease the conduction interference flowing from the power end to the inverter and improve the anti-interference capacity of the inverter.

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AC output reactor	Between the inverter output side and the motor, close to the inverter	Between the inverter output side and the motor. close to the inverter The inverter output side generally has higher harmonics. When the motor is far from the inverter, since there are many distributed capacitors in the circuit, certain harmonics may cause resonance in the circuit and bring about the following two impacts: Degrade the motor insulation performance and damage the motor for the long run. Generate large leakage current and cause frequent inverter protection. In general, the distance between the inverter and the motor exceeds 100 meters. Installation of output AC reactor is recommended.

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3.2.4 Wiring diagram

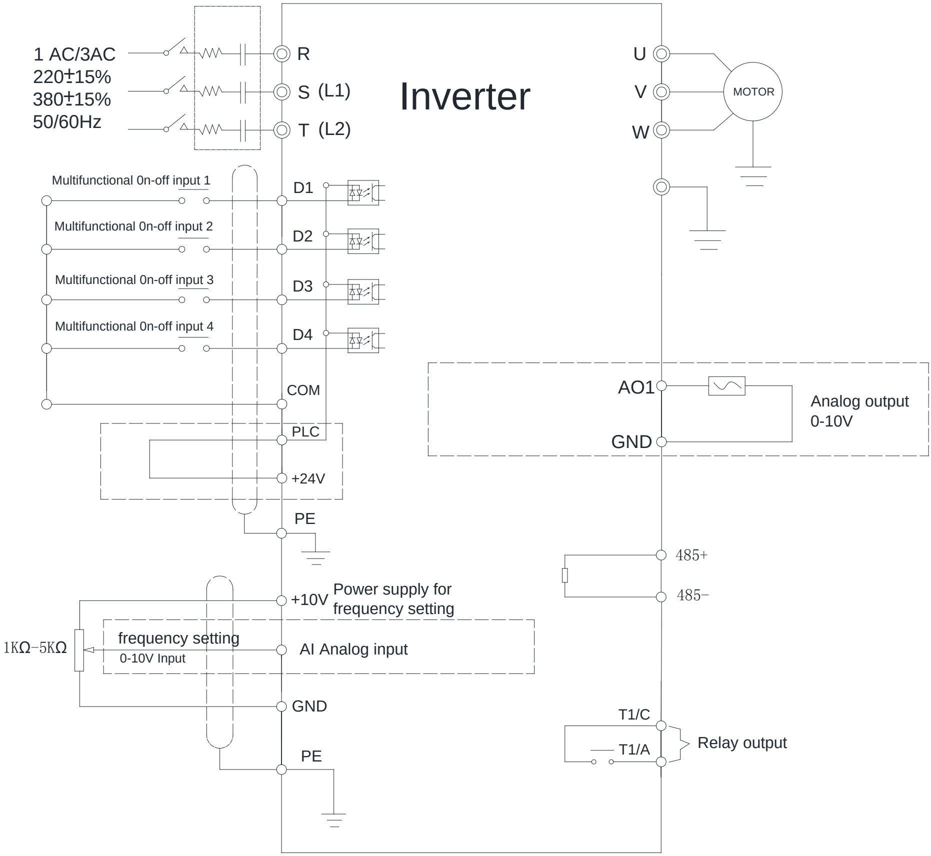

Figure 3-3 HD200B Wiring Diagram

Note:

1. Terminal ◎ refers to the main circuit terminal; terminal ○ refers to the control circuit terminal.

2. Braking unit is standard build-in.

3. Braking resistor is optional for user.

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3.2.5 Main circuit terminals and connections

Danger
● Make sure that the power switch is at OFF status prior to perform wiring connection. Otherwise there may be danger of electric shock! ● Only the qualified and trained personnel can perform wiring connection. Otherwise it may cause equipment and human injuries! ● It should be earthed reliably. Otherwise there may be danger of electric shock or fire!

Caution
● Make sure that the rated value of the input power supply is consistent with that of the inverter. Otherwise it may damage the inverter! ● Make sure that the motor matches the inverter. Otherwise it may damage the motor or generate inverter protection! ● Do not connect the power supply to the terminals of U, V and W. Otherwise it may damage the inverter! ● Do not directly connect the brake resistor between the DC bus terminals (+) and (-). Otherwise it may cause fire!

1) Main circuit terminals

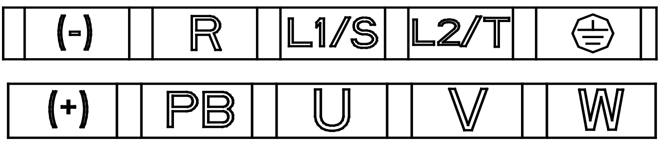

Figure 3-4 Main circuit terminals

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2) Instructions of main circuit terminals

Terminal	Name	Description
L1/S、L2/T	Single phase power input	Connect to AC power
R、L1/S、L2/T	Three phase power input	
(+) , PB	Connection terminals of brake resistor	Connection terminals of brake resistor
U, V, W	Output terminal of inverter	Connect to the three phase motor
⏚	Earth terminal	Earth connection terminal

Precautions on Wiring:

a) Input power terminals R, L1/S, L2/T

There is no phase sequence requirement for the cable connection at the input side of the inverter,

b) Connecting terminals (+) and PB of brake resistor:

The connecting terminals of the brake resistor are effective only for the inverter of less than 30kW with built-in brake unit.

The prototype of brake resistor can refer to the recommended value and the wiring length should be less than 5 meters. Otherwise it may damage the inverter.

c) Terminals U, V, W at the output side of the inverter:

The inverter output side cannot connect to the capacitor or surge absorber. Otherwise, it may cause frequent inverter protection and even damage the inverter.

In case the motor cable is too long, it may generate electrical resonance easily due to the impact of distributed capacitance, thus damaging the motor insulation or generating higher leakage current to invoke over current protection of the inverter. When the length of motor cable is longer than 100 meters, it needs to install a AC output reactor.

d) Earth terminal PE⏚:

This terminal should be earthed reliably, with resistance of earth cable of less than 0.1Ω. Otherwise, it may cause fault or damage the inverter.

Do not share the earth terminal ⏚ and zero line of the power supply.

...rol terminals and connections

1) Control circuit terminals

TA	TC	COM	D1	D2	D3	D4	PLC	+24V	+10V	AI1	AO1	GND	485+	485-

Figure 3-5 HD200B Control Circuit Terminals

2) Function description of control terminal

Table 3-3 Description of Control Terminal Function

Type	Terminal Symbol	Terminal Name	Function Description
Power Supply	+10V~ GND	External +10V power	Provide +10V power supply for external units, and the maximum output current is 10mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ~5kΩ.
	+24V~ COM	External +24V power	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminals and the external sensor. The maximum output current is 200mA.
	PLC	External power input terminal	Connect to 24V by default upon delivery When external signal is used to drive D1 ~ D6, and HDI, PLC needs to connect to the external power supply and disconnect from the +24V power terminal.
Analog Input	AI1 ~ GND	Analog input terminal 1	1. Input range: DC 0V~10V/4mA~20mA, determined by J1 jumper on the control board. 2. Input impedance: 22kΩ (voltage); 500Ω(current)
Digital Input	D1	Digital input 1	1. Optical coupling isolation, compatible with dual polarity input 2. Input impedance: 4.7kΩ 3. Voltage range for level input: 9V ～ 30V
	D2	Digital input 2	
	D3	Digital input 3	
	D4	Digital input 4	

Analog Output	AO1~ GND	Analog output 1	The voltage or current output is determined by J3 jumper on the control board. Output voltage range: 0V ~ 10V. Output current range: 0mA ~ 20mA.
Relay Output 1	TA-TC	Normally open terminal	Driving capacity: AC 250V, 3A
Communication	485+	RS485+	Half-duplex RS485 communication with maximum baud rate of 38400 bps and maximum of 64 nodes.
	485-	RS485-	

3) Description of connection of control terminals

a) Analog input terminal

Since the weak analog voltage signal is easy to suffer external interferences, it needs to employ shielded cable generally and the length should be no longer than 20 meters, as shown in Figure 3-6. In case the analog signal is subject to severe interference, and filter capacitor or ferrite magnetic core should be installed at analog signal source side, as shown in Figure 3-7.

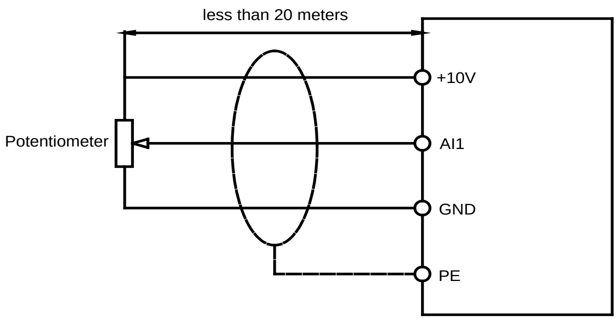


Figure 3-6 Connection of analog input

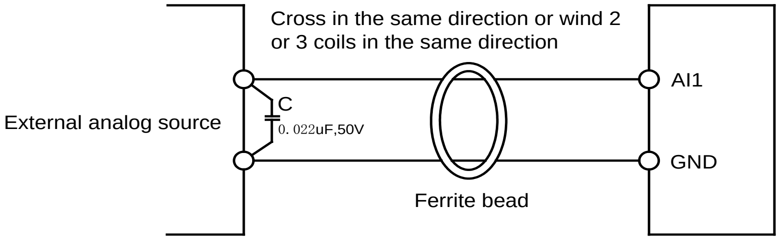
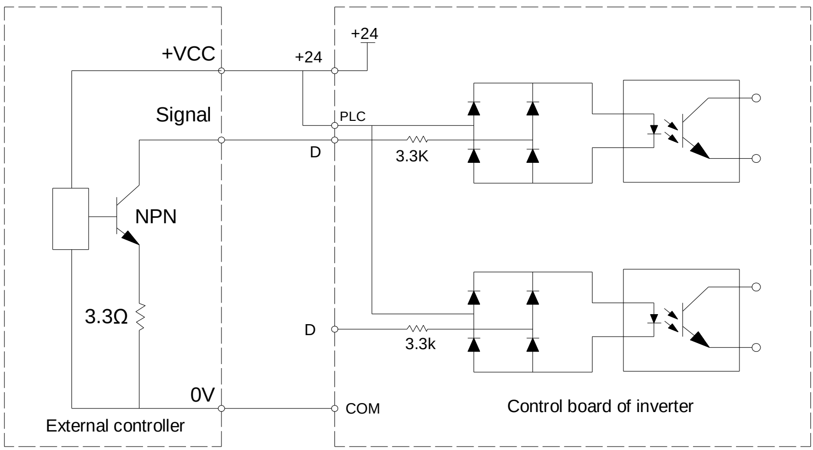


Figure 3-7 Connection of analog Input

b) Digital input terminal

It needs to employ shielded cable generally, with cable length of no more than 20 meters. When active driving is adopted, necessary filtering measures should be taken to prevent the interference to the power supply.
It is recommended to use the contact control mode.

D1~D4 terminal connection: NPN type



This is the most commonly used wiring connection, if external power supply is used, the +24V terminal must disconnect with PLC terminal. The positive pole of external power supply should connect with PLC terminal, and the negative pole connects with COM.

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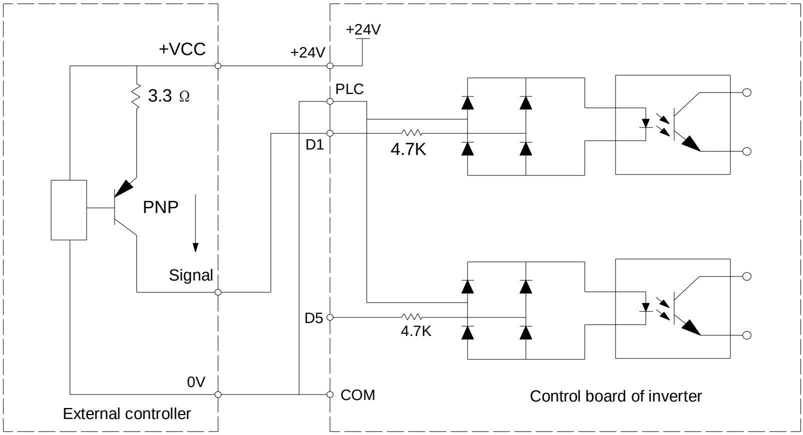
D1~D4 terminal connection: PNP type



In this type, +24V terminal must disconnect with PLC terminal, +24V should connect the common port of external controller, and meantime short connect PLC and COM.

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Chapter 4 Operation and Display

4.1 Keypad Description

With the operation keypad, it can perform such operations on the inverter as function parameter modification, working status monitor and running control (start and stop).

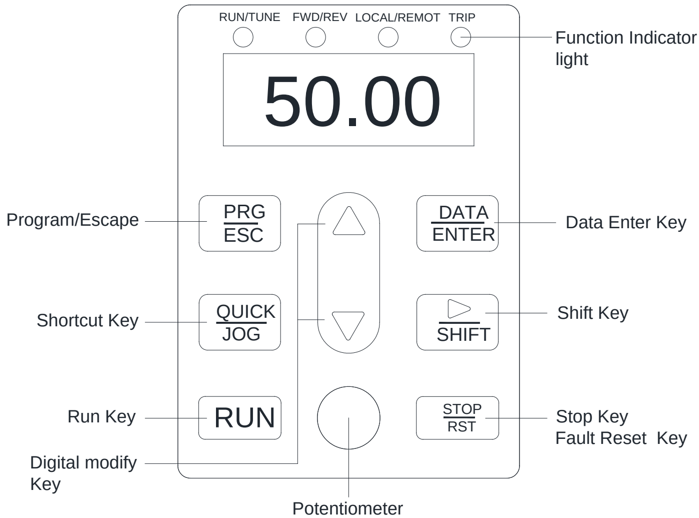

Figure4-1 Operation Keypad Diagram

1) Function key description

Function indicator	Description
RUN	Extinguished: stop status Light on: operating status
FWD/REV	Extinguished: forward operation Light on: reverse operation
LOCAL/REMOT	Extinguished: keypad control Flickering: communication control Light on: terminal control
TUNE/TRIP	Light on: torque control Flickering slowly: parameter autotuning status Flickering quickly: fault status

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2) Unit indictor light description

Unit indictor	Description
Hz	Frequency unit
A	Current unit
V	Voltage unit
RPM	Rotation speed unit
%	Percentage

3) Digital display zone

Five-number digit LED display, can display setting frequency, output frequency, various monitoring data and alarm code.

4) Keypad button description

Button	Name	Function
PRG/ESC	Programming	Entry and exit of primary menu
DATA/ENTER	Confirmation key	Progressively enter menu, and confirm parameters
△	Increment key	Progressively increase of data or function codes
▽	Decrement key	Progressively decrease of data or function codes
▷	Shift key	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification bit of parameters when modifying parameters.
RUN	Running key	Start to run inverter under keyboard control mode
STOP/RST	Stop/reset	Stop inverter in running status and reset operation in fault alarm status. The button's characteristics are restricted by function code P7-02.
QUICK/JOG	Multi-function selection key	According to P7-01, take function switching selection.

4.2 Function Code Checking and Modification Methods Description

The operation keypad of the HD200B series Inverter adopts three-level menu structure to carry out operations such as parameter setting.

The three-level menu includes function parameter group (level 1 menu) → Function code (level 2 menu) → Function code setting value (level 3 menu). Refer to Figure 4-2 for the operation procedure.

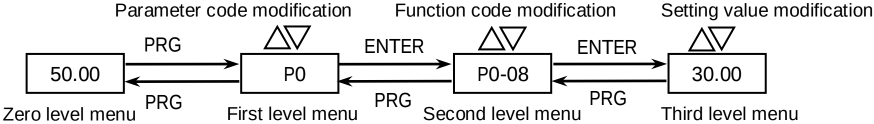
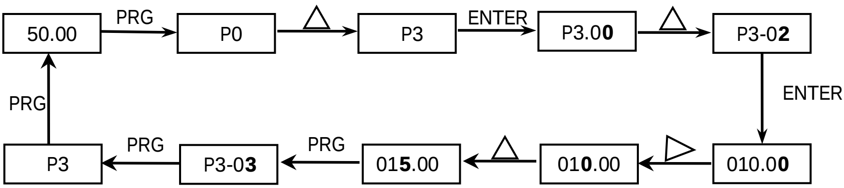


Figure 4-2 Operation Procedure of Three-level Menu

Description: When operating on level 3 menu, press PRG key or ENTER key to return to level 2 menu. The difference between PRG key and ENTER key is described as follows: Pressing ENTER KEY will save the setup parameter and return to the level 2 menu and then automatically shift to the next function code, while pressing PRG key will directly return to level 2 menu without saving the parameter, and it will return to the current function code.

Example: Modify the function code P3-02 from 10.00Hz to 15.00Hz. (The bold-type word indicates the flashing bit.)



In level 3 menu, if there is no flashing bit, it indicates that the function code cannot be modified. The possible reasons include:

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

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

4.3 Power-on Initialization

Firstly the system initializes during the inverter power-on, and LED displays "8.8.8.8.8.8". After initialization, the inverter is in fault protection status if a fault happens, or the inverter is in stand-by status.

4.4 Fault Protection

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... fault status, inverter will display fault code & record output current, output voltage, etc. For details, please refer to P9 (fault and protection) parameter group. Fault can be reset via STOP/RST key or external terminals.

4.5 Stand By

In stop or stand by status, parameters of multi-status can be displayed. Whether or not to display this parameter can be chosen through function code P7-05 (Stop status display parameter) according to binary bits.

In stop status, there are thirteen parameters can be chosen to display or not. They are: setting frequency, bus voltage, DI input status, DO output status, analog input AI1 voltage, radiator temperature, count value, actual length, PLC running step, load speed display, PID setting, HDI input pulse frequency. The displaying of the chosen parameters can be switched in sequence by press " ▷ " button.

Power on after power-off, the displayed parameters would be default considered as the chosen parameters before power-off.

4.6 Running

In running status, there are thirty two parameters can be chosen to display or not through function code P7-04 (running status display parameter 2) according to binary bits. They are: running frequency, setting frequency, DC bus voltage, output voltage, output current, output torque, DI input status, DO output status, analog input AI1 voltage, radiator temperature, actual count value, actual length, line speed, PID setting, PID feedback, etc. The displaying of the chosen parameters can be switched in sequence by pressing " ▷ " button.

4.7 Password Setting

The inverter provides user password protection function. When PP-00 is set to non-zero value, it indicates the user password, and the password protection turns valid after exiting the function code editing status. When pressing PRG key again, "------" will be displayed, and common menu cannot be entered until user password is input correctly.

To cancel the password protection function, enter with password and set PP-00 to "0".

4.8 Motor Parameters Autotuning

To select the vector control running mode, it must input the nameplate parameter of the motor accurately prior to the running of the inverter. The Inverter will select standard motor parameters matching the nameplate parameter. Since the vector control mode relies highly on the motor parameters, it must acquire the accurate parameters of the controlled motor to ensure the good control performance.

The procedures for the automatic tuning of motor parameters are described below:

First, select the command source (P0-02) as the command channel of the operation keypad. Second, input the following parameters in accordance with the actual motor parameters:

P1-01: Rated motor power
P1-02: Rated motor voltage
P1-03: Rated motor current
P1-04: Rated motor frequency
P1-05: Rated rotation speed of motor

If the motor is completely disconnected from the load, set P1.11 to “2” (complete tuning), and press RUN key on the keyboard keypad, then the inverter will automatically calculate the following parameters:

P1-06: Stator resistance
P1-07: Rotor resistance
P1-08: Leakage inductance
P1-09: Mutual inductance
P1-10: Current without load

Finally, complete the automatic tuning of motor parameters.

If the motor cannot be completely disconnected with the load, set P1-11 to “1” (static tuning), and then press RUN key on the keyboard panel.

The following motor parameters can be calculated automatically:

P1-06: Stator resistance
P1-07: Rotor resistance
P1-08: Leakage inductive reactance

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Chapter 5 Function Parameter List

The function parameters of HD200B series inverter have been divided into 20 groups including P0~PP, A5, AC, U0 according to the function. Each function group contains certain function codes. For example, “P1-10” means the tenth function code in the P1 function group. P0~PE are basic function parameter groups; PF is factory parameter group (users are forbidden to access); A5 and AC are factory debugging special parameter group, user modification is not recommended; U0 is monitor function parameter group.

If PP-00 is set to non-zero value, it means parameter protection password is set, and the parameter menu cannot be entered until correct password is input. To cancel the password, please set PP-00 to “0”.

A5, AC and U0 are default hidden parameter groups, which can be displayed by modifying PP-02.

The instruction of the symbols in function parameter list is as following:

“○”：means that the parameter setting value can be modified on stop and running status.

“◎”：means that the parameter setting value cannot be modified on the running status.

“●”：means that the value of the parameter is the real detection value which cannot be modified.

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5.1 Basic Function Parameter Table

Function code	Name	Detailed instruction	Factory default	Modify
P0 Group: Basic Function				
P0-01	Control mode	0: V/F control 1: Sensorless vector control (only for 3AC 380V)	0	◎
P0-02	Running command source	0: Keypad (LED OFF) 1: Terminal (LED ON) 2: Communication (LED flickers)	0	◎
P0-03	Main frequency source A selection	0: Keypad (P0-08, UP and DOWN Adjustable, non-recorded) 1: Keypad (P0-08, UP and DOWN Adjustable, recorded) 2: AI1 3: Reserved 4: Keypad potentiometer 5: Reserved 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication	1	◎
P0-04	Auxiliary frequency source B selection	The same as P0-03	0	◎

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Function code	Name	Detailed instruction	Factory default	Modify
P0-05	Reference of Frequency source B	0: Relative to maximum frequency 1: Relative to frequency source A	0	○
P0-06	Range of Auxiliary Frequency source B	0%～150%	100%	○
P0-07	Frequency source selection	Units place: frequency source selection 0: Main frequency source A 1: Calculation result of frequency A and B (determined by tens place) 2: Switching between A and B 3: Switching between A and calculation result 4: Switching between B and calculation result Tens place: calculation relationship between frequency A and B 0: A + B 1: A - B 2: Max (A, B) 3: Min (A, B)	00	○
P0-08	Keypad reference	0.00Hz ~ maximum	50.00Hz	○

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Function code	Name	Detailed instruction	Factory default	Modify
	frequency	frequency:P0-10		
P0-09	Running direction selection	0: Forward 1: Reverse	0	○
P0-10	Maximum frequency	50.00Hz ~ 300.00Hz	50.00Hz	◎
P0-11	Frequency source upper limit	0: P0-12 1: AI1 2: Reserved 3: Keypad potentiometer 4: Reserved 5: Communication	0	◎
P0-12	Frequency upper limit	P0-14 (frequency lower limit) ~ P0-10 (max. frequency)	50.00Hz	○
P0-13	Frequency upper limit offset	0.00Hz ~ P0-10 (max. frequency)	0.00Hz	○
P0-14	Frequency lower limit	0.00Hz ~ P0-12 (frequency upper limit)	0.00Hz	○
P0-15	Carrier frequency	1.0kHz ~ 12.0kHz	Model depend	○
P0-16	Carrier frequency adjusting according to temperature	0: No 1: Yes	1	○
P0-17	Acceleration time 1	0.01s ~ 36000s	Model depend	○
P0-18	Deceleration time 1	0.01s ~ 36000s	Model depend	○
P0-19	ACC/DEC time unit	0: 1s 1: 0.1s 2: 0.01s	1	◎
P0-21	Auxiliary frequency	0.00Hz ~ P0-10	0.00Hz	○

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Function code	Name	Detailed instruction	Factory default	Modify
	source offset frequency when combination	(max. frequency)		
P0-22	Frequency command resolution	1: 0.1Hz 2: 0.01Hz	2	◎
P0-23	Digital setting frequency storage selection when stop	0: Not store 1: store	1	○
P0-24	Reserved			●
P0-25	ACC/DEC time reference frequency	0: P0-10 (max. frequency) 1: Setting frequency 2: 100Hz	0	◎
P0-26	Running frequency command UP/DN reference	0: Running frequency 1: Setting frequency	0	◎
P1 Group: Motor Parameters				
P1-01	Rated power	0.1kW ~ 5.5kW	Model depend	◎
P1-02	Rated voltage	1V ~ 600V	Model depend	◎
P1-03	Rated current	0.01A ~ 30.00A	Model depend	◎
P1-04	Rated frequency	0.01Hz ~ P0-10 (max. frequency)	Model depend	◎
P1-05	Rated speed	1rpm ~ 36000rpm	Model depend	◎
P1-06	Stator resistance	0.001Ω ~ 65.535Ω	Motor parameter	◎
P1-07	Rotor resistance	0.001Ω ~ 65.535Ω	Motor parameter	◎
P1-08	Leakage	0.01mH ~ 655.35mH	Motor	◎

Function code	Name	Detailed instruction	Factory default	Modify
	inductance		parameter	
P1-09	Mutual inductance	0.01mH ~ 655.35mH	Motor parameter	◎
P1-10	No-load current	0.01A ~ P1-03 (rated current)	Motor parameter	◎
P1-11	Parameters autotuning	0: No action 1: Static autotuning 2: Rotation autotuning	0	◎
P2 Group: Vector Control Parameters				
P2-00	Speed loop proportional gain 1	1 ~ 100	30	○
P2-01	Speed loop integration time 1	0.01s ~ 10.00s	0.50s	○
P2-02	Low switching frequency	0.00 ~ P2-05	5.00Hz	○
P2-03	Speed loop proportional gain 2	1 ~ 100	20	○
P2-04	Speed loop integration time 2	0.01s ~ 10.00s	1.00s	○
P2-05	High switching frequency	P2-02 ~ P0-10 (max. frequency)	10.00Hz	○
P2-06	Vector control slip compensation coefficient	50% ~ 200%	100%	○
P2-07	Speed loop filter time	0.000s ~ 0.100s	0.000s	○
P2-08	Vector control over excitation gain	0 ~ 200	64	○
P2-09	Torque upper limit source selection in	0: P2-10 1: AI1	0	○

Function code	Name	Detailed instruction	Factory default	Modify
	speed control mode	2: Reserved 3:Keypad potentiometer 4: Reversed 5: Communication 6: Reserved 7: Reserved Full scale of 1-7 selection corresponds to P2-10		
P2-10	Torque upper limit digital setting	0.0% ~ 200.0%	150.0%	○
P3 Group: V/F Control Parameters				
P3-00	V/F curve setting	0: Linear 1: Multiple-point 2: Square 3: 1.2 power 4: 1.4 power 6: 1.6 power 8: 1.8 power	0	◎
P3-01	Torque boost	0.0: auto 0.1% ~ 30.0%	0.00%	○
P3-02	Torque boost cutoff frequency	0.00Hz ~ P0-10 (max. frequency)	50.00Hz	◎
P3-03	V/F frequency point 1	0.00Hz ~ P3-05	0.00Hz	◎
P3-04	V/F voltage point 1	0.0% ~ 100.0%	0.0%	◎
P3-05	V/F frequency point 2	P3-03 ~ P3-07	0.00Hz	◎
P3-06	V/F voltage point 2	0.0% ~ 100.0%	0.0%	◎
P3-07	V/F frequency point 3	P3-05 ~ P1-04 (motor rated power)	0.00Hz	◎

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Function code	Name	Detailed instruction	Factory default	Modify
P3-08	V/F voltage point 3	0.0% ~ 100.0%	0.0%	◎
P3-09	V/F slip compensation gain	0.0% ~ 200.0%	0.0%	○
P3-10	V/F over excitation gain	0 ~ 200	64	○
P3-11	V/F oscillation suppression gain	0 ~ 100	Model depend	○
P3-18	Over-current stall action current	50% ~ 200%	150%	○
P3-19	Over-current stall suppression	0: Invalid 1: Valid	1	○
P3-20	Over-current stall suppression gain	0 ~ 100	20	○
P3-21	Double-speed over-current stall action current compensation coefficient	0 ~ 200%	50%	○
P3-22	Over-current stall action voltage	330.0V ~ 390.0V	390.0V	○
P3-23	Over-voltage stall enable	0: Invalid 1: Valid	1	○
P3-24	Over-voltage stall suppression frequency gain	0 ~ 100	50	○
P3- 25	Over-voltage stall suppression voltage gain	0 ~ 100	30	○
P3-26	Over-voltage stall max. rising frequency limit	0 ~ 50Hz	5Hz	○
P3-27	Slip compensation time constant	0.1 ~ 10.0s	0.5	○
P4 Group: Input Terminal				
P4-00	D1 terminal function	0: No function	1	◎

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<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction</th><th>Factory default</th><th>Modify</th></tr>
<tr><td>P4-01</td><td>D2 terminal function</td><td rowspan="3">1: Forward (FWD)
2: Reverse (REV)
3: Three-line running control
4: Forward Jog (FJOG)
5: Reverse Jog (RJOG)
6: Terminal UP
7: Terminal DOWN
8: Coast to stop
9: Fault reset (RESET)
10: Pause running
11: External fault (normal open) input
12: Multi-step speed terminal 1
13: Multi-step speed terminal 2
14: Multi-step speed terminal 3
15: Multi-step speed terminal 4
16: ACC/DEC selection terminal 1
17: ACC/DEC selection terminal 2
18: Main frequency source switching
19: UP and DOWN setting clear (terminal and keypad)</td><td>2</td><td>◎</td></tr>
<tr><td>P4-02</td><td>D3 terminal function</td><td>0</td><td>◎</td></tr>
<tr><td>P4-03</td><td>Reserved</td><td>0</td><td>◎</td></tr>
</table>

Function code	Name	Detailed instruction	Factory default	Modify
		20: Running command switching terminal 21: ACC/DEC invalid 22: PID Pause 23: PLC status reset 32: DC braking command 33: External fault (normal closed) input 34: Frequency modification enabled 35: PID action direction reverse 36: External stop terminal 1 37: Control command switching terminal 2 38: PID integration stop 39~42: Reserved 43: PID parameter switching 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: The running time reset 51: Two-wire/three-wire switching		

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Function code	Name	Detailed instruction	Factory default	Modify
		52: Reverse frequency prohibition		
P4-10	Terminal filter time	0.000s ~ 1.000s	0.010s	○
P4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	◎
P4-12	UP/DN change rate	0.001Hz/s ~ 50.000Hz/s	1.00Hz/s	○
P4-13	AI curve 1 minimum input	0.00V ~ P4-15	0.00V	○
P4-14	AI curve 1 minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
P4-15	AI curve 1 maximum input	P4-13 ~ +10.00V	10.00V	○
P4-16	AI curve 1 maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○
P4-17	AI1 filter time	0.00s ~ 10.00s	0.10s	○
P4-23	AI curve 3 minimum input	-10.00V ~ P4-25	-10.00V	○
P4-24	AI curve 3 minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
P4-25	AI curve 3 maximum input	P4-23 ~ +10.00V	10.00V	○
P4-26	AI curve 3 maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○

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Function code	Name	Detailed instruction	Factory default	Modify
P4-27	AI3 filtering time	0.00s ~ 10.00s	0.10s	○
P4-33	AI curve selection	Units place: AI1 1: Curve 1 (see P4-13 ~ P4-16) 3: Curve 3 (see P4-23 ~ P4-26) Tens place: Reserved	321	○
P4-35	D1 delay time	0.0s ~ 3600.0s	0.0s	◎
P4-36	D2 delay time	0.0s ~ 3600.0s	0.0s	◎
P4-37	D3 delay time	0.0s ~ 3600.0s	0.0s	◎
P4-38	DI terminal valid mode selection 1	0: Active-high 1: Active-low Units place: D1 Tens place: D2 Hundreds place: D3 Thousands place: D4	0000	◎
P5 Group: Output Terminal				
P5-02	Relay T1 output selection	0: No output 1: Inverter is running 2: Fault output (fault stop) 3: FDT1 output 4: Frequency arrival 5: Zero-speed running (no output when stop) 6: Motor overload pre-alarm 7: Inverter overload pre-alarm 11: PLC loop completed	0	○

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Function code	Name	Detailed instruction	Factory default	Modify
		12: Accumulated running time arrival 13: Frequency limiting 15: Ready for running 16: Reserved 17: Frequency upper limit arrival 18: Frequency lower limit arrival 19: Under voltage status output 20: Communication setting 24: Accumulated power-on time arrival 25: FDT2 output 26: Frequency 1 arrival output 27: Frequency 2 arrival output 28: Current 1 arrival output 29: Current 2 arrival output 30: Timing arrival output 31: AI1 input over limit 32: Off load 33: Reverse running 34: Zero-current status 35: Module temperature arrival		

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Function code	Name	Detailed instruction	Factory default	Modify
		36: Output current over limit 37: Lower limit frequency arrival (output when stop) 38: Warning output (keep running) 40: This running time arrival 41: Reserved		
P5-03 ～ P5-06	Reserved			●
P5-07	AO1 output function selection	0: Running frequency 1: Setting frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input 7: AI1 0V～10V 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0A) 15: Output voltage (100.0% corresponds to 1000.0V) 16: Reserved	0	○
P5-10	AO1 offset	-100.0% ~ +100.0%	0.0%	○

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Function code	Name	Detailed instruction	Factory default	Modify
	coefficient			
P5-11	AO1 gain	-10.00 ~ +10.00	1.00	○
P5-12 ~ P5-17	Reserved			○
P5-18	Relay 1 output delay time	0.0s ~ 3600.0s	0.0s	○
P5-19 ~ P5-21	Reserved			
P5-22	Output terminal valid status selection	0: Positive logic 1: Negative logic Units place: Reserved Tens place: Relay1 Hundreds place: Reserved	000	○
P6 Group: Start and Stop Control				
P6-00	Start mode	0: Direct start 1: Speed tracking and restart	0	○
P6-01	Speed tracking mode	0: Begin from stop frequency 1: Begin from zero speed 2: Begin from maximum frequency	0	◎
P6-03	Start frequency	0.00Hz ~ 10.00Hz	0.00Hz	○
P6-04	Start frequency holding time	0.0s ~ 100.0s	0.0s	◎
P6-07	ACC/DEC mode	0: Linear ACC/DEC 1: S-curve ACC/DEC A 2: S-curve ACC/DEC B	0	◎

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Function code	Name	Detailed instruction	Factory default	Modify
P6-08	Time of S curve's start part	0.0% ~ (100.0% ~ P6-09)	30.0%	◎
P6-09	Time of S curve's end part	0.0% ~ (100.0% ~ P6-08)	30.0%	◎
P6-10	Stop mode	0: Deceleration to stop 1: Coast to stop	0	○
P6-11	DC braking start frequency after stop	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P6-12	DC braking delay time after stop	0.0s ~ 100.0s	0.0s	○
P6-13	DC braking current after stop	0% ~ 100%	0%	○
P6-14	DC braking time after stop	0.0s ~ 100.0s	0.0s	○
P6-21	Demagnetization time	0.00s～5.00s	0.5s	○
P7 Group: Keypad and Display				
P7-00	Inverter rated power	0.1kW~1000.0kW	Model depend	●
P7-01	QUICK/JOG function selection	0: Invalid 1: Switching between keypad command and remote command (terminal command and communication command) 2: FDW/REV Switching 3: Forward Jog 4: Reverse Jog 5.Display mode (normal display mode and modified	5	◎

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Function code	Name	Detailed instruction	Factory default	Modify
		parameter display mode) switching		
P7-02	STOP/RST function selection	0: Valid when keypad control 1: Always valid	1	○
P7-03	Running status display 1	0000 ~ FFFF Bit00: Running frequency 1 (Hz) Bit01: Setting frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: DI status Bit08: DO status Bit09: AI1 voltage (V) Bit10: Reserved Bit11: Radiator temperature Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	81F	○
P7-04	Running status display 2	0000 ~ FFFF Bit00: PID feedback	1	○

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Function code	Name	Detailed instruction	Factory default	Modify
		Bit01: PLC step Bit02: HDI input pulse frequency (kHz) Bit03: Running frequency 2 (Hz) Bit04: Remain running time Bit05: AI1 voltage before calibration (V) Bit06: Reserved Bit07: Reserved Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min) Bit11: HDI input pulse frequency (Hz) Bit12: Communication setting value Bit13: Reserved Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display (Hz)		
P7-05	Stop status display	0000 ~ FFFF Bit00: Setting frequency (Hz) Bit01: Bus voltage (V) Bit02: DI input status Bit03: DO output status	53	○

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Function code	Name	Detailed instruction	Factory default	Modify
		Bit04: AI1 voltage(V) Bit05: Reserved Bit06: Radiator temperature Bit07: Count value Bit08: Length value Bit09: PLC step Bit10: Load speed Bit11: PID setting Bit12: HDI input pulse frequency (kHz)		
P7-06	Load speed display coefficient	0.0001 ~ 6.5000	3.0000	○
P7-07	IGBT module temperature	0.0℃~ 100.0℃	-	●
P7-08	Inverter rated voltage	1V~2000V	Model depend	●
P7-09	Accumulated running time	0h ~ 65535h	-	●
P7-10	Model No.	-	-	●
P7-11	Software version No.	-	-	●
P7-12	Load speed display decimal place	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	○
P7-13	Accumulated Power-on time	0h ~ 65535h	-	●
P7-14	Accumulated power consumption	0kW ~ 65535 kW	-	●
P8 Group: Enhanced Function				
P8-00	Jog running	0.00Hz ~ P0-10 (max.	2.00Hz	○

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Function code	Name	Detailed instruction	Factory default	Modify
	frequency	frequency)		
P8-01	Jog acceleration time	0.1s ~ 3600.0s	20.0s	○
P8-02	Jog deceleration time	0.1s ~ 3600.0s	20.0s	○
P8-03	Acceleration time 2	0.1s ~ 3600.0s	Model depend	○
P8-04	Deceleration time 2	0.1s ~ 3600.0s	Model depend	○
P8-05	Acceleration time 3	0.1s ~ 3600.0s	Model depend	○
P8-06	Deceleration time 3	0.1s ~ 3600.0s	Model depend	○
P8-07	Acceleration time 4	0.1s ~ 3600.0s	Model depend	○
P8-08	Deceleration time 4	0.1s ~ 3600.0s	Model depend	○
P8-09	Jump frequency 1	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P8-10	Jump frequency 2	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P8-11	Jump frequency amplitude	0.00Hz ~ P0-10 (maximum frequency)	0.01Hz	○
P8-12	FWD/REV dead time	0.0s ~ 3600.0s	0.0s	○
P8-13	Reverse control	0: Enable 1: Disable	0	○
P8-14	Action when setting frequency lower than frequency lower limit	0: Running at frequency lower limit 1: Stop 2: Zero-speed running	0	○
P8-15	Droop control	0.00Hz ~ 10.00Hz	0.00Hz	○

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Function code	Name	Detailed instruction	Factory default	Modify
P8-16	Accumulated power-on arrival time	0h ~ 36000h	0h	○
P8-17	Accumulated running arrival time	0h ~ 36000h	0h	○
P8-18	Power-on running command valid protection selection	0: No protection 1: Protection	0	○
P8-19	Frequency detection value (FDT1)	0.00Hz ~ P0-10 (maximum frequency)	50.00Hz	○
P8-20	Frequency detection lagging value (FDT1)	0.0% ~ 100.0% (FDT1 level)	5.0%	○
P8-21	Frequency arrival detection amplitude	0.0% ~ 100.0% (maximum frequency)	0.0%	○
P8-22	Jump frequency control during ACC/DEC	0: Invalid 1: Valid	0	○
P8-25	Acceleration time 1 and acceleration time 2 switching frequency point	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P8-26	Deceleration time 1 and deceleration time 2 switching frequency point	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P8-27	Terminal jog priority	0: Invalid 1: Valid	0	○
P8-28	Frequency detection value	0.00Hz ~ P0-10 (maximum frequency)	50.00Hz	○

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Function code	Name	Detailed instruction	Factory default	Modify
	(FDT2)			
P8-29	Frequency detection lagging value (FDT2)	0.0% ~ 100.0% (FDT2 level)	5.0%	○
P8-30	Any arrival frequency detection value 1	0.00Hz ~ P0-10 (maximum frequency)	50.00Hz	○
P8-31	Any arrival frequency detection amplitude 1	0.0% ~ 100.0% (maximum frequency)	0.0%	○
P8-32	Any arrival frequency detection value 2	0.00Hz ~ P0-10 (maximum frequency)	50.00Hz	○
P8-33	Any arrival frequency detection amplitude 2	0.0% ~ 100.0% (maximum frequency)	0.0%	○
P8-34	Zero-current detection level	0.0% ~ 300.0% 100.0% corresponds to motor rated current	5.0%	○
P8-35	Zero-current detection delay time	0.01s ~ 360.00s	0.10s	○
P8-36	Output current over limit value	0.0% (No detection) 0.1% ~ 300.0% (motor rated current)	200.0%	○
P8-37	Output current over limit detection delay time	0.00s ~ 360.00s	0.00s	○
P8-38	Any arrival current 1	0.0% ~ 300.0% (motor rated current)	100.0%	○
P8-39	Any arrival current 1 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	○
P8-40	Any arrival current	0.0% ~ 300.0%	100.0%	○

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Function code	Name	Detailed instruction	Factory default	Modify
	2	(motor rated current)		
P8-41	Any arrival current 2 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	○
P8-42	Timing function selection	0: Invalid 1: Valid	0	○
P8-43	Timing running time selection	0：P8-44 1：AI1	0	○
P8-44	Timing running time	0.0Min ~ 3600.0Min	0.0Min	○
P8-45	AI1 input voltage protection lower limit	0.00V ~ P8-46	3.10V	○
P8-46	AI1 input voltage protection upper limit	P8-45 ~ 10.00V	6.80V	○
P8-48	Cooling fan control	0: Fan runs when inverter running 1: Fan always runs	0	○
P8-49	Wake up frequency	0.0 ~ PA-04 (PID given feedback range)	3.0	○
P8-50	Wake up delay time	0.0s ~ 3600.0s	0.0s	○
P8-51	Dormancy frequency	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	○
P8-52	Dormancy delay time	0.0s ~ 3600.0s	0.0s	○
P8-53	Running arrival time setting	0.0Min ~ 3600.0Min	0.0Min	○
P8-54	Output power correction factor	0.0%～200.0%	100.0%	○
P9 Group: Fault and Protection				
P9-00	Motor overload protection selection	0: Disable 1: Enable	1	○
P9-01	Motor overload	0.20 ~ 10.00	1.00	○

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Function code	Name	Detailed instruction	Factory default	Modify
	protection gain			
P9-02	Motor overload pre-alarm coefficient	50% ~ 100%	80%	○
P9-03	Stall over-voltage gain	0 ~ 100	30	○
P9-04	Overvoltage stall protection voltage	330.0V~800.0V	1AC：390V 3AC：760V	○
P9-05	Stall over current gain	1 ~ 100	20	○
P9-06	Stall over-current point	100% ~ 200%	150%	○
P9-07	Short-circuit to ground protection selection when power-on	0: Invalid 1: Valid	0	○
P9-08	Braking unit action starting voltage	330.0V~800.0V	1AC：378V 3AC：700V	○
P9-09	Fault auto reset times	0 ~ 5	0	○
P9-10	Fault HDO acts selection in fault auto reset	0: No action 1: Action	0	○
P9-11	Fault auto reset interval	0.1s ~ 100.0s	1.0s	○
P9-12	Reserved			
P9-13	Output phase failure protection selection	0: Disable 1: Enable	1	○
P9-14	The first fault type	0: No fault 1: Reserved 2: Acc over current	—	●

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Function code	Name	Detailed instruction	Factory default	Modify
		3: Dec over current 4: Over current in constant speed 5: Over voltage in Acc process 6: Over voltage in Dec process 7: Over voltage in constant speed 8: Buffer resistance overload 9: Under voltage 10: Inverter overload 11: Motor overload 12: Input side phase failure 13: Output side phase failure 14: Module overheat 1 5: External fault 16: Communication fault 17: Contactor fault 1 8: Current detection fault 19: Motor autotuning fault 20: Reserved 21: Parameter R/W fault 2 2: Inverter hardware fault		

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Function code	Name	Detailed instruction	Factory default	Modify
		23: Motor short circuit to ground fault 24: Reserved 25: Reserved 26: Running time arrival 27: Customized fault 1 28: Customized fault 2 29: Power-on time arrival 30: Off load 31: PID feedback lost when running 40: Fast current limiting over time 41: Reserved 42: Speed deviation oversize 43: Motor over speed		
P9-15	The second fault type		—	●
P9-16	The third (latest) fault type		—	●
P9-17	Frequency at the third (latest) fault	—	—	●
P9-18	Current at the third (latest) fault	—	—	●
P9-19	Bus voltage at the third (latest) fault	—	—	●
P9-20	Input terminal’s status at the third (latest) fault	—	—	●

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Function code	Name	Detailed instruction	Factory default	Modify
P9-21	Output terminal's status at the third (latest) fault	—	—	●
P9-22	Inverter status at the third (latest) fault	—	—	●
P9-23	Power-on time at the third (latest) fault	—	—	●
P9-24	Running time at the third (latest) fault	—	—	●
P9-27	Frequency at the second fault	—	—	●
P9-28	Current at the second fault	—	—	●
P9-29	Bus voltage at the second fault	—	—	●
P9-30	Input terminal's status at the second fault	—	—	●
P9-31	Output terminal's status at the second fault	—	—	●
P9-32	Inverter status at the second fault	—	—	●
P9-33	Power-on time at the second fault	—	—	●
P9-34	Running time at the second fault	—	—	●
P9-37	Frequency at the first fault	—	—	●
P9-38	Current at the first	—	—	●

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Function code	Name	Detailed instruction	Factory default	Modify
	fault			
P9-39	Bus voltage at the first fault	—	—	●
P9-40	Input terminal's status at the first fault	—	—	●
P9-41	Output terminal's status at the first fault	—	—	●
P9-42	Inverter status at the first fault	—	—	●
P9-43	Power-on time at the first fault	—	—	●
P9-44	Running time at the first fault	—	—	●
P9-47	Action selection 1 for fault protection	Units place: Motor overload (11) 0: Coast to stop 1: Dec-to-stop 2: Keep running Tens place: Input phase failure (12) Hundreds place: Output phase failure (13) Thousands place: External fault (15) Ten thousands place: communication fault (16)	00000	○
P9-48	Fault protection action selection 2	Units place: Reserved Tens place: Function	00000	○

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Function code	Name	Detailed instruction	Factory default	Modify
		code R/W fault (21) 0: Coast to stop 1: Dec-to-stop Hundreds place: Reserved Thousands place: Reserved Ten thousands: Running time arrival (26)		
P9-49	Fault protection action selection 3	Units place: Customized fault 1 (27) 0: Coast to stop 1: Dec-to-stop 2: Keep running Tens place: Customized fault 2 (28) 0: Coast to stop 1: Dec-to-stop 2: Keep running Hundreds place: Power-on time arrival time (29) 0: Coast to stop 1: Dec-to-stop 2: Keep running Thousands place: Off load (30) 0: Coast to stop 1: Dec-to-stop 2: Decelerate to 7% of motor rated power,	00000	○

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Function code	Name	Detailed instruction	Factory default	Modify
		then keep running; run at setting frequency when no off-load Ten thousands place: PID feedback lost when running (31) 0: Coast to stop 1: Dec-to-stop 2: Keep running		
P9-54	Running frequency selection when fault	0: Run at current running frequency 1: Run at setting frequency 2: Run at upper limit frequency 3: Run at lower limit frequency 4: Run at abnormal backup frequency	0	○
P9-55	Abnormal backup frequency	60.0% ~ 100.0% (100.0% corresponds to maximum frequency(P0-10))	100.0%	○
P9-56~ P9-58	Reserved			●
P9-59	Instantaneous power-off action selection	0: Invalid 1: Deceleration 2: Dec-to-stop	0	○
P9-60	Recover judgment voltage when Instantaneous power-off	80 ~ 100%	85%	○

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Function code	Name	Detailed instruction	Factory default	Modify
P9-61	Recover judgment time when Instantaneous power-off	0.00s ~ 100.00s	0.50s	○
P9-62	Action judgment voltage when instantaneous power-off	60.0% ~ 100.0% (standard bus voltage)	80.0%	○
P9-63	Off-load protection selection	0: Disable 1: Enable	0	○
P9-64	Off-load detection level	0.0 ~ 100.0%	10.0%	○
P9-65	Off-load detection time	0.0 ~ 60.0s	1.0s	○
PA Group: PID Function				
PA-00	PID given source	0: PA-01 1: AI1 2: Reserved 3: Keypad potentiometer 4: High speed pulse HDI 5: Communication 6: Multi-step command	0	○
PA-01	PID given through keypad	0.0 ~ PA-04 (PID given feedback range)	0.0	○
PA-02	PID feedback source	0: AI1 1: Reserved 2: Keypad potentiometer 3: Reserved 4: Reserved	0	○

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Function code	Name	Detailed instruction	Factory default	Modify
		5: Communication 6: Reserved 7: Reserved 8: Reserved		
PA-03	PID action direction	0: Positive 1: Negative	0	○
PA-04	PID given feedback range	PA-01(PID given through keypad)~ 1000.0	100.0	○
PA-05	Proportional gain Kp1	0.0 ~ 100.0	20.0	○
PA-06	Integration time Ti1	0.01s ~ 10.00s	2.00s	○
PA-07	Differential time Td1	0.000s ~ 10.000s	0.000s	○
PA-08	Cutoff frequency of PID reverse	0.00 ~ P0-10 (maximum frequency)	0.00Hz	○
PA-09	PID deviation limit	0.0% ~ 100.0%	0.0%	○
PA-10	PID differential amplitude	0.00% ~ 100.00%	0.10%	○
PA-11	PID given filter time	0.00 ~ 650.00s	0.00s	○
PA-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	○
PA-13	PID output filter time	0.00 ~ 60.00s	0.00s	○
PA-14	Reserved			○
PA-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	○
PA-16	Integration time Ti2	0.01s ~ 10.00s	2.00s	○
PA-17	Differential time Td2	0.000s ~ 10.000s	0.000s	○
PA-18	PID parameter switching condition	0: No switching 1: Switching via	0	○

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Function code	Name	Detailed instruction	Factory default	Modify
		terminals 2: Automatic switching according to the deviation		
PA-19	PID parameter switching deviation 1	0.0% ~ PA-20	20.0%	○
PA-20	PID parameter switching deviation 2	PA-19 ~ 100.0%	80.0%	○
PA-21	PID initial value	0.0% ~ 00.0%	0.0%	○
PA-22	PID initial value holding time	0.00 ~ 360.00s	0.00s	○
PA-23	Forward maximum value between two output deviation	0.00% ~ 100.00%	1.00%	○
PA-24	Reverse maximum value between two output deviation	0.00% ~ 100.00%	1.00%	○
PA-25	PID integration attribute	Units place: Integration separate 0: Invalid 1: Valid Tens place: Stop integrating or not after output reach limit 0: Keep integrating 1: Stop integrating	00	○
PA-26	PID feedback lost detection value	0.0%: No judgment for feedback lost 0.1% ~ 100.0%	0.0%	○
PA-27	PID feedback lost	0.0s ~ 20.0s	0.0s	○

Function code	Name	Detailed instruction	Factory default	Modify
	detection time			
PA-28	PID stop calculation	0: No calculation when stop 1: Calculation when stop	1	○
Pb Group: Wobble Frequency, Fixed Length, Counting				
Pb-00	Wobble frequency setting mode	0: Relative to center frequency 1: Relative to maximum frequency	0	○
Pb-01	Wobble frequency amplitude	0.0% ~ 100.0%	0.0%	○
Pb-02	Sudden Jump frequency amplitude	0.0% ~ 50.0%	0.0%	○
Pb-03	Wobble frequency cycle	0.1s ~ 3000.0s	10.0s	○
Pb-04	Triangular wave rise time of wobble frequency	0.1% ~ 100.0%	50.0%	○
Pb-05	Setting length	0m ~ 65535m	1000m	○
Pb-06	Actual length	0m ~ 65535m	0m	○
Pb-07	Number of pulses per meter	0.1 ~ 6553.5	100.0	○
Pb-08	Setting count value	1 ~ 65535	1000	○
Pb-09	Designated count value	1 ~ 65535	1000	○
PC Group: Multi-step Command and Simple PLC				
PC-00	Multi-step command 0	-100.0% ~ 100.0%	0.0%	○
PC-01	Multi-step command 1	-100.0% ~ 100.0%	0.0%	○

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Function code	Name	Detailed instruction	Factory default	Modify
PC-02	Multi-step command 2	-100.0% ~ 100.0%	0.0%	○
PC-03	Multi-step command 3	-100.0% ~ 100.0%	0.0%	○
PC-04	Multi-step command 4	-100.0% ~ 100.0%	0.0%	○
PC-05	Multi-step command 5	-100.0% ~ 100.0%	0.0%	○
PC-06	Multi-step command 6	-100.0% ~ 100.0%	0.0%	○
PC-07	Multi-step command 7	-100.0% ~ 100.0%	0.0%	○
PC-08	Multi-step command 8	-100.0% ~ 100.0%	0.0%	○
PC-09	Multi-step command 9	-100.0% ~ 100.0%	0.0%	○
PC-10	Multi-step command 10	-100.0% ~ 100.0%	0.0%	○
PC-11	Multi-step command 11	-100.0% ~ 100.0%	0.0%	○
PC-12	Multi-step command 12	-100.0% ~ 100.0%	0.0%	○
PC-13	Multi-step command 13	-100.0% ~ 100.0%	0.0%	○
PC-14	Multi-step command 14	-100.0% ~ 100.0%	0.0%	○
PC-15	Multi-step command 15	-100.0% ~ 100.0%	0.0%	○
PC-16	Simple PLC running mode	0: Stop after one cycle 1: Keep last frequency after one cycle 2: Circular running	0	○

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Function code	Name	Detailed instruction	Factory default	Modify
PC-17	Simple PLC storage selection when power-down	Units place: Storage selection when power-off 0: Not store 1: Store Tens place: Storage selection when stop 0: Not store 1: Store	00	○
PC-18	0th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-19	0th phase ACC/DCC time selection	0 ~ 3	0	○
PC-20	1st phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-21	1st phase ACC/DCC time selection	0 ~ 3	0	○
PC-22	2nd phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-23	2nd phase ACC/DCC time selection	0 ~ 3	0	○
PC-24	3rd phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-25	3rd phase ACC/DCC time selection	0 ~ 3	0	○
PC-26	4th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-27	4th phase ACC/DCC time selection	0 ~ 3	0	○
PC-28	5th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○

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Function code	Name	Detailed instruction	Factory default	Modify
PC-29	5th phase ACC/DCC time selection	0 ~ 3	0	○
PC-30	6th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-31	6th phase ACC/DCC time selection	0 ~ 3	0	○
PC-32	7th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-33	7th phase ACC/DCC time selection	0 ~ 3	0	○
PC-34	8th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-35	8th phase ACC/DCC time selection	0 ~ 3	0	○
PC-36	9th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-37	9th phase ACC/DCC time selection	0 ~ 3	0	○
PC-38	10th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-39	10th phase ACC/DCC time selection	0 ~ 3	0	○
PC-40	11th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-41	11th phase ACC/DCC time selection	0 ~ 3	0	○
PC-42	12th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-43	12th phase	0 ~ 3	0	○

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Function code	Name	Detailed instruction	Factory default	Modify
	ACC/DCC time selection			
PC-44	13th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-45	13th phase ACC/DCC time selection	0 ~ 3	0	○
PC-46	14th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-47	14th phase ACC/DCC time selection	0 ~ 3	0	○
PC-48	15th phase running time	0.0s (m) ~ 6500.0s (m)	0.0s (m)	○
PC-49	15th phase ACC/DCC time selection	0 ~ 3	0	○
PC-50	Timing unit (Simple PLC mode)	0: s (second) 1: m (minute)	0	○
PC-51	Multi-step command 0 given mode	0: PC-00 1: AI1 2: Reserved 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (P0-08), can be modified via UP/DN	0	○
Pd Group: Communication Parameters				
Pd-00	Baud rate	0: 300BPS	5	○

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Function code	Name	Detailed instruction	Factory default	Modify
		1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS		
Pd-01	Data format	0: No parity check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No parity check (8-N-1)	0	○
Pd-02	Local address	1 ~ 247, 0 is broadcast address	1	○
Pd-03	Response delay	0ms ~ 20ms	2	○
Pd-04	Communication timeout time	0.0 (invalid) 0.1s ~ 60.0s	0.0	○
Pd-05	Communication protocol selection	0: Non-standard MODBUS protocol 1: Standard MODBUS protocol	1	○
Pd-06	Communication read current resolution	0: 0.01A 1: 0.1A	0	○
Pd-07	Communication selection	0: External terminal 1: Keypad	0	○
PE Group: Reserved Function				
FE-00	Reserved			○
PP Group: Function Code Management				

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Function code	Name	Detailed instruction	Factory default	Modify
PP-00	User password	0 ~ 65535	0	○
PP-01	Parameter initialization	0: No action 1: Restore factory default, but not including motor parameters 2: Clear the record	0	◎
PP-02	Function parameter group display selection	Units place: U0 group display selection 0: No display 1: Display Tens place: A0 group display selection 0: No display 1: Display	00	◎
PP-03	Reserved			●
PP-04	Function code modification attribute	0: Disable 1: Enable	0	○

5.2 Monitoring Parameter Table

Function code	Name	Minimum unit
U0:Group Basic Monitoring Parameter		
U0-00	Running frequency (Hz)	0.01Hz
U0-01	Setting frequency (Hz)	0.01Hz
U0-02	DC bus voltage (V)	0.1V
U0-03	Output voltage (V)	1V
U0-04	Output current (A)	0.01A
U0-05	Output power (kW)	0.1kW

Function code	Name	Minimum unit
U0-06	Output torque (%)	0.1%
U0-07	DI input status	1
U0-08	DO output status	1
U0-09	AI1 voltage (V)	0.01V
U0-10	Reserved	0
U0-11	Radiator temperature	1℃
U0-12	Count value	1
U0-13	Length value	1
U0-14	Load speed	1
U0-15	PID setting	1
U0-16	PID feedback	1
U0-17	PLC phase	1
U0-18	HDI input pulse frequency (Hz)	0.01kHz
U0-19	Feedback speed (unit 0.1Hz)	0.1Hz
U0-20	Remain running time	0.1Min
U0-21	AI1 voltage before calibration	0.001V
U0-22	Reserved	0
U0-23	Keypad potentiometer voltage before calibration	0.001V
U0-24	linear velocity	1m/Min
U0-25	Current power-on time	1Min
U0-26	Current running time	0.1Min
U0-27	HDI input pulse frequency	1Hz
U0-28	Communication setting value	0.01%
U0-29	Reserved	0.01Hz
U0-30	Main frequency A display	0.01Hz
U0-31	Auxiliary frequency B display	0.01Hz
U0-32	Reserved	1

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Function code	Name	Minimum unit
U0-33	Reserved	0.1°
U0-34	Motor temperature	1℃
U0-35	Target torque (%)	0.1%
U0-36	Reserved	1
U0-37	Power factor angle	0.1°
U0-38	Reserved	1
U0-39	Reserved	1V
U0-40	Reserved	1V
U0-41	DI input status visual display	1
U0-42	DO input status visual display	1
U0-43	DI function status display 1 (function 01-function 40)	1
U0-44	DI function status visual display 2 (function 41-function 80)	1
U0-59	Setting frequency (%)	0.01%
U0-60	Running frequency (%)	0.01%
U0-61	Inverter status	1

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Chapter 6 Parameters Description

Group P0 Basic Function

P0-01	Control mode	Factory default	0

0: V/F control

It is suitable for general purpose application such as pumps, fans etc. One inverter can drive multiple motors.

1: Sensorless vector control (only for HD200B 380V)

It is widely used for the application which requires high torque at low speed, high speed accuracy, and quicker dynamic response, such as machine tool, injection molding machine, centrifugal machine and wire-drawing machine, etc.

Note:

The autotuning of motor parameters must be accomplished properly if you use the sensorless vector control. How to autotuning of motor parameters please refer to P4 Group.

In order to achieve better control characteristic, the parameters of vector control (P2 Group) should be adjusted.

P0-02	Running Command source	Factory default	0

Select the input channel for control command. The inverter control commands include start, stop, forward run, reverse run, Jog and so on.

0: Keypad (“LOCAL/REMOT” LED OFF)

Both RUN and STOP/RST keys are used for running command control. If multifunction key QUICK/JOG is set as FWD/REV switching function (P7-01 is set to be 2), it will be used to change the rotating orientation. If multifunction key QUICK/JOG is set as FWD jog (P7-01 is set to be 3) or REV jog (P7-01 is set to be 4), it will be used for jog running.

1: Terminal (“LOCAL/REMOT” LED ON)

The operations, including FWD, REV, JOGF, JOGR, etc. can be controlled by multifunctional input terminals.

2. Communication ("LOCAL/REMOT" LED flickers)

The operation of inverter can be controlled by host through communication.

P0-03	Main frequency source A selection	Factory default	0

0: Keypad (not store)

The initial value is the value of P0-08. The setting frequency value of inverter can be modified through the keys "▲" and "▼" of the keyboard (or UP and DOWN of multifunctional input terminals).

"Not store" means that the setting frequency is recovered to the value of P0-08 in case of inverter power- off.

1: Keypad (store)

The initial value is the value of P0-08.

"Store" means that the setting frequency remains the same as the value before inverter power-off.

2: AI1

The reference frequency is set by analog input. HD200B series mini size inverter provides 1 analog input terminal AI1, which is compatible with both 0~10V / 0~20mA input signal.

User can select the corresponding relation between the objective frequency and the input voltage value of AI freely. HD200B series inverter provides 3 corresponding relation curves which can be set by users through P4 group function code.

3. Reserved

4: Keypad potentiometer

The reference frequency is set by keypad potentiometer.

5: Reserved

6: Multi-step speed

The reference frequency is determined by P4 and PC groups. The selection of steps is determined by combination of multi-step speed terminals.

7: Simple PLC

User can set reference frequency, hold time, running direction of each step and

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acceleration/deceleration time between steps. For details, please refer to description of PC group.

8: PID

The reference frequency is the result of PID adjustment. For details, please refer to description of PA group.

9: Communication

The reference frequency is set through RS485. For details, please refer to Modbus protocol in Chapter 9.

P0-04	Auxiliary frequency source B selection	Factory default	0

When the auxiliary frequency source is used as independent frequency reference channel (i.e. frequency source switching from A to B), it is used in the same way as the main frequency source. Please refer to P0-03.

When the auxiliary frequency source is used as combination reference, please note:

1. If the auxiliary frequency source is keypad reference, the frequency (P0-08) is invalid, and it needs to adjust the main reference frequency through the keys "▲"and "▼" of the keyboard (or UP and DOWN of multifunctional input terminals).
2. If the auxiliary frequency source is analog input reference AI1 or pulse input reference, 100% of input corresponds to the auxiliary frequency source range (refer to P0-05 and P-06).
3. If the frequency source is pulse input reference, it is similar to the analog input reference.

Note: P0-03 and P0-04 can't be set to be the same value. Otherwise, disorder will occur.

P0-05	Frequency source B reference	Factory default	0
P0-06	Auxiliary Frequency source B range	Factory default	100%

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When the frequency source selection is frequency combination reference (P0-07 is set to 1 or 3), the two parameters are used to determine the adjustment range of auxiliary frequency source.
P0-05 is used to determine the relative object of that range. If it is relative to maximum frequency A, that range will change with the main frequency A.

P0-07	Frequency source selection	Factory default	00

Units place: Frequency source selection
0: Main frequency source A
Reference frequency = A
1: Calculation result of frequency A and B
Reference frequency = Calculation result of frequency A and B (determined by tens place)
2: Switching between A and B
If the multifunctional input terminal HDI (P4-0X=18: frequency switching) is invalid,
reference frequency = A.
If the multifunctional input terminal HDI (frequency source switching) is valid, reference frequency = B.
3: Switching between A and calculation result
If the multifunctional input terminal HDI (frequency switching) is invalid, reference frequency = A.
If the multifunctional input terminal HDI (frequency switching) is valid, reference frequency = calculation result.
4: Switching between B and calculation result
If the multifunctional input terminal HDI (frequency switching) is invalid, reference frequency = B.
If the multifunctional input terminal HDI (frequency switching) is valid, reference frequency = calculation result.
Tens place: Frequency source main/auxiliary calculation relationship
0: A + B
Reference frequency = A + B, achieving frequency combination given function.

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Reference frequency = A - B

2: Max (A, B)

Reference frequency = Max (A, B)

3: Min (A, B)

Reference frequency = Min (A, B)

Note: When the frequency source selection is main/auxiliary calculation, the preset offset frequency can be set via P0-21, which can be added to main/auxiliary calculation result to meet different kinds of demand.

P0-08	Keypad reference frequency	Factory default	50.00Hz

When the main frequency source is selected as “Keypad” or “Terminals UP/DN”, this function code is the initial value of frequency digital setting of the inverter.

P0-09	Running direction	Factory default	0

Through modifying this function code, it can change the rotary direction of the motor without changing motor wiring. It’s equal to adjust any two lines of the motor (U, V and W) and further change the rotary direction of the motor.

Note: If the parameters are restored, the running direction will be back to its original status.

P0-10	Maximum frequency	Factory default	50.00Hz

The maximum output frequency of HD200B series inverter is 3000Hz.

When P0-22 is set to 1, frequency resolution is 0.1Hz, P0-10 setting range is 50.0Hz～3000.0Hz;

When P0-22 is set to 2, frequency resolution is 0.01Hz, P0-10 setting range is 50.0Hz～300.0Hz.

P0-11	Frequency source upper limit	Factory default	0

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It is used to define the source of frequency upper limit. The frequency upper limit can be sourced from either digital setting (P0-12) or analog input. When the analog input is used to set the frequency upper limit, 100% of analog input setting is relative to P0-12.

Notice:

Upper frequency limit should exceed than the maximum frequency.

Output frequency should not exceed upper frequency limit.

P0-12	Frequency upper limit	Factory default	50.00Hz
P0-13	Frequency upper limit offset	Factory default	0.00Hz

When the frequency source upper limit is analog value, P0-13 is used as the setting value's offset. The combination of this offset frequency and P0-12 is used as the final setting value of frequency upper limit.

P0-14	Frequency lower limit	Factory default	0.00Hz

If the reference frequency is lower than frequency lower limit, the inverter can stop, or run with lower limit frequency, or run at zero speed, which is set by P8-14.

P0-15	Carrier frequency	Factory default	Model depend

Carrier frequency will affect the noise of motor and the EMI of inverter.

If the carrier frequency is increased, it will cause better current wave, less harmonic current and lower noise of motor.

Notice:

The factory default is optimal in most cases. Modification of this parameter is not recommended.

If the carrier frequency exceeds the factory default, the inverter must be derated because the higher carrier frequency will cause more switching loss, higher temperature rise of inverter and stronger electromagnetic interference.

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If the carrier frequency is lower than the factory default, it is possible to cause less output torque of motor and more harmonic current.

The effect of modifying carrier frequency is as following:

Carrier frequency	Low → High
Motor noise	High → Low
Output current waveform	Poor → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Leakage current	Small → Big
External radiation interference	Small → Big

P0-16	Carrier frequency adjusting according to temperature	Factory default	1
	Setting range	0: No 1: Yes	

The inverter can automatically adjust the carrier frequency according to its temperature. This function can reduce the possibility of overheat alarm of the inverter.

P0-17	Acceleration time 1	Factory default	Model depend
P0-18	Deceleration time 1	Factory default	Model depend

Acceleration time is the time of accelerating from 0Hz to ACC/DEC time reference frequency (P0-25).

Deceleration time is the time of decelerating from ACC/DEC time reference frequency (P0-25) to 0Hz.

Please refer to following figure.

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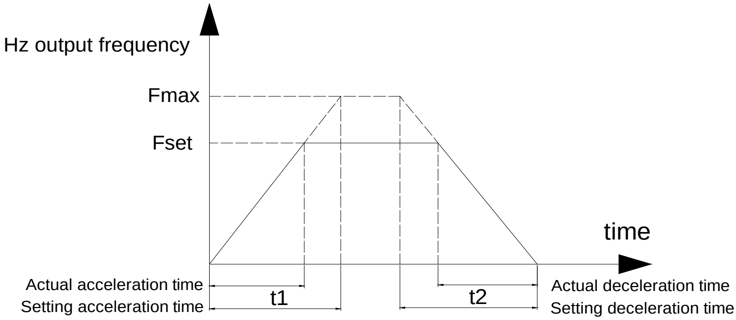

Figure 6-1 ACC/DEC time diagram

There are totally four groups of acceleration/deceleration time which can be selected via the multifunctional digital input terminals.

Group 1: P0-17, P0-18;

Group 2: P8-03, P8-04;

Group 3: P8-05, P8-06;

Group 4: P8-07, P8-08.

P0-19	ACC/DEC time unit	Factory default	1

HD200B series inverter offers three ACC/DEC time units; they are 1s, 0.1s, 0.01s.

Note: When modifying this function parameter, 4 group ACC/DEC time display decimal place changes, the corresponding ACC/DEC time also changes.

P0-21	Auxiliary frequency source offset frequency when combination	Factory default	0.00Hz

This function code is only valid when frequency source is set to be main/auxiliary calculation.

When frequency source is set to be main/auxiliary calculation, P0-21 is offset frequency, which can be combined with main/auxiliary calculation result setting as reference frequency.

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P0-22	Frequency command resolution	Factory default	2

This parameter is used to determine the resolution of all the function codes related to frequency.
When frequency resolution is 0.1Hz, the MAX. output frequency is 3000.0Hz. When frequency resolution is 0.01Hz, the MAX. output frequency is 300.00Hz.

Note: When modifying this parameter, the decimal place of all the parameters related to frequency changes, the corresponding frequency value changes too.

P0-23	Digital setting frequency storage selection when stop	Factory default	1

This function is only valid when frequency source is set by keypad
0: No store means that the keypad setting frequency value would recover to the value of P0-08 (preset frequency) after the inverter stopped. The frequency modification by keys “▲”, “▼” or terminal UP, DOWN would be cleared.
1: Store means that the keypad setting frequency would recover to the last frequency when inverter stopping. The frequency modification by keys “▲”, “▼” or terminal UP, DOWN is valid.

P0-25	ACC/DEC time reference frequency	Factory default	0

ACC/DEC time is ACC/DEC time from 0Hz to the frequency set by P0-25, figure 6-1 is ACC/DEC time schematic diagram.
When P0-25 is set to 1, ACC/DEC time is related to setting frequency. The motor acceleration will change if setting frequency changes frequently.

P0-26	Running frequency command	Factory default	0

This parameter is only valid when frequency source is set by keypad.

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It is used to confirm which mode would be used to modify setting frequency when keys “▲”, “▼” or terminal UP, DOWN acts, namely, whether reference frequency increases/decreases on the basic of running frequency, or increases/decreases on the basic of setting frequency.

Group P1 Motor Parameters

P1-01	Motor rated power	Factory default	Model depend
P1-02	Motor rated voltage	Factory default	Model depend
P1-03	Motor rated current	Factory default	Model depend
P1-04	Motor rated frequency	Factory default	Model depend
P1-05	Motor rated speed	Factory default	Model depend

1. Please set the parameters correctly according to the motor nameplate.
2. In order to achieve superior control performance, please perform motor parameters autotuning. The accuracy of autotuning is closely related to the correct setting of the rated motor parameters.

P1-06	Motor stator resistance	Factory default	Model depend
P1-07	Motor rotor resistance	Factory default	Model depend
P1-08	Motor leakage inductive	Factory default	Model depend
P1-09	Motor mutual inductive	Factory default	Model depend
P1-10	Motor current without load	Factory default	Model depend

P1-06 ~ P1-10 are motor parameters, which cannot be found on the motor nameplate, and are obtained via the inverter autotuning. The static autotuning only can obtain P1-06 ~ P1-08. The rotation autotuning not only can obtain P1-06 ~ P1-10, but also can get current loop PI parameter, etc.
When P1-01 or P1-02 changed, the inverter will change P1-06 ~ P1-10 automatically, and restore P1-06 ~
P1-10 as standard Y series motor parameters.
If motor parameters autotuning failed in the site, please input the related parameters provided by the motor manufacturer.

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P1-11	Motor parameters autotuning	Factory default	0

0: No operation, prohibit motor parameter autotuning.

1: Motor parameter static autotuning, suitable for the applications which the asynchronous motor is not easy to disconnect with the load, and cannot make rotation autotuning.

Before static autotuning, please set the motor type and motor parameters (P1-01 ~ P1-05) correctly. The inverter can obtain P1-06 ~ P1-08 via static autotuning.

Action description: Set the function code to be 1, the keypad displays “TUNE”, then press RUN key, the inverter will make static autotuning.

2: Motor parameter rotation autotuning

To ensure the dynamic control performance of inverter, please select rotation autotuning. During the rotation autotuning, the motor must be disconnected with the load (i.e. no-load).

During rotation autotuning, the inverter will make static autotuning at first, and then accelerates to 80% motor rated frequency according to acceleration time P0-17, holding for a while, at last decelerates to stop according to deceleration time P0-18 and finish autotuning.

Before rotation autotuning, please set motor type and motor parameters P1-01 ~ P1-05, during rotation autotuning, the inverter can obtain P1-06~P1-10 via rotation autotuning.

Action description: Set the function code to 2, the keypad displays “TUNE”, then press RUN key, the inverter will make rotation autotuning.

Note: Autotuning is valid only on keypad operation mode, cannot make autotuning under terminal and communication operation modes.

Group P2 Vector Control Parameters

Group P2 is valid only for vector control. That is to say, when P0-01=0 or 1, it is valid, and when P0-01=2, it is invalid.

P2-00	Speed loop proportional gain 1	Factory default	30
P2-01	Speed loop integration time 1	Factory default	0.50s

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P2-02	Low switching frequency	Factory default	5.00Hz
P2-03	Speed loop proportional gain 2	Factory default	20
P2-04	Speed loop integration time 2	Factory default	1.00s
P2-05	High switching frequency	Factory default	10.00Hz

P2-00 and P2-01 are PI adjustment parameters when the running frequency is lower than low switching frequency (P2-02). P2-03 and P2-04 are PI adjustment parameters when the running frequency is higher than high switching frequency (P2-05). PI parameter of frequency channel between low switching frequency and high switching frequency is linear switching between two groups of PI parameters, as shown in the figure below:

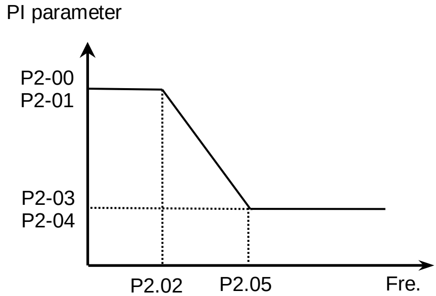

Figure 6-2 PI parameter diagram

The speed dynamic response characteristics of the vector control can be adjusted by setting the proportional coefficient and integration time of the speed regulator.

Increasing the proportional gain or reducing the integration time can accelerate the dynamic response of the speed loop. However, if the proportional gain is too large or the integration time is too short, it will cause the oscillation of the system.

Recommended adjustment method:

If factory default cannot meet the requirements, the relevant parameter values can be subject to fine tuning.

Increase the proportional gain while ensuring no oscillation to the system, and then reduce the integration time to ensure that the system has quick response characteristics and small overshoot.

Caution: Improper PI parameter setting may cause too large speed

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overshoot. Voltage fault may occur when the overshoot drops.

P2-06	Vector control slip compensation coefficient	Factory default	100%

For sensorless vector control, this parameter is used to adjust the speed stabilizing precision of the motor. When the speed is too low due to heavy load of motor, this parameter needs to be enlarged, vice versa.

P2-07	Speed loop filter time	Factory default	0.000s

Under vector control mode, the output of speed loop regulator is torque current command. This parameter is used to filter the torque command. This parameter needs no adjustment generally and this filter time can be increased in case of huge speed fluctuation. In case of oscillation of motor, this parameter should be reduced properly.

The speed loop filter time is low, and the inverter output torque may fluctuate greatly, but the response is quick.

P2-08	Vector control over excitation gain	Factory default	64

During deceleration, over excitation control can suppress bus voltage increase, avoid over voltage fault. The bigger over excitation gain is, the better the suppression result is.

For the application which over voltage fault happens frequently during deceleration, the over excitation gain needs to be increased. But the current would be increased if the over excitation is too bigger, so you need to set the suitable over excitation gain.

For the small inertia situation, voltage doesn't increase during motor deceleration, please set over excitation gain to 0. For the application with braking resistor, please also set over excitation gain to 0.

P2-09	Torque upper limit source under speed control mode	Factory default	0

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P2-10	Torque upper limit digital setting	Factory default	150.0%

In the speed control mode, the maximum of the inverter output torque is controlled by the torque upper limit source.
P2-09 is used to select the setting source of torque upper limit. When setting via the analog value and communication, 100% of the relevant setting corresponds to P2-10, and 100% of P2-10 is the inverter rated torque.

Group P3 V/F Control Parameters

This group of function code is enabled only for V/F control (P0-01=2) and is invalid for vector control.
V/F control is applicable for the general loads such as fan and pump or the applications where one inverter drives multiple motors or the inverter power is one level lower or higher than the motor power.

P3-00	V/F curve setting	Factory default	0

0: Linear V/F curve. It is suitable for common constant torque load.
1: Multiple-point V/F curve. It is suitable for the special loads such as dehydrator and centrifugal machine.
2: Square V/F curve. It is suitable for the centrifugal loads such as fan and pump.
3~8: VF curve between linear VF and square VF.

P3-01	Torque boost	Factory default	Model depend
P3-02	Cut-off frequency of torque boost	Factory default	50.00Hz

To compensate the low frequency torque characteristics of V/F control, it can boost the inverter output voltage during low frequency. If the torque boost is set to too large, the motor may be over heat, and the inverter may be over current.
Adjust this parameter according to the different loads. Increase this parameter for heavy load, reduce it for light load.
When the torque boost is set to 0.0, the inverter will adopt auto torque boost.

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Cut-off frequency of torque boost: Under this frequency, the torque boost is valid. If it exceeds this setting frequency, the torque boost is invalid. Refer to Figure 6-3 for details.

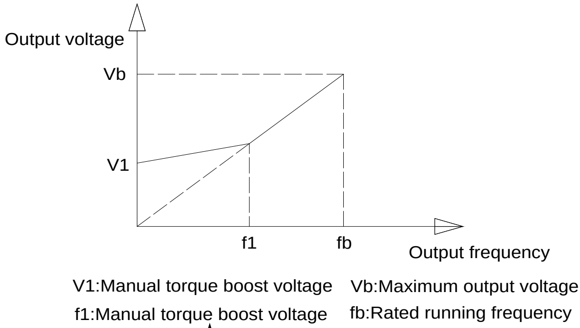

Figure 6-3 Manual torque boost diagram

P3-03	V/F frequency point 1	Factory default	0.00Hz
P3-04	V/F voltage point 1	Factory default	0.0%
P3-05	V/F frequency point 2	Factory default	0.00Hz
P3-06	V/F voltage point 2	Factory default	0.0%
P3-07	V/F frequency point 3	Factory default	0.00Hz
P3-08	V/F voltage point 3	Factory default	0.0%

Multi-step V/F curve is defined by P3-03 to P3-08.

The curve of multi point V/F is generally set according to the load characteristics of the motor.

- Caution: V1<V2<V3 and F1<F2<F3. The voltage corresponding to low frequency should not be set too high, otherwise it may cause motor overheat or inverter fault.

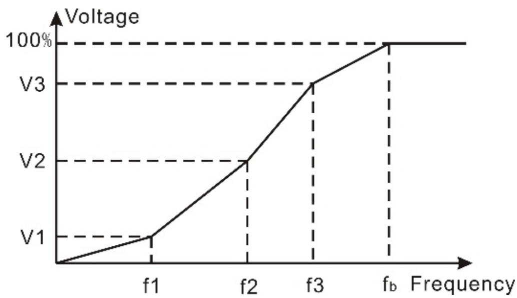

Figure 6-4 V/F curve setting diagram

P3-09	V/F slip compensation gain	Factory default	0.0%

It is valid only for V/F control.
Setting this parameter can compensate the slip of motor speed caused by the load increases, and makes the motor speed stably when the load changes.
V/F slip compensation gain set to 100% means the slip compensation of the motor with rated load is the motor rated slip, which can be calculated according to motor rated power and motor rated speed automatically.
Slip gain adjustment can refer to the following principle: When the load is rated load, the motor speed is basically the same as the target speed. When the values are different, please adjust this gain properly.

P3-10	V/F over-excitation gain	Factory default	64

During deceleration, over excitation control can suppress bus voltage increase, avoid over voltage fault. The bigger over excitation gain is, the better suppression result is.
For the application which over voltage fault happens frequently during deceleration, the over excitation gain needs to be increased. But the current would be increased if the over excitation is too bigger, so you need to set the suitable over excitation gain.
For the small inertia situation, voltage doesn't increase during motor deceleration, please set over excitation gain to 0. For the application with braking resistor, please also set over excitation gain to 0.

P3-11	V/F oscillation suppression gain	Factory default	Model depend

Set the gain as small as possible on the premise that there is effective oscillation suppression measure, which can avoid the affect causing to VF running. Set the gain to 0 when the motor has no oscillation. Only when the

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motor has obvious oscillation, this gain can be increased properly. The bigger the gain is, the better oscillation suppression result will be.

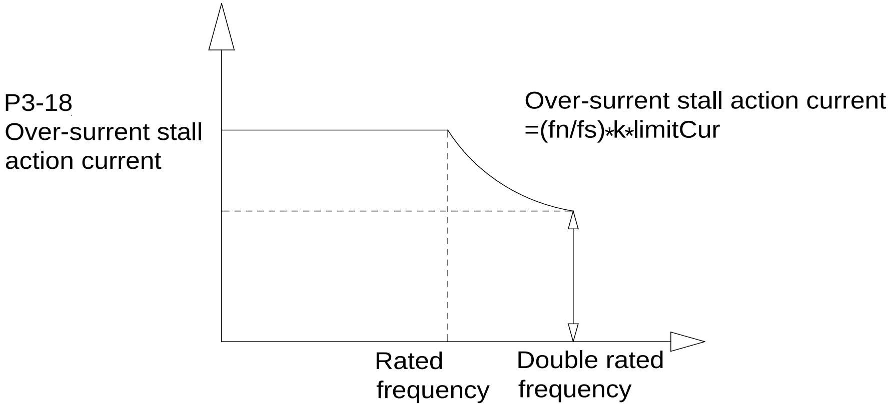
When using this function, please make sure the motor rated current and no load current parameters are accurate, otherwise V/F oscillation suppression result would be bad.

P3-18	Over-current stall action current	Factory default	150%
P3-19	Over-current stall suppression	Factory default	1
P3-20	Over-current stall suppression gain	Factory default	20
P3-21	Double-speed over-current stall action current compensation coefficient	Factory default	50%

In the high frequency region, the motor driving current is smaller, when below the rated frequency, and with the same stall current, the speed of motor drops greatly. In order to improve the operating characteristics of the motor, the stall action current above the rated frequency can be reduced. In some applications like centrifuge, the operating frequency is high, requiring several times of weak magnetic field and large load inertia, this method has a good effect on the acceleration performance.

Over-current stall action current when exceeding the rated frequency = (fs / fn) * k * LimitCur;

fs is the running frequency, fn is the motor rated frequency, k is P3-21 " double-speed over-current stall action current compensation coefficient ", and LimitCur is P3-18 " over-current stall action current”.



Double-speed over-current stall action diagram

Remarks:

Over-current stall action current 150% means 1.5 times of the rated current of inverter;

For high-power motors with carrier frequency below 2 kHz, due to the increasing of the pulse current, the wave-by-wave current-limit response starts before the over-current stall action, and the torque is insufficient. In this case, reduce the over-current stall action current.

P3-22	Over-current stall action voltage	Factory default	390.0V
P3-23	Over-voltage stall enable	Factory default	1
P3-24	Over-voltage stall suppression frequency gain	Factory default	50
P3- 25	Over-voltage stall suppression voltage gain	Factory default	30
P3-26	Over-voltage stall max. rising frequency limit	Factory default	5Hz

Inverter bus voltage limit (above braking resistor turn-on voltage setting)

If the bus voltage exceeds the over-voltage stall point 390V, indicating that the electromechanical system is already in the power generation state (motor speed (output frequency), the over-voltage stall will work, adjust the output frequency (consuming the extra electricity), the actual deceleration time will be automatic longer, avoiding trip protection, if the actual deceleration time cannot meet the requirements, you can increase the over-excitation gain appropriately.

Remarks:
Please note when using a braking resistor or installing a brake unit or using an energy feedback unit:
Set P3-23 "Over-voltage stall enable" value to "0" may cause the deceleration time to prolong.

P3-27	Slip compensation time constant	Factory default	0.5

The smaller the response time value of the slip compensation is set, the faster the response speed is.

Group P4 Input Terminal

The standard Inverter has 7 multifunctional digital input terminals (HDI can be used as high speed pulse input terminal) and two analog input terminals.

P4-00	D1 terminal function	Factory default	1
P4-01	D2 terminal function	Factory default	2
P4-02	D3 terminal function	Factory default	0
P4-03	D4 terminal function	Factory default	0
P4-04	D5 terminal function	Factory default	0

These parameters are used to set the functions of the multifunctional digital input terminals.

Setting value	Function	Description
0	No function	The no operation function can be set on the unused terminals so as to prevent error action.
1	Forward (FWD)	Control the inverter forward and reverse via the external terminals.
2	Reverse (REV)	

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Setting value	Function	Description
3	Three-line running control	This terminal is used to confirm that the inverter running mode is three-line control mode. Refer to P4-11 (terminal command mode) for details.
4	Forward Jog (FJOG)	FJOG refers to Jog forward running, RJOG refers to Jog reverse running. Regarding Jog running frequency and Jog ACC/DEC time, please refer to P8-00, P8-01 and P8-02.
5	Reverse Jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminals, it is used as increment and decrement commands of frequency modification. When the frequency source is set by digital, it can be used to adjust the setting frequency.
7	Terminal DOWN	
8	Coast to stop	The inverter locks the output, and the motor stop process is beyond the inverter control. This mode is the same as the meaning of coast-to-stop as described in P6-10.
9	Fault reset (RESET)	External fault reset function. It is the same as the function of RESET key on the keyboard. Using this function can realize long-distance fault reset.
10	Pause running	The inverter decelerates to stop, but all the running parameters are in the memory status, such as PLC parameter, wobble frequency parameter and PID parameter. After this signal disappears, the inverter restores to the status before stopping.
11	External fault normally open input	After the signal is sent to the inverter, the inverter reports fault E-15 and acts according to the fault protection action mode (see P9-47).
12	Multi-step speed terminal 1	It can realize 16 steps or 16 other command setting through 16 statuses of the four terminals. See attached table 1.
13	Multi-step speed terminal 2	
14	Multi-step speed terminal 3	
15	Multi-step speed terminal 4	
16	ACC/DEC time selection terminal 1	It can select two types of ACC/DEC time though 2 statuses of the two terminals. See attached table 2.
17	ACC/DEC time	

Setting value	Function	Description
	selection terminal 2	
18	Main frequency source switching	Used to switch different frequency source. According to the setting of frequency source selection (P0-07), when setting switching between two frequency sources is frequency source, it can achieve switching two frequency sources via this terminal
19	UP and DOWN setting clear (terminal and keyboard)	When the frequency reference is digital frequency reference, this terminal can be used to clear the frequency value modified by UP/DOWN and thus restore the reference frequency to the setting value of P0-08.
20	Running command switching terminal	When the command source (P0-02) is set to 1, it performs switching between terminal control and keyboard control via this terminal. When the command source (P0-02) is set to 2, it performs switching between communication control and keyboard control via this terminal.
21	ACC/DEC invalid	Protect the inverter from affecting by the external signals (except stop command), and maintain the current frequency.
22	PID Pause	PID is invalid temporarily, and the inverter maintains the current frequency output, no longer adjusts PID of frequency source.
23	PLC status reset	PLC pauses during the execution process. When it runs again, it can restore to the initial status of simple PLC via this terminal.
32	DC braking command	When this terminal is valid, and the inverter directly switches to DC braking status.
33	External fault normal close input	After the external fault normal close signal is sent to the inverter, the inverter reports fault E-15 and stops.
34	Frequency modification enabled	If this function is valid, the inverter does not response to the frequency changing, until this terminal is invalid
35	PID action direction reverse	When this terminal is valid, PID action direction is the opposite of value set by PA-03.
36	External stop terminal 1	The inverter can be stopped by this terminal under keypad control, which has the same function as

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Setting value	Function	Description
		STOP key's.
37	Control command switching terminal 2	Used to switch between terminal control and communication control. If command source selection is set to terminal control, then the system switches to communication control when the terminal is valid, vice versa.
38	PID integration stop	When this terminal is valid, PID integration adjustment function will stop working, but PID ratio adjustment & differential adjustment function are still valid.
39 ~ 42	Reserved	
43	PID parameter switching	When PID parameter switching condition is DI terminal (PA-18=1) and this terminal is invalid, PID parameter is determined by PA-05 ~ PA-07. When this terminal is valid, PID parameter is determined by PA-15 ~ PA-17
47	Emergency stop	When the terminal is valid, the inverter stops with fastest speed, during the process, the current is as upper limits are set. This function applied in the situation which the inverter needs to stop ASAP when the system is in emergency status.
48	External stop terminal 2	In any control mode (Keypad control, terminal control, communication control), the inverter can decelerate to stop via this terminal & the deceleration time is DEC time 4.
49	Deceleration DC braking	When this terminal is valid, the inverter decelerates to the stop DC braking starting frequency, then switches to DC braking status.
50	The running time reset	When the terminal is valid, the inverter will clear the running time to zero, this function need to be used together with timing running (P8-42) and this running time arrival (P8-53).
51	Two-wire / three-wire switching	
52	Reverse frequency disable	

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Attached Table 1 Multi-step Command Function Description

K4	K3	K2	K1	Command setting	Corresponding parameter
OFF	OFF	OFF	OFF	Multi-step	PC-00
OFF	OFF	OFF	ON	Multi-step	PC-01
OFF	OFF	ON	OFF	Multi-step	PC-02
OFF	OFF	ON	ON	Multi-step	PC-03
OFF	ON	OFF	OFF	Multi-step	PC-04
OFF	ON	OFF	ON	Multi-step	PC-05
OFF	ON	ON	OFF	Multi-step	PC-06
OFF	ON	ON	ON	Multi-step	PC-07
ON	OFF	OFF	OFF	Multi-step	PC-08
ON	OFF	OFF	ON	Multi-step	PC-09
ON	OFF	ON	OFF	Multi-step	PC-10
ON	OFF	ON	ON	Multi-step	PC-11
ON	ON	OFF	OFF	Multi-step	PC-12
ON	ON	OFF	ON	Multi-step	PC-13
ON	ON	ON	OFF	Multi-step	PC-14
ON	ON	ON	ON	Multi-step	PC-15

When the frequency source selection is multi-step speed, 100% of PC-00~PC-15 correspond to P0-10 (maximum frequency).
Multi-step command not only can set as multi-step speed, but also can set as PID given source, to meet the requirement of need to switch between different given values.

Attached Table 2 Multi-step Command Speed Function Description

Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameter
OFF	OFF	ACC time/DEC time 1	P0-17. P0-18
OFF	ON	ACC time/DEC time 2	P8-03. P8-04
ON	OFF	ACC time/DEC time 3	P8-05. P8-06
ON	ON	ACC time/DEC time 4	P8-07. P8-08

P4-10	Terminal filter	Factory default	0.010s

It is used to set the sensitivity of DI terminal. If the digital input terminal is

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to interferences and may cause error action, it can increase this parameter value to enhance the anti-interference capability. However, this operation will reduce the sensitivity of DI terminal.

P4-11	Terminal command mode	Factory default	0

0: Two-line running mode 1: This is the most common mode. The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals.

Terminal	Setting value	Description
DI_x	1	Forward running (FWD)
DI_y	2	Reverse running (REV)

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

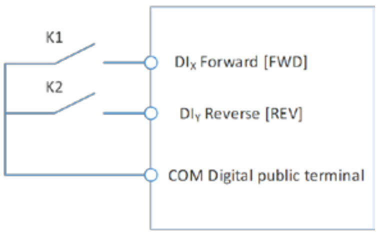


Figure 6-5 Two-line Running Mode 1

1: Two-line running mode 2: When this mode is adopted, REV is enabled terminal. The direction is determined by the status of FWD.

Terminal	Terminal	Description
DI_x	1	Forward running (FWD)
DI_y	2	Forward running (REV)

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

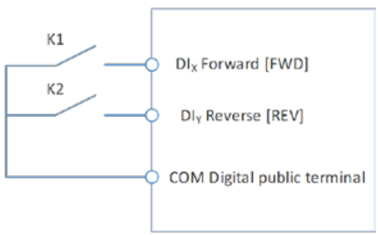


Figure 6-6 Three-line Running Mode 2

2: Three-line running mode 1: In this mode, DI_n is enabled terminal, and the direction is controlled by FWD and REV respectively. However, the pulse is enabled through disconnecting the signal of DI_n terminal when the inverter stops.

Terminal	Setting value	Description
DI_x	1	Forward running (FWD)
DI_y	2	Reverse running (REV)
DI_n	3	Three-line running control

To make the inverter run, users must close DI_n terminal firstly. It can achieve the motor forward or reverse control via pulse rising of DI_x or DI_y.
It can achieve the inverter stop via cutting off DI_n terminal signal. DI_x. DI_y. DI_n are DI1～DI6, HDI multifunctional input terminals, the valid input of DI_x (DI_y) is pulses signal, and the valid input of DI_n is level signal.

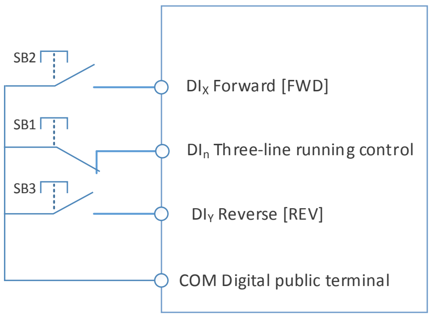


Figure 6-7 Three-line Running Mode 1

Where,
SB1: Stop button
SB2: Forward rotation button
SB3: Reverse rotation button

3: Three-line running mode 2: In this mode, DI_n is enabled terminal, and the running command is given by FWD, while the direction is determined by the status of REV. Stop command is performed through disconnecting the DI_n signal.

Terminal	Setting value	Description
DI_x	1	Forward running (FWD)
DI_y	2	Reverse running (REV)
DI_n	3	Three-line running control

To make the inverter run, users must close DI_n terminal firstly, and then the motor running signal will be generated by DI_x pulse rising edge and the motor direction signal will be generated by D_y status.
It can achieve the inverter stop via cutting off DI_n terminal signal. DI_x. DI_y. DI_n are DI1～DI6, HDI multifunctional input terminals, the valid input of DI_x is pulses signal, and the valid input of DI_n (DI_y) is level signal.

K	Running direction
0	Forward
1	Reverse

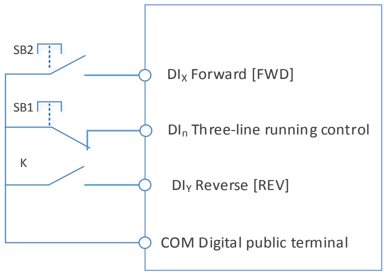


Figure 6-8 Three-line Running Mode 2

Where,
SB1: Stop button SB2: Running button

P4-12	UP/DN change rate	Factory default	1.00Hz/s

Terminals UP/DOWN is used to adjust the change rate when setting frequency.
When P0-22 is set to 2, the range is 0.001~50.000Hz/s.
When P0-22 is set to 1, the range is 0.01~50.00Hz/s.

P4-13	AI curve 1 minimum input	Factory default	0.00V
P4-14	AI curve 1 minimum input corresponding setting	Factory default	0.0%
P4-15	AI curve 1 maximum input	Factory default	10.00V

P4-16	AI curve 1 maximum input corresponding setting	Factory default	100.0%
P4-17	AI1 filter time	Factory default	0.10s

The above function codes define the relationship between the analog input voltage and analog input setting value.

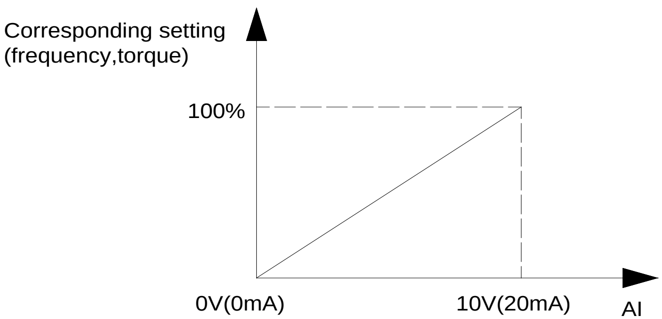
When the analog input voltage is bigger than P4-15 (maximum input of AI curve 1), then calculate the analog voltage according to maximum input. When the analog input voltage is smaller than P4-13 (minimum input of AI curve 1), then calculate the analog voltage with minimum input or 0.0% according to P4-34 (AI below minimum input setting selection).

When the analog input is current input, 1mA current equals to 0.5V voltage.

AI1 input filter time is used to set AI1 software filter time, when the site analog signal can be easily disturbed, please increase filter time to stable the detected analog signal, but the bigger the filter time is, the slower the response speed of the analog detection is . So please set this parameter according to the situation.

In difference applications, 100% of analog input corresponds to different nominal values. Refer to all the application parts for details.

Several setting examples are shown in the following figures:



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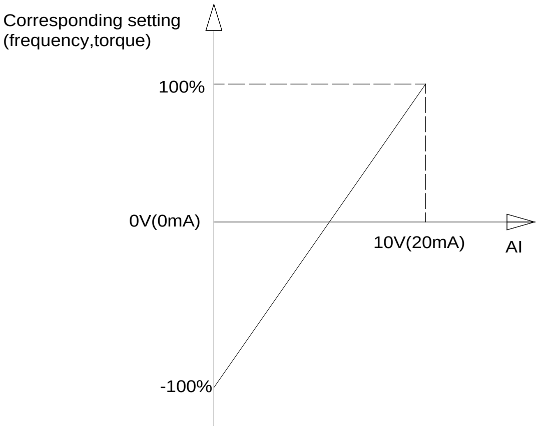

Figure 6-9 Corresponding Relationship between Analog Reference and Setting

P4-23	AI curve 3 minimum input	Factory default	0.00V
P4-24	AI curve 3 minimum input corresponding setting	Factory default	0.0%
P4-25	AI curve 3 maximum input	Factory default	10.00V
P4-26	AI curve 3 maximum input corresponding setting	Factory default	100.0%
P4-27	Keypad potentiometer input filter time	Factory default	0.10s

P4-33	AI curve selection	Factory default	321

Units place and tens place of this function code are used to select analog input AI1 corresponding setting curve.
Curve 1, curve 3 are 2 points curves, set by P4 group.

P4-35	DI1 delay time	Factory default	0.0s
P4-36	DI2 delay time	Factory default	0.0s
P4-37	DI3 delay time	Factory default	0.0s

Used to set the delay time when DI terminal status changing.
Currently only DI1, DI2, DI3 have setting delay time function.

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P4-38	DI terminal valid mode selection 1	Factory default	0000

They are used to set the digital input terminal active status mode. If the selection is active-high, the relevant DI terminal connects with COM is valid, disconnect invalid. If the selection is active-high, the relevant DI terminal connects with COM is invalid, disconnect valid.

Group P5 Output Terminal

HD200B series Inverter has 1 analog output terminal and 1 multifunctional relay output terminal.

P5-02	Relay 1 output function selection	Factory default	2

Multifunctional output terminal function selection is as follows:

Setting value	Function	Description
0	No output	The output terminals do not have any functions.
1	Inverter is running	It indicates the inverter is running, and there is output frequency (can be zero), and the inverter outputs ON signal at this time.
2	Fault output (fault stop)	When the inverter is faulty & it stops, it outputs ON signal.
3	FDT1 output	Please refer to P8-19 and P8-20 for details.
4	Frequency arrival	Please refer to P8-21 for details.
5	Zero speed running (no output when stop)	When the inverter is running & the output frequency is 0, it outputs ON signal. When the inverter stopped, the signal is OFF.
6	Motor overload pre-alarm	Judgment will be made according to the pre-warning threshold value before the motor overload protection action. If it exceeds the pre-warning threshold, it will output ON signal. Motor overload parameters are set in P9-00 to P9-02.
7	Inverter overload pre- alarm	The inverter outputs ON signal 10s before overload protection action
11	PLC circulation completion	When the simple PLC has been running for one cycle, it outputs a pulse signal with width of 250ms.

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Setting value	Function	Description
12	Accumulated running time arrival	When the accumulated running time of the inverter exceeds the setting time P8-17, it outputs ON signal.
13	Frequency limiting	When the setting frequency exceeds the frequency upper limit or frequency lower limit, and the output frequency of the inverter reaches the frequency upper limit or frequency lower limit, it outputs ON signal.
15	Ready for running	When the main circuit and control circuit power supply are connected, the inverter protection function is invalid, and the inverter is in running status, it outputs ON signal.
16	Reserved	
17	Frequency upper limit arrival	When the running frequency reaches frequency upper limit, it outputs ON signal.
18	Frequency lower limit arrival (no output when stop)	When the running frequency reaches frequency lower limit, it outputs ON signal. The signal is OFF when stop.
19	Under voltage status output	During under voltage, the inverter outputs ON signal.
20	Communication setting	Refer to the communication protocol
24	Accumulated power-on time arrival	The accumulated power-on time (P7-13) exceeds the time set by P8-16, the inverter outputs ON signal.
25	FDT2 output	Please refer to P8-28, P8-29 description.
26	Frequency 1 arrival output	Please refer to P8-30, P8-31 description.
27	Frequency 2 arrival output	Please refer to P8-32, P8-33 description.
28	Current 1 arrival output	Please refer to P8-38, P8-39 description.
29	Current 2 arrival output	Please refer to P8-40, P8-41 description.
30	Timing arrival output	When timing function selection (P8-42) is valid, after the running time arrives the set timing, outputs ON signal.

Setting value	Function	Description
31	AI1 input over limit	When analog input AI1 is bigger than P8-46 (AI1 input protection upper limit) or lower than P8-45 (AI1 input protection lower limit), outputs ON signal.
32	Off load	When inverter is in the off-load state, it outputs ON signal.
33	Reverse running	When reverse running, the inverter outputs ON signal.
34	Zero current status	Please refer to description of P8-34, P8-35.
35	Module temperature arrival	The temperature of converter module radiator (P7-07) reaches the set value of module temperature arrival (P8-47), the inverter outputs ON signal.
36	Output current over limit	Please refer to description of P8-36, P8-37.
37	Lower limit frequency arrival (output when stop)	When running frequency reaches lower limit frequency, outputs ON signal. The signal is still ON when stop.
38	Warming output (keep running)	When a fault happens & the process mode of this fault is keeping running, the inverter outputs warming.
40	This running time arrival	This running time exceeds the time set by P8-53, the inverter outputs ON signal.
41	Reserve	

P5-07	AO1 output function selection	Factory default	0

P5-10	AO1 Zero-offset coefficient	Factory default	0.0%
P5-11	AO1 gain	Factory default	1.00

The parameters are used to correct the zero drift of the analog output and the output amplitude deviation. They can also be used to define custom AO output curve.

If “b” represents zero offset, k represents gain, Y represents actual output, and X represents standard output, the actual output is: Y=kX+b;

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Where,
100% of zero-offset coefficients of AO1 correspond to 10V (or 20mA).
Standard output denotes 0 to maximum analog output corresponding to the output of 0 to 10V (or 4mA to 20mA) without Zero-offset and gain correction.

P5-18	Relay 1 output delay time	Factory default	0.0s

P5-22	Output terminal valid status selection	Factory default	000

The output logic of relay 1.
0: Positive logic, the digital output terminal connects with the relevant COM is valid, disconnect invalid.
1: Negative logic, the digital output terminal connects with the relevant COM is invalid, disconnect valid.

Group P6 Start and Stop Control

P6-00	Start mode	Factory default	0

0: Direct start
If DC braking time is set to 0, the inverter will start from the start frequency.
If DC braking time is set to nonzero value, DC braking will be performed firstly, then the inverter starts from the start frequency. It is suitable for the application that the motor maybe running during starting with small inertia load.
1: Speed tracking and restart
Inverter detects the rotation speed and direction of motor, and then starts to run at the detected speed and direction. This can realize smooth start of running motor with big inertia load when instantaneous power-off. To ensure the performance of speed tracking restart, please set motor parameters accurately. (Group P1)

P6-01	Speed tracking mode	Factory default	0

To complete the speed tracking process in the shortest time, select the suitable mode of inverter tracking motor speed:

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0: To track from the frequency when stop, normally it adopts this mode.

1: To track from zero-frequency, suitable for the applications which restart after a long time power-off.

2: To track from maximum frequency and suitable for the general power generating loads.

P6-03	Start frequency	Factory default	0.00Hz
P6-04	Start frequency holding time	Factory default	0.0s

Set proper start frequency can increase the start torque.

If the reference frequency is less than start frequency, inverter will be at stand-by status, and has no output.

The start frequency could be less than the lower frequency limit.

P6-04 takes no effect during FWD/REV switching.

Example 1:

P0-03=0	Frequency source is digital reference
P0-08=2.00Hz	Digital setting frequency is 2.00Hz.
P6-03=5.00Hz	Start frequency is 5.00Hz.
P6-04=2.0s	Start frequency holding time is 2.0s.

At this time, the inverter is at standby status, and the output frequency is 0Hz.

Example 2:

P0-03=0	Frequency source is digital setting.
P0-08=10.00Hz	Digital setting frequency is10.00Hz.
P0-03=5.00Hz	Start frequency is 5.00Hz.
P0-04=2.0s	Start frequency holding time is 2.0s.

At this time, the inverter accelerates to 5Hz, and further to the reference frequency 10Hz in 2s.

P6-07	ACC/DEC mode	Factory default	0

0: Linear ACC/DEC

The output frequency increases or decreases according to the straight line. HD200B series inverter has 4 kinds of ACC/DEC time, which can be set by P4-00 ~ P4-06.

1: S-curve ACC/DEC A

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The output frequency increases or decreases according to S-curve. S-curve is suitable for applications which require start & stop smoothly, such as elevator and conveyor belt.

2: S curve ACC/DEC B

In the S-curve ACC/DEC B, the motor rated frequency f_b is always the inflection point of S curve, showed as figure 6-11. Suitable for the applications that the high speed area above rated frequency needs fast ACC/DEC.

When setting frequency is above rated frequency, ACC/DEC time is:

$$t = (\frac{4}{9} \times (\frac{f}{f_b})^2 + \frac{5}{9}) \times T$$

f is setting frequency, f_b is motor rated frequency, T is the ACC time from 0Hz to rated frequency.

P6-08	Time of S curve's start part	Factory default	30.0%
P6-09	Time of S curve's end part	Factory default	30.0%

S curve start time is shown in Figure 6-10 as t_1 set by P6-08, which is the stage when the slope of output frequency rises gradually.

S curve rise time is shown in Figure 6-10 as the time between t_1 and t_2, which is the stage when the slope of output frequency maintains phase.

S curve end time is shown in Figure 6-10 as t_2 set by P6-09, which is the stage when the slope of output frequency decreases to zero

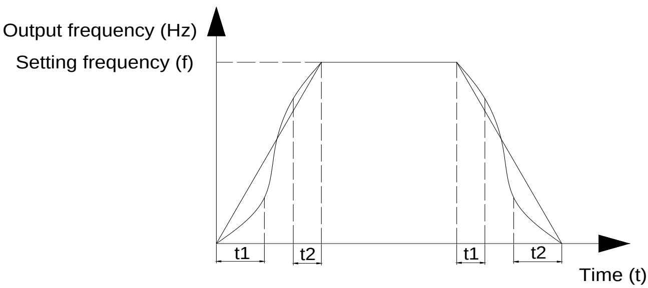

Figure 6-10 S curve ACC/DEC diagram

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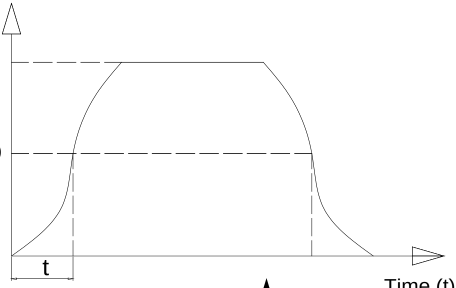

Figure 6-11 S-curve ACC/DEC A diagram

P6-10	Stop mode	Factory default	0

0: Deceleration to stop

After the stop command is valid, the inverter reduces the output frequency according to the DEC time and will stop after the frequency reduces to zero.

1: Coast to stop

After the stop command is valid, the inverter blocks the output immediately. The motor coasts to stop according to the mechanical inertia.

P6-11	DC braking start frequency after	Factory default	0.00Hz
P6-12	DC braking waiting time after	Factory default	0.0s
P6-13	DC braking current after stop	Factory default	0%
P6-14	DC braking time after stop	Factory default	0.0s

DC braking start frequency after stop: Start the DC braking when running frequency reaches this frequency determined by P6-11.

DC braking waiting time after stop: Inverter blocks the output before starting the DC braking. After this waiting time, the DC braking will be started so as to prevent over-current fault caused by DC braking at high speed.

DC brake current after stop: The value of P6-13 is the percentage of rated current of inverter. The bigger the DC braking current is, the greater the braking torque is.

DC brake time after stop: The time which is used to perform DC braking. If the time is 0, the DC braking will be invalid.

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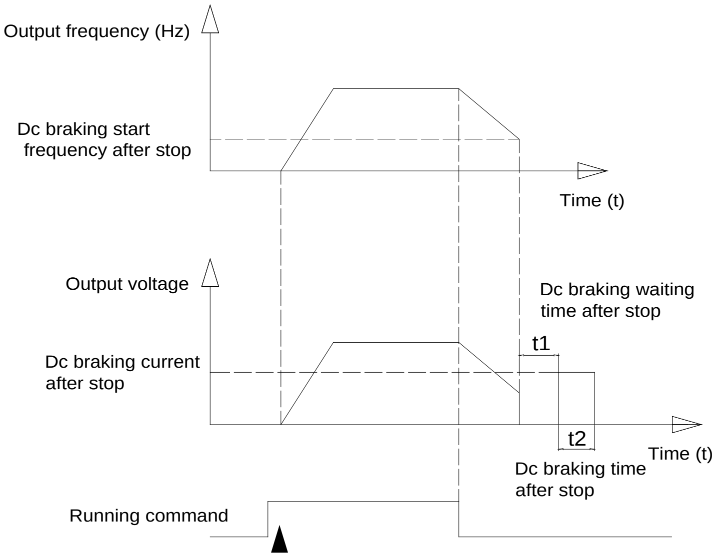


Figure 6-12 DC braking diagram

P6-21	Demagnetization time	Factory default	0.5s
	Setting range	0.00s～5.00s	

Group P7 Keypad and Display

P7-00	Inverter rated power	Factory default	Model depend

Display inverter rated power.

P7-01	QUICK/JOG function selection	Factory default	5

QUICK/JOG is a multifunctional key, whose function can be defined by the value

0: This key is invalid

1: Switching between keyboard command and remote operation. It refers to switching of command source, switching between the current command source and the keyboard control (local operation). If the current command source is keyboard control, this key is invalid.

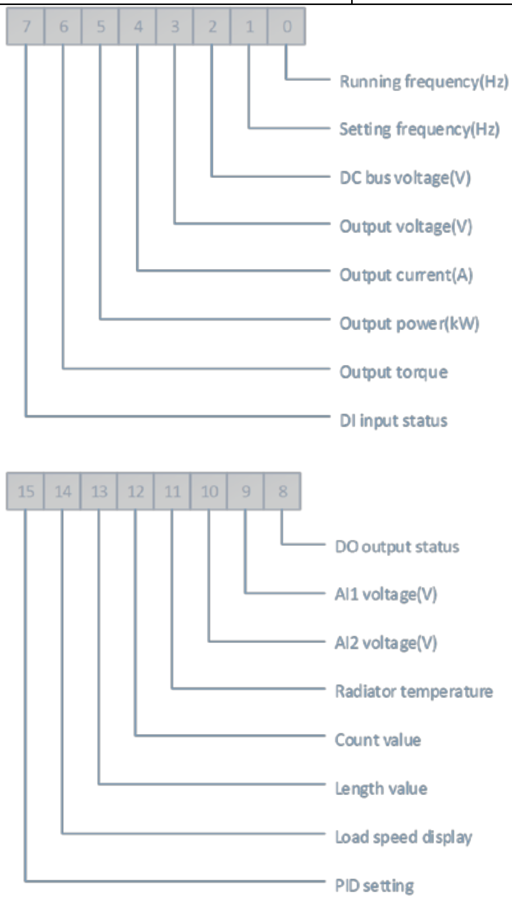
2: Press QUICK/JOG, the running direction of inverter will change. It is only valid when keypad command is valid.

3: It can realize forward jog via QUICK/JOG key.

4: It can realize reverse jog via QUICK/JOG key.

5. Display mode. Switch between normal display mode and modified parameter display mode

P7-02	STOP/RST function selection	Factory default	1

P7-03	Running status display 1		Factory default	1F
	Setting range	0000 ~ FFFF	 If the above parameters need to be	

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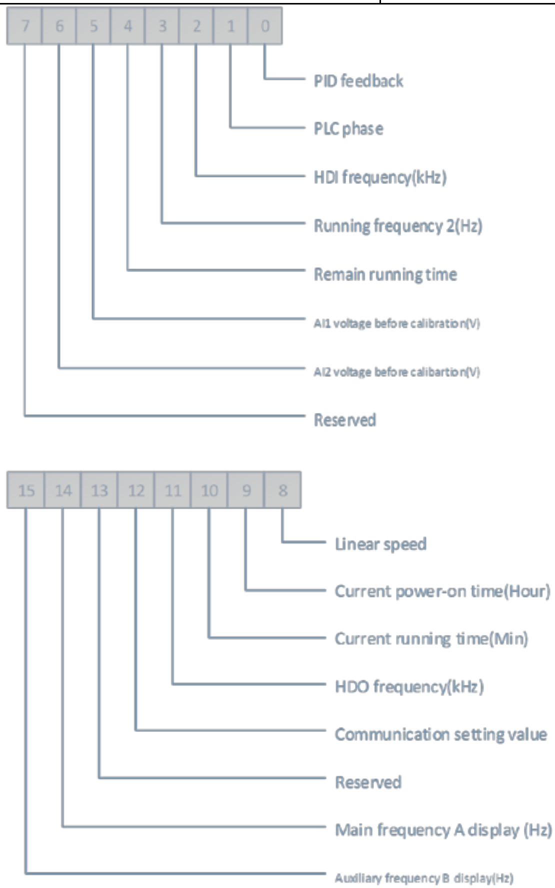
			displayed when running, set the corresponding positions to 1, and change the binary numbers into hexadecimal numbers, and then enter them into P7-03.

P7-04	Running status display 2		Factory default	0
	Setting range	0000 ~ FFFF	 If the above parameters need to be displayed when running, set the corresponding positions to 1, and change the binary numbers into hexadecimal numbers, and then enter them into P7-04.	

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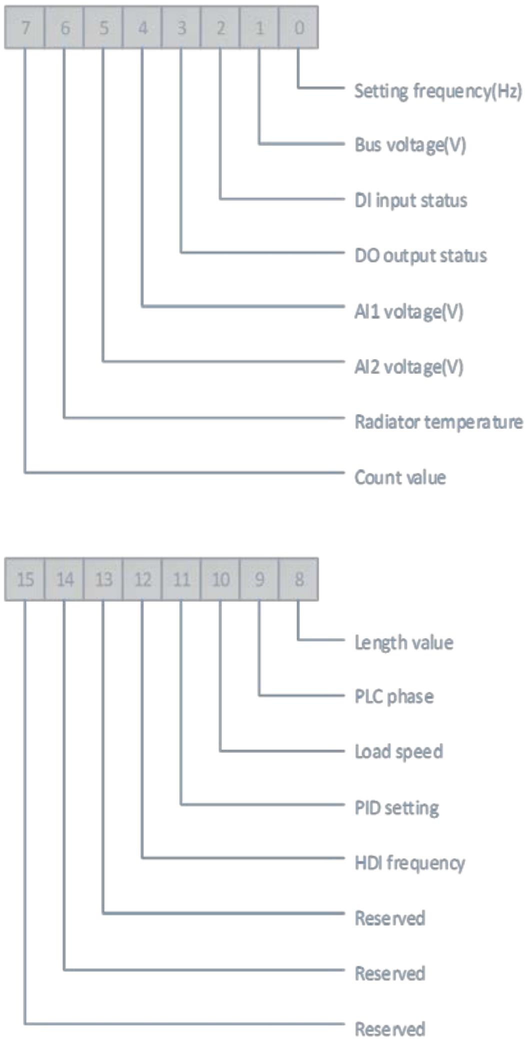
Operation display parameter is used to set the parameters which can be viewed when running. There are at most 32 parameters can be viewed, set the status parameters via the binary bits of P7-03 and P7-04, and the display sequence starts from the lowest order of P7-03.

P7-05	Stop status display		Factory default	0
	Setting range	0000 ~ FFFF	 If the above parameters need to be displayed	

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			when stop, set the corresponding positions to 1, and change the binary numbers into hexadecimal numbers, and then enter them into P7-05.

P7-06	Load speed display coefficient	Factory default	3.0000

The correspondence of the inverter output frequency and the load speed can be adjusted via this parameter when the load speed needs to be displayed.

P7-07	IGBT module temperature	Factory default	—

Display IGBT module temperature.
The over temperature protection values of different IGBT modules are not the same.

P7-08	Inverter rated voltage	Factory default	Model depend

Display inverter rated voltage.

P7-09	Accumulated running time	Factory default	—

Display the accumulated running time of the inverter. When the running time reaches the value set by P8-17, the digital output terminal outputs ON signal.

P7-10	Model No.	Factory default	-
P7-11	Software version No.	Factory default	-
P7-12	Load speed display decimal place	Factory default	0

The parameters are used to set load speed display decimal place. The following load speed calculation format for example:
If load speed display factor (P7-06) is 2.000, load speed decimal place (P7-12) is 2 (2 decimal places), when the running frequency is 40.00Hz, load speed is: 40.00×2.000=80.00 (2 decimal places displayed)
If the inverter stops, load speed is displayed as setting frequency corresponding speed, namely "setting load speed". If setting frequency=50.00Hz, the stop status load speed is: 50.00×2.000=100.00 (2 decimal places displayed)

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P7-13	Accumulated power-on time	Factory default	0h

Display the accumulated power-on time after production.
When this time reaches the value set by P8-17, the inverter multifunctional digital output function (24) outputs ON signal.

P7-14	Accumulated power consumption	Factory default	-

Display the accumulated power consumption till now.

Group P8 Enhanced Function

P8-00	Jog running frequency	Factory default	2.00Hz
P8-01	Jog acceleration time	Factory default	20.0s
P8-02	Jog deceleration time	Factory default	20.0s

It is used to define the reference frequency and ACC/DEC time of the inverter when jogging.
During Jog running, the start mode is fixed to direct start (P6-00=0), the stop mode is fixed to deceleration to stop (P6-10=0).

P8-03	Acceleration time 2	Factory default	Model depend
P8-04	Deceleration time 2	Factory default	Model depend
P8-05	Acceleration time 3	Factory default	Model depend
P8-06	Deceleration time 3	Factory default	Model depend
P8-07	Acceleration time 4	Factory default	Model depend
P8-08	Deceleration time 4	Factory default	Model depend

HD200B series inverter supplies 4 kinds of ACC/DEC time. The principles of them are the same. Please refer to description of P0-17 and P0-18 for more details.
User can select the one of 4 kinds ACC/DEC time thought the different combination of DI terminals. See the description of P4-00~P4-05, then pay attention to Function (16) & Function (17) and Attached table 2.

P8-09	Jump frequency 1	Factory default	0.00Hz
P8-10	Jump frequency 2	Factory default	0.00Hz

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P8-11	Jump frequency amplitude	Factory default	0.00Hz

By means of setting jump frequency, the inverter can keep away from the mechanical resonance with the load. P8.09 and P8.10 are center value of frequency to be skipped.

If both P8-09 and P8-10 are 0, the jump frequency function is invalid no matter what P8.11 is.

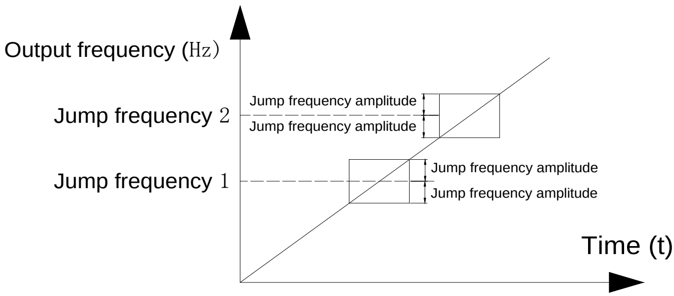

Figure 6-13 Jump frequency diagram

P8-12	FWD/REV dead time	Factory default	0.0s

FWD/REV dead time: The waiting and holding time before the motor changes its spinning direction after the inverter's output frequency is decreased to zero. It is the time taken by the motor to change its spinning direction when the inverter receives REV command during its running process. The time is shown in Figure 6-14:

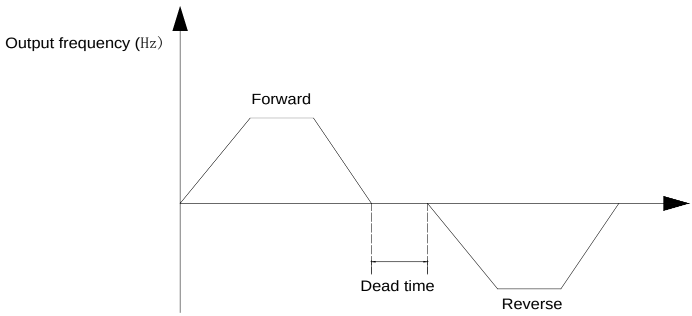

Figure 6-14 FWD/REV dead time diagram

P8-13	Reverse control	Factory default	0

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... to set if the inverter can run reverse, P8-13 is set to 1 for the applications that the motor cannot run reverse.

P8-14	Action when setting frequency lower than frequency lower limit	Factory default	0

It is used to select the inverter running status when the setting frequency is lower than the frequency lower limit.

P8-15	Droop control	Factory default	0.00Hz

When several motors drive the same load, each motor's load is different because of the difference of motor's rated speed. The load of different motors can be balanced through droop control function which makes the speed droop along with load increase.
When the motor outputs rated torque, actual frequency drop is equal to P8-15. User can adjust this parameter from small to big gradually during commissioning.

P8-16	Accumulated power-on arrival time	Factory default	0h

When the accumulated power on time (P7-13) reaches the value set by P8-16, the multifunctional digital DO outputs ON signal.

P8-17	Accumulated running arrival time	Factory default	0h

It is used to set the running time of the inverter.
When the accumulated running time (P7-09) reaches the value set by P8-17, the multifunctional digital DO outputs ON signal.

P8-18	Power-on running command valid protection selection	Factory default	0

1. If power-on running command is valid (for example, the terminal running command is close before power on), the inverter will not response the running command. After the running command is removed & valid again, the inverter will response.

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2. If the fault reset running command is valid, the inverter will not response the running commend, user must cancel the running command to remove the running protection status.

3. This code is set to 1 so as to avoid dangerous caused by that motor responses running command during power-on or fault reset.

P8-19	Frequency detection value (FDT1)	Factory default	50.00Hz
P8-20	Frequency detection lag (FDT1)	Factory default	5.0%

When the output frequency reaches a certain preset frequency (FDT level), DO terminal will output an ON signal until output frequency drops below a certain frequency of FDT level (FDT level - FDT lag), as shown in following figure.

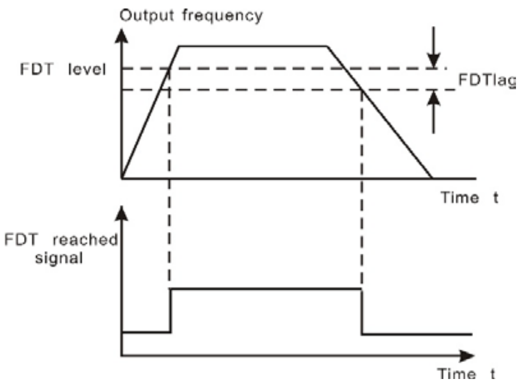

Figure 6-15 FDT Level and lag diagram

P8-21	Frequency arrival detection amplitude	Factory default	0.0%

When output frequency is within the detecting range of reference frequency, an ON-OFF signal will be output. The function can adjust the detecting range.

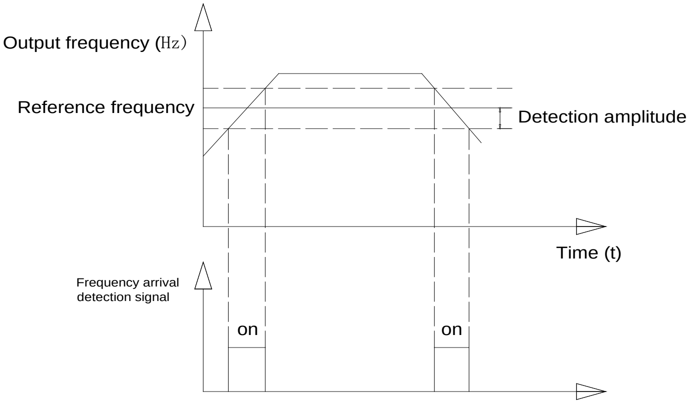

Figure 6-16 Frequency arrival detection diagram

P8-22	Jump frequency during ACC/DEC	Factory default	0

It is used to set if jump frequency is valid during ACC/DEC.
When valid, the running frequency is in the range of jump frequency, the actual running frequency will skip the boundary of the setting jump frequency.

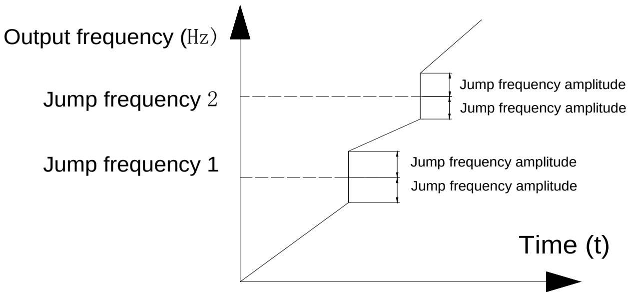

Figure 6-17 Jump frequency during ACC/DEC diagram

P8-25	Acceleration time 1 and acceleration time 2 switching frequency point	Factory default	0.00Hz
P8-26	Deceleration time 1 and deceleration time 2 switching frequency point	Factory default	0.00Hz

This function is valid when don’t use DI terminal to switch ACC/DEC. Suitable

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for the inverter running process, choose different ACC/DEC time according to the running frequency range (instead of through DI terminals).

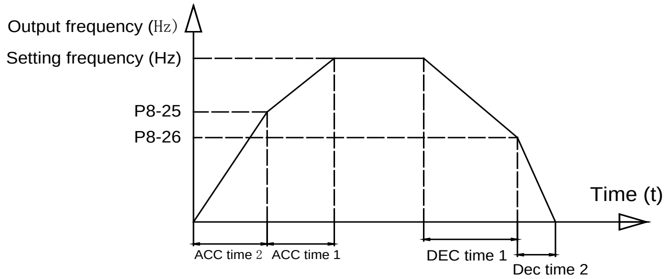

Figure 6-18 ACC/DEC time switching diagram

During ACC, if the running frequency is lower than P8-25, then select ACC time 2, if the running frequency is higher than P8-25, then select ACC time 1.
During DEC, if the running frequency is higher than P8-26, then select DEC time 1, if the running frequency is lower than P8-26, then select DEC time 2.

P8-27	Terminal jog priority	Factory default	0

It is used to set whether the priority of terminal jog function is the highest.
When terminal jog priority is valid, if terminal jog command appears when running, the inverter switches to terminal jog running status.

P8-28	Frequency detection value (FDT2)	Factory default	50.00Hz
P8-29	Frequency detection lag value (FDT2)	Factory default	5.0%

This frequency detection function is the same as FDT1's, please refer to description of FDT1 (P8-19, P8-20).

P8-30	Any arrival frequency detection value	Factory default	50.00Hz
P8-31	Any arrival frequency detection amplitude 1	Factory default	0.0%
P8-32	Any arrival frequency detection value	Factory default	50.00Hz
P8-33	Any arrival frequency detection amplitude 2	Factory default	0.0%

When the output frequency reaches positive or negative detection amplitude of frequency detection value, DO outputs ON signal. HD200B series inverter provides two parameters of any arrival frequency detection value, used to set frequency value and frequency detection range.

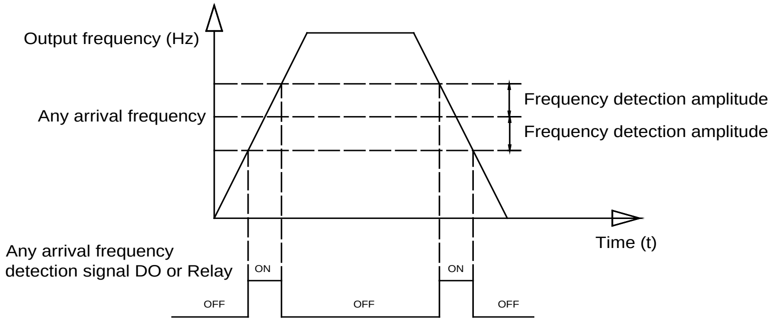

Figure 6-19 Any arrival frequency detection diagram

P8-34	Zero-current detection level	Factory default	5.0%
P8-35	Zero-current detection delay time	Factory default	0.10s

When the output current ≤ zero current detection level, lasts for longer than zero current detection delay time, DO terminal outputs ON signal.

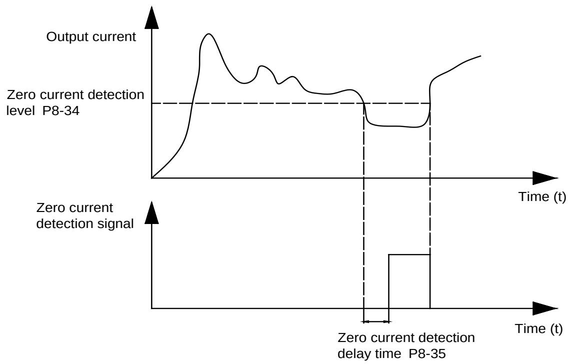

Figure 6-20 Zero-current detection diagram

P8-36	Output current over limit value	Factory default	200.0%

P8-37	Output current over limit detection delay time	Factory default	0.00s

When the output current is bigger than or over-limit detection point, lasts for longer than software over current point detection delay time, DO terminal outputs ON signal.

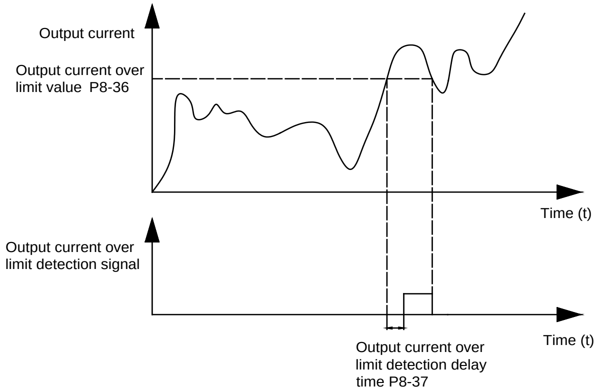

Figure 6-21 Output current over limit function diagram

P8-38	Any arrival current 1	Factory	100.0%
P8-39	Any arrival current 1 amplitude	Factory	0.0%
P8-40	Any arrival current 2	Factory	100.0%
P8-41	Any arrival current 2 amplitude	Factory	0.0%

When the output current is in the range of positive or negative detection amplitude of setting any arrival current, DO terminal outputs ON signal. HD200B series inverter provides two parameters of any arrival current and detection amplitude.

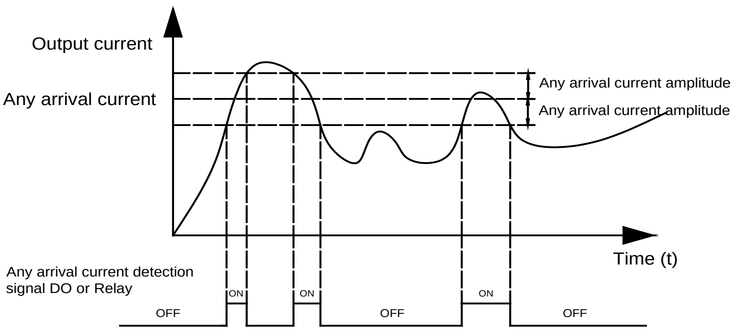

Figure 6-22 Any arrival current detection diagram

P8-42	Timing function selection	Factory default	0
P8-43	Timing running time selection	Factory default	0
P8-44	Timing running time	Factory default	0.0Min

The parameters are used to set the inverter timing running function.
When P8-42 timing function selection is valid, timing starts after the inverter starts, reaches the setting timing running time, the inverter stops automatically, meantime, DO terminal outputs ON signal.
Timing starts from 0 when the inverter starts, timing remain running time can be viewed via U0-20.
The timing running time is set by P8-43, P8-44, time unit is minute.

P8-45	AI1 input voltage protection lower	Factory default	3.10V
P8-46	AI1 input voltage protection upper	Factory default	6.80V

When the analog input AI1 value is bigger than P8-46, or smaller than P8-45, DO terminal outputs “AI1 input over limit” ON signal, used to indicate whether AI1 input voltage is in the setting range.

P8-48	Cooling fan control	Factory default	0

It is used to select cooling fan action mode,
When the selection is 0, cooling fans run when the inverter running, when the inverter stops & the radiator temperature is higher than 40℃, cooling fans run. When the inverter stops & the radiator temperature is lower than 40℃, cooling fans stop.
When the selection is 1, cooling fans always run after power-on.

P8-49	Wake up frequency	Factory default	3.0
P8-50	Wake-up delay time	Factory default	0.0s
P8-51	Dormancy frequency	Factory default	0.00Hz
P8-52	Dormancy delay time	Factory default	0.0s

The parameters are used to achieve dormancy and wake up function in water supply applications.

During running, when the setting frequency ≤ P8-51 dormancy frequency, lasts for P8-52 delay time, the inverter enters into dormancy status & stops automatically.

When the inverter is in the dormancy status & the present running command is valid, if the setting frequency ≥ P8-49 wake up frequency lasts for P8-50 delay time, the inverter starts.

Normally please set wake up frequency ≥ dormancy frequency. Setting both wake up frequency and dormancy frequency are 0.00Hz, then wake up and dormancy functions are invalid.

When starting dormancy function, if frequency source is set by PID, PA-28 will affect whether dormancy status PID calculates or not, PID stop calculation function must be set to be 1 (namely PA-28=1).

P8-53	Running arrival time setting	Factory default	0.0Min

When the running time reaches the time set by P8-53, DO outputs “Running arrival time setting” ON signal.

P8-54	Output power correction factor	Factory default	100.0%

Group P9 Fault and Protection

P9-00	Motor overload protection selection	Factory default	1
P9-01	Motor overload protection gain	Factory default	1.00

P9-00=0: Has no motor overload protection function, may cause the motor overheating damaged.

P9-00=1: The inverter judges whether the motor is overload or not according to the inverse time limit curve of motor overload protection.

The inverse time limit curve of motor overload protection: 220%×(P9-01)×motor rated current, lasts for one minute, the overload fault would be reported; 150%×(P9-01)×motor rated current, lasts for 60 minutes, the overload fault would be reported.

Please set P9-01 according to the motor overload ability. If the parameter is too big, the motor will over heat damage without alarming.

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P9-02	Motor overload pre-warning	Factory default	80%

For safe consideration, there is a pre-warming signal sent to the control system via DO before the motor overload fault protection, the pre-warming coefficient is used to confirm the extent of pre-warming before the motor overload protection. The bigger the parameter is, the smaller the pre-warming lead is.
After the accumulated output current is bigger than (P9-02)*overload inverse time limit curve, DO outputs “motor overload pre-warming” ON signal.

P9-03	Over-voltage stall gain	Factory default	30
P9-04	Over-voltage stall protection voltage	Factory default	1AC: 390V 3AC: 760V

During deceleration, after DC bus voltage exceeds over-voltage stall protection voltage, the inverter stops deceleration & runs with the current frequency, continue decelerating after bus voltage drops.
Over-voltage stall gain is used to adjust the suppression over-voltage capacity during deceleration. The bigger this value is, the stronger the capacity is. Under the precondition of no over-voltage, please set the gain as small as possible.
For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over voltage fault may occur.
When the value is 0, the over voltage stall function is invalid.

P9-05	Over-current stall gain	Factory default	20
P9-06	Over-current stall protection	Factory default	150%

During the inverter ACC/DEC, when the output current exceeds over-current stall protection current, the inverter stops ACC/DEC, runs with the current frequency, continue ACC/DEC after the output current is reduced.
Over-current stall gain is used to adjust the suppression over-current capacity during ACC/DEC. The bigger this value is, the stronger the capacity is. Under the precondition of no over-current, please set the gain as small as possible.
For the load with small inertia, the value should be small. Otherwise, the

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dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over-current fault may occur.

When the value is 0, the over-voltage stall function is invalid.

P9-07	Short circuit to ground protection selection when power-on	Factory default	0

It is used to check if the motor is short circuit to ground when the inverter is power on.

If the function is valid, the inverter UVW terminals have output voltage after power on for a while.

P9-08	Braking unit action starting voltage	Factory default	1AC: 378V 3AC: 700V

P9-09	Fault auto reset times	Factory default	0

After the inverter fails in running process, the inverter stops its output; then performs auto fault reset and continues running after the reset interval defined in P9-11.

P9-09 is used to set fault auto reset times. After this value is exceeded, the inverter will keep fault status.

When the fault auto reset time is setup to 0, there is no auto-reset function, and only manual reset can be done.

P9-10	Faulty HDO action selection during fault auto resetting	Factory default	0

If fault auto reset function is valid, during fault auto resetting, fault reply action or not can be set via P9-10.

P9-11	Fault auto reset interval	Factory default	1.0s

The waiting time of the inverter from the fault alarm to auto reset.

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[illegible]	Output phase failure protection	Factory	1

Select to protect output phase failure or not.

P9-14	The first fault type	0 ~ 50
P9-15	The second fault type	
P9-16	The third (last) fault type	

It is used to record the fault types of last three times: 0 indicates no fault, please refer to Chapter 8 for solutions.

P9-17	The third fault frequency	The last fault frequency
P9-18	The third fault current	The last fault current
P9-19	The third (last) fault bus voltage	The last fault bus voltage
P9-20	The third fault type output terminal status	The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF, the corresponding binary bit is 0. All DI statuses are displayed as decimal numbers.
P9-21	The third fault type output terminal	The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF, the corresponding binary bit is 0. All DO statuses are displayed as decimal numbers.
P9-22	The third fault inverter status	The last fault inverter status
P9-23	The third (last) fault power on	The last fault power on time
P9-24	The third (last) fault running	The last fault running time
P9-27	The second fault frequency	Same as P9-17 ~ P9-24
P9-28	The second fault current	
P9-29	The second fault bus voltage	
P9-30	The second fault input terminal	
P9-31	The second fault output	
P9-32	The second fault inverter	

P9-33	The second fault power on	
P9-34	The second fault running time	
P9-37	The first fault frequency	Same as P9-17 ~ P9-24
P9-38	The first fault current	
P9-39	The first fault bus voltage	
P9-40	The first fault input terminal	
P9-41	The first fault output terminal	
P9-42	The first fault inverter status	
P9-43	The first fault power on time	
P9-44	The first fault running time	

P9-47	Fault protection action selection 1	Factory default	00000
P9-48	Fault protection action selection 2	Factory default	00000
P9-49	Fault protection action selection 3	Factory default	00000
P9-50	Fault protection action selection 4	Factory default	00000

When the selection is “Coast to stop”, the inverter shows E-** and stops directly.
When the selection is “Dec- to-stop”, the inverter shows A-** and decelerates to stop, then shows E-** after stopping.
When the selection is “keep running”, the inverter shows A-** and keeps running, the running frequency is set by P9-54.

P9-54	Running frequency selection continuously when fault	Factory default	0
P9-55	Abnormal backup frequency	Factory default	100.0%

When a fault happens during running and the fault process mode is keep running, the inverter shows A-** with the frequency set by P9-54.
When the inverter is running with the abnormal backup frequency, the value set by P9-55 corresponds to maximum frequency percentage.

P9-59	Instantaneous power-off action	Factory default	0
P9-60	Instantaneous power-off recover judgment voltage	Factory default	85.0%

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P9-61	Instantaneous power-off voltage recover judgment time	Factory default	0.50s
P9-62	Instantaneous power-off action judgment voltage	Factory default	80.0%

The function is that, when instantaneous power off or voltage drops suddenly, the inverter will reduce output speed to decrease compensation voltage for DC bus which is generated by the load feedback energy, so that keep the inverter running.

P9-59=1: When instantaneous power off or voltage drops suddenly, the inverter decelerates, when bus voltage returns to normal, the inverter accelerates to the setting frequency and runs. Normal bus voltage lasts for longer than the time set by P9-61 means that bus voltage returns to normal.

P9-59=2: When instantaneous power off or voltage drops suddenly, the inverter decelerates to stop.

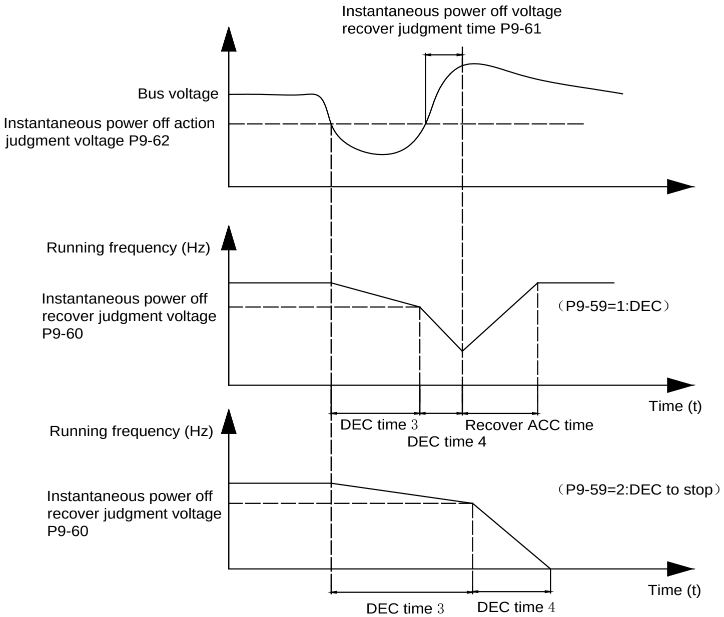

Figure 6-23 Instantaneous stop action diagram

P9-63	Off-load protection selection	Factory default	0
P9-64	Off-load detection level	Factory default	10.0%
P9-65	Off-load detection time	Factory	1.0s

If off-load protection function is valid, when the output current is smaller than off-load detection level P9-64, lasts for longer than off-load detection time P9-65, the output frequency will reduce to 7% of the rated frequency automatically. During off-load protection, if load recovers, the inverter will recover and run with the setting frequency automatically.

Group PA PID Function

PID control is a common used method in process control, such as flow, pressure and temperature control. The principle is firstly to detect the bias between preset/given value and feedback value, then calculate output frequency of inverter according to proportional gain, integral and differential time. Please refer to following figure.

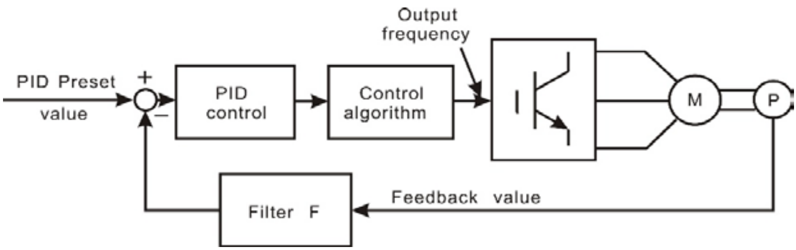

Figure 6-24 PID control diagram

PA-00	PID given source	Factory default	0
PA-01	PID keypad given	Factory default	0.0

This parameter is used to select the given channel of PID target value
This value is an actual physical quantity. It must correspond to the measure range. For example, if the PID keypad given value is 0.3Mpa, PA-01 should be set to 3.0.

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PA-02	PID feedback source	Factory default	0

These parameters are used to select PID given and feedback source.
Notice: Given value and feedback value of PID are percentage values.
100% of given value is corresponding to 100% of feedback value.
Given source and feedback source must not be same, otherwise PID will be malfunction.

PA-03	PID action direction	Factory default	0

0: Positive. When the feedback value is greater than the given value, output frequency will be decreased, such as tension control in winding application.
1: Negative. When the feedback value is greater than the given value, output frequency will be increased, such as tension control in unwinding application.

PA-04	PID given/feedback range	Factory default	100.0

PID given feedback range is a non-dimensional unit. It must correspond to the actual measure range. For example, if the measure range of the pressure meter is 1.0 Mpa, then this parameter should be set to 10.

PA-05	Proportional gain K_p1	Factory default	20.0
PA-06	Integration time T_i1	Factory default	2.00s
PA-07	Differential time T_d1	Factory default	0.000s

Proportional gain K_p1: It decides the adjustment intensity of the whole PID regulator. The higher the K_p1 is, the stronger the adjustment intensity is. When this parameter is 100, indicating the deviation between PID feedback value and given value is 100%, the adjustment amplitude of the PID regulator on the output frequency command is maximum frequency.
Integration time T_i1: It decides the intensity of the integration adjustment of PID regulator. The shorter the integration time is, the stronger the adjustment intensity is. Integration time is the time within which the adjustment value reaches maximum frequency when the deviation between PID feedback value and given value is 100%.
Differential time T_d1: It decides the intensity of the deviation change rate of PID regulator. The longer the differential time is, the stronger the adjustment intensity is. Differential time is the time within which if the feedback value

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changes 100%, the adjustment value reaches maximum frequency.

PA-08	Cut-off frequency of PID	Factory default	0.00Hz

In some situation, only when PID output frequency is negative (inverter reverse), PID can make given value and feedback value in a same status. But the reverse frequency cannot be too high for some applications. The reverse frequency upper limit is determined by PA-08.

PA-09	PID deviation limit	Factory default	0.0%

When the deviation between PID given value and feedback value is smaller than PA-09, PID stops adjustment. The output frequency is stable when the deviation is small, which is suitable for some close loop control applications.

PA-10	PID differential amplitude	Factory default	0.10%
PA-11	PID given filter time	Factory default	0.00s

PID given filter time is the time that PID given value changes from 0.0% to 100.0%.
When PID given is changing, PID given value linearly changes according to the given filter time, so as to reduce the adverse effect of the system caused by the given sudden change.

PA-12	PID feedback filter time	Factory default	0.00s
PA-13	PID output filter time	Factory default	0.00s

PA-12 is used to filter the PID feedback value, this filter can improve anti-interference capability of feedback value, but will bring the response performance of the process close loop system down.
PA-13 is used to filter the PID output frequency, this filter will reduce the sudden change of the inverter output frequency, but also will bring the response performance of the process close loop system down.

PA-15	Proportional gain K_p2	Factory default	20.0
PA-16	Integration time T_i2	Factory default	2.00s
PA-17	Differential time T_d2	Factory default	0.000s
PA-18	PID parameter switching condition	Factory default	0

PA-19	PID parameter switching deviation 1	Factory default	20.0%
PA-20	PID parameter switching deviation 2	Factory default	80.0%

In some applications, one group PID parameter is not enough, different PID parameters would be adopted according to the situation.

The function codes are used to switch two groups PID parameter. The setting mode of the regulator parameters PA-15~PA-17 is similar as PA-05~PA-07's.

Two groups PID parameter can be switched via DI terminal, or switched according to PID deviation automatically.

When selection is automatic switching: when the deviation absolute value between given and feedback is smaller than PA-19 (PID parameter switching deviation 1), PID parameter selection is group 1. When the deviation absolute value between given and feedback is bigger than PA-20 (PID parameter switching deviation 2), PID parameter selection is group 2. When the deviation absolute value between given and feedback is between PA-19 and PA-20, PID parameter is the linear interpolation of two groups PID parameter, showed as figure 6-25.

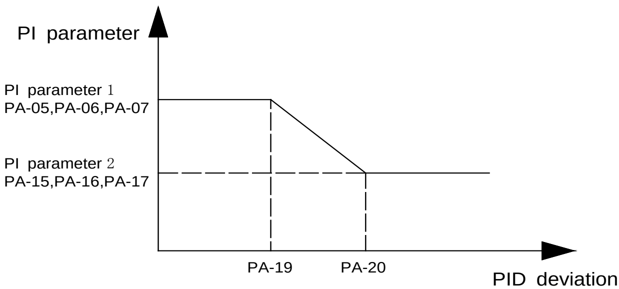

Figure 6-25 PID parameter switching diagram

PA-21	PID initial value	Factory default	0.0%
PA-22	PID initial value holding time	Factory default	0.00s

When starting, PID output is PID initial value (PA-21), lasts for PID initial value holding time (PA-22), PID starts close-loop regulate calculating.

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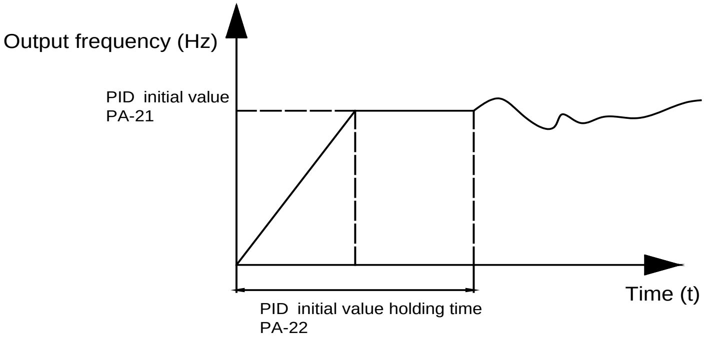

Figure 6-26 PID initial value function diagram

PA-23	Forward maximum value between two output deviation	Factory default	1.00%
PA-24	Reverse maximum value between two output deviation	Factory default	1.00%

This function is used to limit the difference between PID output two bats (2ms/bat), so as to against PID output changing too fast, make the inverter run stably.

PA-23 and PA-24 correspond to the maximum of the output deviation absolute value when forward and reverse, respectively.

PA-25	PID integration attribute	Factory default	00

Integration separation:

If integration separation is valid, when multifunctional digital DI integration pause (function 22) is valid, PID integration stop calculating, PID is only valid when proportional and differential action.

When integration separation is invalid, whatever multifunctional digital DI is valid or not, integration separation is invalid.

Stop integrating or not after output reach limit:

After PID calculation output reaches the maximum or minimum, whether stop integral action or not can be selected. If the selection is stop integrating, PID

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integration will stop calculating, which may help to reduce PID overshoot.

PA-26	PID feedback lost detection	Factory default	0.0%
PA-27	PID feedback lost detection	Factory default	1.0s

The parameters are used to judge whether PID feedback lost or not.
When PID feedback is smaller than feedback lost detection value (PA-26), lasts for longer than PID feedback lost detection time (PA-27), the inverter alarms fault E-31, and handles according to the chose fault process mode.

PA-28	PID stop calculation	Factory default	1

This parameter is used to select PID stop status & whether PID continues calculating or not. For normal applications, PID should stop calculating when stop.

Group PB Wobble Frequency, Fixed Length, Counting

The wobble frequency function is suitable for textile, chemical fiber industries, and the applications which require traversing and winding functions.
The wobble frequency function means that the output frequency of the inverter wobbles up and down with the setting frequency as the center. The trace of running frequency at the time axis is shown in the figure below, of which the wobble amplitude is set by PB-00 and PB-01. When PB-01 is set to 0, indicating the wobble amplitude is 0, the wobble frequency is disabled.

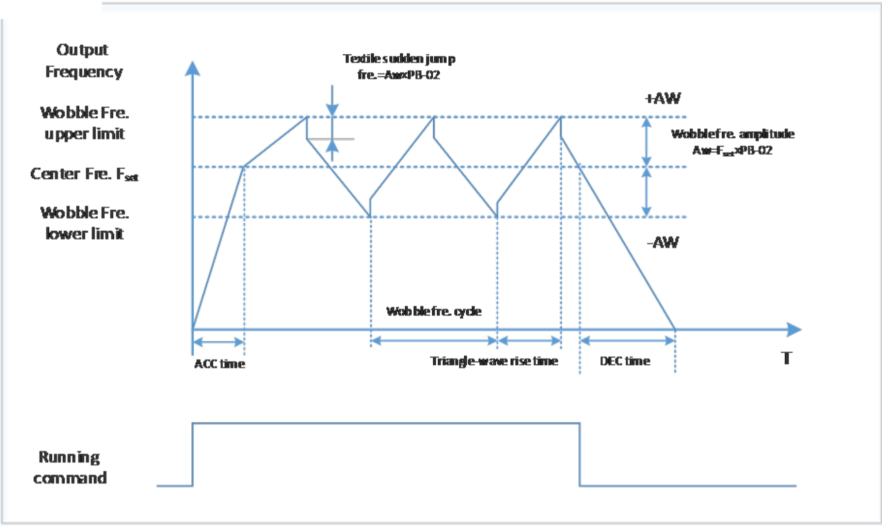

Figure 6-27 Wobble frequency operation diagram

PB-00	Wobble frequency amplitude setting mode	Factory default	0

This parameter is used to select the reference value of the wobble amplitude.

0: Relative to the center frequency (P0-07: frequency source selection), and it is variable wobble amplitude system. The wobble amplitude changes with the center frequency (setting frequency).

1: Relative to the maximum frequency (P0-10) and it is fixed wobble amplitude system. The wobble amplitude is fixed.

PB-01	Wobble frequency amplitude	Factory default	0.0%
PB-02	Sudden jump frequency	Factory default	0.0%

This parameter is used to determine the values of wobble amplitude and sudden jump frequency. The wobble frequency is limited by the frequency upper limit and frequency lower limit.

The wobble amplitude is relative to the central frequency (variable wobble amplitude, select PB-00=0): wobble amplitude: AW=frequency source: P0-07 × wobble amplitude: PB-01.

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The wobble amplitude is relative to the maximum frequency (fixed wobble amplitude, select PB-00=1): wobble amplitude: AW=maximum frequency: P0-10 × wobble amplitude: PB-01.

Sudden jump frequency=wobble amplitude: AW × sudden jump frequency amplitude: PB-02. That is the value of sudden jump frequency relative to the wobble amplitude when the wobble frequency is running.

If the wobble amplitude relative to the central frequency (variable wobble amplitude, select PB-00=0) is selected, the sudden jump frequency is a variable value.

If the wobble amplitude relative to the maximum frequency (fixed wobble amplitude, select PB-00=1) is selected, the sudden jump frequency is a fixed value.

PB-03	Wobble frequency cycle	Factory default	10.0s
PB-04	Triangle-wave rise time of wobble frequency	Factory default	50.0%

Wobble frequency cycle: It refers to the time of a complete cycle of wobble frequency.

PB-04 is relative to the percentage of PB-03.

Triangular wave rise time = PB-03 × PB-04 (unit: s)

Triangular wave fall time = PB-03 × (1-PB-04) (unit: s)

PB-05	Setting length	Factory default	1000m
PB-06	Actual length	Factory default	0m
PB-07	Number of pulses per meter	Factory default	100.0

The parameters are used in fixed length control.

Length information can be collected via input terminals, PB-06= the collected number of pulses/PB-07. When PB-06 is longer than PB-05, DO outputs “length arrival” ON signal.

During fixed length control, length reset operation can be done by set DI terminal function to 28, refers to P4-00~P4-06 for details.

The relative input terminal function need to be set to 27 (length counting input) for applications, HDI must be used when the pulse frequency is high.

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PB-08	Setting counting value	Factory default	1000
PB-09	Designated counting value	Factory default	1000

The counting value can be collected via digital input terminals. The relative input terminal function need to be set to 25 (Counter input) for applications, HDI must be used when the pulse frequency is high.

When the counting value reaches PB-08, DO outputs “setting counting value arrival” ON signal, then the counter will stop counting.
When the counting value reaches PB-09, DO outputs “designated counting value” ON signal. The counter will continue counting till the “setting counting value” is reached.
PB-09 should not exceed PB-08.

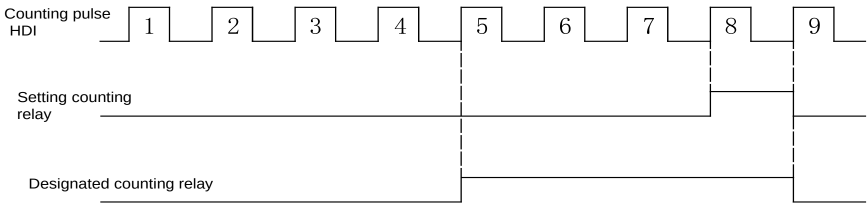

Figure 6-28 Setting counting value arrival and designated counting value arrival function diagram

Group PC Multi-step Command and Simple PLC Function

The multi-step command of HD200B series inverter has more functions than normal multi-step speed. Besides multi-step speed functions, it can be used as the given source of the process PID.

PC-00	Multi-step command 0	Factory default	0.0%
PC-01	Multi-step command 1	Factory default	0.0%
PC-02	Multi-step command 2	Factory default	0.0%
PC-03	Multi-step command 3	Factory default	0.0%
PC-04	Multi-step command 4	Factory default	0.0%
PC-05	Multi-step command 5	Factory default	0.0%
PC-06	Multi-step command 6	Factory default	0.0%
PC-07	Multi-step command 7	Factory default	0.0%

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PC-08	Multi-step command 8	Factory default	0.0%
PC-09	Multi-step command 9	Factory default	0.0%
PC-10	Multi-step command 10	Factory default	0.0Hz
PC-11	Multi-step command 11	Factory default	0.0%
PC-12	Multi-step command 12	Factory default	0.0%
PC-13	Multi-step command 13	Factory default	0.0%
PC-14	Multi-step command 14	Factory default	0.0%
PC-15	Multi-step command 15	Factory default	0.0%

Multi-step command can be used in two situations: as frequency source or as the setting source of the process PID.
In two situations, the dimension of the multi-step command is relative value, range -100.0%~100.0%, When as the frequency source is the percentage of the relative maximum frequency, multi-step command as PID setting source does not need dimension switching, because PID given is relative value. Multi-step command switches selection according to the different status of multifunctional digital D, please refer to P4 group for details.

PC-16	PLC running mode	Factory default	0

When frequency source is set by simple PLC, the symbols of PC-00 ~ PC-15 determines the running direction, the inverter run reverse if they are negative values.

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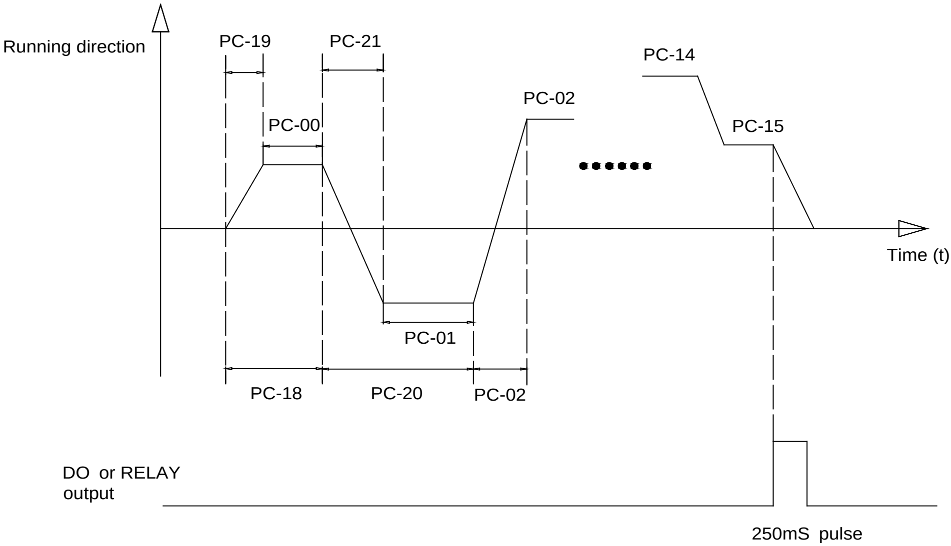

Figure 6-29 Simple PLC diagram

0: Stop after one cycle: Inverter stops automatically as soon as it completes one cycle, and It needs run command to start again.

1: keep last frequency after one cycle: Inverter holds frequency and direction of last phase after one cycle.

2: Circular running: Inverter continues to run cycle by cycle until receive a stop command.

PC-17	Simple PLC storage selection when power-down	Factory default	00

PLC storage when power-off means the last PLC running phase and running frequency are memorized before power-off, keep running from the memory status after power-on next time.

When selection is “not store”, restart PLC process after power-on each time.

“PLC storage when stop” means the last PLC running phase and running frequency are memorized when stopping, keep running with the memory status after power-on next time. When selection is “not store”, restart PLC process after power-on each time.

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PC-18	0th phase running time	Factory default	0.0s (m)
PC-19	0th Phase ACC/DEC time	Factory default	0
PC-20	1st Phase running time	Factory default	0.0s (m)
PC-21	1st Phase ACC/DEC time	Factory default	0
PC-22	2nd Phase running time	Factory default	0.0s (m)
PC-23	2nd Phase ACC/DEC time	Factory default	0
PC-24	3rd Phase running time	Factory default	0.0s (m)
PC-25	3rd Phase ACC/DEC time	Factory default	0
PC-26	4th Phase running time	Factory default	0.0s (m)
PC-27	4th Phase ACC/DEC time	Factory default	0
PC-28	5th Phase running time	Factory default	0.0s (m)
PC-29	5th Phase ACC/DEC time	Factory default	0
PC-30	6th Phase running time	Factory default	0.0s (m)
PC-31	6th Phase ACC/DEC time	Factory default	0
PC-32	7th Phase running time	Factory default	0.0s (m)
PC-33	7th Phase ACC/DEC time	Factory default	0
PC-34	8th Phase running time	Factory default	0.0s (m)
PC-35	8th Phase ACC/DEC time	Factory default	0
PC-36	9th Phase running time	Factory default	0.0s (m)
PC-37	9th Phase ACC/DEC time	Factory default	0
PC-38	10th Phase running time	Factory default	0.0s (m)
PC-39	10th Phase ACC/DEC time	Factory default	0
PC-40	11th Phase running time	Factory default	0.0s (m)
PC-41	11th Phase ACC/DEC time	Factory default	0
PC-42	12th Phase running time	Factory default	0.0s (m)
PC-43	12th Phase ACC/DEC time	Factory default	0
PC-44	13th Phase running time	Factory default	0.0s (m)
PC-45	13th Phase ACC/DEC time	Factory default	0
PC-46	14th Phase running time	Factory default	0.0s (m)
PC-47	14th Phase ACC/DEC time	Factory default	0
PC-48	15th Phase running time	Factory default	0.0s (m)
PC-49	15th Phase ACC/DEC time	Factory default	0
PC-50	PLC running time unit	Factory default	0
PC-51	Multi-step command 0 given	Factory default	0

The given channel of multi-step command 0 is determined by this parameter. Multi-step command 0 has many selections besides PC-00, which is conveniently for switching between multi-step command and other given modes.

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When the frequency source is set by multi-step command or simple PLC, it can achieve switching two frequency sources easily.

Group PD Communication Parameters

Refer to the Communication Protocol for details.

Group PP Function Code Management

PP-00	User	Factory default	0

Any non-zero number can be set, and then the password protection function will be enabled. When user enters into the menu next time, "-----" will be displayed, please input the right password, otherwise the parameters cannot be checked or modified.

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

PP-01	Parameter initialization	Factory default	0

1. Restore to factory default, but not including motor parameters.

After PP-01 is set to 1, most of the inverter function parameters are restored to the factory default settings, except motor parameters, frequency command decimal place (P0-22), fault record information, accumulated running time (P7-09), accumulated power on time (P7-13), accumulated power consumption (P7-14).

2. Clear the record information.

Clear the fault record information, accumulated running time (P7-09), accumulated power on time (P7-13), accumulated power consumption (P7-14).

PP-02	Function parameter group display selection	Factory default	00
PP-03	Reserved		

The setting of parameter display mode is convenient for users to view the function parameter of different spread patterns according to the actual demand.

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PP-04	Function code modification attribute	Factory default	0

The customer setting function code parameter can be modified or not, is used to protect function parameter being modified improperly.
When the function code is set to 0, all the function codes can be modified, when the function code is set to 1, all the function codes only can be viewed, but not modified.

Group U0 Monitoring Parameters

For the convenience of the field debugging, U0 group indicates running status of inverter. User can view them on the keypad.

Code	Name	Range
U0-00	Running frequency	0.00 ～ 320.00Hz (P0-22=2)
U0-01	Setting frequency	0.0 ～ 3200.0Hz (P0-22=1)

U0-00 displays absolute value of theoretical running frequency of the inverter.
U0-01 displays absolute value of setting frequency of the inverter.
The actual output frequency of inverter refers to U0-19.

Code	Name	Range
U0-02	DC bus voltage	0.0V ～ 3000.0V

U0-02 displays the voltage of DC bus.

Code	Name	Range
U0-03	Output voltage	0V ～ 1140V

U0-03 displays the output voltage of inverter at run time.

Code	Name	Range
U0-04	Output current	0.00A ～ 655.35A (Rated Power≤55KW) 0.0A ～ 6553.5A (Rated Power＞55KW)

U0-04 displays the output current of inverter at run time.

Code	Name	Range

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U0-05	Output power	0 ～ 32767

U0-05 displays the output power of inverter at run time.

Code	Name	Range
U0-06	Output torque	-200.0% ～ 200.0%

U0-06 displays the output torque of inverter at run time.

Code	Name	Range
U0-07	DI input status	0 ～ 32767

U0-07 displays the digital value Input terminal state which can be expressed by a 8-bit binary code; if the inverter detects that the input of corresponding terminal is high level(closed), then this bit is set to "1", if the input of corresponding terminal is low level(open), then the bit is set to "0". The relationship between Digital value Input terminal and binary code is shown below.

Bit0	Bit1	Bit2	Bit3
DI1	DI2	DI3	DI4
Bit4	Bit5	Bit6	Bit7
DI5	DI6	DI7	-

Code	Name	Range
U0-08	DO output status	0 ～ 1023

U0-07 displays the digital value output terminal state which can be expressed by a 8-bit binary code; if the inverter detects that the output of corresponding terminal is high level (closed), then this bit is set to "1", if the output of corresponding terminal is low level (open), then the bit is set to "0". The relationship between Digital value output terminal and binary code is shown below.

Bit0	Bit1	Bit2	Bit3
DO3	Relay 1	Reserved	DO1
Bit4	Bit5	Bit6	Bit7
DO2	-	-	-

Code	Name	Range
U0-09	AI1 Voltage	-10 ～ 10V

U0-09 displays the input voltage of AI1.

Code	Name	Range
U0-10	Reserved	

U0-10 Reserved.

Code	Name	Range
U0-11	Radiator temperature	-20 ～ 100℃

U0-11 displays the current temperature of radiator.

Code	Name	Range
U0-12	Count value	-

U0-12 displays the current value of counter.

Code	Name	Range
U0-13	Length value	-

U0-13 displays the current value of length.

Code	Name	Range
U0-14	Load speed	0 ～ 65535

U0-14 displays the speed of load. Refer to the description of P7-12 in user manual.

Code	Name	Range
U0-15	PID setting	0 ～ 65535
U0-16	PID feedback	0 ～ 65535

U0-15 displays the setting value of PID.

U0-16 displays the feedback value of PID.

Take the following formulas as follows:

The setting value of PID= the setting (percentage) of PID × PA-04

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The feedback value of PID=the feedback (percentage) of PID × PA-04

Code	Name	Range
U0-17	PLC phase	0 ～ F

U0-14 displays the current step when inverter is running in simple PLC mode. The relationship between displayed value and current step is shown below.

Displayed value	Inverter is running at step X:
1	X:0
2	X:1
……	……
F	X:15

Code	Name	Range
U0-18	HDI input pulse fre.	0.00 ～ 100.0KHz

U0-18 displays the sampling frequency of High-speed-pulse input (HDI). The smallest unit is 0.01 KHz.

Code	Name	Range
U0-19	Feedback speed	-320.00 ～ 320.00Hz -3200.0 ～ 3200.0Hz

U0-19 displays the actual output frequency of inverter:
When P0-22 is set to 1, the range is -3200.0 to 3200.0. (Unit: Hz)
When P0-22 is set to 2, the range is -320.00 to 320.00. (Unit: Hz)

Code	Name	Range
U0-20	Remain running time	0.0 ～ 6500.0min

U0-20 displays remain running time when inverter is running at timing running mode. (Refer to P8-42, P8-43 and P8-44).

Code	Name	Range
U0-21	AI1 voltage before	0.00 ～ 10.57V
U0-22	Reserved	

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U0-23	Keypad potentiometer voltage before calibration	0.00 ～10.57V

U0-21 displays the sampling voltage of analog input 1(AI1).
The actual input voltage is corrected value after linear calibration, so as to reduce the deviation between sampling voltage and the actual input voltage.
U0-09 and U0-10 display the actual voltages.

Code	Name	Range
U0-24	linear velocity	0 ～ 65535m/min

U0-24 displays the sampling linear velocity of High-speed-pulse input (HDI). The unit is meter per minute (m/min).
It can be calculated according to number of the actual sampling pulse and PB-07(number of pulse per meter).

Code	Name	Range
U0-27	HDI input pulse fre.	0 ～ 65535Hz

U0-27 displays the sampling frequency of High-speed-pulse input (HDI). The unit is 1 Hz. Actually, U0-27 displays the same data with U0-18. The only difference is the unit.

Code	Name	Range
U0-28	Communication setting	-100 ～ 100%

U0-28 displays the data written to address 0X1000.

Code	Name	Range
U0-29	Reserved	-

Code	Name	Range
U0-30	Main fre. A display	0.00 ～ 320.00Hz

U0-30 displays the frequency of main reference-input-channel (Refer to P0-03).
When P0-22 is set to 1, the range is -3200.0 to 3200.0 (Unit: Hz).
When P0-22 is set to 2, the range is -320.00 to 320.00 (Unit: Hz).

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Code	Name	Range
U0-31	Auxiliary fre. B display	0.00 ～ 320.00Hz

U0-31 displays the frequency of auxiliary reference-input-channel (Refer to P0-04).

When P0-22 is set to 1, the range is -3200.0 to 3200.0 (Unit: Hz).

When P0-22 is set to 2, the range is -320.00 to 320.00 (Unit: Hz).

Code	Name	Range
U0-32	Reserved	-
U0-33	Reserved	-

Code	Name	Range
U0-34	Motor temperature	0 ～ 200℃

U0-43 displays the current temperature of motor.

NOTE: This code is reserved (not available in present).

Code	Name	Range
U0-35	Target torque	-200 ～ 200%

U0-43 displays the current upper limit setting of torque. Refer to P2-09 and P2-10.

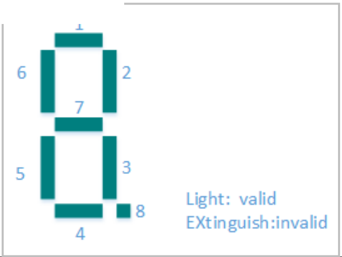
Code	Name	Range
U0-36	Reserved	-

Code	Name	Range
U0-37	Power factor angle	-

U0-43 displays the current power factor angle.

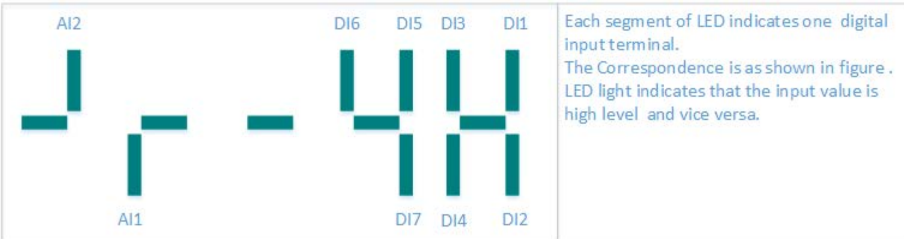
Code	Name	Range
U0-38~U0-40	Reserved	-

Code	Name	Range



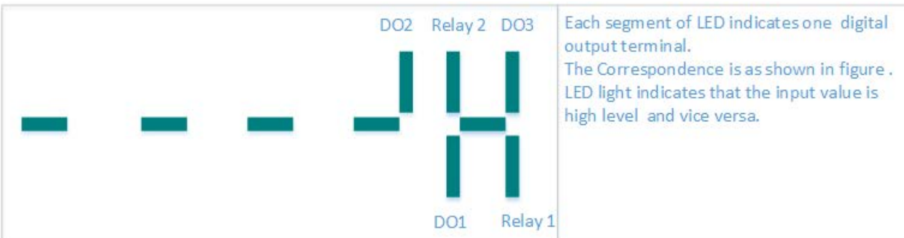
U0-41	Input status visual	-

U0-41 displays the input terminal state on the keypad intuitively.
Take the description for reference:



Code	Name	Range
U0-42	DO input status visual	-

U0-42 displays the digital value output terminal state on the keypad intuitively.



Code	Name	Range
U0-43	DO input status visual display 1	-

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U0-43 displays whether intuitive display function 1-40 are valid or not.
There are 5 digital tubes on keypad. Every digital tube has 8 segments, and each segment indicates a certain function selection.
Define digital tube as shown in figure.
Digital tubes from left to right represent intuitive display function 1-8, 9-16, 7-24, 25-32, 33-40.

Code	Name	Range
U0-44	DI input status visual	-

U0-44 displays whether intuitive display function 41-59 are valid or not.
There are 5 digital tubes on keypad. Every digital tube has 8 segments, and each segment indicates a certain function selection. Digital tubes from left to right represent intuitive display function 41-48, 49-56, 57-59.
NOTE: U0-33 and U0-34 are testing codes for manufacturers.

Code	Name	Range
U0-45	Reserved	-
……	……	-
U0-58	Reserved	-

Code	Name	Range
U0-59	Setting frequency	-100% ~ 100%
U0-60	Running frequency	-100% ~ 100%

U0-59 displays current setting frequency.
U0-60 displays current running frequency.
100% is corresponding to Max. frequency (P0-10).

Code	Name	Range
U0-61	Inverter status	0 ~ 65535

U0-61 displays information of inverter running status. Take the following as reference.

U0-61		
Combination of bit 0 & bit 1	Combination of bit 2 & bit 3	Bit4

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0: stop 1:Forward 2:Reverse	0: constant speed 1: acceleration 2:Deceleration	0: The voltage of DC bus is normal 1: under voltage

NOTE: A digital tube is corresponding to one bit above.

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Chapter 7 Trouble Shooting

7.1 Fault and Trouble Shooting

Fault Name	Converter short circuit protection
Fault Code	E-01
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. The cable connecting the motor with the inverter is too long 3. The module is over-heat 4. The cable connections inside the inverter are loosen 5. The main board is abnormal 6. The driver board is abnormal 7. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Install a reactor or output filter 3. Check if the air duct is blocked and if the fan is in normal status, and resolve the existing problems 4. Make sure the cables are connected well. 5, 6, 7. Ask for technical support.

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Fault Name	Over current when acceleration
Fault Code	E-02
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The acceleration time is too short 4. The manual torque boost or V/F curve is not proper 5. The voltage is too low 6. Start the running motor 7. Load is added suddenly during the acceleration 8. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the acceleration time 4. Adjust the manual torque boost or V/F curve 5. Make the voltage in the normal range 6. Select speed tracking start or start the motor till it stops 7. Cancel the sudden added load 8. Select bigger capacity inverter

Fault Name	Over-current when deceleration
Fault Code	E-03
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The deceleration time is too short 4. The voltage is too low 5. Load is added suddenly during the deceleration 6. Have not installed braking unit and braking resistor

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Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the deceleration time 4. Make the voltage in the normal range 5. Cancel the sudden added load 6. Install braking unit and braking resistor

Fault Name	Over-current when constant speed running
Fault Code	E-04
Reason	1. Short-circuit or ground fault occurred at inverter output 2. Control mode is vector control & motor parameters are not identified 3. The voltage is too low 4. Load is added suddenly during running 5. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Make the voltage in the normal range 4. Cancel the sudden added load 5. Select bigger capacity inverter

Fault Name	Over-voltage when acceleration
Fault Code	E-05
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during acceleration 3. The acceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the acceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when deceleration
Fault Code	E-06
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during deceleration 3. The deceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the deceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when constant speed running
Fault Code	E-07
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during the inverter running
Solution	1. Make the voltage in the normal range 2. Cancel the external force or install braking resistor

Fault Name	Power-supply fault
Fault Code	E-08
Reason	1. The input voltage is out of range
Solution	1. Make the voltage in the normal range

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Fault Name	Under-voltage fault
Fault Code	E-09
Reason	1. Instantaneous power-off 2. The input voltage is out of range 3. Bus voltage is abnormal 4. The rectifier bridge and buffer resistor are abnormal 5. The driver board is abnormal 6. The control board is abnormal
Solution	1. Fault Reset 2. Make the voltage in the normal range 3. Replace the rectifier bridge and buffer resistor 4. Replace the driver board 5. Replace the control board

Fault Name	Inverter over load
Fault Code	E-10
Reason	1. The load is too heavy or motor blockage occurs 2. Capacity of inverter is too small
Solution	1. Reduce the load, check the status of motor & machinery 2. Select bigger capacity inverter

Fault Name	Motor over load
Fault Code	E-11
Reason	1. P9-01 is set improperly 2. The load is too heavy or motor blockage occurs 3. Capacity of inverter is too small
Solution	1. Set P9-01 properly 2. Reduce the load, check the status of motor & machinery 3. Select bigger capacity inverter

Fault Name	Output phase failure
Fault Code	E-13
Reason	1. The connection between inverter and motor is abnormal 2. Output voltage unbalance during the motor running 3. The driver board is abnormal 4. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Make sure the motor three phase winding is normal 3. Replace the driver board 4. Replace the IGBT module

Fault Name	IGBT module over-heat
Fault Code	E-14
Reason	1. Ambient temperature is too high 2. Air duct is blocked 3. Cooling fans are broken 4. Thermal resistor(temperature sensor) of the module is broken 5. IGBT module is broken
Solution	1. Reduce the ambient temperature 2. Clear the air duct 3. Replace cooling fans 4. Replace the thermal resistor 5. Replace IGBT module

Fault Name	Peripheral device fault
Fault Code	E-15
Reason	DI terminal receives an external fault signal generated by
Solution	Reset running

Fault Name	Communication fault
Fault Code	E-16
Reason	1. Master computer works abnormal 2. Communication cable is abnormal 3. PD group is set improperly
Solution	1. Check the connection of master computer 2. Check the communication connection 3. Set PD group properly

Fault Name	Current detection fault
Fault Code	E-18
Reason	1. Hall device is abnormal 2. The driver board is abnormal
Solution	1. Check hall device and connection 2. Replace the driver board

Fault Name	Auto tuning fault
Fault Code	E-19
Reason	1. Motor parameters are set improperly 2. Parameter identification process is delayed
Solution	1. Set parameters according to the motor nameplate 2. Check the cables connecting inverter with motor

Fault Name	EEPROM read/write fault
Fault Code	E-21
Reason	1. EEPROM chip is broken
Solution	1. Replace the main board

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Fault Name	Inverter hardware fault
Fault Code	E-22
Reason	1. Over voltage 2. Over current
Solution	1. Handle as over voltage fault 2. Handle as over current fault

Fault Name	Short-circuit to ground fault
Fault Code	E-23
Reason	1. The motor is short-circuit to ground
Solution	1. Replace cables or motor

Fault Name	Accumulated running time arrival fault
Fault Code	E-26
Reason	1. The accumulated running time reaches the setting value
Solution	1. Clear the record information via parameter initialization

Fault Name	Customized fault 1
Fault Code	E-27
Reason	1. DI terminal receives signal of customized fault 1
Solution	1. Reset running

Fault Name	Customized fault 2
Fault Code	E-28
Reason	1. DI terminal receives signal of customized fault 2
Solution	1. Reset running

Fault Name	Accumulated power-on time arrival fault
Fault Code	E-29
Reason	1. The accumulated power-on time reaches the setting value
Solution	1. Clear the record information via parameter initialization

Fault Name	Off-load fault
Fault Code	E-30
Reason	1. The inverter running current is smaller than P9-64
Solution	1. Confirm if the load breaks away and P9-64 & P6-65 are set

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Fault Name	PID feedback lost fault when running
Fault Code	E-31
Reason	1. PID feedback is smaller than PA-26
Solution	1. Check PID feedback signal or set PA-26 properly

Fault Name	Current-limiting fault
Fault Code	E-40
Reason	1. Whether the load is heavy or the motor is blocked 2. Capacity of inverter is too small.
Solution	1. Reduce the load and detect the motor & machinery condition 2. Select bigger capacity inverter

7.2 Common Faults and Solutions

No.	Fault	Reason	Solution
1	No display when power-on	The input voltage is 0 or too low. The switching power supply on the driver board is broken. Rectifier bridge is broken. Buffer resistors are broken. The control board or keypad is broken.	Check the input power-supply. Reconnect the keypad and 40-core flat cable.
2	E-23 is displayed when power-on	The motor or the output line is short circuited to the ground. The inverter is damaged.	Measure the insulation of the motor and output line with magneto-ohmmeter.
3	E-14 is displayed frequently	Carrier frequency is too high. Fans are broken or air duct is broken. The inverter inside components are broken (such as thermistor)	Reduce the carrier frequency (P0-15). Replace fans, clear the air duct.

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4	Motor does not run after the inverter runs	Motor and motor cables are abnormal. The inverter parameters are set improperly (motor parameter). The connection of the cables of the driver board and control board are not good. The driver board is broken	Make sure the connection of the inverter and motor is very well. Replace the motor or clear the mechanical failure. Check & reset the motor parameters.
5	Digital terminal is invalid	The parameter is set improperly. The external signal is wrong. The jumper between PLC and +24V is loose. The control board is broken.	Check & reset P4 group parameters. Reconnect the external signal cable. Reconnect the jumper between PLC and +24V.
6	Over voltage and over current fault are	Motor parameters are set improperly. The ACC/DEC time is improper. The load fluctuates.	Reset motor parameters or perform auto tuning. Set proper ACC/DEC time.
7	E-17 is displayed when power-on or running	The soft-start contactor is not closed	Check if the contactor cables are loosened. Check if the contactor is broken. Check if the contactor 24V power supply is broken.
8	Power on display 8.8.8.8.8	Inverter initialization failure. The relative components of the control board are broken.	Check the keypad and 22-core flat cable. Replace the control board.

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Chapter 8 MODBUS Communication Protocol

HD200B series inverter provides RS485 communication interface, and adopts MODBUS communication protocol. User can realize centralized monitoring through PC/PLC, host computer, and also can set inverter's operating commands, modify or read function parameters, read operating status and fault information, etc.

8.1 About Protocol

This serial communication protocol defines the transmission information and use format in the series communication. It includes the formats of master-polling, broadcast and slave response frame, and master coding method with the content including slave address (or broadcast address), command, transmiting data and error checking. The response of slave adopts the same structure, including action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving the information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

8.2 Application Method

The inverter could be connected into a "Single-master Multi-slave" PC/PLC control network with RS485 bus.

8.3 Bus Structure

(1) Interface mode

RS485

(2) Transmission mode

There provide asynchronous series and half-duplex transmission mode. At the same time, just one can send the data and the other only receives the data between master and slave. In the series asynchronous communication, the data

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is sent out frame by frame in the form of message.

(3) Topological structure

In Single-master Multi-slave system, the setup range of slave address is 0 to 247. 0 refers to broadcast communication address. The address of slave must be exclusive in the network. That is basic condition of MODBUS communication.

8.4 Protocol Description

HD200B series inverter communication protocol is a kind of asynchronous serial master-slave communication protocol. In the network, only one equipment (master) can build a protocol (Named as “Inquiry/Command”). Other equipment (slave) response “Inquiry/Command” of master only by providing the data, or doing the action according to the master’s “Inquiry/Command”. Here, master is Personnel Computer, Industrial control equipment or Programmable logical controller, and the slave is inverter or other communication equipment with the same communication protocol. Master not only can visit some slave separately for communication, but also sends the broadcast information to all the slaves. For the single “Inquiry/Command” of master, all of slaves will return a signal that is a response; for the broadcast information provided by master, slave needs not feedback a response to master.

8.5 Communication Data Structure

MODBUS protocol communication data format of HD200B series inverter is shown as following:

In RTU mode, the Modbus minimum idle time between frames should be no less than 3.5 bytes. The checksum adopts CRC-16 method. All data except checksum itself sent will be counted into the calculation. Please refer to section: CRC Check for more information. Note that at least 3.5 bytes of Modbus idle time should be kept and the start and end idle time need not be summed up to it.

The entire message frame must be transmitted as a continuous data stream. If a idle time is more than 1.5 bytes before completion of the frame, the receiving

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device flushes the incomplete message and assumes that the next byte will be the address field of a new message. Similarly, if a new message begins earlier than 3.5 bytes interval following a previous message, the receiving device will consider it as a continuation of the previous message. Because of the frame's confusion, at last the CRC value is incorrect and communication fault will occur.

RTU frame format:

START	Transmission time of 3.5 bytes
Slave Address	Communication addr. : 0 to 247
Command Code	03H:Read slave parameters 06H: Write slave parameters
DATA (N-1)	Data: Function code parameter address, the number of function code parameter, Function code parameter, etc.
DATA (N-2)	
……	
DATA0	
CRC Low byte	Detection Value: CRC value
CRC High byte	
END	Transmission time of 3.5 bytes

8.6 Command Code and Communication Data Description

8.6.1 Command code: 03H, reads N words. (There are 12 characters can be read at the most.)

For example: The inverter start address F002 of the slave 01 continuously reads two consecutive values.

Master command information

Address	01H
Command Code	03H
Start Address High byte	F0H
Start Address Low byte	02H
Register Number High byte	00H
Register Number Low byte	02H
CRC Low byte	56H
CRC High byte	CBH

Slave responding information

Address	01H
Command Code	03H
Byte Number	04H
Data F002H High byte	00H
Data F002H Low byte	00H
Data F003H High byte	00H
Data F003H Low byte	01H
CRC Low byte	3BH
CRC High byte	F3H

8.6.2 Command code: 06H, write a word

For example: Write 5000(1388H) into address F00AH, slave address 02H.

Master command information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H
Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

Slave responding information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H
Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

8.6.3 CRC checking

In RTU mode, messages include an error-checking field that is based on a CRC method. The CRC field checks the contents of the entire message. The CRC

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field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value received in the CRC field. If the two values are not equal, an error results.

The CRC is started by 0xFFFF. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low byte is appended first, followed by the high byte. The following are C language source code for CRC-16.

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
    int i;
    unsigned int crc_value = 0xffff;
    while(data_length--)
    {
        crc_value ^= *data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
                crc_value = (crc_value>>1)^0xa001;
            else
                crc_value = crc_value>>1;
```


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```
            }
        }
        return(crc_value);
    }
```

8.6.4 Address definition of communication parameter

Here is about address definition of communication parameter. It’s used to control the inverter operation, status and related parameter setting.

(1) The mark rules of function code parameters address:

The group number and mark of function code is the parameter address for indicating the rules.

P0~PF group parameter address:

High byte: F0 to FF, low byte: 00 to FF

A0 group parameter address:

High byte: A0, low byte: 00 to FF

U0 group parameter address:

High byte: 70H, low byte: 00 to FF

For example: P3-12, address indicates to F30C

PC-05, address indicates to FC05

A0-01, address indicates to A001

U0-03, address indicates to 7003

Note:

1. Group PF: Either the parameter cannot be read, nor be changed.
2. Group U0: Only for reading parameter, cannot be changed parameters.
3. Some parameters cannot be changed during operation; some parameters regardless of what kind of status the inverter in, the parameters cannot be changed. Change the function code parameters, pay attention to the scope of the parameters, units, and relative instructions.

Besides, due to EEPROM be frequently stored, it will reduce the lifetime of EEPROM. So in the communication mode, some function code needn’t be stored, only change the RAM value. To achieve this function, change high order

... of the function code into zero.

Corresponding function code addresses are indicated below:
P0~PF group parameter address:
High byte: 00 to FF, low byte: 00 to FF
A0 group parameter address:
High byte: 40, low byte: 00 to FF
U0 group parameter address:
High byte: 70H, low byte: 00 to FF
For example: P3-12, address indicates to 030C
PC-05, address indicates to 0C05
A0-01, address indicates to 4001
These addresses can only act writing RAM, it cannot act reading. When act reading, it is invalid address.

(2) Stop/start parameter address

Parameter Address	Parameter Description
1000	* Communication setting value (-10000 to 10000) (Decimal)
1001	Running frequency
1002	Bus voltage
1003	Output voltage
1004	Output current
1005	Output power
1006	Output torque
1007	Running speed
1008	DI input flag
1009	DO output status
100A	AI1 voltage
100B	Reserved
100C	Radiator temperature
100D	Counting value input
100E	Length value input
100F	Load speed
1010	PID setting

Parameter Address	Parameter Description
1011	PID feedback
1012	PLC running process
1013	HDI input pulse frequency, unit is 0.01kHz
1014	Feedback speed, unit is 0.1Hz
1015	Remain running time
1016	AI1 voltage before calibration
1017	Reserved
1018	Reserved
1019	Linear speed
101A	Current power on time
101B	Current running time
101C	HDI input pulse frequency, unit is 1Hz
101D	Communication setting value
101E	Actual feedback speed
101F	Main frequency A display
1020	Auxiliary frequency B display

Note:

Communication setting value is the percentage of relative value, and 10,000 corresponds to 100.00%, -10000 corresponds to -100.00%.

To the data of frequency, the percentage is the percentage of relative maximum frequency (P0-10).

To the data of torque, the percentage is P2-10 (torque upper limit).

(3) Control command input to inverter (write only)

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

(4) Read inverter status: (read only)

Status Word	Status Word Function
3000	0001：Forward running
	0002：Reverse running
	0003：Stop

(5) Parameters locking password check: (If the return is 8888H, it means the password check passes.)

Password Address	Content of Input password
1F00	*****

(6) Digital output terminal control: (write only)

Command Address	Command Content
2001	BIT0：Reserved BIT1：Reserved BIT2：RELAY1 output control BIT3：Reserved

(7) Analog output AO1 control: (write only)

Command Address	Command Content
2002	0～7FFF refers to 0％～100％

(9) Pulse output control: (write only)

Command Address	Command Content
2004	0～7FFF refers to 0％～100％

(10) Inverter fault code description:

Inverter Fault	Inverter Fault Information

8000	0000：No fault 0001：Reserved 0002：Over current when acceleration 0003：Over current when deceleration 0004：Over current when constant speed running 0005：Over voltage when acceleration 0006：Over voltage when deceleration 0007：Over voltage when constant speed running 0008：Reserved 0009：Under voltage fault 000A：Inverter overload 000B：Motor overload 000C：Input phase failure 000D：Output phase failure 000E：Module overheat 000F：External fault 0010：Communication fault 0011：Contactor fault 0012：Current detection fault 0013：Motor autotuning fault 0014：Reserved 0015：Parameter R/W fault 0016：Inverter hardware fault 0017：Motor short circuit to ground fault 0018：Reserved 0019：Reserved 001A：Running time arrival 001B：Customized fault 1

8.6.5 Description data of communication fault information (fault code)

Communication Fault Address	Fault function description

8001	0000：No fault 0001：Password error 0002：Command error 0003：CRC check error 0004：Invalid address 0005：Invalid parameter 0006：Parameter changing invalid 0007：System locked 0008：EEPROM operating

8.7 PD Group Communication Parameter Description

Pd-00	Baud Rate	Factory Setting	6005
	Setting range	0：300BPS 1：600BPS 2：1200BPS 3：2400BPS 4：4800BPS 5：9600BPS	

This parameter is used to set the data transmission rate between host computer and the inverter. Please note that baud rate of the host computer and inverter must be the same. Otherwise, the communication is impossible. The bigger baud rate is, the faster communication is.

Pd-01	Data Format	Factory Setting	0
	Setting range	0：No check: Data format <8,N,2> 1：Even parity Check :data format <8,E,1> 2：Odd Parity Check : data format <8,O,1> 3：No check: Data format <8-N-1>	

The setting data format of host computer and inverter must be the same; otherwise, the communication is impossible.

Pd-02	Local Address	Factory Setting	1

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	Setting range	1~247, 0 is broadcast address

When the local address is set to be 0, that is broadcast address, it can realize the broadcast function of host computer.

Local address must be unique (except broadcast address). This is the base of point-to-point communication between host computer and inverter.

Pd-03	Response Delay	Factory Setting	2ms
	Setting range	0~20ms	

Response delay: It refers to the interval time from the inverter finishes receiving data to sending data to the host computer. If the response delay is less than system processing time, then the response delay is based on the system processing time. If the response delay is more than system processing time, after the system processing the data, it should be delayed to wait until the response delay time arrives, then sending data to host computer.

Pd-04	Communication Timeout	Factory Setting	0.0s
	Setting range	0.0s (invalid) 0.1~60.0s	

When the function code set to be 0.0 s, the communication timeout parameter is invalid.

When the function code set to be valid value, if the interval time between the communication and the next communication is beyond the communication timeout, the system will report communication failure error (Err16). At normal circumstances, it is set to be invalid. If in the continuous communication system, set the parameter, you can monitor the communication status.

Pd-05	Communication Protocol selection	Factory Setting	1
	Setting range	0：Nonstandard Modbus protocol 1：Standard Modbus protocol	

PD-05=1: Select standard MODBUS protocol

PD-05=0: When reading the command, the slave return is one byte than the

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standard MODBUS protocol's, for details refer to communications Data Structure of this protocol.

Pd-06	Communication Read Current Resolution	Factory Setting	0
	Setting range	0：0.01A 1：0.1A	

It is used to confirm the output current unit when communication reads output current.

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Preface

Firstly, thank you for purchasing HD200E series inverter!

HD200E series is a high torque type vector inverter. Its motor control performance increases obviously. The inverter can implement the control of asynchronous motor and permanent magnet synchronous motor (PMSM). The function is more powerful. It is used to drive various automation production equipment involving textile, paper-making, machine tool, packing, food, crane, petroleum machinery, fan, pump etc.

This manual describes the correct use of HD200E series Inverter, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

Notes
● Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. ● The drawings in the manual are shown for description only and may not match the product you purchased. ● The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. ● Contact our agents or customer service center if you have problems during the use.

Contents

Chapter 1 Safety Information and Precaution

In this manual, the notices are divided two types as follows:

DANGER indicates that failure to comply with the notice will result in severe personal injury or even death.

WARNING indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. The company will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety Information and Warning

1.1.1 Before Installation

DANGER
• Do not install the equipment if you find water seepage, component missing or damage upon unpacking. • Do not install the equipment if the packing list does not conform to the product you received.

WARNING
• Handle the equipment with care during transportation to prevent damage to the equipment. • Do not use the equipment with damaged or missing components. Failure to comply will result in personal injury. • Do not touch the components with your hands. Failure to comply will result in static electricity damage.

1.1.2 During Installation

DANGER
• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • Do not loosen the fixed screws of the components, especially the screws with red mark.

WARNING
• Do not drop wire end or screw into the Inverter. Failure to comply will result in damage to the Inverter. • Install the Inverter in places free of vibration and direct sunlight. • Arrange the installation positions properly when two Inverters are laid in the same cabinet to ensure the cooling effect.

1.1.3 During Wiring

DANGER
• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the Inverter. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Tie the Inverter to ground properly by standard. Failure to comply may result in electric shock

NG

• Never connect the power cables to the output terminals (U, V, W) of the Inverter.

• Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the Inverter.

• Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire.

• Use wire sizes recommended in the manual. Failure to comply may result in accidents.

• Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.

1.1.4 Before Power-on

DANGER

• Check that the following requirements are met:

The voltage class of the power supply is consistent with the rated voltage class of the Inverter.

The input terminals (R, S, T) and output terminals (U, V, W) are properly connected.

No short-circuit exists in the peripheral circuit.

The wiring is secured.

Failure to comply will result in damage to the Inverter

• Do not perform the voltage resistance test on any part of the Inverter because such test has been done in the factory. Failure to comply will result in accidents.

WARNING

• Cover the Inverter properly before power-on to prevent electric shock.

• All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents

1.1.5 After Power-on

DANGER

• Do not open the Inverter's cover after power-on. Failure to comply may result in electric shock.

• Don’t touch the drive and peripheral circuit with wet hands.

• Do not touch any I/O terminal of the Inverter. Failure to comply may result in electric shock.

• Initial power on, the drive is checking the safety of its external circuit with strong electric, so please don't touch the drive’s terminals U, V, W and the motor’s terminals.

1.1.6 During Operation

DANGER

• Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.

• Signal detection must be performed only by qualified personnel during operation.

Failure to comply will result in personal injury or damage to the Inverter.

WARNING

• Avoid objects falling into the Inverter when it is running. Failure to comply will result in damage to the Inverter.

• Do not start/stop the Inverter by turning the contactor ON/OFF. Failure to comply will result in damage to the Inverter.

Maintenance

DANGER

• Repair or maintenance of the Inverter may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the Inverter.

• Do not repair or maintain the Inverter at power-on. Failure to comply will result in electric shock.

• Repair or maintain the Inverter only ten minutes after the Inverter is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury.

• Ensure that the Inverter is disconnected from all power supplies before starting repair or maintenance on the Inverter.

• Set and check the parameters again after the Inverter is replaced.

• All the pluggable components must be plugged or removed only after power-off.

• The rotating motor generally feeds back power to the Inverter. As a result, the Inverter is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the Inverter is disconnected from the motor before starting repair or maintenance on the Inverter.

WARNING

• The running motor could feed power to inverter, even though the motor stop and power off. So please make sure cut the connect between motor and inverter.

1.2 Important Notes

1.2.1 RCD Request

The running equipment could produce large leak current which pass the protect earth conductor, please install the B type RCD in the power supply side. Please consider the equipment could produce transient and steady state. Please choose the special RCD with control higher harmonic function or general use RCD with after current.

1.2.2 Insulation Checking of Motors

Before using the drive, the insulation of the motors must be checked, especially, if it is used for the first time, if it has been stored for a long time or regularly check. This is to reduce the risk of the drive from being damaged by the poor insulation of the motor. When checking, must make sure the motors and the drive is separated, please use 500V insulation tester to measure the insulating resistance. It should not be less than 5MΩ.

1.2.3 Motor Thermal Protection

If the ratings of the driven motor are not in compliance with the drive, especially, the drive rated power more than motor rated power, be sure to adjust the protective threshold or to install thermal relay before the motor to ensure the motor is properly protected.

1.2.4 Operate Above Power Frequency

This drive can provide 0Hz~300Hz output frequency. If the user needs to run the motor above 50hz frequency, please consider the affordability of mechanical devices.

1.2.5 The Mechanical Device Resonance

The drive system may encounter mechanical resonance with the load when operating within certain band of output frequency. Skip frequencies have been set to avoid it.

1.2.6 Motor Heat and Noise

The output voltage is in PWM wave with some harmonics. Therefore, temperature rise, noise and vibration of motor are higher than 50Hz.

1.2.7 Varistors or Capacitors Used to Improve the Power Factor

Don't connect any varistor or capacitor to the output terminals of the drive, because the drive's output voltage waveform is PWM, otherwise tripping or damaging of components may occur; in addition, don't install circuit breaker or contactor at the output side of the drive.

Breakers Connected to the Input/output of the Drive

If contactor is connected between the input power supply and the motor, please don't use contactor to control drive start-stop. If it must be done, interval time should not less than one-hour. If frequently charging and discharging, the life of the internal capacitance of the drive will be reduced. If circuit breaker or contactor needs to be connected between output side of the drive and the motor, be sure to operate these circuit breakers or contactor when the drive has no output, to avoid damaging of the drive.

1.2.9 Using Outside the Range of Rated Voltage

The drive is unsuitable to be used out of the specified range of operation voltage; otherwise, it may be damaged. If need, please use suitable voltage regulation device.

1.2.10 Change From 3-phase to 2-phase

It is not recommended to change the drive from 3-phase input to 2-phase input. Otherwise it will lead to failure or damaged.

1.2.11 Protection Against Lightning Strike

There are transient surge suppressors inside the Drive which protects it against lighting strike. Department for frequent thunder and lightning, users should install the drive front-end protection.

1.2.12 Derating Due to Altitude

Derating must be considered when the drive is installed at high altitude, greater than 1000m. Because of the thin air, the cooling effect of drive is deteriorated. Please contact our technical advice in this case.

1.2.13 Special Usage

If users need the wiring diagram, such as common DC bus, without in the manual, please consult our company.

1.2.14 Disposing Unwanted Drive

The capacitors may explode when they are burnt. Poisonous gas may be generated when the plastic parts like front covers are burnt. Disposing method: please dispose the Drive as industrial waste.

1.2.15 Adaptable Motor

1. The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper Inverter according to the rated motor current.

2. The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.

3. The standard parameters of the adaptable motor have been configured inside the Inverter. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.

4. The Inverter may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the Inverter is disconnected from the tested parts.

Chapter 2 Product Information

2.1 Model Description

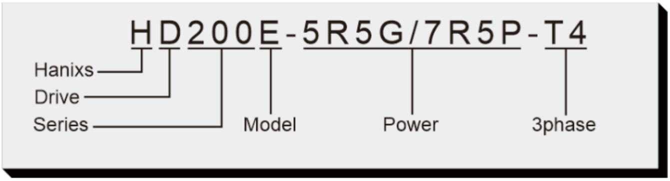

Figure 2-1 Model description

2.2 Nameplate

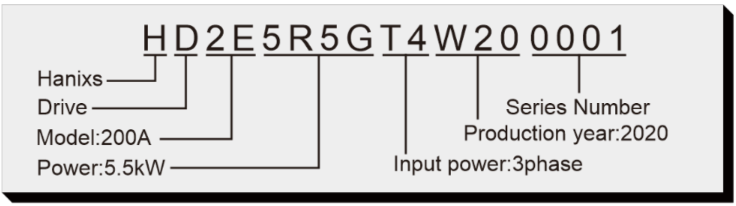

Figure 2-2 Nameplate

2.3 Selection Guide

Table 2-1 HD200E Inverter Model and Technical Data

Inverter Model	Power Capacity (kVA)	Rated Input Current (A)	Rated Output Current (A)	Applicable Motor (kW)
3AC 380~415V±15%				
HD200E-0R7G/1R5P-T4	1.5	3.4/5.0	2.1/3.8	0.7/1.5
HD200E-1R5G/2R2P-T4	3	5.0/5.8	3.8/5.1	1.5/2.2
HD200E-2R2G/004P-T4	4	5.8/10.5	5.1/9.0	2.2/4.0
HD200E-004G/5R5P-T4	5.9	10.5/14.6	9.0/13	4.0/5.5
HD200E-5R5G/7R5P-T4	8.9	14.6/20.5	13/17	5.5/7.5
HD200E-7R5G/011P-T4	11	20.5/26	17/25	7.5/11
HD200E-011G/015P-T4	17	26/35	25/32	11/15
HD200E-015G/018P-T4	21	35/38.5	32/37	15/18
HD200E-018G/022P-T4	24	38.5/46.5	37/45	18/22
HD200E-022G/030P-T4	30	46.5/62.5	45/60	22/30
HD200E-030G/037P-T4	40	62.5/76.0	60/75	30/37
HD200E-037G/045P-T4	57	76.0/92.0	75/91	37/45
HD200E-045G/055P-T4	69	92.0/113	91/112	45/55
HD200E-055G/075P-T4	85	113/157	112/150	55/75
HD200E-075G/090P-T4	114	157/180	150/176	75/90
HD200E-090G/110P-T4	134	180/214	176/210	90/110
HD200E-110G/132P-T4	160	214/256	210/253	110/132

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32G/160P-T4	192	256/307	253/304	132/160
HD200E-160G/185P-T4	231	307/350	304/340	160/185
HD200E-185G/200P-T4	242	350/385	340/385	185/200
HD200E-200G/220P-T4	250	385/430	385/430	200/220
HD200E-220G/250P-T4	280	430/468	430/468	220/250
HD200E-250G/280P-T4	355	468/525	468/525	250/280
HD200E-280G/315P-T4	396	525/590	525/590	280/315
HD200E-315G/350P-T4	445	590/665	590/665	315/350
HD200E-350G/400P-T4	500	665/785	665/785	350/400

2.4 Technical Specifications

Table 2-2 HD200E Inverter Technical Specifications

Item		Specifications
Basic functions	Output frequency	Sensorless vector control: 0~300Hz V/f control: 0~3200Hz
	Control mode	Sensorless vector control（SVC） V/f control
	Carrier frequency	0.5kHz~16kHz The carrier frequency automatically adjusted based on the load features.
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency * 0.025%
	Starting torque	G type: 0.5Hz/180%（SVC） P type: 0.5Hz/100%
	Speed range	1:100（SVC）
	Speed control accuracy	±0.5%（SVC）
	Overload capacity	G type: 150% rated current 60s; 180% rated current 3s. P type: 120% rated current 60s; 150% rated current 3s.
	Torque boost	Automatic torque boost; manual torque boost 0.1%~30.0%
	V/f curve	Three modes: Straight-line V/f curve; Multi-point V/f curve; N-power type V/f curve（1.2 power，1.4 power，1.6 power，1.8 power，square）.
	V/f separation	2 modes: complete separation, half separation
	Ramp mode	Straight-line ramp and S-curve ramp. Four kinds of acceleration/deceleration time with the range of 0.0~6500.0s.
	DC braking	DC braking frequency: 0.00Hz~maximum frequency Braking time: 0.0s~36.0s Braking action current value: 0.0%~100.0%
	Jog control	Jog frequency range: 0.00Hz~50.00Hz Jog acceleration and deceleration time: 0.0s~6500.0s
	Simple PLC, multi-step speed operation	It implements up to 16 speeds via the simple PLC function or combination of DI terminal states.
	Built-in PID	Built-in PID control to easily realize the close loop control of the process parameters (such as pressure, temperature, flow, etc.).

	Automatic voltage regulation（AVR）	Automatically maintain a constant output voltage when grid voltage changes.
	Over-voltage / Over-current stall control	Automatic limit of the current and voltage during the operation，prevent frequent over-current and over-voltage trip.
	Rapid current limit	Minimizing over-current fault，Protect the normal operation of converter.
	Torque limit and control	"Rooter" characteristics，automatic limit of the torque during the operation，to prevent frequent over-current trip.
	Fault protection function	Motor short-circuit detection at power-on, input/output phase failure protection, overcurrent protection, overvoltage protection, under voltage protection, overheat protection and overload protection, etc.
Individualized functions	High performance	Based on high performance of current vector control technology to achieve asynchronous motor and synchronous motor control.
	Non-stop when instantaneous power off	The load feedback energy compensates the voltage reduction so that the Inverter can continue to run for a short time.
	Fast current limit	Avoid frequent over-current fault of the frequency Inverter.
	Virtual IO	Five groups of virtual DI/DO can realize simple logic control.
	Timing control	Timing control function: Time range 0.0min~6500.0min.
	Communication protocol	It supports standard RS-485（MODBUS protocols） communication.
Operation	Running command source	Operation panel，control terminals，serial communication port，you can perform switchover between these sources in various ways.
	Frequency source	There are a total of 10 frequency sources, such as digital setting, analog voltage setting, analog current setting, pulse setting and serial communication port setting. You can perform switchover between these sources in various ways.
	Auxiliary frequency source	There are ten auxiliary frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis.
	Input terminal	6 digital input (DI1~DI6) terminals, DI6 supports up to 100 kHz high-speed pulse input. 2 analog input (AI) terminals: AI1: 0~10V AI2: 0~10V or 0/4~20mA
	Output terminal	1 output terminal (DO)，Optional for the open collector output or high-speed pulse output（0~20kHz）. 1 relay output terminal（TA-TB-TC）. 1 analog output terminals (AO)：0~20mA or 0~10V.
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt.
	Altitude	Less than 1000m; each rises 1000m, derating 10% to use.
	Ambient temperature	－10℃~＋40℃（if 40℃~50℃，please derating to use）.
	Humidity	Less than 95%RH，no water condenses
	Vibration	Less than 5.9m/s2（0.6g）
	Storage temperature	－20℃~＋60℃

:t Outline and Installation Dimension

The case type of HD200E inverter:

Power Range	Type of Inverter Case
0.75kW-11kW	Plastic
15kW-350kW	Metal

2.5.1 Inverter Outline Drawing

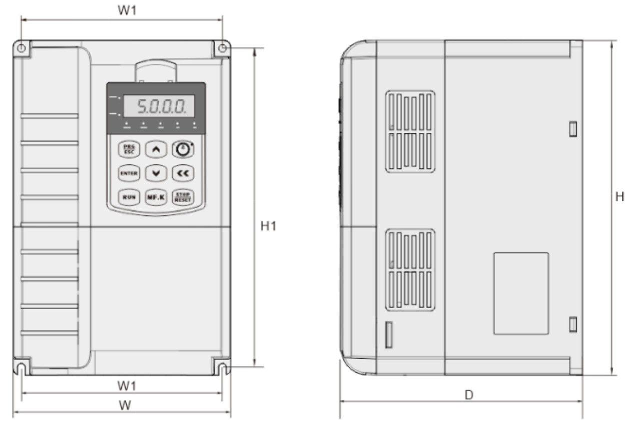

Figure 2-3 0.75~11kW plastic case inverter outline and dimension diagram

Notes: Please set the dust shied to the side of the heat emission hole to prevent the dust into the inverter inside.

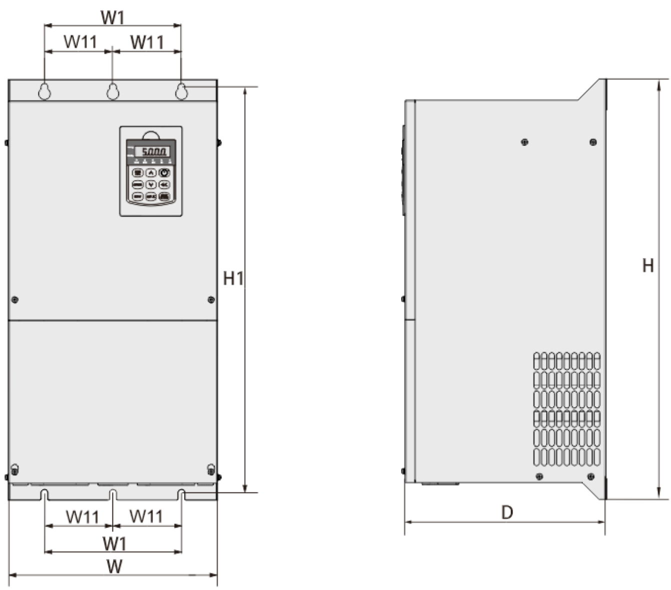

Figure 2-4 15~350kW metal case inverter outline and dimension diagram

al & Installation Dimension

Table 2-3 External & Installation Dimension

Inverter Models	External Dimension (mm)			Installation Dimension (mm)			Hole Diameter (mm)
	W	H	D	W1	H1	W11	
HD200E-0R7G/1R5P-T4 HD200E-1R5G/2R2P-T4 HD200E-2R2G/004P-T4 HD200E-004G/5R5P-T4	118	185	156.7	106.6	175.3	-	Φ4
HD200E-5R5G/7R5P-T4 HD200E-7R5G/011P-T4 HD200E-011G/015P-T4	160	247	178.1	148	235	-	Φ5
HD200E-015G/018P-T4 HD200E-018G/022P-T4	217	335	184	140	324	-	Φ4
HD200E-022G/030P-T4	228	361	203.5	139	349	-	Φ6
HD200E-030G/037P-T4 HD200E-037G/045P-T4	285	463	224	235	447	-	Φ6
HD200E-045G/055P-T4 HD200E-055G/075P-T4 HD200E-075G/090P-T4	305	613	294	200	592	-	Φ10
HD200E-090G/110P-T4 HD200E-110G/132P-T4 HD200E-132G/160P-T4	400	753	293	280	731.5	-	Φ10
HD200E-160G/185P-T4 HD200E-185G/200P-T4 HD200E-200G/220P-T4 HD200E-220G/250P-T4	520	865	343	380	836.5	190	Φ12
HD200E-250G/280P-T4 HD200E-280G/315P-T4 HD200E-315G/350P-T4 HD200E-350G/400P-T4	800	1172	412	600	1143	300	Φ14

2.5.3 Keypad External Dimension

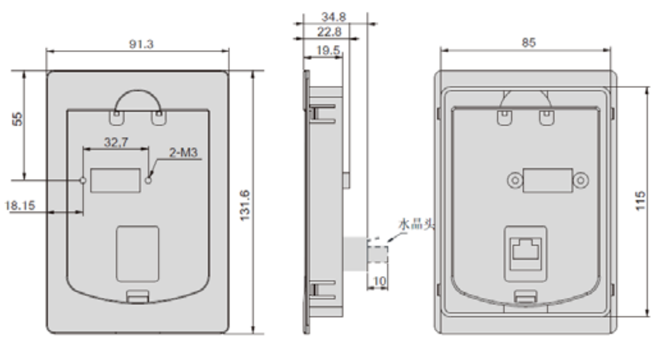

Figure 2-5 Keypad external dimension

ɔtion of Peripheral Electrical Devices

Table 2-4 Description of Peripheral Electrical Devices

Name	Install Location	Function
Air switch MCCB	Front of input circuit	When downstream devices is over current, breaking the power.
Contactor	Between the air switch and the input of frequency inverter	The frequency inverter start and stop, should avoid frequently operating by the contactor or doing direct start-up operation.
AC Reactor	Input side of the frequency inverter	1) Improve the input power factor of the inverter; 2) Suppress the higher harmonics of the input side; prevent the other equipment damage for the voltage waveform distortion.
Input EMC Filter	Input side of the frequency inverter	1) Reduce the inverter external conduction and radiation disturbance; 2) Reduce the interference of conduction flowing from the power to the inverter, and improve the anti-interference ability of the inverter.
DC Reactor	Between EMC filter and braking resistor	1) Improve the input power factor of the inverter; 2) Improve the efficiency and thermal stability of the whole inverter. 3) Suppress the higher harmonics of the input side; reduce external conduction and radiation disturbance.
AC Output Reactor	Between the output side of the frequency inverter and motor, close to the inverter	The output side of the inverter generally contains much higher harmonics. When the motor is far from the inverter, there is large distributed capacitance in the circuit, the higher harmonics may produce resonance in the circuit, and bring two influences: 1) Destroy motor insulation performance, might damage the motor for a long time. 2) Have caused a greater leakage current and the inverter will trip frequently. Generally, when the cables from the inverter to motor are longer than 100m, an output AC line reactor should be used.

2.7 Selection of Braking Unit and Resistor

1. Resistance selection of braking resistor

When braking, the regenerative energy of motor is expended on braking resistor.

According to formula U*U/R = Pb:

U means braking voltage when system brakes stably（Different system, different braking voltage. Generally 380VAC system uses 700V）.

Pb refers to braking power.

2. Selection of braking resistor's power

In the theory, the power of braking resistor is the same as the braking power. But in consideration the derating, we could use this formula to calculate the power of the braking resistor:

K * Pr = Pb * D.

K ranges from 15% to 30%;

Pr----power of resistor;

D----braking frequency（percentage of regeneration process to whole deceleration）:

Elevator / oil pumping unit: 20%~30%

Winding and unwinding: 20%~30%

Centrifuge: 50%~60%

Occasional braking load: 5%

General application: 10%.

3. Selection guidance

Note: Table 2-5 is the guide data, according to the actual situation, the user can choose different resistance and power (the resistance must not be greater than the recommended value in the table, but the power could.). The motor's power in

...plication system, determine the braking resistor, which have relationship with system inertia, deceleration ... energy of the load, the customer should select according to the actual situation. The bigger the system inertia, the shorter time required deceleration, braking more frequent, the braking resistor should have the bigger power and the smaller resistance.

Table 2-5 Selection of HD200E Inverter Braking Package

Inverter Model	Recommended Braking Resistor Power (W)	Recommended Braking Resistor Resistance (Ω)	Braking Unit	Remark
HD200E-0R7G/1R5P-T4	150W	≥300Ω	Standard build-in	The wiring method, please refer to Chapter 3.
HD200E-1R5G/2R2P-T4	150W	≥220Ω		
HD200E-2R2G/004P-T4	250W	≥200Ω		
HD200E-004G/5R5P-T4	300W	≥130Ω		
HD200E-5R5G/7R5P-T4	400W	≥90Ω		
HD200E-7R5G/011P-T4	500W	≥65Ω		
HD200E-011G/015P-T4	800W	≥43Ω		
HD200E-015G/018P-T4	1000W	≥32Ω		
HD200E-018G/022P-T4	1300W	≥25Ω		
HD200E-022G/030P-T4	1500W	≥22Ω		
HD200E-030G/037P-T4 HD200E-037G/045P-T4 HD200E-045G/055P-T4 HD200E-055G/075P-T4 HD200E-075G/090P-T4	2500W	≥16Ω	Optional built-in	
HD200E-090G/110P-T4 HD200E-110G/132P-T4 HD200E-132G/160P-T4 HD200E-160G/185P-T4 HD200E-185G/200P-T4 HD200E-200G/220P-T4 HD200E-220G/250P-T4 HD200E-250G/280P-T4 HD200E-280G/315P-T4 HD200E-315G/350P-T4 HD200E-350G/400P-T4	According to braking unit request	According to braking unit request	External	

2.8 Inverter Daily Maintenance

1. Daily Maintenance

Many factors such as ambient temperature, humidity, dust, vibration will cause the internal components aging and give rise to the occurrence of potential faults or lessen the service life of the inverter. Therefore, it is necessary to conduct routine maintenance to the inverter.

2. Daily inspection

a) When running, whether the motor has abnormal sound.

b) When running, whether the motor generates vibration.

c) Whether the installation environment of the inverter changes.

d) Whether the cooling fan of the inverter is working properly.

e) Whether the inverter is overheating

3. Daily cleaning

a) Reserve the inverter in a clean state.

emove the dust on the surface of the inverter to prevent dust entering the inside of the inverter, especially

c) Effectively clear the oil from the cooling fan.

4. Routine Checking

Check regularly the place which is difficult to check when the inverter is running. Routine checking items:

a) Check the air duct, and regularly clean.

b) Check whether the screws are loose.

c) Check whether the inverter is corroded.

d) Check whether the terminals have arc traces.

e) Check whether the main circuit is insulation.

Notes: When using a DC 500V Mega-Ohm-Meter to test insulating resistance, please make sure the main circuit and the inverter is disconnected. Please don't use the insulation resistance meter to test the insulation of the control circuit. High voltage test is unnecessary (it has already been conducted before delivery).

5. Replacing of quick-wearing Parts

The quick-wearing parts of the inverter mainly include cooling fan and electrolytic capacitors for filters. Their lifetime depends largely on their application environment and maintenance condition. Normally, lifetime is:

Components	Life
Fan	2~3 years
Electrolyte capacitor	4~5 years

The user can decide the replace age limit according to the running time.

1. Cooling fan

Possible cause of damages: wear of the bearing, aging of the fan vanes.

Criteria: Check if there is crack on fan vanes and other parts. When the inverter is switched on, check if there is any abnormal vibration.

2. Filtering electrolytic capacitors

Possible cause of damages: the quality of input power is bad, the ambient temperature is high, frequent loading jump and aging of electrolyte.

Criteria: Check if there is any leakage of liquids. Check if the safety valve protrudes. Measurement of static capacitance and insulation resistance.

3. Storage

After buying the inverter, when store for temporarily and long-term, the following notes are important:

1) As far as possible store into the original packaging.

2) Long-term storage will cause the deterioration of electrolytic capacitors. Therefore, the inverter must be powered within 2 years, and the conduction time is at least for 5 hours. The input voltage must be boosted gradually to the rated value by the voltage regulator.

Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical Installation

3.1.1 Installation Environment

1. Ambient temperature: the surrounding environment and temperature has great influence on the life of the inverter, the running ambient temperature of the inverter should be within the temperature range of -10℃~50℃.

2. The inverter should be installed on the surface of the antifoaming goods, there must be enough space for heat dissipation around, install the inverter vertically on the support with the screw.

3. Install in the location where vibration is less than 0.6G. Pay special attention to be away from the punch press and other equipments.

4. Install in the location free of direct sunlight, wet, drops of water.

5. Install in the location reserve away from corrosive gas, flammable gas or explosive gas.

6. Install in the location avoid greasy dirt, dust, metal dust.

7. The inverter should be installed on the fire-proof plate.

Single installation: The table below shows single installation recommendation size.

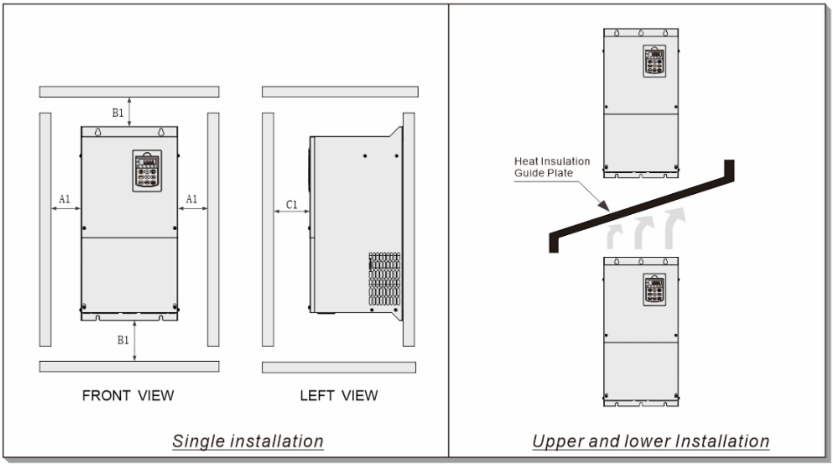

Figure 3-1 Installation Diagram

Power Rating	Installation Size		
	A1	B1	C1
0.75~4kW	≥30mm	≥100mm	≥30mm
5.5~37kW	≥50mm	≥200mm	≥50mm
45~132kW	≥50mm	≥300mm	≥50mm
160~220kW	≥50mm	≥350mm	≥50mm
250~350kW	≥50mm	≥400mm	≥50mm

Upper and lower Installation: when two inverters are mounted one on top the other, an heat insulation guide plate should be fixed in between as shown above.

3.1.2 Installation Attention

When installing, the thermal dissipation should be paid attention to. So please note the following:

1) In order to easy to dissipate the thermal, please install the inverter vertically, but cannot be inverted. If there are several inverters in the cabinet, the best method is to install side by side. When two Variable Speed Drives are installed one on top the other, the heat insulation guide plate should be installed between as shown in Figure. 3-1.

nents on installation space are shown in Figure 3-1 which should ensure the heat dissipation space of the t should ensure the heat dissipation condition of other components in the cabinet.

3) Mounting bracket must be flame-retardant material.

4) For the location where there is metal powder, the inverter should be mounted outside of the cabinet. If the space is sealed, should make the cabinet having space as large as possible.

3.2 Electrical Installation

3.2.1 External Electrical Part Selection

Table3-1 HD200E Inverter External Electrical Part Selection

Inverter Model	Circuit Breaker (A)	Recommended Contactor (A)	Recommended Input Side Main Circuit Wire (mm^2)	Recommended Output Side Main Circuit Wire (mm^2)	Recommended Control Circuit Wire (mm^2)
HD200E-0R7G/1R5P-T4	16	10	2.5	2.5	1.0
HD200E-1R5G/2R2P-T4	16	10	2.5	2.5	1.0
HD200E-2R2G/004P-T4	25	16	4.0	4.0	1.0
HD200E-004G/5R5P-T4	32	25	4.0	4.0	1.0
HD200E-5R5G/7R5P-T4	40	32	4.0	4.0	1.0
HD200E-7R5G/011P-T4	40	32	4.0	4.0	1.0
HD200E-011G/015P-T4	63	40	4.0	4.0	1.0
HD200E-015G/018P-T4	63	40	6.0	6.0	1.0
HD200E-018G/022P-T4	100	63	6.0	6.0	1.5
HD200E-022G/030P-T4	100	63	10	10	1.5
HD200E-030G/037P-T4	125	100	16	10	1.5
HD200E-037G/045P-T4	160	100	16	16	1.5
HD200E-045G/055P-T4	200	125	25	25	1.5
HD200E-055G/075P-T4	200	125	35	25	1.5
HD200E-075G/090P-T4	250	160	50	35	1.5
HD200E-090G/110P-T4	250	160	70	35	1.5
HD200E-110G/132P-T4	350	350	120	120	1.5
HD200E-132G/160P-T4	400	400	150	150	1.5
HD200E-160G/185P-T4	500	400	185	185	1.5
HD200E-185G/200P-T4	600	600	150*2	150*2	1.5
HD200E-200G/220P-T4	600	600	150*2	150*2	1.5
HD200E-220G/250P-T4	800	600	185*2	185*2	1.5
HD200E-250G/280P-T4	800	800	185*2	185*2	1.5
HD200E-280G/315P-T4	800	800	150*3	150*3	1.5
HD200E-315G/350P-T4	800	800	150*4	150*4	1.5
HD200E-350G/400P-T4	1000	1000	150*4	150*4	1.5

Diagram

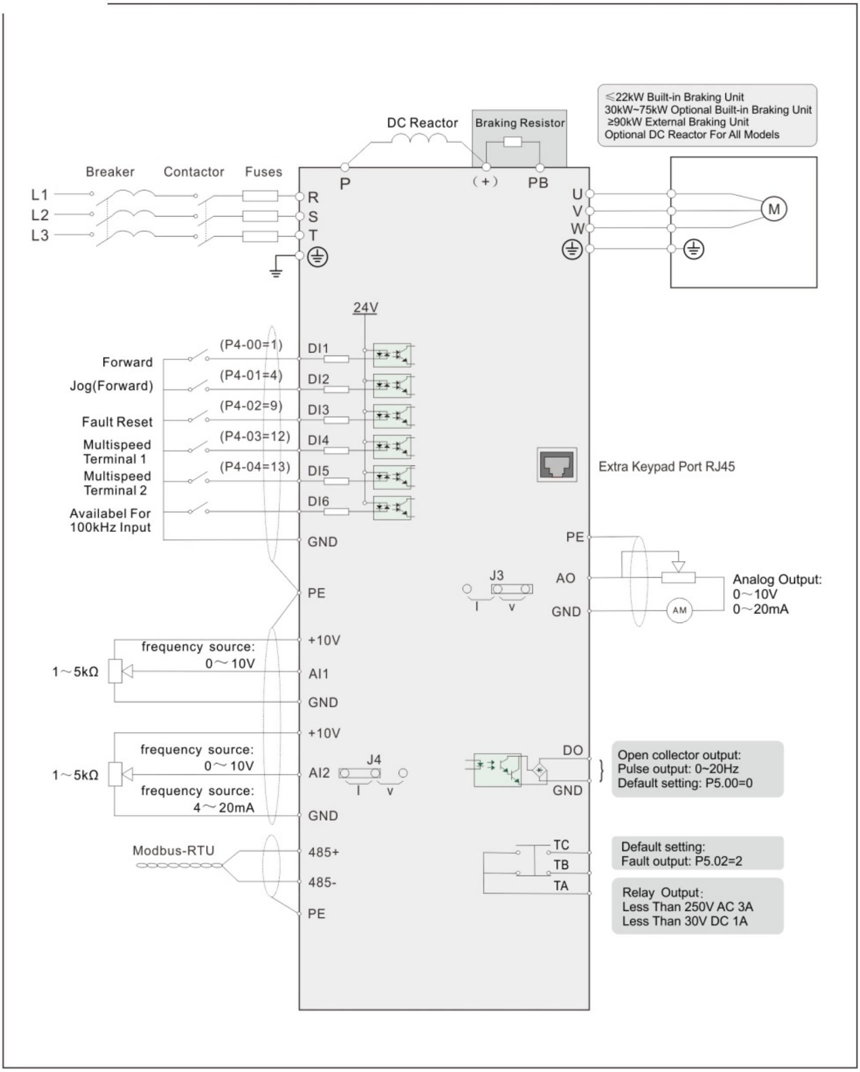

Diagram 3-1 Inverter Wiring Diagram

Notes: terminal ◎ means main circuit terminal, ○ means control circuit terminal.

3.2.3 Main Circuit Terminals

⚠ WARNING
1. Before wiring, make sure the power switch is OFF, otherwise it can lead to electric shock.
2. Only trained professionals can do wiring, so as to avoid the risk of the drive damage and the personal Injury.
3. The inverter must be properly earthed to reduce electrical accident and fire.

TION

1. Ensure that the inverter's rated input voltage is identical with the AC supply voltage before using it. 2. Confirm the motor and the inverter adaptation, otherwise, it may damage the inverter or cause the motor triping. 3. It is prohibited to connect the AC supply cables to the inverter's terminals U, V and W. 4. Braking resistor cannot be directly connected to the DC bus (+), (-).

Introduction of main circuit terminals of three phase 380V inverter

Sign	Name	Description
R, S, T	3-phase power supply input terminals	3-phase 380V AC supply connections
(+), (-)	DC bus wire (+,-) terminals	DC bus input common point, reserved terminals for above 30kw external brake units.
(+), PB	Brake resistor wiring terminals	30kW and below, the brake resistor connected points.
P, (+)	Add reactor wiring terminals outside	Connection point of external DC reactor.
U, V, W	Inverter output terminals	Connect 3-phase motor
⏚	Earth terminal	Earth terminal

Wiring Notes:

a) Input Power R, S, T:

The frequency inverter's input side wiring is not requirements in phase order.

b) DC bus terminals (+), (-)

Notice: Wiring can only be done after the inverter's AC power is cut off, then waiting for at least 5mins and confirming the voltage between DC bus terminals plus and minus is below DC 36V.

When choosing external braking units more than 30KW for frequency inverter, do not mistake the terminals (+), (-), otherwise, it can lead to the inverter damage and fire.

When the cables from the frequency inverter to motor are longer than 10m, multi-stranded cables or close two-lane parallel wiring should be used.

Braking resistor cannot be directly connected to the DC bus, otherwise, it cause the risk of the inverter damage and fire.

c) Brake resistor terminals (+), PB:

Less than 30KW, after confirming the inverters have built-in brake units, the braking resistor terminals are effective.

Selection of braking resistor should refer to the recommended value, and wiring distance should be less than 5m, so as to reduce the risk of the inverter damage.

d) Add reactor connect terminal outside P, (+):

30kW and above frequency inverter, adding reactor outside，remove the connected piece between P and (+), then connect the reactor to the two terminals.

e) Frequency Inverter Output Side U. V. W:

The capacitors or surge absorbers cannot be connected to the output side of the inverter. Otherwise cause the frequency inverter to trip frequently or even be damaged.

Because motor cable is too long, the impact of distributed capacitance produces electrical resonance, which led to the damage of the motor insulation, the inverter triping for a bigger leakage current. When the cables from the inverter to motor are longer than 100m, an AC input reactor should be used.

f) Earth Terminal ⏚

The terminal must be properly earthed, ground resistance must be less than 0.1Ω. Otherwise, it lead to equipment abnormal operation or damaged.

Notice: It is prohibited to share the earth terminal E and the power zero line terminal N.

3.2.4 Control Circuit Terminals

1. Control circuit terminals drawing:

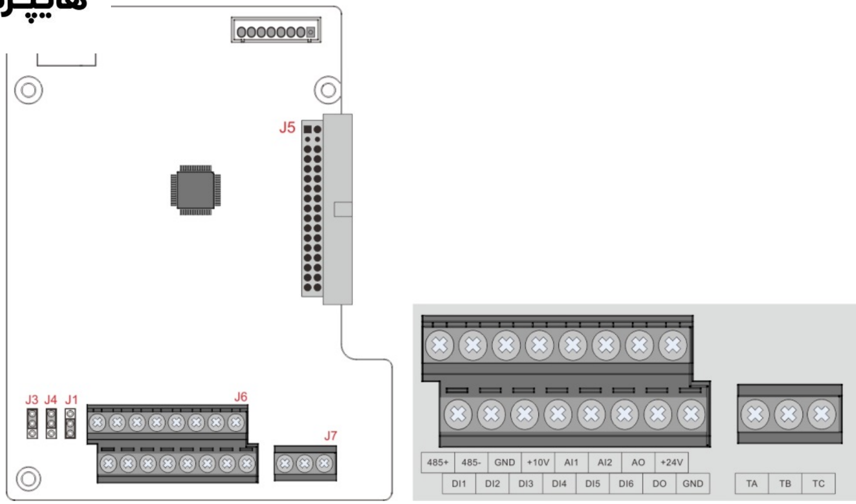

Diagram 3-2 Control Circuit Terminals

2. Description of control circuit terminals

Table 3-2 Description of Control Circuit Terminals

Type	Terminal symbol	Terminal Name	Function Description
Power Supply	+10V~GND	+10V power supply	Provide +10V power supply for external units. Normally it's used as working power supply of the external potentiometer, the potentiometer resistance range: 1kΩ ~ 5kΩ. Max output current: 10mA.
	+24V~COM	+24V power supply	Provide +24 V power supply for external units. Generally it's used as the power supply of digital input & output terminals and external transducers. Max output current: 200mA.
Analog Input	AI1-GND	Analog input 1	Input range: DC 0V~10V Input impedance: 22kΩ
	AI2-GND	Analog input 2	Input range: DC 0~10V or 0/4~20mA, determined by J4 jumper on the control board Input impedance: 22kΩ (voltage), 500kΩ (current)
Digital Input	DI1-COM	Digital input 1	Optical coupling isolation, compatible with dual polarity input. Input impedance: 3.3kΩ Voltage range for level input: 9~30V DI6-COM can be used for high speed pulse input. Maximum input frequency: 100kHz.
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	DI5-COM	Digital input 5	
	DI6-COM	Digital input 6	
Analog Output	AO-GND	Analog output	The voltage or current output is determined by J2 jumper on the control board. Voltage output range: 0V~10V, Current output range: 0mA~20mA.

Digital Output	DO-GND	Digital output	It can be used as high speed pulse output or open collector output which is determined by function code P5-00. High speed pulse output: maximum frequency is 20kHZ. Output voltage range: DC 0V~24V. Output current range: 0mA~50mA.
Relay Output	T1/A-T1/B	Normal close terminal	Driving capacity: AC 250V，3A，COSø=0.4; DC 30V，1A.
	T1/A-T1/C	Normal open terminal	
Communication Terminal	485- 485+	RS485 communication	Support standard MODBUS Communication.

3. Control board jumper description

Jumper No.	Jumper Name	Options symbol	Description
J5	Drive flat cable	-	Signal connection cable between control board and drive board
J9	External keypad interface	-	External keypad interface
J3	AO output options	V I	Options: voltage output, current output Default：voltage output enabled
J4	AI2 input options	V I	Options: voltage output, current output Default：current output enabled
J1	485 terminal resistance options	NC 485	Options: 485 terminal resistance(120Ω) Default: No resistance

Chapter 4 Operation and Display

4.1 Description of Operation Keypad

Through the operation keypad, we could modify the function parameters, monitor the working status, and perform the running control (start, stop) on the inverter.

Its outline and functional zone are as follows.

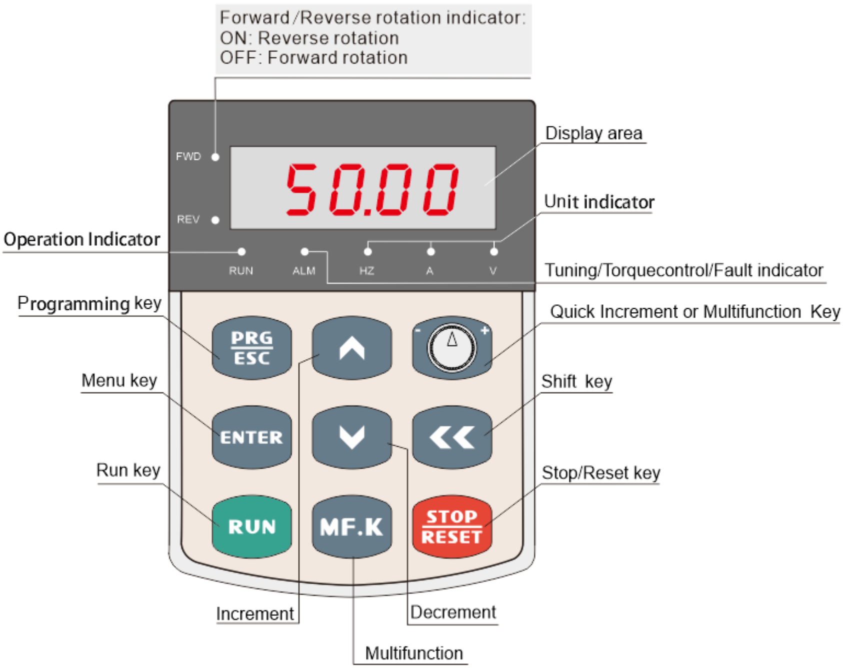

Figure 4-1 Operation Keypad Diagram

1. Description of Function Indicators

RUN: ON indicates that the Inverter is at running status, OFF indicates that the Inverter is at stop status.

FWD/REV: On indicates reverse rotation, OFF indicates forward rotation.

2. Unit Indicators

Hz: unit of frequency

A: unit of current

V: unit of voltage

3. Digital Display

The 5-number digit LED display can display the setting frequency, output frequency, monitoring data and fault codes.

4．Description of Keypad button

Table 4-1 Keypad Button Function Menu

Key	Name	Function
PRG/ESC	Programming	Enter or exit Level I menu.
ENTER	Confirmation	Enter the menu interfaces level by level, and confirm the parameter setting.
▲	Increment	Increase data or function code.
▼	Decrement	Decrease data or function code.
SHIFT	Shift	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification bit of parameters when modifying parameters.
RUN	Running	Start to run inverter under keyboard control mode.
STOP RESET	Stop/Reset	Stop inverter on running status and reset operation on fault status. The functions of this key are restricted in P7-02.
MF.K	Multifunction	Perform function switchover (such as quick switchover of command source or direction) according to the setting of P7-01.

4.2 Viewing and Modifying Function Codes

Basic function code group is inverter's whole function codes, after entering its grade menu.

The operation panel of HD200E adopts three-level menu. The three-level menu consists of function code group (Level I), function code (Level II), and function code setting value (level III), as shown in the following Figure.

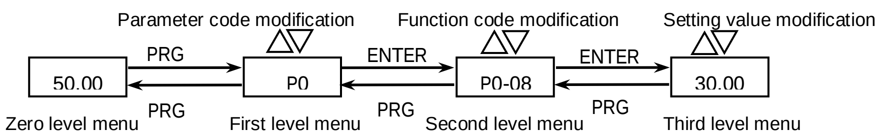

Figure 4-2 Operation procedure of Three-level Menu

Explain: You can return to Level II menu from Level III menu by pressing PRG or ENTER. If you press ENTER, the system saves the parameter setting first, and then goes back to Level II menu and shifts to the next function code. If you press PRG, the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

In Level III menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This maybe because:

1/ Such a function code is only readable, such as, actual detected parameter and running record parameter.

2/ Such a function code cannot be modified in the running state and can only be modified at stop status.

4.3 User Modified Function Code

In you modified menu, only the parameters that are modified to a non-default value are displayed. The menu is generated by the inverter automatically. After the mode is switched over to User modified function code, Level II menu is displayed

4.4 Definition and Operation of the Multifunction Key (MF.K)

You can define the function (command source switchover or rotation direction switchover) of the multifunction key in P7-01. For details, see the description of P7-01.

4.5 Starting or Stopping the Inverter

4.5.1 Selecting the Start/Stop Command Source

There are three start/stop command sources, namely, operation keypad control, terminal control, and communication control. You can select the command source in P0-02.

P0-02	Command Source Selection	Default: 0	Description

	Setting Range	0	Operation keypad control (Indicator OFF)	Press RUN, STOP to start or stop the Inverter.
		1	Terminal control (indicator ON)	DI terminal needs to be defined as the run/stop terminal.
		2	Communication control (Indicator Blinking)	The Modbus-RTU communication protocol is used.

1. Operation Keypad Control

Control inverter through operation keypad, use function code P0-02=0. After you press RUN, the Inverter starts running (the RUN indicator is ON). After you press STOP, when the Inverter is in running state, the Inverter stops running (the RUN indicator is OFF)

2. Terminal Control

This control mode is applicable to scenarios where the PID switch or electromagnetic button is used to start or stop the application system or scenarios where the dry contact signal is used to start or stop the Inverter.

The switch signal mode is set in P4-11. The input terminal of the start/stop signal is set in P4-00 to P4-09. For details, see the description of P4-11 and P4-00 to P4-09.

3. Communication Control

The most common configuration is when the host computer is used to control running of the inverter by means of communication, such as the RS485.

The communication interface of HD200E inverter supports the Modbus-RTU protocol, and the communication is implemented only when the host computer supports the Modbus-RTU master station protocol.

4.5.2 Start Mode

HD200E supports three start modes, namely, direct start, rotational speed tracking restart, and pre-excited start (asynchronous motor), set in P6-00.

Direct start: It is applicable to small-inertia load. The frequency curve in this mode is shown in the following Figure. DC braking before the start is applicable to inverter of load such as elevator and crane. Startup frequency is applicable to inverter with burst start under start torque, such as cement mixer.

P6-00 = 1 (Rotational speed tracking restart) It is applicable to large-inertia load. The frequency curve in this mode is shown in the following Figure. If the load motor is still rotating due to the inertia when the Inverter starts, this mode is used to prevent start overcurrent

P6-00 = 2 (Pre-excited start)

It is applicable only to inductive asynchronous motor. The Inverter performs pre-excitation before start, improving quick response of the motor and meeting the requirements of short acceleration time. The frequency curve in this mode is shown in the following Figure

4.5.3 Stop Mode

The inverter supports two stop modes, decelerate to stop and coast to stop, set in P6-10.

4.5.4 Timing Stop

HD200E supports timing stop. This function is enabled by P8-42 and the timing duration is determined by P8-43 and P8-44.

You can set the timing duration by means of analog input (such as potentiometer signal). For details, see the description of P8-43.

4.6 Setting the Running Frequency

The inverter provides two frequency sources, namely, main frequency source A and auxiliary frequency source B. You can select one frequency source and switch over between the two sources. You can also perform superposition on the two sources by setting the calculation formula to meet different control requirements of different scenarios

4.6.1 Frequency Setting by the Main Frequency Source

There are nine setting modes of main frequency sources, digital setting (UP/DOWN modification, non-retentive at power failure), digital setting (UP/DOWN modification, retentive at power failure), AI1, AI2, HDI pulse setting, multi-step speed, simple PLC, PID, communication, and keypad potentiometer setting. You can select one in P0-03.

According to the preceding Figure, the running frequency of the Inverter can be set by means of function codes, manual adjustment, analog input, multi-speed terminal, external feedback signal, internal PID regulator, or the host computer.

4.6.2 Frequency Setting by the Auxiliary Frequency Source

setting by the auxiliary frequency source is the same as the frequency setting by the main frequency n set the auxiliary frequency source in P0-04.

The relationship between the target running frequency and the main frequency source and auxiliary frequency source is set in P0-07, as follows:

1) Main frequency source A: The main frequency source is directly used to set the target running frequency.

2) Auxiliary frequency source B: The auxiliary frequency source is directly used to set the target running frequency.

3) A and B operation: There are four operation methods, namely, A+B, A-B, maximum of A and B, and minimum of A and B.

4) Frequency switchover: DI terminal is used to switch over between the preceding three frequency setting channels.

4.6.3 Binding Command Source to Frequency Source

The three command sources can be separately bound to frequency sources. When the specified command source (P0-02) is bound to a frequency source (corresponding digit in the value of P0-27), the frequency is determined by the frequency setting channel set in P0-27. In this case, both main and auxiliary frequency sources are ineffective.

4.6.4 Frequency Closed-loop Control

HD200E has a built-in PID regulator. Together with the frequency sources, the PID regulator can implement automatic adjustment of progress control, such as constant temperature, constant pressure, and tension control.

When PID frequency closed-loop control is implemented, P0-03 (Main frequency source A selection) must be set to 8 (PID). The PID-related parameters are set in group PA.

HD200E has two built-in equivalent PID calculating units. You can set the features, such as adjustment speed and accuracy, for the two units separately based on the actual conditions. Switchover between the two units can be implemented automatically or by means of an external DI terminal.

4.6.5 Swing Mode

In textile and chemical processing equipment, the application of swing frequency function can improve the coiling uniform flat of spindle. It can be achieved by setting Pb-00 to Pb-04 function code.

About the specific methods, please refer to the related function code detailed description.

4.6.6 Multi-Speed Mode

In the applications where the running frequency of the inverter need not be adjusted continuously and only several frequencies are required, the multi-speed control can be used. HD200E supports a maximum of 16 running frequencies, which are implemented by state combinations of four DI terminals. Set the function codes corresponding to DI terminals to a value among 12 to 15, and then the DI terminals are specified as the multi-frequency input terminals. The multiple frequencies are set based on the multi-frequency table in group PC. In addition, you need to set P0-03 (Main frequency source A selection) to 6 (Multi-step).

HD200E supports a maximum of four DI terminals to be used as the multi-frequency input terminals. You can also use less than four DI terminals, and the empty bit is considered to be 0.

4.6.7 Setting the Motor Rotating Direction

After the inverter restores the default settings, press RUN, the inverter drive the motor to rotate. In this case, the rotating direction is regarded as forward rotation. If the rotating direction is reverse to the direction required by the equipment, power off the inverter and exchange any two of the output UVW cables (wait until the main capacitor of the Inverter is completely discharged).

In some applications where both forward rotation and reverse rotation are required, enable the reverse control (P8-13 = 0, default value) and meanwhile reverse the rotating direction by setting P0-09 to 1. Then press RUN to make the motor rotate in the reverse direction.

If the command source is terminal control and reverse rotation is required, use the default value 0 of P8-13 to enable reverse control.

When the running frequency of the Inverter is set by means of communication (P0-03 = 9) and reverse control is enabled (P8-13 = 0), the inverter instructs the reverse direction if the setting frequency is a negative value. If the given running command is reverse rotation or the set frequency is a negative value, but reverse control is disabled (P8-13 = 1), the inverter will run at 0 Hz and has no output. In some applications where reverse rotation is prohibited, do not change the rotating direction by modifying the function codes because the function codes will be restored once the Inverter restores the default settings

4.6.8 Setting the Fixed Length Control Mode

HD200E has the fixed length control function. The length pulses are sampled by the DI terminal allocated with function 27 (Length count input). The "Actual length" (Pb-06) is obtained by dividing the number of pulses sampled by the value of Pb-07 (Number of pulses per meter). If the actual length is larger than the "Set length" (Pb-05), the multifunctional DO terminal becomes ON.

of fixed length control, the length can be reset by means of the DI terminal allocated with function 28

Note:

1) In the fixed length control mode, the direction cannot be identified and only the length shall be calculated based on the number of pulses.

2) Only DI6 can be allocated with the function "Length count input".

3) An automatic stop system can be implemented, if the length reached signal output by the DO is fed back to the inverter input terminal with stop function.

4.6.9 Use of the Counting Function

The count value needs to be collected by the DI terminal that is allocated with function 25. When the count value reaches Pb-08 (Set count value), the DI terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting. When the count value reaches Pb-09 (Designated count value), the DI terminal allocated with function 9 (Designated count value reached) becomes ON. The counter continues to count until "Set count value" is reached.

Note:

1. Pb-09 (Designated count value) must not be greater than Pb-08 (Set count value).
2. DI6 must be used when the pulse frequency is high.
3. The DO terminal that is allocated with function 9 (Designated count value reached) and the DO terminal that is allocated with function 8 (Set count value reached) must not be the same.
4. In the RUN/STOP state of the Inverter, the counter will not stop until "Set count value" is reached.
5. The count value is retentive at power failure.
6. An automatic stop system can be implemented if the signal output by the DO terminal with the function (Count value reached) is fed back to the DI terminal of the inverter with stop function.

4.7 Setting and Auto-tuning of Motor Parameters

4.7.1 Motor Parameters to Be Set

When the Inverter runs in the vector control mode (P0-01 = 0), accurate motor parameters are required to ensure desired inverter performance and running efficiency. This is extremely different from the V/f control (P0-01 = 2).

Motor parameters (motor 1 by default) that need to be set are listed in the following table.

Parameter	Description	Remark
P1-00	Motor type	Asynchronous motor, variable frequency asynchronous motor, synchronous motor
P1-01~P1-05	Rated motor power, Rated motor voltage, Rated motor current, Rated motor frequency, Rated motor rotational speed.	Model parameters, Manual input
P1-06~P1-20	Motor internal equivalent stator resistance, inductive reactance and rotor inductance.	Auto-tuning parameters

For complicated application system with multiple motors, the parameters of motor 2 are listed in the following table.

Motor 2 Parameter	Remark
H2-00	Asynchronous motor, variable frequency asynchronous motor, synchronous motor
H2-01~H2-05	Model parameters, manual input
H2-06~H2-20	Auto-tuning parameters

4.7.2 Motor Auto-tuning

To obtain the motor parameters, the Inverter can perform dynamic auto-tuning or static auto-tuning. For the asynchronous motor that cannot be disconnected from the load, you can input the motor parameters of the same model that was successfully auto-tuned before.

Auto-tuning	Application	Result

[illegible]mic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) can be disconnected from the load.	Best
With-load dynamic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) cannot be disconnected from the load.	OK
Static auto-tuning	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load and dynamic auto-tuning is not allowed.	Poor
Manual input	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load. Input the motor parameters of the same model that was successfully autotuned before into function codes P1-00 toP1-10.	OK

The following motor auto-tuning description takes motor 1 as an example. The auto-tuning of motor 2 is the same and only the function codes are changed correspondingly. The process of motor auto-tuning is as follows:

1) If the motor can be disconnected from the load, disconnect the motor from the load mechanically after power-off so that the motor can run without load.

2) After power-on, set P0-02 (Command source selection) to 0 (Operation keypad control).

3) Input the motor nameplate parameters (such as P1-00 to P1-05) correctly and input the following parameters based on the actually selected motor.

Motor	Parameter
Motor 1	P1-00:Motor type selection P1-01:Rated motor power P1-02:Rated motor voltage P1-03:Rated motor current P1-04:Rated motor frequency P1-05:Rated motor rotational speed
Motor 2	H2-00 to H2-05, defined the same as P1-00 to P1-05

For asynchronous motor, set P1-37 (Auto-tuning selection) to 2 (Asynchronous motor complete auto-tuning). For motors 2, 3, or 4, the corresponding function code is H2-37, press ENTER on the operation keypad. The operation keypad displays:

TUNE

Then press RUN on the operation keypad. The inverter will drive the motor to accelerate/ decelerate and run in the forward/reverse direction, and the RUN indicator is ON. The auto-tuning lasts approximately 2 minutes. When the preceding display information disappears and the operation keypad returns to the normal parameter display status, it indicates that the auto-tuning is complete.

The Inverter will automatically calculate the following motor parameters:

Motor	Parameter
Motor 1	P1-06:Stator resistance (asynchronous motor) P1-07:Rotor resistance (asynchronous motor) P1-08:Leakage inductive reactance (asynchronous motor) P1-09:Mutual inductive reactance (asynchronous motor) P1-10:No-load current (asynchronous motor)
Motor 2	H2-06 to H2-10, defined the same as P1-06 to P1-10

If the motor cannot be disconnected from the load, set P1-37 (Motor 2 is H2-37) to 1 (Asynchronous motor static tuning) and then press RUN on the operation keypad. The motor auto-tuning starts.

4.7.3 Setting and Switchover of Multiple Groups of Motor Parameters

The Inverter supports switchover between two groups of motor parameters, groups H1, H2 (motor 1 parameters).

You can select the current effective motor parameter group by means of function code P0-24 or DI terminals with functions 41. When the DI terminals with functions 41 become ON, they are privileged and the setting of P0-24 becomes invalid.

4.8 Password Setting

The Inverter provides the user password protection function. When PP-00 is set to a nonzero value, the value is the user password. The password takes effect after you exit the function code editing state. When you press PRG again, "------" will be displayed, and you must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set PP-00 to 0.

Parameter Saving and Default Setting Restoring

After a function code is modified on the operation keypad, the modification will be saved in the register of the inverter and remain effective at next power-on.

The inverter supports backup and restoration of parameter setting, which is convenient for commissioning.

The inverter also provides the retentive function on alarm information and accumulative running time.

You can restore the backup values or default settings of the function codes of the inverter or clear the running data through PP-01. For details, see the description of PP-01.

Chapter 5 Function Parameter List

If PP-00 is set to non-zero number, parameter protection is enabled. Under the situation of function parameter model and user change parameter model, you must enter the correct password to enter the parameter menu. If you want to cancel, please PP-00 is set to 0.

Customized parameters mode menu is not protected by password.

Group P and Group H are standard function parameters, Group U are monitoring function parameters. The symbols in the function code table are described as follows:

"√": The parameter settings can be modified when the inverter is either stop or running state;

"×": The parameters settings cannot be modified when the inverter is in the running state;

"○": Parameter value is the actual testing records, it cannot be modified.

5.1 Basic Function Parameter Table

Function Code	Parameter Name	Setting Range	Factory Default	Property
P0 Group: Basic Function				
P0-00	Inverter model	1: G Type（constant torque load model） 2: P Type（variable torque load, e.g. fan and water pump load models）	1	×
P0-01	Motor 1 control mode	0: Sensorless vector control（SVC） 1: Reserved 2: V/f control	0	×
P0-02	Command source selection	0: Operation keypad（LED off） 1: Terminal（LED on ） 2: Communication（LED blinking）	0	√
P0-03	Main frequency source A selection	0: Digital setting（preset frequency P0-08，UP/DOWN adjustable，non-retentive at power failure） 1: Digital setting（preset frequency P0-08，UP/DOWN adjustable，retentive at power failure） 2: AI1 3: AI2 4: Reserved 5: HDI speed pulse（DI6） 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication setting 10: Keypad potentiometer	0	×
P0-04	Auxiliary frequency source B selection	The same as P0-03	0	×
P0-05	Superimposed auxiliary frequency source B	0: Relative to maximum frequency 1: Relative to the frequency source A	0	√
P0-06	Superimposed auxiliary frequency source B	0% ~ 150%	100%	√

P0-07	Frequency source superposition selection	Unit's digit: frequency source selection 0: Main frequency source A 1: The operation result of A and B（operation relationship determined by ten's digit） 2: Switchover between A and B 3: Switchover between A and "A and B operation" 4: Switchover between auxiliary frequency source B and the operation result of A and B Ten's digit: A and B operation relationship 0: A+B；　1: A-B； 2: Max (A,B);　3: Min (A,B)	00	√
P0-08	Preset frequency	0.00Hz ~ maximum frequency（P0-10）	50.00Hz	√
P0-09	Rotation direction	0: Forward 1: Reverse	0	√
P0-10	Maximum frequency	50.00Hz ~ 300.00Hz	50.00Hz	×
P0-11	Frequency source upper limit	0: Set by P0-12 1: AI1；2: AI2；3: Reserved 4: HDI Pulse 5: Communication	0	×
P0-12	Frequency upper limit	Frequency lower limit P0-14 ~ maximum frequency P0-10	50.00Hz	√
P0-13	Frequency upper limit offset	0.00Hz ~ maximum frequency P0-10	0.00Hz	√
P0-14	Frequency lower limit	0.00Hz ~ P0-12 (frequency upper limit)	0.00Hz	√
P0-15	Carrier frequency	0.5kHz ~ 16.0kHz	Model depend	√
P0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	1	√
P0-17	Acceleration time 1	0.00s ~ 65000s	Model depend	√
P0-18	Deceleration time 1	0.00s ~ 65000s	Model depend	√
P0-19	Acceleration/ Deceleration time unit	0: 1s；　1: 0.1s； 2: 0.01s	1	×
P0-21	Frequency offset of auxiliary frequency source for X and Y operation	0.00Hz ~ P0-10 (maximum frequency)	0.00Hz	√
P0-22	Frequency reference resolution	1: 0.1Hz 2: 0.01Hz	2	×
P0-23	Retentive of digital setting frequency upon power failure	0: Not store 1: Store	0	√
P0-24	Motor selection	0: Motor 1　　1: motor 2	0	×

P0-25	Acceleration/ Deceleration time base frequency	0: Maximum frequency（P0-10） 1: Set frequency 2: 100Hz	0	×
P0-26	Base frequency for UP/ DOWN modification during running	0: Running frequency 1: Set frequency	0	×
P0-27	Binding command source to frequency source	Unit's digit: (Binding operation panel command to frequency source) 0: No binding 1: Digital set frequency 2: AI1 3: AI2 4: Reserved 5: HDI (DI6) 6: Multi-speed 7: Simple PLC 8: PID 9: Communication setting Ten's digit: Terminal command binding frequency source Hundred's digit: Binding communication command to frequency source Thousand's digit: automatic operation binding frequency source	0000	√
P0-28	Serial communication protocol	0: Modbus protocol	0	√
P1 Group: Motor 1 Parameters				
P1-00	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0	×
P1-01	Rated motor power	0.1kW ~ 1000.0kW	Model depend	×
P1-02	Rated motor voltage	1V ~ 2000V	Model depend	×
P1-03	Rated motor current	0.01A ~ 655.35A（Inverter power <=55kW） 0.1A ~ 6553.5A（Inverter power >55kW）	Model depend	×
P1-04	Rated motor frequency	0.01Hz ~ maximum frequency	Model depend	×
P1-05	Rated motor speed	1rpm ~ 65535rpm	Model depend	×
P1-06	Stator resistance (asynchronous motor)	0.001Ω ~ 65.535Ω（Inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（Inverter power >55kW）	Tuning paramet ers	×
P1-07	Rotor resistance (asynchronous motor)	0.001Ω ~ 65.535Ω（Inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（Inverter power >55kW）	Tuning paramet ers	×

P1-08	Leakage inductance (asynchronous motor)	0.01mH ~ 655.35mH（Inverter power <=55kW） 0.001mH ~ 65.535mH（Inverter power >55kW）	Tuning parameters	×
P1-09	Mutual inductance (asynchronous motor)	0.1mH ~ 6553.5mH（Inverter power <=55kW） 0.01mH ~ 655.35mH（Inverter power >55kW）	Tuning parameters	×
P1-10	No-load current (asynchronous motor)	0.01A ~ P1-03（Inverter power <=55kW） 0.1A ~ P1-03（Inverter power >55kW）	Tuning parameters	×
P1-16	Stator resistance (synchronous motor)	0.001Ω ~ 65.535Ω（Inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（Inverter power >55kW）	Tuning parameters	×
P1-17	Shaft D inductance (synchronous motor)	0.01mH ~ 655.35mH（Inverter power <=55kW） 0.001mH ~ 65.535mH（Inverter power >55kW）	Tuning parameters	×
P1-18	Shaft Q inductance (synchronous motor)	0.01mH ~ 655.35mH（Inverter power <= 55kW） 0.001mH ~ 65.535mH（Inverter power >55kW）	Tuning parameters	×
P1-20	Back EMF (synchronous motor)	0.1V ~ 6553.5V	Tuning parameters	×
P1-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 2: Asynchronous motor complete auto-tuning 11: Synchronous motor with-load auto-tuning 12: Synchronous motor no-load auto-tuning	0	×
P2 Group: Motor 1 Vector Control Parameters				
P2-00	Speed loop proportional gain 1	1 ~ 100	10	√
P2-01	Speed loop integral time 1	0.01s ~ 10.00s	0.50s	√
P2-02	Switchover frequency 1	0.00 ~ P2-05	5.00Hz	√
P2-03	Speed loop proportional gain 2	1 ~ 100	30	√
P2-04	Speed loop integral time 2	0.01s ~ 10.00s	1.00s	√
P2-05	Switchover frequency 2	P2-02 ~ maximum frequency	10.00Hz	√
P2-06	Vector control slip gain	50% ~ 200%	100%	√
P2-07	Time constant of speed loop fiter	0.000s ~ 0.100s	0.000s	√
P2-08	Vector control overexcitation gain	0 ~ 200	64	√

P2-09	Torque upper limit source in speed control mode	0: Function code P2-10 setting 1: AI1 2: AI2 3: Reserved 4: HDI Pulse 5: Communication 6: MIN（AI1,AI2） 7: MAX（AI1,AI2） Full range of options 1-7 corresponding to P2-10	0	√
P2-10	Digital setting of torque upper limit in speed control mode	0.0% ~ 200.0%	150.0%	√
P2-13	Excitation adjustment proportional gain	0 ~ 60000	2000	√
P2-14	Excitation adjustment integral gain	0 ~ 60000	1300	√
P2-15	Torque adjustment proportional gain	0 ~ 60000	2000	√
P2-16	Torque adjustment Integral gain	0 ~ 60000	1300	√
P2-17	Speed loop integral property	Unit's digit: integral separation 0: Disabled 1: Enabled	0	√
P2-18	Field weakening mode of synchronous motor	0: Field weakening mode invalid 1: Field weakening mode 2: Automatic adjustment	1	√
P2-19	Field weakening depth of synchronous motor	50%~500%	100%	√
P2-20	Field weakening depth of synchronous motor	1%~300%	50%	√
P2-21	Field weakening automatic adjustment gain	10%~500%	100%	√
P2-22	Field weakening integral multiple	2~10	2	√
P3 Group: V/f Control parameter				
P3-00	V/F curve setting	0: Linear 1: Multi-point 2: Square 3: 1.2 -power 4: 1.4 -power 6: 1.6 -power 8: 1.8 -power 9: Reserved 10: V/F complete separation 11: V/F half separation	0	×
P3-01	Torque boost	0.0%:（Automatic torque boost） 0.1%~30.0%	Model depend	√

	Cut-off frequency of torque boost	0.00Hz ~ maximum frequency	50.00Hz	×
P3-03	Multi-point V/F frequency 1	0.00Hz ~ P3-05	0.00Hz	×
P3-04	Multi-point V/F voltage 1	0.0% ~ 100.0%	0.0%	×
P3-05	Multi-point V/F frequency 2	P3-03 ~ P3-07	0.00Hz	×
P3-06	Multi-point V/F voltage 2	0.0% ~ 100.0%	0.0%	×
P3-07	Multi-point V/F frequency 3	P3-05~ rated motor frequency（P1-04）	0.00Hz	×
P3-08	Multi-point V/F voltage 3	0.0% ~ 100.0%	0.0%	×
P3-09	V/F slip compensation	0.0% ~ 200.0%	0.0%	√
P3-10	V/F over-excitation gain	0~200	64	√
P3-11	V/F oscillation suppression gain	0~100	Model depend	√
P3-13	V/F oscillation suppression gain	0: Digital setting（P3-14） 1: AI1 2: AI2 3: Reserved 4: HDI 5: Multi-step 6: Simple PLC 7: PID 8: Communication Note: 100.0% corresponds to the rated motor voltage	0	√
P3-14	Voltage digital setting for V/F separation	0V ~ rated motor voltage	0V	√
P3-15	Voltage rise time of V/F separation	0.0s ~ 1000.0s Note: It indicates the time for the voltage rising from 0 V to rated motor voltage.	0.0s	√

P4 Group: Input Terminal				
P4-00	DI1 Terminal function	0: No function 1: Forward RUN（FWD） 2: Reverse RUN（REV） （When setting to 1, 2, it needs to be used with P4-11） 3: Three-line running control 4: Forward JOG（FJOG） 5: Reverse JOG（RJOG） 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset（RESET） 10: Run pause 11: Normally open (NO) input of external fault 12: Multi-step speed terminal 1 13: Multi-step speed terminal 2 14: Multi-step speed terminal 3 15: Multi-step speed terminal 4 16: Terminal 1 for acceleration/deceleration time selection 17: Terminal 2 for acceleration/deceleration time selection 18: Frequency source switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover terminal 1 21: Acceleration/Deceleration prohibited 22: PID pause 23: PLC status reset 24: Swing pause 25: Counter input 26: Counter reset 27: Length count input 28: Length reset 29: Torque control prohibited 30: HDI frequency input （enabled only for DI6） 31: Reserved 32: Immediate DC braking 33: Normally closed (NC) input of external fault 34: Frequency modification 35: Reverse PID action direction 36: External STOP terminal 11 37: Command source switchover terminal 2 38: PID integral pause 39: Switchover between frequency source A and preset frequency 40: Switchover between frequency source Band preset frequency	1	×
P4-01	DI2 Terminal function		4	×
P4-02	DI3 Terminal function		9	×
P4-03	DI4 Terminal function		12	×
P4-04	DI5Terminal function		13	×
			0	×
			0	×
			0	×
			0	×
P4-05	DI6 Terminal function		0	×

		41: Motor selection terminal 1 42: Reserved 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed control/Torque control switchover 47: Emergency stop 48: External STOP terminal 2 49: Deceleration DC braking 50: Clear the current running time 51-59: Reserved		
P4-06 ~ P4-07	Reserved			×
P4-08	Braking voltage action point	100% ~ 160%	128%	√
P4-09	AVR function selection	0: Invalid 1: Valid 2: Invalid only when deceleration	0	√
P4-10	DI input terminal filter time	0.000s ~ 1.000s	0.010s	√
P4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	×
P4-12	Terminal UP/DOWN change rate	0.001Hz/s ~ 65.535Hz/s	1.00Hz/s	√
P4-13	AI curve 1 minimum input	0.00V ~ P4-15	0.00V	√
P4-14	Corresponding setting of AI Curve 1 minimum input	-100.0% ~ +100.0%	0.0%	√
P4-15	AI curve 1 maximum input	P4-13 ~ +10.00V	10.00V	√
P4-16	Corresponding setting of AI Curve 1 maximum input	-100.0% ~ +100.0%	100.0%	√
P4-17	AI1 filter time	0.00s ~ 10.00s	0.10s	√
P4-18	AI curve 2 minimum input	0.00V ~ P4-20	0.00V	√

	Corresponding setting of AI Curve 2 minimum input	-100.0% ~ +100.0%	0.0%	√
P4-20	AI curve 2 maximum input	P4-18 ~ +10.00V	10.00V	√
P4-21	Corresponding setting of AI Curve 1 maximum input	-100.0% ~ +100.0%	100.0%	√
P4-22	AI2 filter time	0.00s ~ 10.00s	0.10s	√
P4-28	HDI minimum input	0.00kHz ~ P4-30	0.00kHz	√
P4-29	Corresponding setting of HDI minimum input	-100.0% ~ 100.0%	0.0%	√
P4-30	HDI maximum input	P4-28 ~ 100.00kHz	50.00kHz	√
P4-31	HDI maximum input setting	-100.0% ~ 100.0%	100.0%	√
P4-32	HDI filter time	0.00s ~ 10.00s	0.10s	√
P4-33	AI Analog input curve selection	Unit's digit: AI1 curve selection 1: Curve 1（2 points，see P4-13 ~ P4-16） 2: Curve 2（2 points，see P4-18 ~ P4-21） 3: Curve 3（2 points，see P4-23 ~ P4-26） 4: Curve 4（4 points，see H6-00 ~ H6-07） 5: Curve 5（4 points，see H6-08 ~ H6-15） Ten's digit: AI2 curve selection Curve 1 to curve 5 (same as AI1)	321	√
P4-34	Setting for AI less than minimum input	Unit's digit: AI1 set below the minimum input selection 0: Corresponding to the minimum input set 1: 0.0% Ten's digit: AI2 set below the minimum input selection， the same as above	000	√
P4-35	DI1 delay time	0.0s ~ 3600.0s	0.0s	×
P4-36	DI2 delay time	0.0s ~ 3600.0s	0.0s	×
P4-37	DI3 delay time	0.0s ~ 3600.0s	0.0s	×
P4-38	DI input terminal valid mode selection 1	0: Positive logic 1: Negative logic Unit's digit: DI1 Ten's digit: DI2 Hundred's digit: DI3 Thousand's digit: DI4 Ten thousand's digit: DI5	00000	×
P4-39	DI input terminal valid mode selection 2	0: Positive logic 1: Negative logic Unit's digit: DI6 Ten's digit: reserved Hundred's digit: reserved Thousand's digit: reserved Ten thousand's digit: reserved	00000	×

P5 Group: Output terminal				
P5-00	DO terminal output mode selection	0: High speed pulse output（HDO） 1: Open collector output（DO）	0	√
P5-01	Control board DO open collector output function selection	0: No output 1: Inverter running 2: Fault output（downtime） 3: Frequency-level detection FDT1 output 4: Frequency reached 5: Zero-speed running（no output at stop) 6: Motor overload pre-warning 7: Inverter overload pre-warning 8: Set count value reached 9: Designated count value reached 10: Length reached 11: PLC cycle completed 12: Accumulative running time reached 13: Frequency limited 14: Torque limited 15: Ready for RUN 16: AI1>AI2 17: Frequency upper limit reached 18: Frequency lower limit reached（run-related） 19: Undervoltage state output 20: Communication setting 21: Positioning completed（Reserved） 22: Positioning approached（Reserved） 23: Zero-speed running 2（having output at stop） 24: Accumulative power-on time reached 25: Frequency level detection FDT2 output 26: Frequency 1 reached output 27: Frequency 2 reached output 28: Current 1 reached output 29: Current 2 reached output 30: Timing reached output 31: AI1 input limit exceeded 32: Load becoming 0 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached（having output at stop） 38: Alarm output（continue to run） 39: Motor overheat warning 40: Current running time reached 41: Fault output (There is no output if it is the coast to stop fault and undervoltage occurs.	0	√
P5-02	Control board relays 1 function selection（TA-TB-TC）		2	√
P5-03	Reserved		0	√
P5-04	Reserved		1	√
P5-05	Reserved		4	√

[illegible]	HDO High-speed pulse output function selection	0: Running frequency 1: Setting frequency 2: Output current 3: Output torque（absolute value） 4: Output power 5: Output voltage 6: HDI High-speed pulse input （DI6 terminal，100.% corresponding to 100.0kHz） 7:AI1 8:AI2 9: Reserved 10: Reserved 11: Count value 12: Communication setting 13: Motor rotational speed 14: Output current （100.0% corresponding to 1000.0A） 15: Output voltage （100.0% corresponding to 1000.0V） 16: Output torque (actual value)	0	√
P5-07	AO1 Analog output function selection		0	√
P5-08	Reserved		1	√
P5-09	HDO Output the maximum frequency	0.01kHz ~ 100.00kHz	50.00kHz	√
P5-10	AO offset coefficient	-100.0% ~ +100.0%	0.0%	√
P5-11	AO gain	-10.00 ~ +10.00	1.00	√
P5-17	DO open collector output delay time	0.0s ~ 3600.0s	0.0s	√
P5-18	Control board relay 1 TA-TB-TC output delay time	0.0s ~ 3600.0s	0.0s	√
P5-22	DO output terminal valid state selection	0: Positive logic 1: Negative logic Unit's digit: DO Ten's digit: TA-TB-TC Hundred's digit: Reserved Thousand's digit: Reserved Ten thousand's digit: Reserved	00000	√
P6 Group: Start/Stop Control				
P6-00	Start mode	0: Direct start 1: Speed tracking and restart 2: Pre-excited start（asynchronous motor）	0	√
P6-01	Speed tracking mode	0: From frequency at stop 1: From zero speed 2: From maximum frequency	0	×
P6-02	Speed tracking speed	1 ~ 100	20	√

	Startup frequency	0.00Hz ~ 10.00Hz	0.00Hz	√
P6-04	Startup frequency holding time	0.0s ~ 100.0s	0.0s	×
P6-05	Startup DC braking current/Pre-excited current	0% ~ 100%	0%	×
P6-06	Startup DC braking time/ Pre-excited time	0.0s ~ 100.0s	0.0s	×
P6-07	Acceleration/ Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration A 2: S-curve acceleration/deceleration B	0	×
P6-08	Time proportion of S-curve start segment	0.0% ~ （100.0%-P6-09）	30.0%	×
P6-09	Time proportion of S-curve end segment	0.0% ~ （100.0%-P6-08）	30.0%	×
P6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	√
P6-11	Initial frequency of stop DC braking	0.00Hz ~ maximum frequency	0.00Hz	√
P6-12	Waiting time of stop DC braking	0.0s ~ 100.0s	0.0s	√
P6-13	Stop DC braking current	0%~100%	0%	√
P6-14	Stop DC braking time	0.0s~100.0s	0.0s	√
P6-15	Stop DC braking time	0%~100%	100%	√
P7 Group: Operation Keypad and Display				
P7-01	MF.K Key function selection	0: MF.K key disabled 1: Switchover between operation keypad control and remote command control (terminal or communication) 2: Switchover between forward and reverse 3: Forward JOG 4: Reverse JOG	0	×
P7-02	STOP/RESET key function	0: STOP/RESET key enabled only under keypad control 1: STOP/RESET key enabled always	1	√

P7-03	LED display running parameters 1	0000~FFFF Bit00: Running frequency 1（Hz） Bit01: Set frequency（Hz） Bit02: Bus voltage（V） Bit03: Output voltage（V） Bit04: Output current（A） Bit05: Output power（kW） Bit06: Output torque（%） Bit07: DI input terminal state Bit08:DO output terminal state Bit09: AI1 voltage（V） Bit10: AI2 voltage（V） Bit11: Reserved Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F	√
P7-04	LED running display parameters2	0000~FFFF Bit00: PID feedback Bit01: PLC Stage Bit02: HDI input pulse frequency（kHz） Bit03: Running frequency 2（Hz） Bit04: Remaining running time Bit05: AI1 voltage before correction（V） Bit06: AI2 voltage before correction（V） Bit07: Reserved Bit08: Linear speed Bit09: Current power-on time（Hour） Bit10: Current running time（Min） Bit11: HDI input pulse frequency（Hz） Bit12: Communication setting value Bit13: Reserved Bit14: Main frequency A display（Hz） Bit15: Auxiliary frequency B display	0	√
P7-05	LED inverter stop parameter display	0000~FFFF Bit00: Setting frequency（Hz） Bit01: Bus voltage（V） Bit02: DI terminal input status Bit03: DO terminal output status Bit04: AI1voltage（V） Bit05: AI2 voltage（V） Bit06: Reserved Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: HDI input pulse	33	√

	Load speed display coefficient	0.0001 ~ 6.5000	1.0000	√
P7-07	Heatsink temperature of inverter module	0.0℃ ~ 100.0℃	-	○
P7-08	Reserved		-	○
P7-09	Accumulative running time	0h ~ 65535h	-	○
P7-10	Product number	-	-	○
P7-11	Software version	-	-	○
P7-12	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal place 3: 3 decimal place	1	√
P7-13	Accumulative power-on time	0h ~ 65535h	-	○
P7-14	Accumulative power consumption	0kW ~ 65535kWh	-	○
P8 Group: Auxiliary Functions				
P8-00	JOG running frequency	0.00Hz ~ maximum frequency	2.00Hz	√
P8-01	JOG acceleration time	0.0s ~ 6500.0s	20.0s	√
P8-02	JOG deceleration time	0.0s ~ 6500.0s	20.0s	√
P8-03	Acceleration time 2	0.0s ~ 6500.0s	Model depend	√
P8-04	Deceleration time 2	0.0s ~ 6500.0s	Model depend	√
P8-05	Acceleration time 3	0.0s ~ 6500.0s	Model depend	√
P8-06	Deceleration time 3	0.0s ~ 6500.0s	Model depend	√
P8-07	Acceleration time 4	0.0s ~ 6500.0s	Model depend	√
P8-08	Deceleration time 4	0.0s ~ 6500.0s	Model depend	√
P8-09	Jump frequency 1	0.00Hz ~ maximum frequency	0.00Hz	√
P8-10	Jump frequency 2	0.00Hz ~ maximum frequency	0.00Hz	√
P8-11	Frequency jump amplitude	0.00Hz ~ maximum frequency	0.01Hz	√
P8-12	Forward/Reverse rotation dead-zone time	0.0s ~ 3000.0s	0.0s	√
P8-13	Reverse control prohibition	0: Enable 1: Disable	0	√
P8-14	Running mode when set frequency lower than frequency lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	0	√
P8-15	Droop control	0.00Hz ~ 10.00Hz	0.00Hz	√

	Accumulative power-on time threshold	0h ~ 65000h	0h	√
P8-17	Accumulative running time	0h ~ 65000h	0h	√
P8-18	Startup protection selection	0: No 1: Yes	0	√
P8-19	Frequency detection Value（FDT1）	0.00Hz ~ maximum frequency	50.00Hz	√
P8-20	Frequency detection hysteresis value（FDT1）	0.0% ~ 100.0%（FDT1 level）	5.0%	√
P8-21	Detection range of frequency	0.0% ~ 100.0%（maximum frequency）	0.0%	√
P8-22	Jump frequency during acceleration/deceleration	0: Invalid 1: Valid	0	√
P8-25	Frequency switchover Point between acceleration time 1 and acceleration time 2	0.00Hz ~ maximum frequency	0.00Hz	√
P8-26	Frequency switchover Point between deceleration time 1 and deceleration time 2	0.00Hz ~ maximum frequency	0.00Hz	√
P8-27	Terminal JOG preferred	0: Invalid 1: Valid	0	√
P8-28	Frequency detection value（FDT2）	0.00Hz ~ maximum frequency	50.00Hz	√
P8-29	Frequency detection hysteresis value（FDT2）	0.0% ~ 100.0%（FDT2 level）	5.0%	√
P8-30	Any frequency reaching detection value 1	0.00Hz ~ maximum frequency	50.00Hz	√
P8-31	Any frequency reaching detection amplitude 1	0.0% ~ 100.0%（maximum frequency）	0.0%	√
P8-32	Any frequency reaching detection value 2	0.00Hz ~ maximum frequency	50.00Hz	√
P8-33	Any frequency reaching detection amplitude 2	0.0% ~ 100.0% (maximum frequency）	0.0%	√
P8-34	Zero current Detection level	0.0% ~ 300.0% 100.0% Corresponding to the motor rated current	5.0%	√
P8-35	Zero current detection delay time	0.01s ~ 600.00s	0.10s	√
P8-36	Output overcurrent threshold	0.0%（no detection） 0.1% ~ 300.0%（rated motor current）	200.0%	√
P8-37	Output overcurrent detection delay time	0.00s ~ 600.00s	0.00s	√
P8-38	Any current reaching 1	0.0% ~ 300.0%（rated motor current）	100.0%	√

	Any current reaching 1 amplitude	0.0% ~300.0%（rated motor current）	0.0%	√
P8-40	Any current reaching 2	0.0% ~ 300.0%（rated motor current）	100.0%	√
P8-41	Any current reaching 2 amplitude	0.0% ~ 300.0%（rated motor current）	0.0%	√
P8-42	Timing function	0: Invalid 1: Valid	0	√
P8-43	Timing running time selection	0: P8-44 setting 1: AI1 2: AI2 3: Reserved (100% of analog input corresponds to the value of P8-44)	0	√
P8-44	Timing duration	0.0Min ~ 6500.0Min	0.0Min	√
P8-45	AI1 input voltage protection value lower limit	0.00V ~ P8-46	3.10V	√
P8-46	AI1 input voltage protection value upper limit	P8-45 ~ 10.00V	6.80V	√
P8-47	Module temperature threshold	0℃ ~ 100℃	75℃	√
P8-48	Cooling fan control	0: Fan rotating during inverter running 1: Fan keeping running	0	√
P8-49	Wakeup frequency	Dormant frequency（P8-51） ~ maximum frequency（P5-10）	0.00Hz	√
P8-50	Wakeup delay time	0.0s ~ 6500.0s	0.0s	√
P8-51	Dormant frequency	0.00Hz ~ wakeup frequency（P8-49）	0.00Hz	√
P8-52	Dormant delay time	0.0s ~ 6500.0s	0.0s	√
P8-53	Current running reaching time setting	0.0Min ~ 6500.0Min	0.0Min	√
P9 Group: Fault and Protection				
P9-00	Motor overload protection selection	0: Disable 1: Enable	1	√
P9-01	Motor overload protection gain	0.20 ~ 10.00	1.00	√
P9-02	Motor overload warning coefficient	50% ~ 100%	80%	√
P9-03	Overvoltage stall gain	0 ~ 100	0	√
P9-04	Overvoltage stall protective voltage	120% ~ 150%	130%	√
P9-05	Overcurrent stall gain	0 ~ 100	20	√

	Overcurrent stall protective current	100% ~ 200%	160%	√
P9-07	Short-circuit to ground upon power-on protection function	0: Invalid 1: Valid	1	√
P9-09	Fault auto reset times	0 ~ 20	0	√
P9-10	during fault auto reset, fault DO action output terminal selection	0: No action 1: Action	0	√
P9-11	Time interval of fault auto reset	0.1s ~ 100.0s	1.0s	√
P9-12	Input phase failure protection/contactor energizing protection selection	0: Disable 1: Enable	11	√
P9-13	Output phase failure protection selection	0: Disable 1: Enable	1	√
P9-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Buffer resistance overload 9: Under voltage 10: Inverter overload 11: Motor overload 12: Power input phase failure 13: Power output phase failure 14: Module overheat 15: External equipment fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Reserved 21: Parameter read-write fault 22: Inverter hardware fault 23: Short circuit to ground 24: Reserved 25: Reserved 26: Running time reached 27: User-defined fault 1 28: User-defined fault 2 29: Power-on time reached 30: Load becoming 0 31: PID feedback lost during running 40: Rapid current-limited overtime	—	○
P9-15	2nd fault type		—	○
P9-16	3rd (latest) fault type		—	○

		41: Motor switchover during running 42: Too large speed deviation 43: Motor over-speed 45: Motor overheat 51: Initial position fault		
P9-17	Frequency at 3rd (latest) fault	—	—	○
P9-18	Current at 3rd (latest) fault	—	—	○
P9-19	Bus voltage at 3rd (latest) fault	—	—	○
P9-20	Input terminal status at 3rd fault (latest)	—	—	○
P9-21	Output terminal status at 3rd fault (latest)	—	—	○
P9-22	Inverter status at 3rd (latest) fault	—	—	○
P9-23	Power-on time at 3rd (latest) fault	—	—	○
P9-24	Running time at 3rd fault (latest)	—	—	○
P9-27	Frequency at 2nd fault	—	—	○
P9-28	Current at 2nd fault	—	—	○
P9-29	Bus voltage at 2nd fault	—	—	○
P9-30	Input terminal status at 2nd fault	—	—	○
P9-31	Output terminal status at 2nd fault	—	—	○
P9-32	Inverter status at 2nd fault	—	—	○
P9-33	Power-on time at 2nd fault	—	—	○
P9-34	Running time at 2nd fault	—	—	○
P9-37	Frequency at 1st fault	—	—	○
P9-38	Current at 1st fault	—	—	○
P9-39	Bus voltage at 1st fault	—	—	○
P9-40	Input terminal status at 1st fault	—	—	○
P9-41	Output terminal status at 1st fault	—	—	○
P9-42	Inverter status at 1st fault	—	—	○
P9-43	Power-on time at 1st fault	—	—	○

	Running time at 1st fault	—	—	○
P9-47	Fault protection action selection 1	Unit's digit: Motor overload（11） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Ten's digit: Power input phase failure（12） Hundred's digit: Power output phase failure（13） Thousand's digit: External equipment fault（15） Ten thousand's digit: Communication fault（16）	00000	√
P9-48	Fault protection action selection 2	Unit's digit: Encoder/PG card fault（20） 0: Coast to stop Ten's digit: Function code read-write fault（21） 0: Coast to stop 1: Stop according to the stop mode Hundred's digit: Reserved Thousand's digit: Motor overheat（25） Ten thousand's digit: Running time reached（26）	00000	√
P9-49	Fault protection action selection 3	Unit's digit: User-defined fault 1（27） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Ten's digit: User-defined fault 2（28） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundred's digit: Power-on time reached（29） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousand's digit: Off-load（30） 0: Coast to stop 1: Speed reducing stop 2: Continue to run at 7% of rated motor frequency and resume to the setting frequency if the load recovers. Ten thousand's digit: PID feedback lost during running（31） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	00000	√

P9-50	Fault protection action selection 4	Unit's digit: Too large speed deviation（42） 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Ten's digit: Motor over-speed（43） Hundred's digit: Initial position fault（51）	00000	√
P9-54	Frequency selection for continuing to run upon fault	0: Running as current running frequency 1: Running as setting frequency 2: Running as frequency upper limit 3: Running as frequency lower limit 4: Running as Backup frequency upon abnormality	0	√
P9-55	Backup frequency upon abnormality	0.0% ~ 100.0% （100.0% Corresponding to the maximum frequency P0-10）	100.0%	√
P9-59	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0	√
P9-60	Action pause judging voltage at instantaneous power failure	80.0% ~ 100.0%	90.0%	√
P9-61	Voltage recovers judging time at instantaneous power failure	0.00s ~ 100.00s	0.50s	√
P9-62	Action judging voltage At instantaneous power failure	60.0% ~ 100.0%（standard bus voltage）	80.0%	√
P9-63	Off-load protection	0: Invalid 1: Valid	0	√
P9-64	Off-load detection level	0.0 ~ 100.0％	10.0%	√
P9-65	Off-load detection time	0.0 ~ 60.0s	1.0s	√
P9-67	Over-speed detection value	0.0％ ~ 50.0％ (maximum frequency)	20.0%	√
P9-68	Over-speed detection time	0.0s no detection 0.1 ~ 60.0s	1.0s	√
P9-69	Detection value of too large speed deviation	0.0％ ~ 50.0％（maximum frequency）	20.0%	√
P9-70	Detection time of too large speed deviation	0.0s no detection 0.1s ~ 60.0s	5.0s	√
PA Group: PID Function				

PA-00	PID setting source	0: PA-01 setting 1: AI1 2: AI2 3: Reserved 4: HDI (DI6) 5: Communication 6: Multi-step	0	√
PA-01	PID digital setting	0.0%~100.0%	50.0%	√
PA-02	PID feedback source	0: AI1 1: AI2 2: Reserved 3: AI1-AI2 4: HDI (DI6) 5: Communication 6: AI1+AI2 7: MAX（|AI1|, |AI2|） 8: MIN（|AI1|, |AI2|）	0	√
PA-03	PID action direction	0: Forward action 1: Reverse action	0	√
PA-04	PID setting feedback range	0 ~ 65535	1000	√
PA-05	Proportional gain Kp1	0.0 ~ 100.0	20.0	√
PA-06	Integral time Ti1	0.01s ~ 10.00s	2.00s	√
PA-07	Derivative time Td1	0.000s ~ 10.000s	0.000s	√
PA-08	PID Cut-off frequency of PID reverse rotation	0.00 ~ maximum frequency	2.00Hz	√
PA-09	PID deviation limit	0.0% ~ 100.0%	0.0%	√
PA-10	PID Differential limit	0.00% ~ 100.00%	0.10%	√
PA-11	PID setting change time	0.00 ~ 650.00s	0.00s	√
PA-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	√
PA-13	PID feedback filter time	0.00 ~ 60.00s	0.00s	√
PA-14	Reserved	-	-	√
PA-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	√
PA-16	Integral time Ti2	0.01s ~ 10.00s	2.00s	√
PA-17	Derivative time Td2	0.000s~10.000s	0.000s	√
PA-18	PID parameter switchover condition	0: No switchover 1: Switchover via DI terminal 2: Automatic switchover based on deviation	0	√

	PID parameter switchover deviation 1	0.0% ~ PA-20	20.0%	√
PA-20	PID parameter switchover deviation 2	PA-19 ~ 100.0%	80.0%	√
PA-21	PID initial value	0.0% ~ 100.0%	0.0%	√
PA-22	PID initial value holding time	0.00 ~ 650.00s	0.00s	√
PA-23	Maximum deviation between two times PID outputs in forward direction	0.00% ~ 100.00%	1.00%	√
PA-24	Maximum deviation between two times PID outputs in	0.00% ~ 100.00%	1.00%	√
PA-25	PID integral property	Unit's digit: Integral separated 0: Invalid 1: Valid Ten's digit: Whether to stop integral operation when the output reaches the limit 0: Continue integral operation 1: Stop integral operation	00	√
PA-26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1% ~ 100.0%	0.0%	√
PA-27	Detection time of PID feedback loss	0.0s ~ 20.0s	0.0s	√
Pb Group: Swing Frequency, Fixed Length and Counting				
Pb-00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	√
Pb-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	√
Pb-02	Swing frequency amplitude	0.0% ~ 50.0%	0.0%	√
Pb-03	Swing frequency cycle	0.1s ~ 3000.0s	10.0s	√
Pb-04	Triangular wave rising time coefficient	0.1% ~ 100.0%	50.0%	√
Pb-05	Setting length	0m ~ 65535m	1000m	√
Pb-06	Actual length	0m ~ 65535m	0m	√
Pb-07	Number of pulses Per meter	0.1 ~ 6553.5	100.0	√
Pb-08	Set count value	1 ~ 65535	1000	√
Pb-09	Designated count value	1 ~ 65535	1000	√
PC Group: Multi-reference and Simple PLC Function				
PC-00	Multi-Reference 0	-100.0% ~ 100.0%	0.0%	√

	Multi-Reference 1	-100.0% ~ 100.0%	0.0%	√
PC-02	Multi-Reference 2	-100.0% ~ 100.0%	0.0%	√
PC-03	Multi-Reference 3	-100.0% ~ 100.0%	0.0%	√
PC-04	Multi-Reference 4	-100.0% ~ 100.0%	0.0%	√
PC-05	Multi-Reference 5	-100.0% ~ 100.0%	0.0%	√
PC-06	Multi-Reference 6	-100.0% ~ 100.0%	0.0%	√
PC-07	Multi-Reference 7	-100.0% ~ 100.0%	0.0%	√
PC-08	Multi-Reference 8	-100.0% ~ 100.0%	0.0%	√
PC-09	Multi-Reference 9	-100.0% ~ 100.0%	0.0%	√
PC-10	Multi-Reference 10	-100.0% ~ 100.0%	0.0%	√
PC-11	Multi-Reference 11	-100.0% ~ 100.0%	0.0%	√
PC-12	Multi-Reference 12	-100.0% ~ 100.0%	0.0%	√
PC-13	Multi-Reference 13	-100.0% ~ 100.0%	0.0%	√
PC-14	Multi-Reference 14	-100.0% ~ 100.0%	0.0%	√
PC-15	Multi-Reference 15	-100.0% ~ 100.0%	0.0%	√
PC-16	Simple PLC running mode	0: Stop after running one cycle 1: Keep last values after running one cycle 2: Circular running	0	√
PC-17	Simple PLC store selection	Unit's digit: Store selection when power-off 0: Not store 1: Store Ten's digit: Store selection when stop 0: Not store 1: Store	00	√
PC-18	Running time of simple PLC reference 0	0.0s（h） ~ 6553.5s（h）	0.0s（h）	√
PC-19	Acceleration/Deceleration time of simple PLC reference 0 selection	0 ~ 3	0	√
PC-20	Running time of simple PLC reference 1	0.0s（h） ~ 6553.5s（h）	0.0s（h）	√
PC-21	Acceleration/Deceleration time of simple PLC reference 1 selection	0 ~ 3	0	√
PC-22	Running time of simple PLC reference 2	0.0s（h） ~ 6553.5s（h）	0.0s（h）	√
PC-23	Acceleration/Deceleration time of simple PLC reference 2 selection	0 ~ 3	0	√
PC-24	Running time of simple PLC reference 3	0.0s（h） ~ 6553.5s（h）	0.0s（h）	√
PC-25	Acceleration/Deceleration time of simple PLC reference 3 selection	0 ~ 3	0	√

	Running time of simple PLC reference 4	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-27	Acceleration/Deceleration time of simple PLC reference 4 selection	0 ~ 3	0	√
PC-28	Running time of simple PLC reference 5	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-29	Acceleration/Deceleration time of simple PLC reference 5 selection	0 ~ 3	0	√
PC-30	Running time of simple PLC reference 6	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-31	Acceleration/Deceleration time of simple PLC reference 6 selection	0 ~ 3	0	√
PC-32	Running time of simple PLC reference 7	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-33	Acceleration/Deceleration time of simple PLC reference 7 selection	0 ~ 3	0	√
PC-34	Running time of simple PLC reference 8	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-35	Acceleration/Deceleration time of simple PLC reference 8 selection	0 ~ 3	0	√
PC-36	Running time of simple PLC reference 9	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-37	Acceleration/Deceleration time of simple PLC reference 9 selection	0 ~ 3	0	√
PC-38	Running time of simple PLC reference 10	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-39	Acceleration/Deceleration time of simple PLC reference 10 selection	0 ~ 3	0	√
PC-40	Running time of simple PLC reference 11	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-41	Acceleration/Deceleration time of simple PLC reference 11 selection	0 ~ 3	0	√
PC-42	Running time of simple PLC reference 12	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-43	Acceleration/Deceleration time of simple PLC reference 12 selection	0 ~ 3	0	√
PC-44	Running time of simple PLC reference 13	0.0s(h) ~ 6553.5s(h)	0.0s(h)	√
PC-45	Acceleration/Deceleration time of simple PLC reference 13 selection	0 ~ 3	0	√

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	Running time of simple PLC reference 14	0.0s（h）~ 6553.5s（h）	0.0s（h）	√
PC-47	Acceleration/Deceleration time of simple PLC reference 14 selection	0 ~ 3	0	√
PC-48	Running time of simple PLC reference 15	0.0s（h）~ 6553.5s（h）	0.0s（h）	√
PC-49	Acceleration/Deceleration time of simple PLC reference 15 selection	0 ~ 3	0	√
PC-50	Time unit of simple PLC running	0: s（second） 1: h（hour）	0	√
PC-51	Multi-Reference 0 setting mode	0: Function code PC-00 setting 1: AI1 2: AI2 3: Reserved 4: HDI 5: PID 6: Preset frequency（P0-08）setting，modified via terminal UP/DOWN	0	√
Pd Group: Communication Parameters				
Pd-00	Baud rate	Unit's digit: MODBUS 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	5	√
Pd-01	MODBUS Data format	0: No check（8-N-2） 1: Even parity check（8-E-1） 2: Odd Parity check（8-O-1） 3: No check 8-N-1（MODBUS Valid）	0	√
Pd-02	Local address	1~247，0 Broadcast address	1	√
Pd-03	Response delay	0ms ~ 20ms（Valid for MODBUS）	2	√
Pd-04	Time for Communication timeout	0.0（invalid）， 0.1s~60.0s（Valid for MODBUS）	0.0	√
Pd-06	Communication reading current resolution	0: 0.01A 1: 0.1A	0	√
PP Group: Function Code Management				
PP-00	User password	0 ~ 65535	0	√

PP-01	Parameter initialization	0: No operation 01: Restore factory settings except motor parameters 02: Clear records 04: Backup user current parameters 05: Restore the user backup parameters	0	×
PP-02	Function parameter group display selection	Unit's digit: Group U display selection 0: Not display 1: Display Ten's digit: Group P display selection 0: Not display 1: Display	11	×
PP-03	Individualized parameter display selection	Unit's digit: User-defined parameter display selection 0: Not display 1: Display（--u--group） Ten's digit: User-modified parameter display selection 0: Not display 1: Display（--p--group）	00	√
PP-04	Parameter modification property	0: Modifiable 1: Not modifiable	0	√
H0 Group: Torque Control Parameters				
H0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0	×
H0-01	Torque setting source selection in torque control	0: Digital setting 1（H0-03） 1: AI1 2: AI2 3: Reserved 4: HDI 5: Communication 6: MIN（AI1,AI2） 7: MAX（AI1,AI2）(Full range of values 1-7，corresponds to the digital setting H0-03）	0	×
H0-03	Torque digital setting in torque control	-200.0% ~ 200.0%	150.0%	√
H0-05	Forward direction maximum frequency in torque control	0.00Hz ~ maximum frequency	50.00Hz	√
H0-06	Reverse direction maximum frequency in torque control	0.00Hz ~ maximum frequency	50.00Hz	√
H0-07	Acceleration time in Torque control	0.00s ~ 65000s	0.00s	√
H0-08	Deceleration time in Torque control	0.00s ~ 65000s	0.00s	√
H1 Group: Virtual IO				
H1-00	Virtual XDI1 terminal function selection	0 ~ 59	0	×

	Virtual XDI2 terminal function selection	0 ~ 59	0	×
H1-02	Virtual XDI3 terminal function selection	0 ~ 59	0	×
H1-03	Virtual XDI4 terminal function selection	0 ~ 59	0	×
H1-04	Virtual XDI5 terminal function selection	0 ~ 59	0	×
H1-05	Virtual XDI input terminal state setting mode	0: Valid or not for the XDI, it is decided by the state of virtual XDOx. 1: XDI valid or not is decided by the function code H1-06 setting. Unit's digit: Virtual XDI1 Ten's digit: Virtual XDI2 Hundred's digit: Virtual XDI3 Thousand's digit: Virtual XDI4 Ten thousand's digit: Virtual XDI5	00000	×

H1-06	Virtual XDI input terminal state setting	0: Invalid 1: Valid Unit's digit: Virtual XDI1 Ten's digit: Virtual XDI2 Hundred's digit: Virtual XDI3 Thousand's digit: Virtual XDI4 Ten thousand's digit: Virtual XDI5	00000	×
H1-07	Function selection for AI1 as DI	0 ~ 59	0	×
H1-08	Function selection for AI2 as DI	0 ~ 59	0	×
H1-09	Function selection for AI3 as DI	0 ~ 59	0	×
H1-10	Effective model selection for AI terminal as DI	0: High level valid 1: Low level valid Unit's digit: AI1 Ten's digit: AI2 Hundred's digit: AI3	000	×
H1-11	Virtual XDO1 Output function selection	0: Short with physical DIx internally 1~40: Refer to group P5 physical DO output selection	0	√
H1-12	Virtual XDO2 Output function selection	0: Short with physical DIx internally 1~40: Refer to group P5 physical DO output selection	0	√
H1-13	Virtual XDO3 Output function selection	0:Short with physical DIx internally 1~40: Refer to group P5 physical DO output selection	0	√

H1-14	Virtual XDO4 Output function selection	0: Short with physical DIx internally 1~40: Refer to group P5 physical DO output selection	0	√
H1-15	Virtual XDO5 Output function selection	0: Short with physical DIx internally 1~40: Refer to group P5 physical DO output selection	0	√
H1-16	Virtual XDO1 output delay time	0.0s ~ 3600.0s	0.0s	√
H1-17	Virtual XDO2 output delay time	0.0s ~ 3600.0s	0.0s	√
H1-18	Virtual XDO3 output delay time	0.0s ~ 3600.0s	0.0s	√
H1-19	Virtual XDO4 output delay time	0.0s ~ 3600.0s	0.0s	√
H1-20	Virtual XDO5 output delay time	0.0s ~ 3600.0s	0.0s	√
H1-21	Virtual XDO output terminal effective state selection	0: Positive logic 1: Reverse logic Unit's digit: XDO1 Ten's digit: XDO2 Hundred's digit: XDO3 Hundred's digit: XDO4 Ten thousand's digit: XDO5	00000	√

H2 Group: Motor 2 Control				
H2-00	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0	×
H2-01	Rated motor power	0.1kW ~ 1000.0kW	Model depend	×
H2-02	Rated motor voltage	1V ~ 2000V	Model depend	×
H2-03	Rated motor current	0.01A~655.35A（inverter power<=55kW） 0.1A~6553.5A（ inverter power >55kW）	Model depend	×
H2-04	Rated motor frequency	0.01Hz ~ maximum power	Model depend	×
H2-05	Rated motor speed	1rpm ~ 65535rpm	Model depend	×
H2-06	Stator resistance (asynchronous motor)	0.001Ω ~ 65.535Ω（inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（inverter power >55kW）	Model depend	×
H2-07	Rotor resistance (asynchronous motor)	0.001Ω ~ 65.535Ω（inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（inverter power >55kW）	Model depend	×
H2-08	Leakage inductance (asynchronous motor)	0.01mH~655.35mH (inverter power <=55kW) 0.001mH~65.535mH (inverter power >55kW)	Model depend	×

	Mutual inductance (asynchronous motor)	0.1mH~6553.5mH（inverter power <=55kW） 0.01mH~655.35mH（inverter power >55kW）	Model depend	×
H2-10	No-load current (asynchronous motor)	0.01A ~ H2-03 (inverter power <=55kW) 0.1A ~ H2-03 (inverter power >55kW)	Model depend	×
H2-16	Stator resistance (synchronous motor)	0.001Ω ~ 65.535Ω（inverter power <=55kW） 0.0001Ω ~ 6.5535Ω（inverter power >55kW）	Model depend	×
H2-17	Shaft D inductance (synchronous motor)	0.01mH~655.35mH (inverter power <=55kW) 0.001mH~65.535mH (inverter power >55kW)	Model depend	×
H2-18	Shaft Q inductance (synchronous motor)	0.01mH~655.35mH (inverter power <=55kW) 0.001mH~65.535mH (inverter power >55kW)	Model depend	×
H2-20	Back EMF (synchronous motor)	0.1V ~ 6553.5V	Model depend	×
H2-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 2: Asynchronous motor complete auto-tuning 11: Synchronous motor with-load auto-tuning 12: Synchronous motor no-load auto-tuning	0	×
H2-38	Speed loop proportional gain 1	1 ~ 100	30	√
H2-39	Speed loop integral time 1	0.01s ~ 10.00s	0.50s	√
H2-40	Switchover frequency 1	0.00 ~ H2-43	5.00Hz	√
H2-41	Speed loop proportional gain 2	1 ~ 100	20	√
H2-42	Speed loop integral time 2	0.01s ~ 10.00s	1.00s	√
H2-43	Switchover frequency 2	H2-40 ~ maximum frequency	10.00Hz	√
H2-44	Vector control slip gain	50% ~ 200%	100%	√
H2-45	Time constant of speed loop filter	0.000s ~ 0.100s	0.000s	√
H2-46	Vector control overexcitation gain	0 ~ 200	64	√
H2-47	Torque upper limit source in speed control mode	0: H2-48 setting 1: AI1 2: AI2 3: Reserved 4: HDI 5: communication 6: MIN（A, AI2） 7: MAX（AI1, AI2） Full range of options of 1-7，corresponding to H2-48 digital setting	0	√
H2-48	Digital setting of Torque upper limit in speed control mode	0.0% ~ 200.0%	150.0%	√

	Excitation adjustment proportional gain	0 ~ 20000	2000	√
H2-52	Excitation adjustment integral gain	0 ~ 20000	1300	√
H2-53	Torque adjustment proportional gain	0 ~ 20000	2000	√
H2-54	Torque adjustment integral gain	0 ~ 20000	1300	√
H2-55	Speed loop integral property	Unit's digit: Integral separated 0: Invalid 1: valid	0	√
H2-56	Field weakening mode of synchronous motor	0: No field weakening 1: Direct calculation 2: Adjustment	1	√
H2-57	Field weakening degree of synchronous motor	50% ~ 500%	100%	√
H2-58	Maximum field Weakening current	1% ~ 300%	50%	√
H2-59	Field weakening automatic adjustment gain	10% ~ 500%	100%	√
H2-60	Field weakening integral multiple	2 ~ 10	2	√
H2-61	Motor 2 control mode	0: Sensorless vector control（SVC） 1: Reserved 2: V/f control	0	×
H2-62	Motor 2 acceleration/ Deceleration time	0: Same as motor 1 1: Acceleration/Deceleration time 1 2: Acceleration/Deceleration time 2 3: Acceleration/Deceleration time 3 4: Acceleration/Deceleration time 4	0	√
H2-63	Motor 2 torque boost	0.0%: Automatic torque boost 0.1% ~ 30.0%	Model depend	√
H2-65	Motor 2 oscillation suppression gain	0 ~ 100	Model depend	√
H5 Group: Control Optimization Parameters				
H5-00	DPWM switchover frequency upper limit	0.00Hz ~ 15.00Hz	12.00Hz	√
H5-01	PWM modulation model	0: Asynchronous modulation 1: Synchronous modulation	0	√
H5-02	Dead zone compensation mode selection	0: No compensation 1: Compensation mode 1 2: Compensation mode 1	1	√
H5-03	Random PWM depth	0: Random PWM invalid 1~10: PWM carrier frequency random depth	0	√
H5-04	Rapid current limit	0: Disable 1: Enable	1	√

	Current detection compensation	0 ~ 100	5	√
H5-06	Undervoltage threshold setting	60.0% ~ 140.0%	100.0%	√
H5-07	SVC optimization mode selection	0: No optimization 1: Optimization mode 1 2: Optimization mode 2	1	√
H5-08	Dead-zone time adjustment	100% ~ 200%	150%	√
H5-09	Overvoltage threshold setting	200.0V ~ 2500.0V	Model depend	×
H6 Group: AI Analog Input Curve Setting				
H6-00	AI curve 4 minimum input	-10.00V~H6-02	0.00V	√
H6-01	Corresponding setting of AI curve 4 minimum input	-100.0%~+100.0%	0.0%	√
H6-02	AI curve 4 inflexion 1 input	H6-00~H6-04	3.00V	√
H6-03	Corresponding setting of AI curve 4 inflexion 1 input	-100.0%~+100.0%	30.0%	√
H6-04	AI curve 4 inflexion 2 input	H6-02~H6-06	6.00V	√
H6-05	Corresponding setting of AI curve 4 inflexion 2 input	-100.0%~+100.0%	60.0%	√
H6-06	AI curve 4 maximum input	H6-06~+10.00V	10.00V	√
H6-07	Corresponding setting of AI curve 4 maximum input	-100.0%~+100.0%	100.0%	√
H6-08	AI curve 5 minimum input	-10.00V~H6-10	-10.00V	√
H6-09	Corresponding setting of AI curve 5 minimum input	-100.0%~+100.0%	-100.0%	√
H6-10	AI curve 5 inflexion 1 input	H6-08~H6-12	-3.00V	√
H6-11	Corresponding setting of AI curve 5 inflexion 1 input	-100.0%~+100.0%	-30.0%	√
H6-12	AI curve 5 inflexion 2 input	H6-10~H6-14	3.00V	√
H6-13	Corresponding setting of AI curve 5 inflexion 2 input	-100.0%~+100.0%	30.0%	√
H6-14	AI curve 5 maximum input	H6-12~+10.00V	10.00V	√
H6-15	Corresponding setting of AI curve 5 maximum input	-100.0%~+100.0%	100.0%	√
H6-24	Jump point setting of AI1	-100.0%~100.0%	0.0%	√
H6-25	Jump amplitude setting of AI1	0.0%~100.0%	0.5%	√
H6-26	Jump point setting of AI2	-100.0%~100.0%	0.0%	√
H6-27	Jump amplitude setting of AI2	0.0%~100.0%	0.5%	√
HC Group: Analog Input/output Correction				

	AI1 measured voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-01	AI1 displayed voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-02	AI1 measured voltage 2	6.000V ~ 9.999V	factory calibrated	√
HC-03	AI1 displayed voltage 2	6.000V ~ 9.999V	factory calibrated	√
HC-04	AI2 measured voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-05	AI2 displayed voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-06	AI2 measured voltage 2	6.000V ~ 9.999V	factory calibrated	√
HC-07	AI2 displayed voltage 2	6.000V ~ 9.999V	factory calibrated	√
HC-12	AO target voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-13	AO measured voltage 1	0.500V ~ 4.000V	factory calibrated	√
HC-14	AO target voltage 2	6.000V ~ 9.999V	factory calibrated	√
HC-15	AO measured voltage 2	6.000V ~ 9.999V	factory calibrated	√

ring Parameters Table

Function Code	Parameter Name	Minimum Unit	Communication Address
U0 Group: Basic Monitoring Parameters			
U0-00	Running frequency（Hz）	0.01Hz	7000H
U0-01	Set frequency（Hz）	0.01Hz	7001H
U0-02	Bus voltage（V）	0.1V	7002H
U0-03	Output voltage（V）	1V	7003H
U0-04	Output current（A）	0.01A	7004H
U0-05	Output power（kW）	0.1kW	7005H
U0-06	Output torque（%）	0.1%	7006H
U0-07	DI terminal input state	1	7007H
U0-08	DO terminal output state	1	7008H
U0-09	AI1 voltage（V）	0.01V	7009H
U0-10	AI2 voltage（V）	0.01V	700AH
U0-11	Reserved		700BH
U0-12	Count value	1	700CH
U0-13	Length value	1	700DH
U0-14	Load speed display	1	700EH
U0-15	PID setting	1	700FH
U0-16	PID feedback	1	7010H
U0-17	PLC stage	1	7011H
U0-18	HDI Input pulse frequency（Hz）	0.01kHz	7012H
U0-19	Feedback speed（unit 0.01Hz）	0.01Hz	7013H
U0-20	Remaining running time	0.1Min	7014H
U0-21	AI1voltage before correction	0.001V	7015H
U0-22	AI2 voltage before correction	0.001V	7016H
U0-23	Reserved		7017H
U0-24	Linear speed	1m/Min	7018H
U0-25	Current power-on time	1Min	7019H
U0-26	Current running time	0.1Min	701AH
U0-27	HDI Pulse input frequency	1Hz	701BH
U0-28	Communication setting value	0.01%	701CH
U0-29	Reserved		701DH
U0-30	Main frequency A display	0.01Hz	701EH
U0-31	Main frequency B display	0.01Hz	701FH
U0-32	Viewing any register address value	1	7020H
U0-33	Synchronous motor rotor position	0.1°	7021H
U0-34	Motor temperature	1℃	7022H

	Target torque（%）	0.1%	7023H
U0-36	Resolver position	1	7024H
U0-37	Power factor angle	0.1°	7025H
U0-38	Reserved		7026H
U0-39	Target voltage upon V/F separation	1V	7027H
U0-40	Output voltage upon V/F separation	1V	7028H
U0-41	I terminal input state visual display	1	7029H
U0-42	DO terminal output state visual display	1	702AH
U0-43	DI terminal function state visual display 1（function 01-function 40）	1	702BH
U0-44	DI terminal function state visual display 2（function 41-function 80）	1	702CH
U0-45	Reserved		702DH
U0-58	Reserved		703AH
U0-59	Setting frequency（%）	0.01%	703BH
U0-60	Running frequency（%）	0.01%	703CH
U0-61	Inverter state	1	703DH
U0-62	Current fault code	1	703EH
U0-63	Reserved	-	
U0-64	Reserved	-	
U0-65	Torque upper limit	0.01%	7041H

Chapter 6 Faults and Solutions

6.1 Faults and Trouble Shooting

HD200E provides a lot of fault information and protective functions. After a fault occurs, the Inverter implements the protection function, and displays the fault code on the operation panel (if the operation keypad is available).

Before contacting company for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or company.

E-22 is the Inverter hardware overcurrent or overvoltage signal. In most situations, the hardware overvoltage fault causes E-22.

Fault Name	Inverter unit protection
Display	E-01
Possible Causes	1, The output circuit is grounded or short circuited. 2, The connecting cable of the motor is too long. 3, The module overheats. 4, The internal connections become loose. 5, The main control board is faulty. 6, The inverter board is faulty.
Solutions	1, Eliminate external faults. 2, Install a reactor or an output filter. 3, Check the air filter and the cooling fan. 4, Connect all cables properly. 5, Contact the agent or company 6, Contact the agent or company
Fault Name	Overcurrent during acceleration
Display	E-02
Possible Causes	1, The output circuit is grounded or short circuited. 2, Motor auto-tuning is not performed. 3, The acceleration time is too short. 4, Manual torque boost or V/F curve is not appropriate. 5, The voltage is too low. 6, The startup operation is performed on the rotating motor. 7, A sudden load is added during acceleration. 8, The Inverter model is of too small power class.
Solutions	1, Eliminate external faults. 2, Perform the motor autotuning. 3, Increase the acceleration time. 4, Adjust the manual torque boost or V/F curve. 5, Adjust the voltage to normal range. 6, Select rotational speed tracking restart or start the motor after it stops. 7, Remove the added load.
Fault Name	Overcurrent during deceleration
Display	E-03

Possible Causes	1, The output circuit is grounded or short circuited. 2, Motor auto-tuning is not performed. 3, The deceleration time is too short. 4, The voltage is too low. 5, A sudden load is added during deceleration.
Solutions	1, Eliminate external faults. 2, Perform the motor autotuning. 3, Increase the deceleration time. 4, Adjust the voltage to normal range. 5, Remove the added load.
Fault Name	Overcurrent at constant speed
Display	E-04
Possible Causes	1, The output circuit is grounded or short circuited. 2, Motor auto-tuning is not performed. 3, The voltage is too low. 4, A sudden load is added during operation. 5, The Inverter model is of too small power class.
Solutions	1, Eliminate external faults. 2, Perform the motor autotuning. 3, Adjust the voltage to normal range. 4, Remove the added load. 5, Select an Inverter of higher power class
Fault Name	Overvoltage during acceleration
Display	E-05
Possible Causes	1, The input voltage is too high. 2, An external force inverters the motor during acceleration. 3, The acceleration time is too short. 4, The braking unit and braking resistor are not installed.
Solutions	1, Adjust the voltage to normal range. 2, Cancel the external force or install a braking resistor. 3, Increase the acceleration time. 4, Install the braking unit and braking resistor.
Fault Name	Overvoltage during deceleration
Display	E-06
Possible Causes	1, The input voltage is too high. 2, An external force inverters the motor during deceleration. 3, The deceleration time is too short. 4, The braking unit and braking resistor are not installed.
Solutions	1, Adjust the voltage to normal range. 2, Cancel the external force or install the braking resistor. 3, Increase the deceleration time. 4, Install the braking unit and braking resistor.

	Overvoltage at constant speed
Display	E-07
Possible Causes	1, The input voltage is too high. 2, An external force inverters the motor during deceleration.
Solutions	1, Adjust the voltage to normal range. 2, Cancel the external force or install the braking resistor.
Fault Name	Control power supply fault
Display	E-08
Possible Causes	The input voltage is not within the allowable range.
Solutions	Adjust the input voltage to the allowable range.
Fault Name	Undervoltage
Display	E-09
Possible Causes	1, Instantaneous power failure occurs on the input power supply. 2, The Inverter's input voltage is not within the allowable range. 3, The bus voltage is abnormal. 4, The rectifier bridge and buffer resistor are faulty. 5, The inverter board is faulty.
Solutions	1, Reset the fault. 2, Adjust the voltage to normal range. 3, Contact the agent or company. 4, Contact the agent or company 5, Contact the agent or company6, Contact the agent or company
Fault Name	Inverter overload
Display	E-10
Possible Causes	1, The load is too heavy or lockedrotor occurs on the motor. 2, The Inverter model is of too small power class.
Solutions	1, Reduce the load and check the motor and mechanical condition. 2, Select an Inverter of higher power class.
Fault Name	Motor overload
Display	E-11
Possible Causes	1, F9-01 is set improperly. 2, The load is too heavy or lockedrotor occurs on the motor. 3, The Inverter model is of too small power class.
Solutions	1, Set correctly. 2, Reduce the load and check the motor and the mechanical condition. 3, Select an Inverter of higher power class.
Fault Name	Power input phase loss
Display	E-12

Possible Causes	1, The three-phase power input is abnormal. 2, The inverter board is faulty. 3, The lightening board is faulty. 4, The main control board is faulty.
Solutions	1, Eliminate external faults. 2, Contact the agent or company. 3, Contact the agent or company 4, Contact the agent or company
Fault Name	Power output phase loss
Display	E-13
Possible Causes	1, The cable connecting the Inverter and the motor is faulty. 2, The Inverter's three-phase outputs are unbalanced when the motor is running. 3, The inverter board is faulty. 4, The module is faulty.
Solutions	1, Eliminate external faults. 2, Check whether the motor three-phase winding is normal. 3, Contact the agent or company. 4, Contact the agent or company
Fault Name	Module overheat
Display	E-14
Possible Causes	1, The ambient temperature is too high. 2, The air filter is blocked. 3, The fan is damaged. 4, The thermally sensitive resistor of the module is damaged. 5, The inverter module is damaged.
Solutions	1, Lower the ambient temperature. 2, Clean the air filter. 3, Replace the damaged fan. 4, Replace the damaged thermally sensitive resistor. 5, Replace the inverter module.
Fault Name	External equipment fault
Display	E-15
Possible Causes	1, External fault signal is input via S. 2, External fault signal is input via virtual I/O.
Solutions	1, Reset the operation. 2, Reset the operation.

Fault Name	Communication fault
Display	E-16
Possible Causes	1, The host computer is in abnormal state. 2, The communication cable is faulty. 3, P5-28 is set improperly. 4, The communication parameters in group FD are set improperly.

Solutions	1, Check the cabling of host computer. 2, Check the communication cabling. 3, Set P5-28 correctly. 4, Set the communication parameters properly.
Fault Name	Contactor fault
Display	E-17
Possible Causes	1, The inverter board and power supply are faulty. 2, The contactor is faulty.
Solutions	1, Replace the faulty inverter board or power supply board. 2, Replace the faulty contactor.
Fault Name	Current detection fault
Display	E-18
Possible Causes	1, The HALL device is faulty. 2, The inverter board is faulty.
Solutions	1, Replace the faulty HALL device. 2, Replace the faulty inverter board.
Fault Name	Motor auto-tuning fault
Display	E-19
Possible Causes	1, The motor parameters are not set according to the nameplate. 2, The motor auto-tuning times out.
Solutions	1, Set the motor parameters according to the nameplate properly. 2, Check the cable connecting the Inverter and the motor.
Fault Name	EEPROM readwrite fault
Display	E-21
Possible Causes	The EEPROM chip is damaged.
Solutions	Replace the main control board.
Fault Name	Inverter hardware fault
Display	E-22
Possible Causes	1, Overvoltage exists. 2, Overcurrent exists.
Solutions	1, Handle based on overvoltage. 2, Handle based on overcurrent.
Fault Name	Short circuit to ground
Display	E-23
Possible Causes	The motor is short circuited to the ground.
Solutions	Replace the cable or motor.
Fault Name	Accumulative running time reached
Display	E-26
Possible Causes	The accumulative running time reaches the setting value.
Solutions	Clear the record through the parameter initialization function.

	User-defined fault 1
Display	E-27
Possible Causes	1, The user-defined fault 1 signal is input via S. 2, User-defined fault 1 signal is input via virtual I/O.
Solutions	1, Reset the operation. 2, Reset the operation.
Fault Name	User-defined fault 2
Display	E-28
Possible Causes	1, The user-defined fault 2 signal is input via S 2, The user-defined fault 2 signal is input via virtual I/O.
Solutions	1, Reset the operation. 2, Reset the operation.
Fault Name	Accumulative power-on time reached
Display	E-29
Possible auses	The accumulative power-on time reaches the setting value.
Solutions	The accumulative power-on time reaches the setting value.
Fault Name	Load becoming 0
Display	E-30
Possible auses	The Inverter running current is lower than P9-64.
Solutions	Check that the load is disconnected or the setting of P9-64 and P9-65 is correct.
Fault Name	PID feedback lost during running
Display	E-31
Possible auses	The PID feedback is lower than the setting of PA-26.
Solutions	Check the PID feedback signal or set PA-26 to a
Fault Name	Pulse-by-pulse current limit fault
Display	E-40
Possible auses	1, The load is too heavy or lockedrotor occurs on the motor. 2, The Inverter model is of too small power class.
Solutions	1, Reduce the load and check the motor and mechanical condition. 2, Select an Inverter of higher power class.
Fault Name	Motor switchover fault during running
Display	E-41
Possible auses	Change the selection of the motor via terminal during running of the Inverter.
Solutions	Perform motor switchover after the Inverter stops.
Fault Name	Too large speed deviation
Display	E-42
Possible Causes	1, The encoder parameters are set incorrectly. 2, The motor auto-tuning is not performed. 3, P9-69 and P9-70 are set incorrectly.

Solutions	1, Set the encoder parameters properly. 2, Perform the motor autotuning. 3, Set P9-69 and P9-70 correctly based on the actual situation.
Fault Name	Motor over-speed
Display	E-43
Possible Causes	1, The encoder parameters are set incorrectly. 2, The motor auto-tuning is not performed.3: P9-69 and P9-70 are set incorrectly.
Solutions	1, Set the encoder parameters properly. 2, Perform the motor autotuning. 3, Set P9-69 and P9-70 correctly based on the actual situation.
Fault Name	Motor overheat
Display	E-45
Possible Causes	1, The cabling of the temperature sensor becomes loose. 2, The motor temperature is too high.
Solutions	1, Check the temperature sensor cabling and eliminate the cabling fault. 2, Lower the carrier frequency or adopt other heat radiation measures.
Fault Name	Initial position fault
Display	E-51
Possible auses	The motor parameters are not set based on the actual situation.
Solutions	Check that the motor parameters are set correctly and whether the setting of rated current is too small.

6.2 Common Faults and Solutions

You may come across the following faults during the use of the Inverter. Refer to the following table for simple fault analysis.

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on.	1: There is no power supply to the Inverter or the power input to the Inverter is too low. 2: The power supply of the switch on the inverter board of the AC inverter is faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the inverter board and the operation panel breaks.	1:Check the power supply. 2:Check the bus voltage. 3:Re-connect the 8-core and 28-core cables. 4:Contact the agent or company for technical support.
2	“HC” is displayed at power-on.	1: The cable between the inverter board and the control board is in poor contact. 2: Related components on the control board are damaged. 3: The motor or the motor cable is short circuited to the ground. 4: The HALL device is faulty. 5: The power input to the Inverter is too	1:Re-connect the 8-core and 28-core cables. 2:Contact the agent or company for technical support.

		low.	
3	"E-23" is displayed at power-on.	1: The motor or the motor output cable is short-circuited to the ground. 2: The Inverter is damaged.	1:Measure the insulation of the motor and the output cable with a megger. 2:Contact the agent or company for technical support.
4	The Inverter display is normal upon power-on. But "HC" is displayed after running and ops immediately.	1:The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited.	1:Replace the damaged fan. 2:Eliminate external fault.
5	E-14 (module overheat) fault is reported frequently.	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the Inverter are damaged (thermal coupler or others).	1:Reduce the carrier Frequency (P5-15). 2:Replace the fan and clean The air filter. 3:Contact the agent or company for technical support.
6	The motor does not rotate after the Inverter runs.	1: Check the motor and the motor cables. 2: The Inverter parameters are set improperly (motor parameters). 3: The cable between the inverter board and the control board is in poor contact. 4: The inverter board is faulty.	1:Ensure the cable between the Inverter and the motor is normal. 2:Replace the motor or clear mechanical faults. 3:Check and re-set motor parameters.
7	The DI terminals are disabled.	1: The parameters are set incorrectly. 2: The external signal is incorrect. 3: The jumper bar across OP and +24V becomes loose. 4: The control board is faulty.	1:Check and reset the parameters in group H4. 2:Re-connect the external signal cables. 3:Re-confirm the jumper bar across OP and +24 V. 4:Contact the agent or company for technical support.
8	The Inverter reports overcurrent and overvoltage frequently.	1: The motor parameters are set improperly. 2:The acceleration/deceleration time is improper. 3: The load fluctuates.	1:Re-set motor parameters or re-perform the motor autotuning. 2:Set proper acceleration/deceleration time. 3:Contact the agent or company for technical support.
9	E-17 is reported upon power-on or running.	The soft startup contactor is Not picked up.	1:Check whether the contactor cable is loose. 2:Check whether the contactor is faulty. 3:Check whether 24V power supply of the contactor is faulty. 4:Contact the agent or company for technical support.
11	8.8.8.8.8 Is displayed upon power-on.	Related component on the control board is damaged.	Replace the control board.

Appendix A Modbus Communication Protocol

HD200E series inverter provides RS485 communication interface, and support Modbus-RTU communication protocol. The user could centralize control through PC or PLC. This communication protocol could set inverter operation command, change and read function code parameter, and read inverter working state and fault information.

1. Protocol Content

The serial communication protocol definites the deliver content of series communication and use format, Including: host machine poll (broadcast) format; the coding method of host machine. The content is as follows: request of operative function code, deliver data and error verify etc. If the slave report error when it receive information, or couldn't finish the request of operative function, it will organize an error report to feedback to host machine.

1.1 Method

The inverter connects "MCU" PC/PLC control net with RS485, as communication slave machine.

2.2 Bus structure

a) Method of interface

RS485 hardware interface

b) Topological structure

Single host and sevel slave system. The setting range of slave address is 1~247, 0 is broadcast communication address. The net slave address is only.

c) Communication deliver method.

Asynchronization serial, half duplex transmission. The host and slave just send the data by only one, the other one accept the data at the same time. The data in serial asynchronization communication is sent one by one in message.

HD200E series inverter communication protocol is an asynchronization serial host-slave Modbus one, and the only one equipment could build protocol in the net. The slaves just response or make some action the host query command through providing data.

Host means PC, industry control equipment or PLC etc; the slave means HD200E series inverter. Host could communicate with one slave, and also communicate with all the slave. For visiting the host "query/command", the slave need response. But for the broadcast from the host, the slave not need to response.

2. Protocol Form

2.1 HD200E series MODBUS protocol form as follows:

Modbus Packet

Start(Idle at least 3.5 characters)	Slave address	Function code	Data	CRC	End(Idle at least 3.5 characters)

2.2 RTU frame format

FH START	3.5 characters time
Slave address ADR	Communication address:1~247, the address is 0 which is representative broadcast address
Command code CMD	03:read slave parameter;06:write slave parameter
Digit content DATA（N-1）	Function code parameter address, quantity of function code parameter and value
Digit content DATA（N-2）	
……	
Digit content DATA0	
CRC CHK high-order	Test value: CRC value
CRC CHK low-order	

	3.5 characters time

CMD and DATA

a) Command code:03H, read N words（Word）（maximum reading quantity is 12）.

b) Command code:06H read one word（Word）, for example: read 5000（1388H）to slave address 02H, the F00AH address of inverter.

c) CRC methods:

CRC（Cyclical Redundancy Check）use RTU frame format, the message include error detection region based on CRC. CRC region detects the whole message content. CRC region is two bytes, including CRC a 16-bit binary values. It is calculated by the deliver equipment and added to message. The receiving equipment recalculate the receiving CRC, and compare with the value in CRC regain. If the two CRC is different, which means the deliver is wrong.

CRC is stored in 0xFFFF first, and then transfer and settle continuous 8 bytes and value in current register. Just 8bit in each character is valid for CRC, start bit and stop bit and parity check bit is all invalid.

In the CRC producing process, each 8 bit character need to be different with the content of register. The result move to LSB, and the MSD is filled by 0. If the tested LSB is 1, register is different with the preset value. The whole process need repeat 8 times.

CRC is add to message, and low byte first and the high byte, CRC simple function is as follows;

```
unsigned int crc_chk_value（unsigned char *data_value,unsigned char length）
{
unsigned int crc_value=0xFFFF;
int i;
while（length--）
{
crc_value^=*data_value++;
for（i=0;i<8;i++）
{
if（crc_value&0x0001）
{
crc_value=（crc_value>>1）^0xa001;
}
else
{
crc_value=crc_value>>1;
}
}
}
return（crc_value）;
}
```

d) Definition of communication protocol address Use function code group no. and mark no. to show rules:

High byte: F0~FF（group）, A0~AF（C group）, 70~7F（d group）

Low byte: 00~FF

For example: function code is H1.12，address is 0xF10C;

Note:

FF group: could not read and change parameters;

d group: could just read, but not change parameter.

Some parameter couldn't be changed when the inverter is running; some other parameter never be changed in any state; if we want to change the function code parameter, please note the range, unit and description of the parameter.

code group	Communication visit address	Communication modify the function code address of RAM
H0~HE Group	0xF000~0xFEFF	0x0000~0xEFF
C0~CC Group	0xA000~0xACFF	0x4000~0x4CFF
d0 Group	0x7000~0x70FF	

In addition, the life of the EE PROM will be shortened if EE PROM is frequently stored. So the users should reduce the times of storing EE PROM. And some parameter under communication mode is no need to store, and just need to change the value in RAM.

If the H group parameter, and need to realize above function, just change the function code high bit H to 0.

If the C group parameter, and need to realize above function, just change the function code high bit C to 4.

The corresponding function code address is as follows;

High byte: 00~0F（H group）, 40~4F（C group）

Low byte: 00~FF

Such as: function code H1.12 won't be stored to EEPROM，address is 0x010C;

Function code C0.06 won't be stored to EEPROM，address is 0x4006;

The address is just written RAM，not to reas.

Halt/operation parameter:

Parameter Address	Parameter Description
0x 1000	Communication setting value（-10000~10000）（decimal system）
0x 1001	Operation frequency
0x 1002	Bus voltage
0x 1003	Output voltage
0x 1004	Output current
0x 1005	Output power
0x 1006	Output torque
0x 1007	Operation speed
0x 1008	DI terminal input mark
0x 1009	DO terminal output mark
0x 100A	AI1 voltage
0x 100B	AI2 voltage
0x 100C	AI3 voltage
0x 100D	Count value input
0x 100E	Length input
0x 100F	Load speed
0x 1010	PID setting
0x 1011	PID feedback
0x 1012	PLC step
0x 1013	HDI input pulse frequency, unit 0.01kHz
0x 1014	Feedback speed, unit 0.1Hz

0x 1015	Residue operation time
0x 1016	AI1 voltage before revising
0x 1017	AI2 voltage before revising
0x 1018	AI3 voltage before revising
0x 1019	Linear speed
0x 101A	Current power on time
0x 101B	Current running time
0x 101C	HDI input pulse frequency, unit 1Hz
0x 101D	Communication setting value
0x 101E	Practical feedback speed
0x 101F	Main frequency A display
0x 1020	Auxiliary frequency B display

Note: communication setting value is relative vale percentage, 10000 is corresponding 100.00%, -10000 is corresponding -100.00%.

For the frequency dimensional data, the percent is corresponding to the max frequency (P5-10); for the torque dimensional data, the percent is P2-10,H2-48.

Control command input to inverter (just write)

Command Word Address	Command Function
0x 2000	0001: foreward running
	0002: reveral running
	0003: foreword jog
	0004: reveral jog
	0005: halt freely
	0006: slowing down halt
	0007: fault reset

Read inverter state:（read only）

Status word address	Status word function
0x 3000	0001: foreward running
	0002: reveral running
	0003: halt

: password verify:（if back to 8888H， means password verify successfully ）

Password address	Input password content
0x 1F00	*****
0x 2001	BIT0:SP2 output control BIT1:TA3-TB3-TC3 relay 3 output control BIT2:TA1-TB1-TC1 relay 1 output control BIT3:TA2-TB2-TC2 relay 2 output control BIT4:SP1 output control BIT5:XDO1;BIT6:XDO2 BIT7:XDO3;BIT8:XDO4 BIT9:XDO5

Analog output A01 control:（write only）

Command address	Command content
0x 2002	0~7FFF means 0％~100％

Analog output A02 control:（write only）

Command address	Command content
0x 2003	0~7FFF means 0％~100％

Pulse（HDI）output control:（write only）

Command address	Command content
0x 2004	0~7FFF means 0％~100％

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escription:

Inverter fault address	Inverter fault information
0x 8000	0000:no fault 0001:retain 0002:Over-current during acceleration 0003:Over-current during deceleration 0004:Over-current in constant speed operation 0005:Over-voltage during acceleration 0006:Over-voltage during deceleration 0007:Over-voltage in constant speed 0008:buffer resistance over-load fault 0009:underload fault 000A:inverter overload 000B:motor overload 000C:input phase loss 000D:outputphase loss 000E:module over-heat 000F:external fault 0010:communication abnormal 0011:contactor abnormal 0012:current detecting fault 0013:motor tune fault 0014:encoder/PG card fault 0015:parameter read and write abnormal 0016:inverter hardware fault 0017:motor short trouble to ground 0018:retain 0019:retain 001A:reach operation time 001B:User defined fault 1 001C:User defined fault 2 001D:reach power on time 001E:lose load 001F:PID feedback lose in running 0028:rapid current-limiting overtime fault 0029:switch motor fault in running 002A:speed variation larger 002B:motor over-speed 002D:motor over-heat 005A:encoder wiring setting error 005B:unconnect encoder 005C:initial position error 005E:speed feedback error

munication Parameter Description

Pd-00	Baud rate	Default	6005
	Setting range	Unit: MODUBS baud rate 0:300BPS 1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS	

This parameter is used to set the data deliver speed between upper machine and inverter.

Note: the baul rate of upper machine is same with inverter, otherwise the communication couldn’t continue. The baud rate is larger, the speed of communication is higher.

Pd-01	Data format	Default	0
	Setting range	0:No verify:Data format<8,N,2> 1:even verify:Data format<8,E,1> 2:odd verify:Data format<8,O,1> 3:No verify:Data format<8-N-1>	

The upper machine is same with the inverter’s setting format, otherwise the communication couldn’t continue.

Pd-02	Machine address	Default	1
	Setting range	1~247，0 is broadcast address	

The machine address set to 0, and broadcast address, realize upper machine broadcast function.

Pd-03	Response delay	Default	2ms
	Setting range	0~20ms	

Response delay: it means the time between the finish time of inverter data receiving and upper mamchine send data time. If the response time is less than system handle time, the response delay time is according to system handle time, if the response delay is longer than system handle time, wait the system handle the data,till get the response delay, and send the data to upper machine.

Pd-04	Communication overtime	Default	0.0 s
	Setting range	0.0 s（invalid）;0.1~60.0s	

When the function code is set to 0.0s, the communication overtime parameter is invalid.

When the function code is valid value, the time between two communication time is over communication overtime, the system will report E-16. Generally it is set to invalid.

Set Sub parameter to watch the communication state in the continue communication system.

Guarantee Agreement

Warranty of the company products executes in accordance with "the quality assurance" in instructions.

1. Warranty period is 12 months from the date of purchasing the product

2. Even within 12 months, maintenance will also be charged in the following situations:

2.1. Incorrect operation (according to the manual) or the problems are caused by unauthorized repair or transformation.

2.2. The problems are caused by exceeding the requirements of standards specifications to use the inverter.

2.3 After purchase, loss is caused by falling damage or improper transportation.

2.4 The devices' aging or failure is caused by bad environment (corrosive gas or liquid).

2.5 Earthquake, fire wind disaster, lightning, abnormal voltage or other accompanied natural disasters cause the damage.

2.6 Damage is caused during transport (note: the mode of transportation is determined by customers, the company helps to handle the transferring procedures of goods).

2.7 Unauthorized tearing up the product identification (e.g.: Nameplate, etc.); the serial number does not match the warranty card.

2.8 Failing to pay the money according purchase agreement.

2.9 Cannot objective actually describe the installation, wiring, operation, maintenance or other using situation to the company's service units.

Preface

Thank you for purchasing HD400S series solar pump inverters.

This manual describes how to use HD400S series inverter properly. Please read it carefully before installation, operation, maintenance and inspection. Besides, please use the product after understanding the safety precautions.

Precautions
● In order to describe the product's details, the drawings presented in this instruction are sometimes shown without covers or protective guards. When using the product, please make sure to install the cover or protective guard as specified firstly, and operate the products in accordance with the instructions.
● Since the drawings in this manual are represented examples, some are subject to differ from delivered products.
● This manual may be modified when necessary because of improvement of the product, modification or changes in specifications. Such modifications are denoted by a revised manual No..
● If you want to order the manual due to loss or damage, please contact our company agents in each region or our company customer service center directly.
● If there is still any problem during using the products, please contact our company customer service center directly.

Contents

Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are classified as follows:

Danger: Operations which are not performed according to requirements may cause serious equipment loss or personnel injury.

Caution: Operations which are not performed according to requirements may cause medium hurt or light hurt or material loss.

During the installation, commissioning and maintenance of the system, please make sure to follow the safety and precautions of this chapter. In case of a result of illegal operations, caused any harm and losses is nothing to do with the company.

1.1 Safety Precautions

1.1.1 Before Installation:

Danger	● Do not use the water-logged inverter, damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury. ● Use the motor with Class B or above insulation. Otherwise, there may be risk of electric shock.
Caution	● Carefully handled when loading, otherwise it may damage the inverter. ● Please don't use the damaged drive or inverter with missing parts, there may be risk of injury. ● Do not touch the electronic parts and components; otherwise it will cause static electricity.

1.1.2 During Installation:

Danger	● Install the inverter on incombustible surface such as metal, and keep away from flammable substances. Otherwise it may cause fire. ● Do not loose the set screw of the equipment, especially the screws marked in RED.
Caution	● Do not drop the cable residual or screw in the inverter. Otherwise it may damage the inverter. ● Please install the drive in the place where there is no direct sunlight or less vibratory. ● When more than two inverters are to be installed in one cabinet, due attention should be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the heat sinking effect.

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1.1.3 During Wiring:

Danger	● Operation should be performed by the professional engineering technician. Otherwise there will be danger of electric shock! ● There should be circuit breaker between the inverter and power supply. Otherwise, there may be fire! ● Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock! ● The ground terminal should be earthed reliably. Otherwise there may be danger of electric shock.
Caution	● Never connect AC power to output UVW terminals. Please note the remark of the wiring terminals, connect them correctly. Otherwise may cause inverter damaged. ● Ensure the wiring circuit can meet the requirement of EMC and the area safety standard. Please follow the instructions in the manual before wiring. Otherwise may cause injury or electric shock. ● Never connect the braking resistor between DC bus (+), (-) terminals. Otherwise may cause fire. ● Encoder must be used together with shielded wire, and ensure the single terminal of the shielded lay is connected with ground well.

1.1.4 Before Power-on:

Danger	● Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the inverter. The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused. ● The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur.
Caution	● The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused! ● Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur!

1.1.5 After Power-on:

Danger	● Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock! ● Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock! ● Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock! ● At power-on, the inverter will perform the security check of the external heavy-current circuit automatically. Thus, at the moment please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.

Caution	● If parameter identification is required, due attention should be paid to the danger of injury arising from the rotating motor. Otherwise accident may occur! ● Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During Operation:

Danger	● Do not touch the fan or discharge resistor to sense the temperature. Otherwise, you may get burnt! ● Detection of signals during the operation should only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused!
Caution	● During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment! ● Do not start and shut down the inverter by connecting and disconnecting the contactor. Otherwise, it may damage the equipment!

1.1.7 During Maintain:

Danger	● Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock! ● Be sure to conduct repair and maintenance after the charge LED indicator of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury! ● The inverter should be repaired and maintained only by the qualified person who has received professional training. Otherwise, it may cause personal injury or equipment damage! ● Carry out parameter setting after replacing the inverter, all the plug-ins must be plug and play when power outage.

1.2 Precautions

1.2.1 Motor Insulation Inspection

When the motor is used for the first time, or when the motor is reused after being kept, or when periodical inspection is performed, it should conduct motor insulation inspection so as to avoid damaging the inverter because of the insulation failure of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the 500V megameter, and the insulating resistance measured should be at least 5MΩ.

1.2.2 Thermal Protection of the Motor

If the ratings of the motor does not match those of the inverter, especially when the rated power of the inverter is higher than the rated power of the motor, the relevant motor protection parameters in the in the inverter should be adjusted, or thermal relay should be mounted to protect the motor.

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1.2.3 Running with Frequency higher than Standard Frequency

This inverter can provide output frequency of 0Hz to 3000Hz. If the user needs to run the inverter with frequency of more than 50Hz, please take the resistant pressure of the mechanical devices into consideration.

1.2.4 Vibration of Mechanical Device

The inverter may encounter the mechanical resonance point at certain output frequencies, which can be avoided by setting the skip frequency parameters in the inverter.

1.2.5 Motor Heat and Noise

Since the output voltage of inverter is PWM wave and contains certain harmonics, the temperature rise, noise and vibration of the motor will be higher than those at power frequency.

1.2.6 Voltage-sensitive Device or Capacitor Improving Power Factor at the Output Side

Since the inverter output is PWM wave, if the capacitor for improving the power factor or voltage-sensitive resistor for lightning protection is mounted at the output side, it is easy to cause instantaneous over current in the inverter, which may damage the inverter. It is recommended that such devices not be used.

1.2.7 Switching Devices like Contactors Used at the Input and Output terminal

If a contactor is installed between the power supply and the input terminal of the inverter, it is not allowed to use the contactor to control the startup/stop of the inverter. If such contactor is unavoidable, it should be used with interval of at least one hour. Frequent charge and discharge will reduce the service life of the capacitor inside the inverter. If switching devices like contactor are installed between the output end of the inverter and the motor, it should ensure that the on/off operation is conducted when the inverter has no output. Otherwise the modules in the inverter may be damaged.

1.2.8 Use under voltage rather than rated voltage

If the HD400S series inverter is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the inverter. When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.9 Change Three-phase Input to Two-phase Input

It is not allowed to change the HD400S series three-phase inverter into two-phase one. Otherwise, it may cause fault or damage to the inverter.

1.2.10 Lightning Impulse Protection

The series inverter has lightning over current protection device, and has certain self-protection capacity against the lightning. In applications where lightning occurs frequently, the user should install additional protection devices at the front-end of the inverter.

Chapter 2 Product Information

2.1 Product Inspection

Checking the following items when receiving the inverter

Confirmation Items	Method
Confirm if the inverter is what you ordered	Check name plate
Damaged or not	Inspect the entire exterior of the inverter to see if there are any scratches or other damage resulting from shipping
Confirm if the fastening parts (screws, etc.) are loose or not	Check with a screw driver if necessary
User's manual, certification and other spares	User's manual and the relative spares

Please contact the local agent or our company directly if there is any damage on the inverter

2.2 Model & Nameplate Description

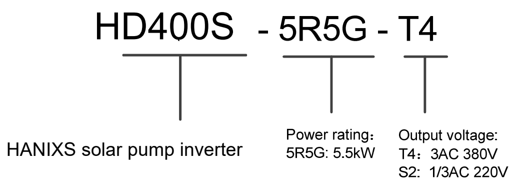


Figure 2-1 HD400S Model description

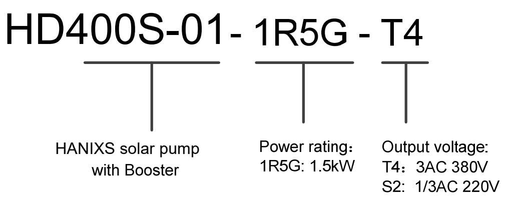


Figure 2-2 HD400S Model description

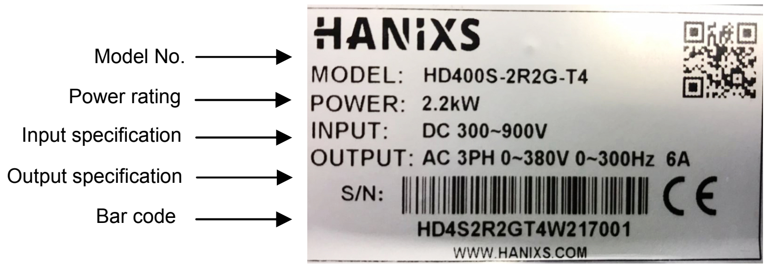


Figure 2-4 Nameplate description

2.3 Selection Guide

Table 2-1 HD400S Series Inverter Model and Technical Data

Model	motor		Rated output current （A）	Suggested open circuit voltage （V）
	kW	HP		
Three phase output 220V				
HD400S-0R4G-S2	0.4	0.5	2.3	350~400
HD400S-0R7G-S2	0.75	1	4	350~400
HD400S-1R5G-S2	1.5	2	7	350~400
HD400S-2R2G-S2	2.2	3	9.6	350~400
HD400S-004G-S2	4.0	5	17	350~400
HD400S-5R5G-S2	5.5	7.5	25	350~400
HD400S-7R5G-S2	7.5	10	32	350~400
HD400S-011G-S2	11	15	45	350~400
Three phase output 380V				
HD400S--0R7G-T4	0.75	1	2.1	625~750
HD400S-1R5G-T4	1.5	2	3.8	625~750
HD400S-2R2G-T4	2.2	3	6	625~750
HD400S-004G-T4	4.0	5	9	625~750
HD400S-5R5G-T4	5.5	7.5	13	625~750
HD400S-7R5G-T4	7.5	10	17	625~750
HD400S-011G-T4	11	15	25	625~750
HD400S-015G-T4	15	20	32	625~750
HD400S-018G-T4	18.5	25	37	625~750
HD400S-022G-T4	22	30	45	625~750
HD400S-030G-T4	30	40	60	625~750
HD400S-037G-T4	37	50	75	625~750
HD400S-045G-T4	45	60	90	625~750
HD400S-055G-T4	55	75	110	625~750
HD400S-075G-T4	75	100	150	625~750
HD400S-090G-T4	90	125	176	625~750
HD400S-110G-T4	110	150	210	625~750

Table 2-2 HD400S-01 Series Inverter Model and Technical Data

Model	motor		Rated output current (A)	Suggested open circuit voltage (V)
	kW	HP		
Three phase output 220V				
HD400S-01-0R4G-S2	0.4	0.5	2.3	70~200
HD400S-01-0R7G-S2	0.75	1	4.0	70~200
HD400S-01-1R5G-S2	1.5	2	7.0	150~400
Three phase output 380V				
HD400S-01-0R7G-T4	0.75	1	2.1	150~600
HD400S-01-1R5G-T4	1.5	2	3.8	250~600
HD400S-01-2R2G-T4	2.2	3	6.0	250~600

2.4 Technical Specifications

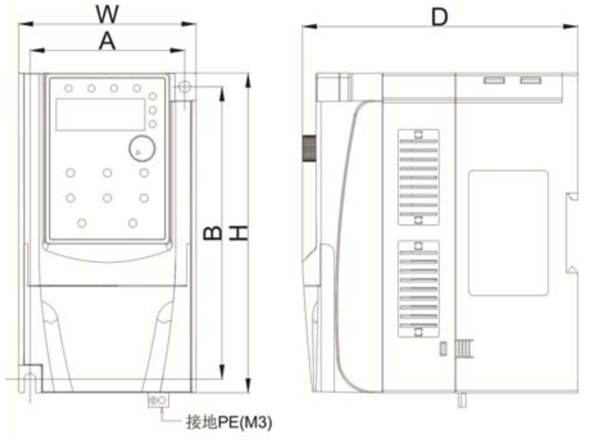
Table 2-3 HD400S/HD400S-01 Series Inverter Technical Specifications

Item	Technical Index	Specification
Input	Input DC voltage (HD400S)	200~450V (220V pump) 300~900V (380V pump)
	Input DC voltage (HD400S-01)	220V pump: 70-200V (0.4~0.75kW), 150-400V (1.5kW) 380V pump: 150-600V (0.75kW), 250-600V (1.5~2.2kW)
Output	Output voltage	0～rated input voltage
Control Features	Control mode	V/f control Sensorless vector control

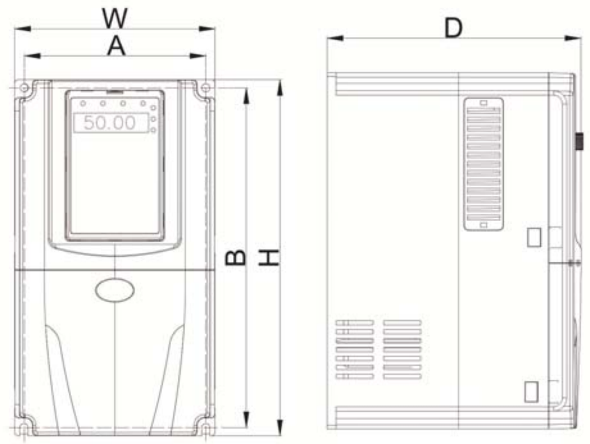
	Operation command mode	Keypad control Terminal control Serial communication control
	Frequency setting mode	MPPT automatic regulation CVT (constant voltage)
	Overload capacity	150% 60s, 180% 10s, 200% 3s.
	Starting torque	0.5Hz/150% (SVC); 1Hz/150% (V/f)
	Speed adjustment range	1:100 (SVC), 1:50 (V/f)
	Speed control precision	±0.5% (SVC)
	Carrier frequency	1.0~16.0kHz, automatically adjusted according to temperature and load characteristics
	Frequency accuracy	Digital setting: 0.01Hz Analog setting: maximum frequency * 0.05%
	Torque boost	Automatically torque boost; manually torque boost: 0.1%~30.0%
	V/f curve	Three types: linear, multiple point and square type (1.2 power, 1.4 power, 1.6 power, 1.8 power, square)
	Acceleration/deceleration mode	Straight line / S curve; four kinds of acceleration/deceleration time, range: 0.1s~3600.0s
Control Function	Over-voltage & over-current stall control	Limit current & voltage automatically during the running process, prevent frequent over-current & over-voltage tripping
	Fault protection function	Up to 30 fault protections including over-current, over-voltage, under-voltage, overheating, default phase, overload, shortcut, etc., can record the detailed running status during failure & has fault automatic reset function
	Special functions for solar pump system	MPPT (Maximum Power Point Tracking), dry tap protection, water level sensor failure protection, full water warning, weak sunshine warning, full automatic running, automatic switching of PV input and other power inputs.
Input/output terminals	Input terminals	Programmable DI：on-off inputs Programmable AI：0~10V or 0/4~20mA input
	Output terminals	2 relay outputs
	Communication terminals	Offer RS485 communication interface, support MODBUS-RTU communication protocol
Human machine interface	LED display	Display frequency setting, output frequency, output voltage, output current, etc.
	Multifunction key	QUICK/JOG key, can be used as multifunction key
Environment	Ambient temperature	-10℃～40℃, derated 4% when the temperature rise by every 1℃ (40℃～50℃).
	Humidity	90%RH or less (non-condensing)
	Altitude	≤1000M: output rated power, ＞1000M: output derated
	Storage temperature	-20℃～60℃

2.5 HD400S External & Installation Dimensions

2.5.1 Single phase output 220V inverter



0.4~1.5kW



2.2~4.0kW

Power Range	External Dimension (mm)			Installation Dimension (mm)		Mounting Bolt Model
	W	H/H1	D/D1	A	B	
0.4~1.5kW	78	140/148.4	124.8/121.8	73	128	M4
2.2kW	135	240	173	122.6	229	M4
4.0kW	170	285	176	158	273.5	M4

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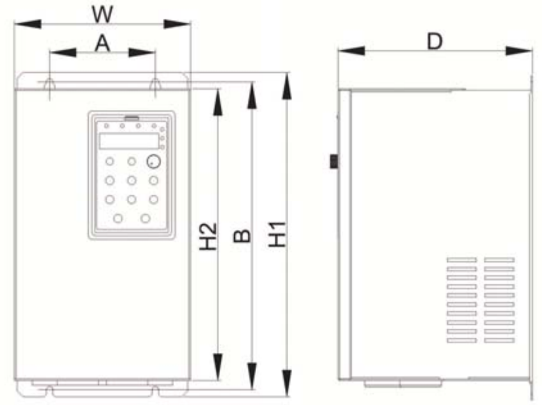
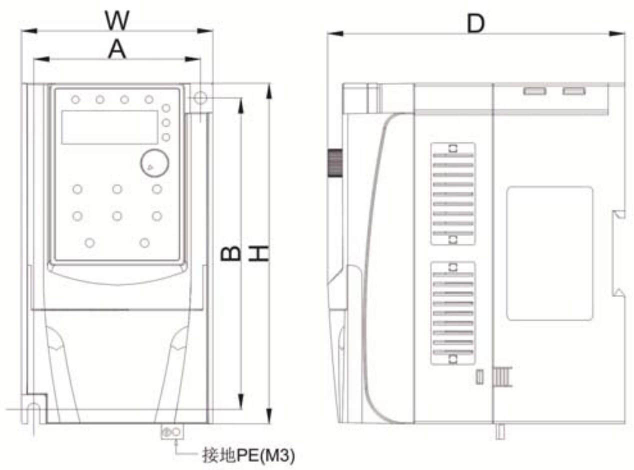


5.5kW

Power range	External dimension (mm)				Installation Dimension (mm)		Mounting Bolt Model
	W	H1	H2	D	A	B	
5.5kW	200	329.1	300	177.2	90	316.6	M4

2.5.2 Three phase output 220V inverter



0.4~1.5kW

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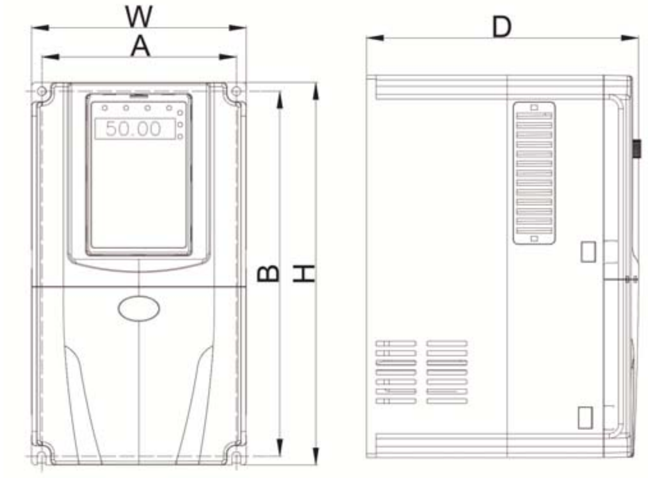
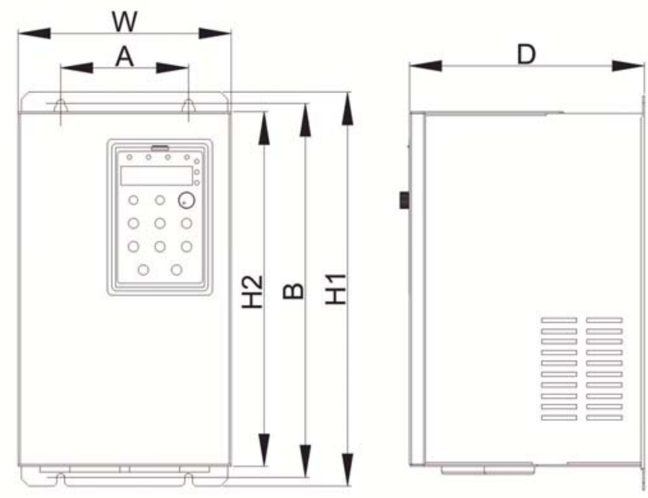


2.2~5.5kW

Power Range	External Dimension (mm)			Installation Dimension (mm)		Mounting Bolt Model
	W	H/H1	D/D1	A	B	
0.4~1.5kW	78	140/148.4	124.8/121.8	73	128	M4
2.2kW	110	185	153	98	174	M4
4.0kW	135	240	173	122.6	229	M4
5.5kW	170	285	176	158	273.5	M4



7.5～11Kw

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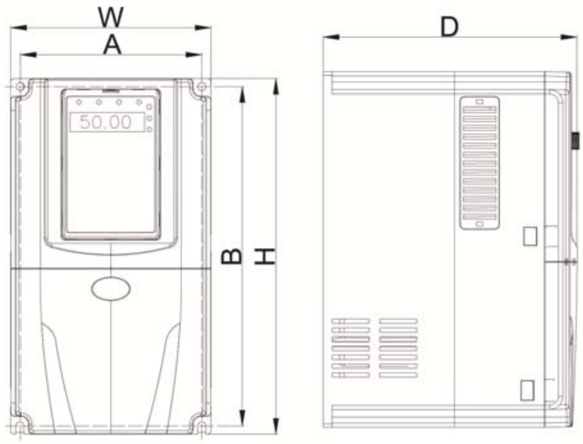
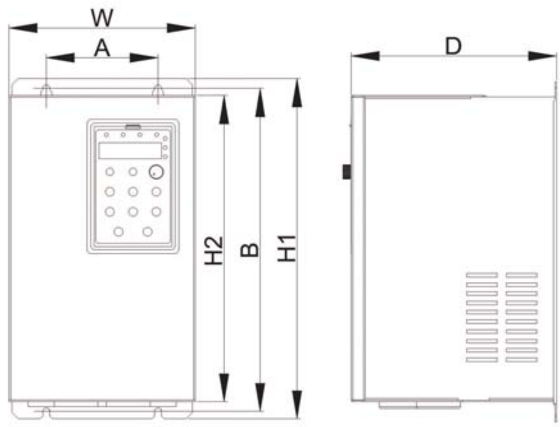
Power Range	External Dimension (mm)				Installation Dimension (mm)		Mounting Bolt Model
	W	H1	H2	D	A	B	
7.5kW	200	329.1	300	177.2	90	316.6	M4
11kW	225	397.6	365	185.2	120	384.1	M5

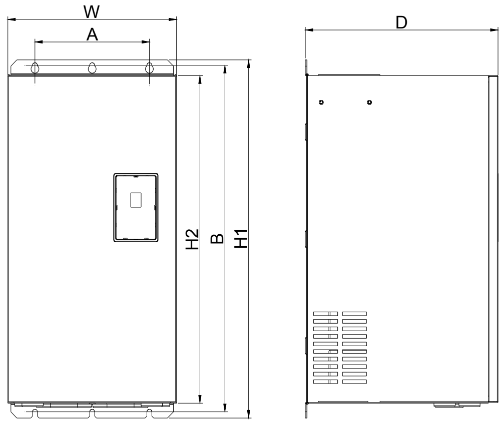
2.5.3 Three phase output 380V inverter



0.75～11kW



15～30kW



37～110kW

Power range	External dimension (mm)				Installation dimentsion (mm)		Mounting Bolt Model
	W	H1	H2	D	A	B	
0.75~2.2kW	110	185		153	98	174	M4
4.0~5.5kW	135	240		173	122.6	229	M4
7.5~11kW	170	285		176	158	273.5	M4
15kW	200	329.1	300	177.2	90	316.6	M4
18.5~22kW	225	397.6	365	185.2	120	384.1	M5
30kW	255	439.6	402.4	209.6	140	423.6	M5
37~45kW	280	570	521.2	258	190	552	M6
55~75kW	320	600	552	330	230	582	M8
90~110kW	320	715	662	330	230	695.5	M8

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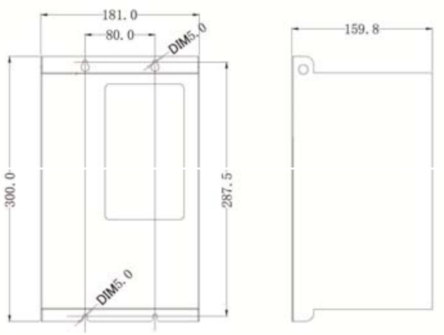
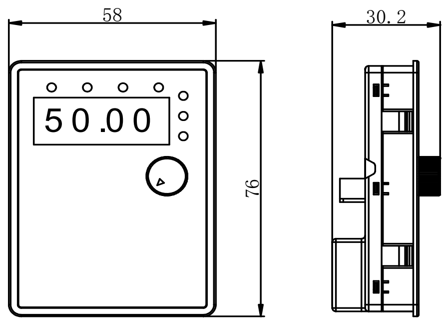
2.6 HD400S-01 External & Installation Dimensions



2.7Keypad External Dimension



Keypad dimension of HD400S series 1AC/3AC 220V 0.4~1.5kW inverters

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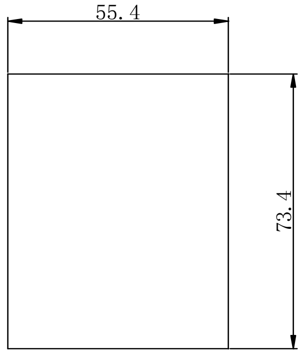
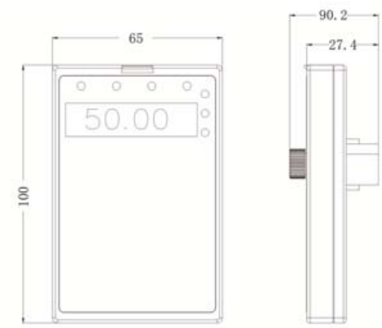
Illustration: This keypad can be connected with the inverter externally by ordinary network cable, also can be mounted on the front side of panel directly. The suggested thickness of panel is 1.2mm.

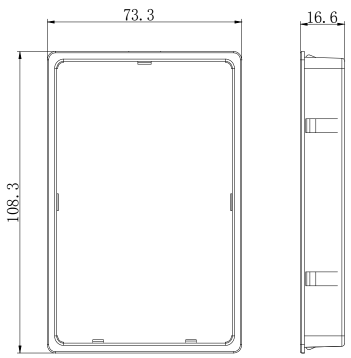


The installation size on the panel while using this keypad

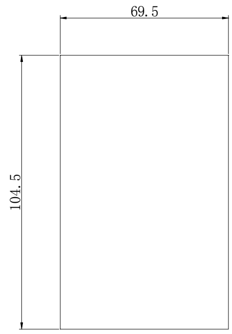


Keypad dimension of other power rating inverters

Illustration: This keypad can be connected with the inverter externally by ordinary network cable, and it needs an additional bracket to fix it.



65*100mm keypad bracket dimension



65*100mm hole dimension of keypad bracket

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2.8 Wiring Diagram

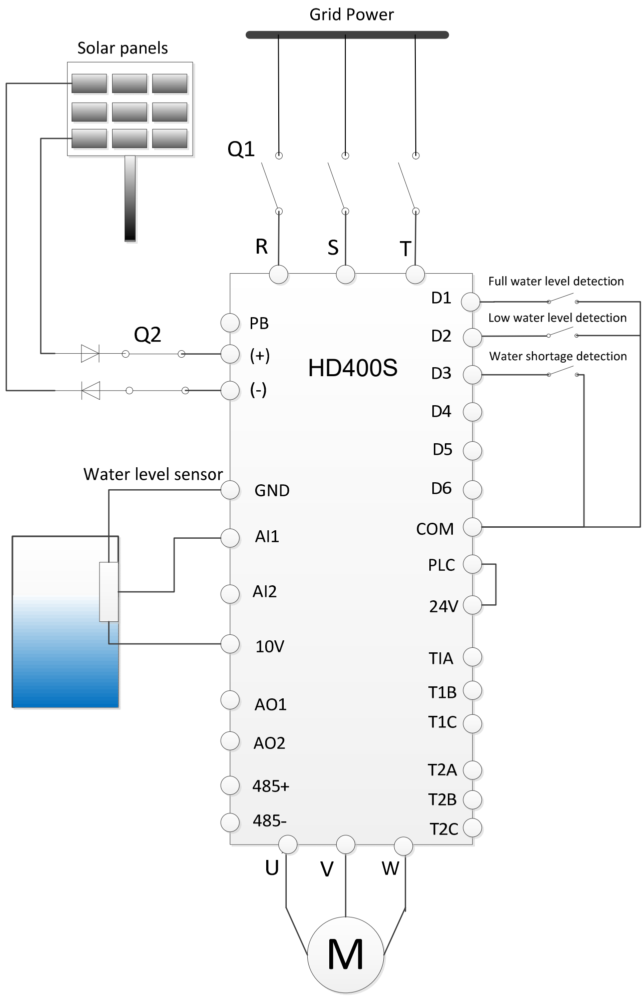

Figure 2-3 Wiring Diagram of solar pump inverter

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2.9Main Circuit Terminals and Connections

1) Main circuit terminals

Figure 2-4 Main circuit terminals（HD400S 1AC/3AC 220V, 0.4～1.5kW）

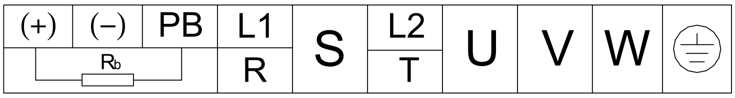

Figure 2-5 Main circuit terminals（HD400S 1AC/3AC 220V, 2.2kW; 3AC 380V, 0.75～ 11kW）

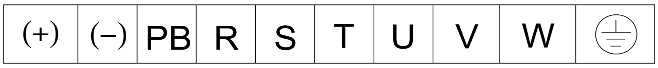

Figure 2-6 Main circuit terminals（HD400S 3AC 380V, 15~22kW）

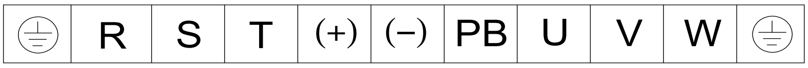

Figure 2-7 Main circuit terminal（HD400S 3AC 380V, 30kW）

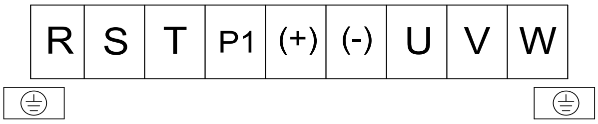

Figure 2-8 Main circuit terminals（HD400S 3AC 380V, 37～75kW）

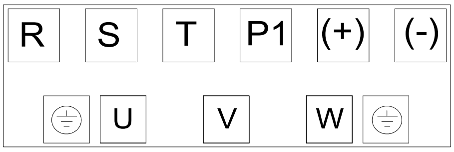

Figure 2-9 Main circuit terminals（HD400S 3AC 380V, 90～200kW）

Figure 2-10 Main circuit terminals（HD400S-01）

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2) Instructions of main circuit terminals:

Terminal	Name	Description
R, S, T (3 AC) L, N (1 AC)	Input terminals of AC power supply	Connect to three phase or single phase AC power
(+) , (-)	1. Input terminals of DC power 2. Negative and positive terminals of DC bus	1. Connect to the solar panels 2. Common DC bus input point
(+) , PB	Connection terminal of brake resistor	Connection point of brake resistor of the inverter below 18.5kW (220V) & the inverter below 37kW (other voltages)
P1, (+)	Connection terminal of external DC reactor	Connection point of external DC reactor
U, V, W	Output terminal of inverter	Connect to the three phase motor
⏚	Earth terminal	Earth connection terminal

Precautions on Wiring:

a) Input power R, S, T or L, N:
There is no phase sequence requirement for the cable connection at the input side of the inverters.

b) Terminals U, V, W at the output side of the inverter:
The inverter output side cannot connect to the capacitor or surge absorber. Otherwise, it may cause frequent inverter protection and even damage the inverter.
In case the motor cable is too long, it may generate electrical resonance easily due to the impact of distributed capacitance, thus damaging the motor insulation or generating higher leakage current to invoke over current protection of the inverter. When the length of motor cable is longer than 100 meters, it needs to install an AC output reactor.

c) Earth terminal PE⏚:
This terminal should be earthed reliably, with resistance of earth cable of less than 0.1Ω. Otherwise, it may cause fault or damage the inverter.
Do not share the earth terminal ⏚ and zero line of the power supply.

2.10Control Terminals and Connections

1) Control circuit terminals

AO1	RS485+	RS485-	COM	PLC	+24V	D4	HDO	T1A	T1B	T1C
AI1	GND	+10V	D1	D2	D3	D5	HDI			

Figure 2-11 Control Circuit Terminals (HD400S series 1AC/3AC 220V, 0.4～1.5kW)

AI1	AI2	AO1	AO2	GND	COM	CME	COM	PLC	+24V	HDO	T1A	T1B	T1C
RS485+	RS485-	+10V	GND	D1	D2	D3	D4	D5	D6	HDI	T2A	T2B	T2C

Figure 2-12 Control Circuit Terminals (HD400S series 2.2～110kW)

+10V	AI1	GND	485+	485-	GND	D1	D2	D3	COM	PLC	+24V

T1A	T1B	T1C
T2A	T2B	T2C

Figure 2-13 Control Circuit Terminals (HD400S-01 series)

2) Function description of control terminal

Table 2-4 Description of Control Terminal Function

Type	Terminal Symbol	Terminal Name	Function Description
Power Supply	+10V~ GND	External +10V power	Provide +10V power supply for external units, and the maximum output current is 10mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ~5kΩ.
	+24V~ COM	External +24V power	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminals and the external sensor. The maximum output current is 200mA.
	PLC	External power input terminal	Connect to 24V by default upon delivery When external signal is used to drive D1~D6, and HDI, PLC needs to connect to the external power supply and disconnect from the +24V power terminal
Analog Input	AI1~GND	Analog input terminal 1	1. Input range: DC 0V~10V/4mA~20mA, determined by J1 jumper on the control board. 2. Input impedance: 20kΩ (voltage); 500Ω(current)
	AI2~GND	Analog input terminal 2	1. Input range: DC 0V~10V/4mA~20mA, determined by J2 jumper on the control board. 2. Input impedance: 20kΩ (voltage); 500Ω(current)
Digital Input	D1	Digital input 1	1. Optical coupling isolation, compatible with dual polarity input 2. Input impedance: 4.7kΩ 3. Voltage range for level input: 9V~30V
	D2	Digital input 2	
	D3	Digital input 3	
	D4	Digital input 4	
	D5	Digital input 5	
	D6	Digital input 6	
	HDI~CME/ D7~COM	High-speed pulse input terminal	In addition to the characteristics of D1 to D6, it can also be used as the high speed pulse input channel. Maximum input frequency is 100kHz Caution: The CME is internally insulated with the COM, but they have been short circuited externally (HDI is driven by +24V by default prior to delivery). When HDI needs to be driven by the external power, the short circuited between CME and COM must be disconnected.
Analog Output	AO1~GND	Analog output 1	The voltage or current output is determined by J3 jumper on the control board. Output voltage range: 0V~10V. Output current range: 0mA ~ 20mA.

	AO2~GND	Analog output 2	The voltage or current output is determined by J4 jumper on the control board. Output voltage range: 0V~10V. Output current range: 0mA ~ 20mA.
Digital Output	HDO~CME	High speed pulse output / open collector output	It can be used as high speed pulse output or open collector output which is determined by function code P5-00. High speed pulse output: maximum frequency is 100kHz Open collector output :Optical coupling isolation, dual polarity Output voltage range: 0V~24V Output current range: 0mA~50mA Note: The CME is internally insulated with the COM, but they have been short circuited externally (HDO is driven by +24V by default prior to delivery).
Relay Output 1	T1B-T1C	Normally closed terminal	Driving capacity: AC 250V, 3A, COSØ=0.4 DC 30V, 1A
	T1A-T1C	Normally open terminal	
Relay Output 2	T2B-T2C	Normally closed terminal	Driving capacity: AC 250V, 3A, COSØ=0.4 DC 30V, 1A
	T2A-T2C	Normally open terminal	

2.11 Instructions on Warranty

Free warranty only applies to the inverter itself.

1) We provide 12 months warranty (starting from the date of original shipment as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

2) Reasonable repair expenses will be charged for the following situations within 12 months:

a) The equipment is damaged because the user fails to comply with the requirements of the user's manual;

b) Damage caused by fire, flood and abnormal voltage;

3) Damage caused when the inverter is used for abnormal function.

The service expenses will be calculated according to the standard of the manufacturer. If there is any agreement, the agreement should prevail.

Chapter 3 Operation and Display

3.1 Keypad Description

With the operation keypad, it can perform such operations on the inverter as function parameter modification, working status monitor and running control (start and stop).

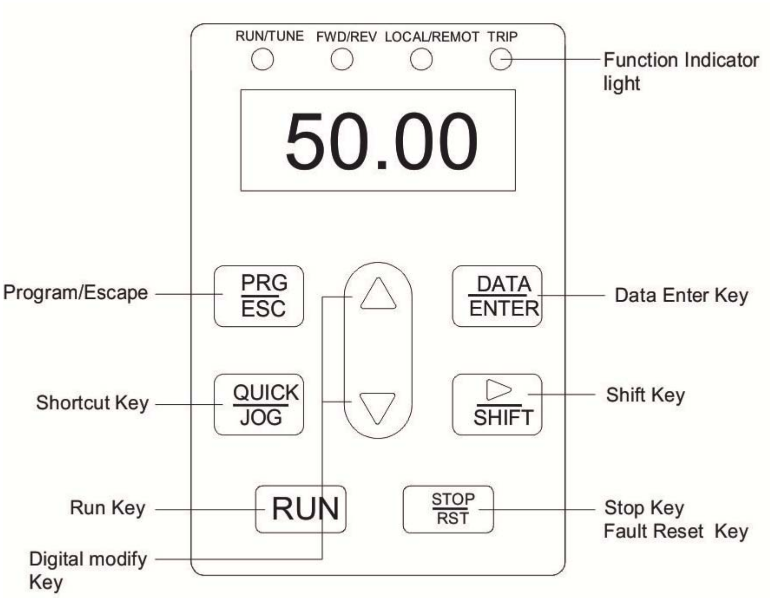

Figure 3-1 Operation Keypad Diagram

1) Function key description

Function indicator	Description
RUN	Extinguished: stop status Light on: operating status
FWD/REV	Extinguished: forward operation Light on: reverse operation
LOCAL/REMOT	Extinguished: keypad control Flickering: communication control Light on: terminal control
TUNE/TRIP	Light on: torque control Flickering slowly: parameter autotuning status Flickering quickly: fault status

2) Unit indicator light description

Unit indicator	Description
Hz	Frequency unit
A	Current unit
V	Voltage unit
RPM	Rotation speed unit
%	Percentage

3) Digital display zone

Five-number digit LED display, can display setting frequency, output frequency, various monitoring data and alarm code.

4) Keypad button description

Button	Name	Function
PRG/ESC	Programming key	Entry and exit of primary menu
DATA/ENTER	Confirmation key	Progressively enter menu, and confirm parameters
△	Increment key	Progressively increase of data or function codes
▽	Decrement key	Progressively decrease of data or function codes
▷	Shift key	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification bit of parameters when modifying parameters.
RUN	Running key	Start to run inverter under keyboard control mode
STOP/RST	Stop/reset	Stop inverter in running status and reset operation in fault alarm status. The button's characteristics are restricted by function code P7-02.
QUICK/JOG	Multi-function selection key	According to P7-01, take function switching selection.

3.2 Function Code Checking and Modification Methods Description

The operation keypad of theHD400S Series Inverter adopts three-level menu structure to carry out operations such as parameter setting.

The three-level menu includes function parameter group (level 1 menu) → Function code (level 2 menu) → Function code setting value (level 3 menu). Refer to Figure 4-2 for the operation procedure.

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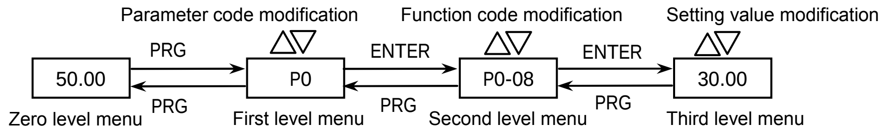
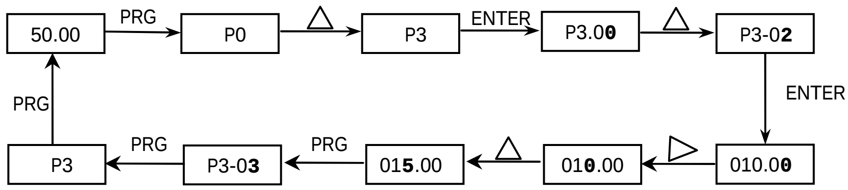


Figure 3-2 Operation Procedure of Three-level Menu

Description: When operating on level 3 menu, press PRG key or ENTER key to return to level 2 menu. The difference between PRG key and ENTER key is described as follows: Pressing ENTER KEY will save the setup parameter and return to the level 2 menu and then automatically shift to the next function code, while pressing PRG key will directly return to level 2 menu without saving the parameter, and it will return to the current function code.

Example: Modify the function code P3-02 from 10.00Hz to 15.00Hz. (The bold-type word indicates the flashing bit.)



In level 3 menu, if there is no flashing bit, it indicates that the function code cannot be modified. The possible reasons include:

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

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

3.3 Power-on Initialization

Firstly the system initializes during the inverter power-on, and LED displays “8.8.8.8.8.8”. After initialization, the inverter is in fault protection status if a fault happens, or the inverter is in stand-by status

3.4 Fault Protection

In fault status, inverter will display fault code & record output current, output voltage, etc. For details, please refer to P9 (fault and protection) parameter group. Fault can be reset via STOP/RST key or external terminals.

3.5 Stand By

In stop or stand by status, parameters of multi-status can be displayed. Whether or not to display this parameter can be chosen through function code P7-05 (Stop status display parameter) according to binary bits.

In stop status, there are thirteen parameters can be chosen to display or not. They are: setting frequency, bus voltage, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, radiator temperature, count value, actual length, PLC running step, load speed display, PID setting, HDI input pulse frequency. The displaying of the chosen parameters can be switched in sequence by press “ ▷ ” button. Power on after power-off, the displayed parameters would be default considered as the chosen parameters before power-off.

3.6 Running

In running status, there are thirty two parameters can be chosen to display or not through function code P7-04 (running status display parameter 2) according to binary bits. They are: running frequency, setting frequency, DC bus voltage, output voltage, output current, output torque, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, radiator temperature, actual count value, actual length, line speed, PID setting, PID feedback, etc. The displaying of the chosen parameters can be switched in sequence by pressing “▷ ” button.

3.7 Password Setting

The inverter provides user password protection function. When PP-00 is set to non-zero value, it indicates the user password, and the password protection turns valid after exiting the function code editing status. When pressing PRG key again, “------“will be displayed, and common menu cannot be entered until user password is input correctly.

To cancel the password protection function, enter with password and set PP-00 to “0”.

Chapter 4 Parameters Description

Group P0 Basic Function

P0-01	Control mode		Factory default	0
	Setting range	0	V/F control	
		1	Sensorless vector control	

0: V/F control
It is suitable for general purpose application such as pumps, fans etc. One inverter can drive multiple motors.
1: Sensorless vector control
It is widely used for the application which requires high torque at low speed, high speed accuracy, and quicker dynamic response, such as machine tool, injection molding machine, centrifugal machine and wire-drawing machine, etc.

P0-02	Running Command source		Factory default	0
	Setting range	0	0: Keypad (LED OFF)	
		1	1: Terminal (LED ON)	
		2	2: Communication (LED flickers)	

Select the input channel for control command. The inverter control commands include start, stop, forward run, reverse run, Jog and so on.

0: Keypad ("LOCAL/REMOT" LED OFF)
Both RUN and STOP/RST keys are used for running command control. If multifunction key QUICK/JOG is set as FWD/REV switching function (P7-01 is set to be 2), it will be used to change the rotating orientation. If multifunction key QUICK/JOG is set as FWD jog (P7-01 is set to be 3) or REV jog (P7-01 is set to be 4), it will be used for jog running.

1: Terminal ("LOCAL/REMOT" LED ON)
The operations, including FWD, REV, JOGF, JOGR, etc. can be controlled by multifunctional input terminals.

2: Communication ("LOCAL/REMOT" LED flickers)
The operation of inverter can be controlled by host through communication.

P0-09	Running direction		Factory default	0
	Setting range	0	Direction is forward	
		1	Direction is reverse	

Through modifying this function code, it can change the rotary direction of the motor without changing motor wiring. It's equal to adjust any two lines of the motor (U, V and W) and further change the rotary direction of the motor.

Note: If the parameters are restored, the running direction will be back to its original status. For the pump application, the running direction must be correct, otherwise the system cannot work properly.

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P0-10	Maximum frequency	Factory default	50.00Hz
	Setting range	50.00Hz ~ 300.00Hz	

When the analog input, high speed pulse input (HDI) or multi-step command is as the frequency source, their 100.0% is calibrated by P0-10 relatively.

P0-12	Frequency upper limit	Factory default	50.00Hz
	Setting range	P0-14 (frequency lower limit) ~ P0-10 (maximum frequency)	
P0-13	Frequency upper limit offset	Factory default	0.00Hz
	Setting range	0.00Hz ~ P0-10 (maximum frequency)	

When the frequency source upper limit is analog value or HDI pulse, P0-13 is used as the setting value's offset. The combination of this offset frequency and P0-12 is used as the final setting value of frequency upper limit.

P0-14	Frequency lower limit	Factory default	0.00Hz
	Setting range	0.00Hz ~ P0-12 (frequency upper limit)	

If the reference frequency is lower than frequency lower limit, the inverter can stop, or run with lower limit frequency, or run at zero speed, which is set by P8-14.

P0-17	Acceleration time 1	Factory default	Model depend
	Setting range	0.00s ~ 36000s	
P0-18	Deceleration time 1	Factory default	Model depend
	Setting range	0.00s ~ 36000s	

Acceleration time is the time of accelerating from 0Hz to 50Hz.
Deceleration time is the time of decelerating 50Hz to 0Hz.

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Group P1 Motor Parameters

P1-00	Motor type		Factory default	0
	Setting range	0	Common asynchronous motor	
		1	Variable frequency asynchronous motor	
P1-01	Motor rated power		Factory default	Model depend
	Setting range		0.1kW ~ 1000.0kW	
P1-02	Motor rated voltage		Factory default	Model depend
	Setting range		1V ~ 2000V	
P1-03	Motor rated current		Factory default	Model depend
	Setting range		0.01A ~ 655.35A (Inverter power≤55kW) 0.1A ~ 6553.5A (Inverter power＞55kW)	
P1-04	Motor rated frequency		Factory default	Model depend
	Setting range		0.01Hz ~ P0-10 (maximum frequency)	
P1-05	Motor rated speed		Factory default	Model depend
	Setting range		1rpm ~ 65535rpm	

Please set the parameters correctly according to the motor nameplate even using V/f control mode.

P1-06	Motor stator resistance	Factory default	Model depend
	Setting range	0.001Ω ~ 65.535Ω (Inverter power≤55kW) 0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)	
P1-07	Motor rotor resistance	Factory default	Model depend
	Setting range	0.001Ω ~ 65.535Ω (Inverter power≤55kW) 0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)	
P1-08	Motor leakage inductive	Factory default	Model depend
	Setting range	0.01mH ~ 655.35mH (Inverter power≤55kW) 0.001mH ~ 65.535mH (Inverter power＞55kW)	
P1-09	Motor mutual inductive	Factory default	Model depend
	Setting range	0.1mH ~ 6553.5mH (Inverter power≤55kW) 0.01mH ~ 655.35mH (Inverter power＞55kW)	
P1-10	Motor current without load	Factory default	Model depend
	Setting range	0.01A ~ P1-03 (Inverter power≤55kW) 0.1A ~ P1-03 (Inverter power＞55kW)	

Group P3 V/F Control Parameters

This group of function code is enabled only for V/F control (P0-01=0) and is invalid for vector control.
V/F control is applicable for the general loads such as fan and pump or the applications where one inverter drives multiple motors or the inverter power is one level lower or higher than the motor power.

P3-00	V/F curve setting		Factory default	4
	Setting range	0	Linear V/F curve	
		1	Multiple-point V/F curve	
		2	Square V/F curve	
		3	1.2 power V/F	
		4	1.4 power V/F	
		6	1.6 power V/F	
		8	1.8 power V/F	

0: Linear V/F curve. It is suitable for common constant torque load.
1: Multiple-point V/F curve. It is suitable for the special loads such as dehydrator and centrifugal machine.
2: Square V/F curve. It is suitable for the centrifugal loads such as fan and pump.
3~8: VF curve between linear VF and square VF.

P3-01	Torque boost	Factory default	Model depend
	Setting range	0.0% ~ 30%	
P3-02	Cut-off frequency of torque boost	Factory default	50.00Hz
	Setting range	0.00Hz ~ P0-10 (maximum frequency)	

To compensate the low frequency torque characteristics of V/F control, it can boost the inverter output voltage during low frequency. If the torque boost is set to too large, the motor may be over heat, and the inverter may be over current.
Adjust this parameter according to the different loads. Increase this parameter for heavy load, reduce it for light load.
When the torque boost is set to 0.0, the inverter will adopt auto torque boost.
Cut-off frequency of torque boost: Under this frequency, the torque boost is valid. If it exceeds this setting frequency, the torque boost is invalid. Refer to Figure 4-1 for details.

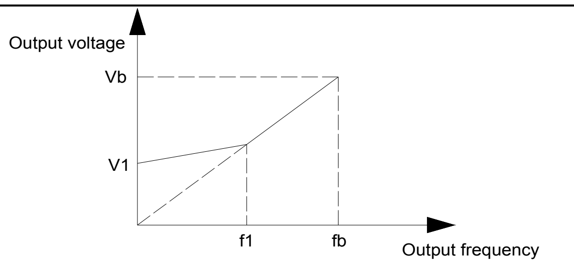

Figure 4-1 Manual torque boost diagram

P3-09	V/F slip compensation gain	Factory default	0.0%
	Setting range	0% ~ 200.0%	

It is valid only for V/F control.
Setting this parameter can compensate the slip of motor speed caused by the load increases, and makes the motor speed stably when the load changes.
V/F slip compensation gain set to 100% means the slip compensation of the motor with rated load is the motor rated slip, which can be calculated according to motor rated power and motor rated speed automatically.
Slip gain adjustment can refer to the following principle: When the load is rated load, the motor speed is basically the same as the target speed. When the values are different, please adjust this gain properly.

P3-10	V/F over-excitation gain	Factory default	64
	Setting range	0 ~ 200	

During deceleration, over excitation control can suppress bus voltage increase, avoid over voltage fault. The bigger over excitation gain is, the better suppression result is.
For the application which over voltage fault happens frequently during deceleration, the over excitation gain needs to be increased. But the current would be increased if the over excitation is too bigger, so you need to set the suitable over excitation gain.
For the small inertia situation, voltage doesn't increase during motor deceleration, please set over excitation gain to 0. For the application with braking resistor, please also set over excitation gain to 0.

P3-11	V/F oscillation suppression gain	Factory default	Model depend
	Setting range	0 ~ 100	

Set the gain as small as possible on the premise that there is effective oscillation suppression measure, which can avoid the affect causing to VF running. Set the gain to 0 when the motor has no oscillation. Only when the motor has obvious oscillation, this gain can be increased properly. The bigger the gain is, the better oscillation suppression result will be.
When using this function, please make sure the motor rated current and no load current parameters are accurate, otherwise V/F oscillation suppression result would be bad.

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Group P4 Input Terminal

The standard Inverter has 7 multifunctional digital input terminals (HDI can be used as high speed pulse input terminal) and two analog input terminals.

P4-00	D1 terminal function	Factory default	51
P4-01	D2 terminal function	Factory default	52
P4-02	D3 terminal function	Factory default	53
P4-03	D4 terminal function	Factory default	12
P4-04	D5 terminal function	Factory default	13
P4-05	D6 terminal function	Factory default	02
P4-06	HDI terminal function	Factory default	0

These parameters are used to set the functions of the multifunctional digital input terminals.

Setting value	Function	Description
0	No function	Can be set on the unused terminals so as to prevent error action.
1	Forward (FWD)	Control the inverter forward and reverse via the external terminals.
2	Reverse (REV)	
3	Three-line running control	This terminal is used to confirm that the inverter running mode is three-line control mode. Refer to P4-11 (terminal command mode) for details.
4	Forward Jog (FJOG)	FJOG refers to Jog forward running, RJOG refers to Jog reverse running. Regarding Jog running frequency and Jog ACC/DEC time, please refer to P8-00, P8-01 and P8-02.
5	Reverse Jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminals, it is used as increment and decrement commands of frequency modification. When the frequency source is set by digital, it can be used to adjust the setting frequency.
7	Terminal DOWN	
8	Coast to stop	The inverter locks the output, and the motor stop process is beyond the inverter control. This mode is the same as the meaning of coast-to-stop as described in P6-10.
9	Fault reset (RESET)	External fault reset function. It is the same as the function of RESET key on the keyboard. Using this function can realize long-distance fault reset.
10	Pause running	The inverter decelerates to stop, but all the running parameters are in the memory status, such as PLC parameter, wobble frequency parameter and PID parameter. After this signal disappears, the inverter restores to the status before stopping.
11	External fault normally open input	After the signal is sent to the inverter, the inverter reports fault E-15 and acts according to the fault protection action mode (see P9-47).
51	Full water level detection	Detect the water level, if full water, pause pumping. Enabled when PC-19 = 1. Terminal D1 defaults to this function.

Setting value	Function	Description
52	Low water level detection	Detect the water level, only if the signal is enabled, the pump can start. Enable when PC-19 =1. Terminal D2 defaults to this function.
53	Water shortage detection	Detect the water level trough terminal, if the level is too low, prevent dry pumping. Terminal D3 defaults to this function.
54	Forced to switch to power frequency input mode	When the inverter is in the power frequency input condition, the inverter can be forced to switch to work on the power frequency input mode through the terminal.

P4-10	DI Terminals filter time	Factory default	0.010s
	Setting range	0.000s ~ 1.000s	

It is used to set the sensitivity of DI terminal. If the digital input terminal is vulnerable to interferences and may cause error action, it can increase this parameter value to enhance the anti-interference capability. However, this operation will reduce the sensitivity of DI terminals.

P4-13	AI curve 1 minimum input	Factory default	0.00V
	Setting range	0.00V ~ P4-15	
P4-14	AI curve 1 minimum input corresponding setting	Factory default	0.0%
	Setting range	-100.00% ~ 100.0%	
P4-15	AI curve 1 maximum input	Factory default	10.00V
	Setting range	P4-13 ~ 10.00V	
P4-16	AI curve 1 maximum input corresponding setting	Factory default	100.0%
	Setting range	-100.00% ~ 100.0%	
P4-17	AI1 filter time	Factory default	0.10s
	Setting range	0.00s ~ 10.00s	

The above function codes define the relationship between the analog input voltage and analog input setting value.
When the analog input voltage is bigger than P4-15 (maximum input of AI curve 1), then calculate the analog voltage according to maximum input. When the analog input voltage is smaller than P4-13 (minimum input of AI curve 1), then calculate the analog voltage with minimum input or 0.0% according to P4-34 (AI below minimum input setting selection).
When the analog input is current input, 1mA current equals to 0.5V voltage.
AI1 input filter time is used to set AI1 software filter time, when the site analog signal can be easily disturbed, please increase filter time to stable the detected analog signal, but the bigger the filter time is, the slower the response speed of the analog detection is . So please set this parameter according to the situation.
In difference applications, 100% of analog input corresponds to different nominal values. Refer to all the application parts for details.
Several setting examples are shown in the following figures:

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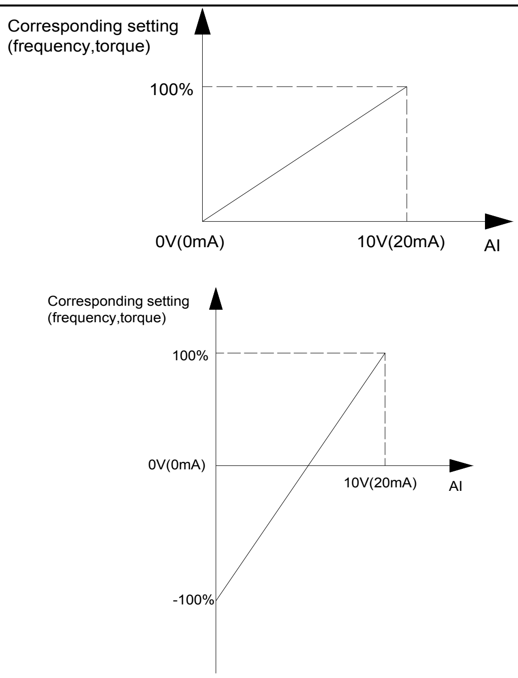

Figure 4-2 Corresponding Relationship between Analog Reference and Setting

P4-18	AI curve 2 minimum input	Factory default	0.00V
	Setting range	0.00V ~ P4-20	
P4-19	AI curve 2 minimum input corresponding setting	Factory default	0.0%
	Setting range	-100.00% ~ 100.0%	
P4-20	AI curve 2 maximum input	Factory default	10.00V
	Setting range	P4-18 ~ 10.00V	
P4-21	AI curve 2 maximum input corresponding setting	Factory default	100.0%
	Setting range	-100.00% ~ 100.0%	
P4-22	AI2 filter time	Factory default	0.10s
	Setting range	0.00s ~ 10.00s	

P4-23	AI curve 3 minimum input	Factory default	0.00V
	Setting range	-10.00V ~ P4-25	
P4-24	AI curve 3 minimum input corresponding setting	Factory default	0.0%
	Setting range	-100.00% ~ 100.0%	
P4-25	AI curve 3 maximum input	Factory default	4.00V
	Setting range	P4-23 ~ 10.00V	

P4-26	AI curve 3 maximum input corresponding setting		Factory default	100.0%
	Setting range	-100.00% ~ 100.0%		
P4-27	Keypad potentiometer input filter time		Factory default	0.10s
	Setting range	0.00s ~ 10.00s		

P4-28	HDI minimum input		Factory default	0.00kHz
	Setting range	0.00kHz ~ P4-30		
P4-29	HDI minimum input corresponding setting		Factory default	0.0%
	Setting range	-100.00% ~ 100.0%		
P4-30	HDI maximum input		Factory default	50.00kHz
	Setting range	P4-28 ~ 100.00kHz		
P4-31	HDI maximum input setting		Factory default	100.0%
	Setting range	-100.00% ~ 100.0%		
P4-32	HDI filter time		Factory default	0.10s
	Setting range	0.00s ~ 10.00s		

This group of function code defines the corresponding relationship when the pulse is used as frequency setting mode.
The pulse frequency input can only be input via HDI channel. The applications of this group function are similar as those of AI curve 1 function.

P4-33	AI curve selection		Factory default	321
	Setting range	Units place	AI1 curve selection	
		1	Curve 1 (see P4-13 ~ P4-16)	
		2	Curve 2 (see P4-18 ~ P4-21)	
		3	Curve 3 (see P4-23 ~ P4-26)	
		Tens place	AI2 curve selection, ibid	

Units place and tens place of this function code are used to select analog input AI1, AI2 corresponding setting curve.
Curve 1, curve 2, curve 3 are 2 points curves, set by P4 group.
Standard inverter has 2 analog input terminals.

P4-34	AI below minimum input setting selection		Factory default	000
	Setting range	Units place	AI1 below minimum input setting selection	
		0	Correspond to minimum input setting	
		1	0.0%	
		Tens place	AI2 below minimum input setting selection (0 ~ 1, ibid)	
		Hundreds place	Reserved	

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The parameter is used to set how to confirm the analog corresponding setting when the analog input voltage is lower than the setting “the minimum input”.
Units place, tens place and hundreds place of this function code correspond to the analog input AI1, AI2 and Keypad potentiometer.
If the selection is 0, when AI input is lower than “the minimum input”, the analog value corresponding setting is the curve “the minimum input corresponding setting” (P4-14, P4-19, P4-24) determined by the function code.
If the selection is 1, when AI input is lower than “the minimum input”, the analog value corresponding setting is 0.0%.

P4-35	DI1 delay time		Factory default	0.0s
	Setting range	0.0s ~ 3600.0s		
P4-36	DI2 delay time		Factory default	0.0s
	Setting range	0.0s ~ 3600.0s		
P4-37	DI3 delay time		Factory default	0.0s
	Setting range	0.0s ~ 3600.0s		

Used to set the delay time when DI terminal status changing.
Currently only DI1, DI2, DI3 have setting delay time function.

Group P5 Output Terminal

P5-01	HDO open collector output selection	Factory default	0
P5-02	Relay 1 output function selection	Factory default	21
P5-03	Relay 2 output function selection	Factory default	0

The parameters are used to select the functions of 3 digital outputs.
Multifunctional output terminal function selection is as follows:

Setting value	Function	Description
0	No output	The output terminals do not have any functions.
1	Inverter is running	It indicates the inverter is running, and there is output frequency (can be zero), and the inverter outputs ON signal at this time.
2	Fault output (fault stop)	When the inverter is faulty & it stops, it outputs ON signal.
3	FDT1 output	Please refer to P8-19 and P8-20 for details.
4	Frequency arrival	Please refer to P8-21 for details.
5	Zero speed running (no output when stop)	When the inverter is running & the output frequency is 0, it outputs ON signal. When the inverter stopped, the signal is OFF.
6	Motor overload pre-alarm	Judgment will be made according to the pre-warning threshold value before the motor overload protection action. If it exceeds the pre-warning threshold, it will output ON signal. Motor overload parameters are set in P9-00 to P9-02.
7	Reserved	Reserved
8	Reserved	Reserved
9	Reserved	Reserved
10	Reserved	Reserved
11	PLC circulation completion	When the simple PLC has been running for one cycle, it outputs a pulse signal with width of 250ms.
12	Accumulated running time arrival	When the accumulated running time of the inverter exceeds the setting time P8-17, it outputs ON signal.
13	Frequency limiting	When the setting frequency exceeds the frequency upper limit or frequency lower limit, and the output frequency of the inverter reaches the frequency upper limit or frequency lower limit, it outputs ON signal.
14	Torque limiting	In speed control mode, when the output torque reaches torque limit, the inverter is in stall protection status and outputs ON signal.
15	Ready for running	When the main circuit and control circuit power supply are connected, the inverter protection function is invalid, and the inverter is in running status, it outputs ON signal.
16	AI1>AI2	When analog input AI1 is bigger than AI2, the inverter outputs ON signal.

Setting value	Function	Description
17	Frequency upper limit arrival	When the running frequency reaches frequency upper limit, it outputs ON signal.
18	Frequency lower limit arrival (no output when stop)	When the running frequency reaches frequency lower limit, it outputs ON signal. The signal is OFF when stop.
19	Under voltage status output	During under voltage, the inverter outputs ON signal.
20	Communication setting	Refer to the communication protocol
21	Power frequency & PV indication	Terminal output, contactor connect B & C; it's power frequency mode when closing OFF; it's PV mode when opening ON.
22	Reserved	Reserved
23	Zero-speed running 2 (output when stop)	When the output frequency is 0Hz, the inverter outputs ON signal. The signal is still ON when stop.
24	Accumulated power-on time arrival	The accumulated power-on time (P7-13) exceeds the time set by P8-16, the inverter outputs ON signal.
25	FDS2 output	Please refer to P8-28, P8-29 description.
26	Frequency 1 arrival output	Please refer to P8-30, P8-31 description.
27	Frequency 2 arrival output	Please refer to P8-32, P8-33 description.
28~30	Reserved	Reserved
31	AI1 input over limit	When analog input AI1 is bigger than P8-46 (AI1 input protection upper limit) or lower than P8-45 (AI1 input protection lower limit), outputs ON signal.
32	Off load	When inverter is in the off-load state, it outputs ON signal.
33	Reverse running	When reverse running, the inverter outputs ON signal.
34	Zero current status	Please refer to description of P8-34, P8-35.
35	Module temperature arrival	The temperature of converter module radiator (P7-07) reaches the set value of module temperature arrival (P8-47), the inverter outputs ON signal.
36	Output current over limit	Please refer to description of P8-36, P8-37.
37	Lower limit frequency arrival (output when stop)	When running frequency reaches lower limit frequency, outputs ON signal. The signal is still ON when stop.
38	Warning output (keep running)	When a fault happens & the process mode of this fault is keeping running, the inverter outputs warning.
39	Input power switching signal	Output OFF signal when using PV input, and output ON signal when using other power.
40	Reserve	Reserve

Group P6 Start and Stop Control

P6-00	Start mode		Factory default	0
	Setting range	0	Direct start	
		1	Speed tracking and restart	
		2	Pre-excitation start	

0: Direct start

If DC braking time is set to 0, the inverter will start from the start frequency.

If DC braking time is set to nonzero value, DC braking will be performed firstly, then the inverter starts from the start frequency. It is suitable for the application that the motor maybe running during starting with small inertia load.

1: Speed tracking and restart

Inverter detects the rotation speed and direction of motor, and then starts to run at the detected speed and direction. This can realize smooth start of running motor with big inertia load when instantaneous power-off. To ensure the performance of speed tracking restart, please set motor parameters accurately. (Group P1)

2: pre-excitation start

It is only valid for asynchronous motor, used to establish magnetic field before motor running. For pre-excitation current, pre-excitation time, please refer to P6-05, P6-06 instruction.

If pre-excitation time is set to 0, the inverter will cancel the pre-excitation process, start from the starting frequency. Or the inverter will make the pre-excitation, then start, which can improve the motor dynamic response performance.

P6-01	Speed tracking mode		Factory default	0
	Setting range	0	Begin from stop frequency	
		1	Begin from zero speed	
		2	Begin from maximum frequency	

To complete the speed tracking process in the shortest time, select the suitable mode of inverter tracking motor speed:

0: To track from the frequency when stop, normally it adopts this mode.

1: To track from zero-frequency, suitable for the applications that restart after a long time power-off.

2: To track from maximum frequency and suitable for the general power generating loads.

P6-02	Speed tracking speed	Factory default	20
	Setting range	1 ~ 100	

It is used to select the speed tracking speed when speed tracking and restart.

The bigger this parameter is, the faster the tracking speeds is. But too big value may result in unreliable tracking.

P6-03	Start frequency	Factory default	0.00Hz
	Setting range	0.00Hz ~ 10.00Hz	
P6-04	Start frequency holding time	Factory default	0.0s
	Setting range	0.0s ~ 100.0s	

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Please set proper start frequency to ensure the start torque. In order to fully establish the magnetic flux when the motor starts, it is necessary to maintain the start frequency for a certain time.
P6-03 is not limited by the lower limit frequency. When the setting frequency is lower than start frequency, the inverter does not start and is at the standby state.
P6-04 does not work during FWD/REV switching.

P6-05	DC braking current before start/pre-excitation current		Factory default	0%
	Setting range	0% ~ 100%		
P6-06	DC braking time before start/pre-excitation time		Factory default	0.0s
	Setting range	0.0s ~ 100.0s		

DC braking is used to make the running motor stop & restart. Pre-excitation is used to establish asynchronous motor magnetic field, then start, improve the response speed.
DC braking is only valid when start directly, the inverter performs DC braking according to P6-05 firstly, and runs after P6-06. If DC braking time is 0, the inverter starts directly. The bigger the DC braking current is, the greater the braking force is.
If the start mode is pre-excitation start, then the inverter establishes magnetic field according to the set pre-excitation current firstly, runs after the set pre-excitation time. If the pre-excitation time is 0, the inverter starts directly.
DC braking current before start/pre-excitation current refers to the percentage of the inverter rated current.

P6-10	Stop mode		Factory default	0
	Setting range	0	Deceleration to stop	
		1	Coast to stop	

0: Deceleration to stop
After the stop command is valid, the inverter reduces the output frequency according to the DEC time and will stop after the frequency reduces to zero.
1: Coast to stop
After the stop command is valid, the inverter blocks the output immediately, and the motor coasts to stop according to the mechanical inertia.

Group P9 Fault and Protection

P9-00	Motor overload protection selection		Factory default	1
	Setting range	0	Invalid	
		1	Valid	
P9-01	Motor overload protection gain		Factory default	1.00
	Setting range		0.20 ~ 10.00	

P9-00=0: Has no motor overload protection function, may cause the motor overheating damaged.
P9-00=1: The inverter judges whether the motor is overload or not according to the inverse time limit curve of motor overload protection.
The inverse time limit curve of motor overload protection: 220% * (P9-01) * motor rated current, lasts for one second, the overload fault would be reported; 150% * (P9-01) * motor rated current, lasts for 60 seconds, the overload fault would be reported.
Please set P9-01 according to the motor overload ability. If the parameter is too big, the motor will over heat damage without alarming.

P9-02	Motor overload pre-warning coefficient	Factory default	80%
	Setting range	50% ~ 100%	

For safe consideration, there is a pre-warning signal sent to the control system via DO before the motor overload fault protection, the pre-warning coefficient is used to confirm the extent of pre-warning before the motor overload protection. The bigger the parameter is, the smaller the pre-warning lead is.
After the accumulated output current is bigger than (P9-02)*overload inverse time limit curve, DO outputs “motor overload pre-warning” ON signal.

P9-03	Over-voltage stall gain	Factory default	10
	Setting range	0 (No over voltage stall) ~ 100	
P9-04	Over-voltage stall protection voltage	Factory default	130%
	Setting range	120% ~ 150% (three phase)	

During deceleration, after DC bus voltage exceeds over-voltage stall protection voltage, the inverter stops deceleration & runs with the current frequency, continue decelerating after bus voltage drops.
Over-voltage stall gain is used to adjust the suppression over-voltage capacity during deceleration. The bigger this value is, the stronger the capacity is. Under the precondition of no over-voltage, please set the gain as small as possible.
For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over voltage fault may occur.
When the value is 0, the over voltage stall function is invalid.

P9-05	Over-current stall gain	Factory default	20
	Setting range	0 ~ 100	
P9-06	Over-current stall protection current	Factory default	150%
	Setting range	100% ~ 200%	

During the inverter ACC/DEC, when the output current exceeds over-current stall protection current, the inverter stops ACC/DEC, runs with the current frequency, continue ACC/DEC after the output current is reduced.

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Over-current stall gain is used to adjust the suppression over-current capacity during ACC/DEC. The bigger this value is, the stronger the capacity is. Under the precondition of no over-current, please set the gain as small as possible.
For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over-current fault may occur.
When the value is 0, the over-voltage stall function is invalid.

P9-09	Fault auto reset times		Factory default	20
	Setting range	0 ~ 20		

After the inverter fails in running process, the inverter stops its output; then performs auto fault reset and continues running after the reset interval defined in P9-11.
P9-09 is used to set fault auto reset times. After this value is exceeded, the inverter will keep fault status.
When the fault auto reset time is setup to 0, there is no auto-reset function, and only manual reset can be done.

P9-10	Faulty HDO action selection during fault auto resetting		Factory default	0
	Setting range	0: No action 1: Action		

If fault auto reset function is valid, during fault auto resetting, fault reply action or not can be set via P9-10.

P9-11	Fault auto reset interval		Factory default	5.0s
	Setting range	0.1s ~ 200.0s		

The waiting time of the inverter from the fault alarm to auto reset.

P9-12	Input phase failure protection selection		Factory default	1
	Setting range	0: Invalid 1: Valid		

This function is invalid for all HD400S series inverters.

P9-13	Output phase failure protection selection		Factory default	1
	Setting range	0: Invalid 1: Valid		

Select to protect output phase failure or not. This function is invalid for single phase output 220V inverters.

P9-14	The first fault type	0 ~ 50
P9-15	The second fault type	
P9-16	The third (last) fault type	

It is used to record the fault types of last three times: 0 indicates no fault, please refer to Chapter 8 for solutions.

P9-17	The third fault frequency	The last fault frequency
P9-18	The third fault current	The last fault current

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P9-19	The third (last) fault bus voltage	The last fault bus voltage
P9-20	The third fault type output terminal status	The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF, the corresponding binary bit is 0. All DI statuses are displayed as decimal numbers.
P9-21	The third fault type output terminal	The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF, the corresponding binary bit is 0. All DO statuses are displayed as decimal numbers.
P9-22	The third fault inverter status	The last fault inverter status
P9-23	The third (last) fault power on time	The last fault power on time
P9-24	The third (last) fault running time	The last fault running time
P9-27	The second fault frequency	Same as P9-17 ~ P9-24
P9-28	The second fault current	
P9-29	The second fault bus voltage	
P9-30	The second fault input terminal status	
P9-31	The second fault output terminal status	
P9-32	The second fault inverter status	
P9-33	The second fault power on time	
P9-34	The second fault running time	
P9-37	The first fault frequency	Same as P9-17 ~ P9-24
P9-38	The first fault current	
P9-39	The first fault bus voltage	
P9-40	The first fault input terminal status	
P9-41	The first fault output terminal status	
P9-42	The first fault inverter status	
P9-43	The first fault power on time	
P9-44	The first fault running time	

9-47	Fault protection action selection 1		Factory default	00000
	Setting range	Units place	Motor overload (E-11)	
		0	Coast to stop	
		1	Dec-to-stop	
		2	Keep running	
		Tens place	Input phase failure (E-12) (same as units place)	
		Hundreds place	Output phase failure (E-13) (same as units place)	

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		Thousands place	External fault (E-14) (same as units place)	
		Ten thousands place	Communication fault (E-15) (same as units place)	
P9-48	Fault protection action selection 2		Factory default	00000
	Setting range	Units place	Reserved	
		Tens place	E^2PROM W/R fault (E-21)	
		0	Coast to stop	
		1	Dec-to-stop	
		Hundreds place	Reserved	
		Thousands place	Reserved	
		Ten thousands place	Running time arrival (E-26) (same as units place of P9-47)	
P9-49	Fault protection action selection 3		Factory default	00000
	Setting range	Units place	Customized fault 1 (E-27) (same as units place of P9-47)	
		Tens place	Customized fault 2 (E-28) (same as units place of P9-47)	
		Hundreds place	Power-on time arrival (E-29) (same as P9-487 units place)	
		Thousands place	Off load (E-30)	
		0	Coast to stop	
		1	Dec-to-stop	
		2	Deceleration to 7% of motor rated power, then keep running; run at setting frequency when no off-load	
		Ten thousands place	PID feedback lost when running (E-31) (same as units place of P9-47)	
P9-50	Fault protection action selection 4		Factory default	00000
	Setting range	Units place	Speed deviation oversize (E-42) (same as units place of P9-47)	
		Tens place	Motor over speed (E-43) (same as units place of P9-47)	
		Hundreds place	Reserved	
		Thousands place	Reserved	
		Ten thousands place	Reserved	

When the selection is “Coast to stop”, the inverter shows E-** and stops directly.
When the selection is “Dec- to-stop”, the inverter shows A-** and decelerates to stop, then shows E-** after stopping.
When the selection is “keep running”, the inverter shows A-** and keeps running, the running frequency is set by P9-54.

P9-54	Running frequency selection continuously when fault		Factory default	0
	Setting range	0	Run at current running frequency	
		1	Run at setting frequency	
		2	Run at upper limit frequency	
		3	Run at lower limit frequency	
		4	Run at abnormal backup frequency	
P9-55	Abnormal backup frequency		Factory default	100.0%
	Setting range	60.0% ~ 100.0%		

When a fault happens during running and the fault process mode is keep running, the inverter shows A-** with the frequency set by P9-54.

When the inverter is running with the abnormal backup frequency, the value set by P9-55 corresponds to maximum frequency percentage.

P9-59	Instantaneous power-off action		Factory default	0
	Setting range	0	Invalid	
		1	Deceleration	
		2	Dec-to-stop	
P9-60	Instantaneous power-off recover judgment voltage		Factory default	85.0%
	Setting range	0.0% ~ 100.0%		
P9-61	Instantaneous power-off voltage recover judgment time		Factory default	0.20s
	Setting range	0.00s ~ 100.00s		
P9-62	Instantaneous power-off action judgment voltage		Factory default	83.0%
	Setting range	0.0% ~ 100.0% (standard bus voltage)		

The function is that, when instantaneous power off or voltage drops suddenly, the inverter will reduce output speed to decrease compensation voltage for DC bus which is generated by the load feedback energy, so that keep the inverter running.

P9-59=1: When instantaneous power off or voltage drops suddenly, the inverter decelerates, when bus voltage returns to normal, the inverter accelerates to the setting frequency and runs. Normal bus voltage lasts for longer than the time set by P9-61 means that bus voltage returns to normal.

P9-59=2: When instantaneous power off or voltage drops suddenly, the inverter decelerates to stop.

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Group PP Function Code Management

PP-00	User password	Factory default	0
	Setting range	0 ~ 65535	

Any non-zero number can be set, and then the password protection function will be enabled. When user enters into the menu next time, "-----" will be displayed, please input the right password, otherwise the parameters cannot be checked or modified.
0000: Clear the previous password and disable the password protection function.

PP-01	Parameter initialization		Factory default	0
	Setting range	0	No operation	
		1	Restore factory default, but not including motor parameters	
		2	Clear the fault record	

1. Restore to factory default, but not including motor parameters.
After PP-01 is set to 1, most of the inverter function parameters are restored to the factory default settings, except motor parameters, frequency command decimal place (P0-22), fault record information, accumulated running time (P7-09), accumulated power on time (P7-13), accumulated power consumption (P7-14).
2. Clear the record information.
Clear the fault record information, accumulated running time (P7-09), accumulated power on time (P7-13), accumulated power consumption (P7-14).

PP-02	Function parameter group display selection	Factory default	00
	Reserved		
PP-03	Reserved		

The setting of parameter display mode is convenient for users to view the function parameter of different spread patterns according to the actual demand.

Group PC Special Parameters for HD400S Series Solar Pump Inverter

PC-00	Power supply selection		Factory default	0
	Setting range	0	PV	
		1	Power frequency	
		2	Power frequency & PV switching	

When setting PC-00 to be 0, the power supply is from solar panels, this group parameters become valid. While setting it to be 1, it means to use other power supplies, like grid power etc., thus, this group parameters are invalid.

PC-01	MPPT mode		Factory default	0
	Setting range	0	Dynamic tracking	
		1	Constant voltage	
PC-02	Voltage setting under constant mode		Factory default	Model depend
	Setting range	0～1000V		

This function is to set the output voltage setting mode under the maximum output power point of solar system. When PC-01=0, the output voltage adjusts dynamically, to ensure the system output power always is at maximum point.

When PC-01=1, to fix the output voltage at a constant value by PC-02. The stability is better under this mode.

PC-03	Minimum MPPT voltage		Factory default	Model depend
	Setting range	0～1000V		
PC-04	Maximum MPPT voltage		Factory default	Model depend
	Setting range	0～1000V		

To set the tracking voltage range while setting PC-01=0 (dynamic tracking),

PC-03 and PC-04 are used to set the minimum and maximum reference voltage under the dynamic MPPT tracking mode. The faster the tracking is, if the range is smaller, but the voltage of maximum power point must be in this range.

PC-05	Proportional gain Kp1		Factory default	200
	Setting range	0～1000		
PC-06	Integration time Ti1		Factory default	2.00s
	Setting range	0.01～10.00s		
PC-07	Reserve		Factory default	0
	Setting range	0～10000		

Proportional gain Kp1：

It decides the adjustment intensity of PI proportional regulator. The higher the Kp1 is, the stronger the

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adjustment intensity is.

Integration time Ti1：
It decides the intensity of the integration adjustment of PI integral regulator. The shorter the Ti1 is, the stronger the adjustment intensity is.

PC-08	Proportional gain Kp2	Factory default	600
	Setting range	0～1000	
PC-09	Integration time Ti2	Factory default	0.30s
	Setting range	0.01～10.00s	
PC-10	Reserved	Factory default	0
	Setting range	0～10000	

Same setting as PC-05 and PC-06.

PC-11	Reserved	Factory default	0
	Setting range	0～10000	

PC-12	Maximum output value of PI forward running	Factory default	2.0
	Setting range	0.0～10000	
PC-13	Maximum output value of PI reverse running	Factory default	50
	Setting range	0.0～10000	

Output limitation value of PI intergration.

PC-14	Sampling period	Factory default	2
	Setting range	0～1000.0	

PC-15	PI parameter switching deviation 1	Factory default	0.4%
	Setting range	0.0%～PC-16	
PC-16	PI parameter switching deviation 2	Factory default	1.0%
	Setting range	PC-15～100.0%	

PC-17	PI limitation deviation	Factory default	0.0%
	Setting range	0.0～100.0%	

PI deviation limitation, if the deviation value of setting and feedback is not in the range, the PI regulator stop to adjust.

PC-18	Minimum running frequency of pump	Factory default	0.00Hz

	Setting range	0.00～40.00Hz

When the output frequency of inverter is less than or equal to PC-18, after the delay time of PC-28, the weak sunshine warning will happen and the inverter stops.

PC-19	Water level feedback channel selection	Factory default	0
	Setting range	0：No 1：Terminal 2：AI1 3：AI2	
PC-20	Full water level detection value	Factory default	25%
	Setting range	0～100%	
PC-21	Full water level detection delay time	Factory default	5s
	Setting range	0～3600s	
PC-22	Full water level warning auto-reset delay time	Factory default	20
	Setting range	0～3600s	

When PC-19 is not 0, water level detection is valid.
When PC-19=1, If the signal is detected, after the delay time of PC-21, the inverter pauses running and gives a warning (A-01)
During the warning, when the full water level signal is invalid, after the delay of PC-22, the warning will be reset and inverter will start automatically.
When PC-19=2 or 3, when detected water level is higher than PC-20, after the depay of PC-21, the warning will be reset and inverter will start automatically.
During the warning, when the water level is lower than PC-20, after the delay of PC-22, the warning will be reset and inverter will start automatically.

PC-23	Water level sensor disconnection detection value	Factory default	0
	Setting range	0～100%	
PC-24	Water level sensor disconnection detection delay time	Factory default	100
	Setting range	0～3600s	

When PC-19 is not 0 or 1, the fault detection of water level sensor is valid. When the detect water level is lower than PC-23, after the delay time of PC-24, the inverter gives the warning of water level sensor failure and then stops.

PC-25	Motor underload detection current value	Factory default	0%
	Setting range	0～100%	
PC-26	Motor underload detection delay time	Factory default	50s

	Setting range	0～3600s	
PC-27	Motor underload auto-reset time	Factory default	20s
	Setting range	10～3600s	

When PC-25 is 0, the terminal detects the low water level of well bottom.
If the signal is detected, after the delay time of PC-26, the inverter pauses running and gives a warning (A-02)
During the warning, when the low water level signal is invalid, after the delay of PC-27, the warning will be reset and inverter will start again.
When PC-25 is not 0, can refer to P1-03 rated current.
When the motor output current is lower than the current value set by PC-25, after the PC-26 delay time, the inverter pauses running and gives a warning (A-02).
During the warning, when the low water level signal is invalid, after the delay of PC-27, the warning will be reset and inverter will start again.

PC-28	Weak sunshine detection time	Factory default	20s
	Setting range	0～3600s	
PC-29	Weak sunshine auto-reset time	Factory default	20s
	Setting range	0～3600s	

When the output frequency of inverter is less than PC-18, after the delay time of PC-28, the inverter gives weak sunshine warning.
Under the condition of weak sunshine warning, after the delay time of PC-29, the warning resets and inverter restarts automatically.

PC-30	Automatic start voltage	Factory default	20V
	Setting range	0～200V	

When the DC bus voltage of inverter is higher than the min. MPPT voltage plus PC-30, the inverter starts automatically.

PC-33	Master & slave mode	Factory default	0
	Setting range	0: no function 1: master 2: slave	

PC-34	MPPT initial voltage	Factory default	83
	Setting range	0~100	

This mode can realize the parallel use of multiple pumps under the same PV array, improving the system's working efficiency. The master coordinates the slaves' work based on the amount of electricity generated by the PV array. When the light gradually becomes stronger, the master starts the slaves one by one. Otherwise, stop the slaves one by one. When it is detected that the PV input voltage is higher than the PC-34 setting value, the inverter automatically switches back to the PV operation mode and outputs a switching signal through the relay.

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PC-38	Motor type	Factory default	0
	Setting range	0：Three phase pump 1：Single phase pump	

When PC-38=1, for single phase motor.
When PC-38=0, for three phase motor
If single-phase motor control, the output phase loss function must be shielded (P9-13=0), and the keyboard display current is subject to the largest phase of the output current.

PC-39	Voltage threshold for PV switching to power frequency	Factory default	100.0V
	Setting range	When weak sunshine fault, or the PV voltage is lower than this value, switch to the power frequency mode.	

PC-40	Voltage threshold for power frequency switching to PV	Factory default	150.0V
	Setting range	When the PV voltage is higher than this value, after weak sunshine auto-reset time, switch to PV mode.	

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Group PC Special Parameters for HD400S-01 Series Solar Pump Inverter

PC-00	Power supply selection		Factory default	0
	Setting range	0	PV	
		1	Power frequency	

When setting PC-00 to be 0, the power supply is from solar panels, this group parameters become valid. While setting it to be 1, it means to use other power supplies, like grid power etc., thus, this group parameters are invalid.

PC-01	MPPT mode		Factory default	0
	Setting range	0	Dynamic tracking	
		1	Constant voltage	
PC-02	Voltage setting under constant mode		Factory default	Model depend
	Setting range	0～750V		

This function is to set the output voltage setting mode under the maximum output power point of solar system.
When PC-01=0, the output voltage adjusts dynamically, to ensure the system output power always is at maximum point.
When PC-01=1, to fix the output voltage at a constant value by PC-02. The stability is better under this mode.

PC-03	Minimum MPPT voltage		Factory default	Model depend
	Setting range	0 ~ PC-04		
PC-04	Maximum MPPT voltage		Factory default	Model depend
	Setting range	PC-03 ~ 750V		

To set the tracking voltage range while setting PC-01=0 (dynamic tracking),
PC-03 and PC-04 are used to set the minimum and maximum reference voltage under the dynamic MPPT tracking mode. The faster the tracking is, if the range is smaller, but the voltage of maximum power point must be in this range.

PC-05	Proportional gain Kp1		Factory default	100
	Setting range	0～1000		
PC-06	Integration time Ti1		Factory default	2.00s
	Setting range	0.00～10.00s		

Proportional gain Kp1：
It decides the adjustment intensity of PI proportional regulator. The higher the Kp1 is, the stronger the adjustment intensity is.
Integration time Ti1:

It decides the intensity of the integration adjustment of PI integral regulator. The shorter the Ti1 is, the stronger the adjustment intensity is.

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PC-07	Proportional gain Kp2	Factory default	600
	Setting range	0～1000	
PC-08	Integration time Ti2	Factory default	0.30s
	Setting range	0.00～10.00s	

Same setting as PC-05 and PC-06.

PC-09	Maximum output value of PI forward running	Factory default	0.2
	Setting range	0.0～10000	
PC-10	Maximum output value of PI reverse running	Factory default	5.0
	Setting range	0.0～10000	

Output limitation value of PI intergration.

PC-11	Sampling period	Factory default	2
	Setting range	0～1000.0	

PC-12	PI parameter switching deviation 1	Factory default	0.4%
	Setting range	0.0%～PC-13	
PC-13	PI parameter switching deviation 2	Factory default	1.0%
	Setting range	PC-12～100.0%	

PC-14	PI limitation deviation	Factory default	0.0%
	Setting range	0.0～100.0%	

PI deviation limitation, if the deviation value of setting and feedback is not in the range, the PI regulator stop to adjust.

PC-15	Minimum running frequency of pump	Factory default	0.00Hz
	Setting range	0.00～40.00Hz	

When the output frequency of inverter is less than or equal to PC-15, after the delay time of PC-25, the weak sunshine warning will happen and the inverter stops.

PC-16	Water level feedback channel selection	Factory default	0

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	Setting range	0：No 1：Terminal 2：AI1 3：AI2	
PC-17	Full water level detection value	Factory default	25%
	Setting range	0～100%	
PC-18	Full water level detection delay time	Factory default	60s
	Setting range	0～3600s	
PC-19	Full water level warning auto-reset delay time	Factory default	20
	Setting range	0～3600s	

When PC-16 is not 0, water level detection is valid.
When PC-16=1, If the signal is detected, after the delay time of PC-18, the inverter pauses running and gives a warning (A-01)
During the warning, when the full water level signal is invalid, after the delay of PC-19, the warning will be reset and inverter will start automatically.
When PC-19=2 or 3, when detected water level is higher than PC-17, after the depay of PC-18, the warning will be reset and inverter will start automatically.
During the warning, when the water level is lower than PC-20, after the delay of PC-19, the warning will be reset and inverter will start automatically.

PC-20	Water level sensor disconnection detection value	Factory default	0
	Setting range	0～100%	
PC-21	Water level sensor disconnection detection delay time	Factory default	100
	Setting range	0～3600s	

When PC-16 is not 0 or 1, the fault detection of water level sensor is valid. When the detect water level is higher than PC-20, after the delay time of PC-21, the inverter gives the warning of water level sensor failure and then stops.

PC-22	Motor underload detection current value	Factory default	0%
	Setting range	0～100%	
PC-23	Motor underload detection delay time	Factory default	50s
	Setting range	0～3600s	
PC-24	Motor underload auto-reset time	Factory default	20s
	Setting range	10～3600s	

When PC-22 is 0, the terminal detects the low water level of well bottom.
If the signal is detected,the inverter pauses running and gives a warning.

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When the output current of motor is less than the setting value of PC-22, after the delay time of PC-23, the inverter gives motor underload warning and then stop.
Under the condition of underload warning, after the delay time of PC-24, the warning resets and inverter restarts automatically.

PC-25	Weak sunshine detection time	Factory default	20s
	Setting range	0～3600s	
PC-26	Weak sunshine auto-reset time	Factory default	20s
	Setting range	0～3600s	

When the output frequency of inverter is less than PC-15, after the delay time of PC-25, the inverter gives weak sunshine warning.
Under the condition of weak sunshine warning, after the delay time of PC-26, the warning resets and inverter restarts automatically.

PC-27	Automatic start voltage	Factory default	20V
	Setting range	0～200V	

When the DC bus voltage of inverter is higher than the min. MPPT voltage plus PC-27, the inverter starts automatically.

PC-28	Weak sunshine protection voltage	Factory default	220V: 80.0V 380V: 110.0V
	Setting range	0.0V~300V	

PC-30	Master & slave mode	Factory default	0
	Setting range	0: no function 1: master 2: slave	

This mode can realize the parallel use of multiple pumps under the same PV array, improving the system's working efficiency. The master coordinates the slaves' work based on the amount of electricity generated by the PV array. When the light gradually becomes stronger, the master starts the slaves one by one. Otherwise, stop the slaves one by one.

PC-34	Boost proportional gain Kp1	Factory default	100
	Setting range	0～1000	
PC-35	Boost integration time Ti1	Factory default	3.00s
	Setting range	0.00～10.00s	

Boost proportional gain Kp1：
It decides the adjustment intensity of PI proportional regulator. The higher the Kp1 is, the stronger the adjustment intensity is.

Boost integration time Ti1：
It decides the intensity of the integration adjustment of PI integral regulator. The shorter the Ti1 is, the stronger the adjustment intensity is.

PC-36	Boost proportional gain Kp2	Factory default	600
	Setting range	0～1000	
PC-37	Boost integration time Ti2	Factory default	0.30s
	Setting range	0.00～10.00s	

Same setting as PC-34 and PC-35.

PC-38	Reference voltage	Factory default	220V: 350.0V 380V: 570.0V
	Setting range	0.0V~1000.0V	

PC-39	Boost protection current	Factory default	12.00A
	Setting range	7.00-20.00A	

PC-40	Maximum output value of PI forward running of boost voltage	Factory default	3
	Setting range	0.0～10000	
PC-41	Maximum output value of PI reverse running of boost voltage	Factory default	20
	Setting range	0.0～10000	

It’s the output limitation value of PI intergration of boost voltage.

PC-42	Boost voltage’s PI maximum output value	Factory default	Reserved
	Setting range	Reserved	

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PC-43	Boost voltage PI parameter switching deviation 1	Factory default	0.0%
	Setting range	0.0～100.0%	
PC-44	Boost voltage PI parameter switching deviation 2	Factory default	2.0%
	Setting range	0.0～100.0%	

PC-45	Boost voltage PI limitation deviation	Factory default	0.0%
	Setting range	0.0～100.0%	

Boost voltage PI deviation limitation, if the deviation value of setting and feedback is not in the range, the PI regulator stop to adjust.

Chapter 5 Trouble Shooting

5.1 Fault and Trouble Shooting

HD400S series solar pump inverter has comprehensive warning information and protection functions, while the failures happen, the protection function will be activated, inverter stops the output and gives failure code on the keypad.

Before asking the service, customers can make self diagnosis based on the indications as below, to analyse the causes of failures and find out the solutions.

Fault Name	Converter short circuit protection
Fault Code	E-01
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. The cable connecting the motor with the inverter is too long 3. The module is over-heat 4. The cable connections inside the inverter are loosen 5. The main board is abnormal 6. The power board is abnormal 7. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Install a reactor or output filter 3. Check if the air duct is blocked and if the fan is in normal status, and resolve the existing problems 4. Make sure the cables are connected well

Fault Name	Over current when acceleration
Fault Code	E-02
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The acceleration time is too short 4. The manual torque boost or V/F curve is not proper 5. The voltage is too low 6. Start the running motor 7. Load is added suddenly during the acceleration 8. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the acceleration time 4. Adjust the manual torque boost or V/F curve 5. Make the voltage in the normal range 6. Select speed tracking start or start the motor till it stops 7. Cancel the sudden added load 8. Select bigger capacity inverter

Fault Name	Over-current when deceleration
Fault Code	E-03
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The deceleration time is too short 4. The voltage is too low 5. Load is added suddenly during the deceleration 6. Have not installed braking unit and braking resistor
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the deceleration time 4. Make the voltage in the normal range 5. Cancel the sudden added load 6. Install braking unit and braking resistor

Fault Name	Over-current when constant speed running
Fault Code	E-04
Reason	1. Short-circuit or ground fault occurred at inverter output 2. Control mode is vector control & motor parameters are not identified 3. The voltage is too low 4. Load is added suddenly during running 5. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Make the voltage in the normal range 4. Cancel the sudden added load 5. Select bigger capacity inverter

Fault Name	Over-voltage when acceleration
Fault Code	E-05
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during acceleration 3. The acceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the acceleration time 4. Install braking unit and braking resistor

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Fault Name	Over-voltage when deceleration
Fault Code	E-06
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during deceleration 3. The deceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the deceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when constant speed running
Fault Code	E-07
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during the inverter running
Solution	1. Make the voltage in the normal range 2. Cancel the external force or install braking resistor

Fault Name	Power-supply fault
Fault Code	E-08
Reason	1. The input voltage is out of range
Solution	1. Make the voltage in the normal range

Fault Name	Under-voltage fault
Fault Code	E-09
Reason	1. Instantaneous power-off 2. The input voltage is out of range 3. Bus voltage is abnormal 4. The rectifier bridge and buffer resistor are abnormal 5. The power board is abnormal 6. The control board is abnormal
Solution	1. Fault Reset 2. Make the voltage in the normal range 3. Ask for technical support 4. Ask for technical support 5. Ask for technical support 6. Ask for technical support

Fault Name	Inverter over load
Fault Code	E-10
Reason	1. The load is too heavy or motor blockage occurs 2. Capacity of inverter is too small
Solution	1. Reduce the load, check the status of motor & machinery 2. Select bigger capacity inverter

Fault Name	Motor over load
Fault Code	E-11
Reason	1. P9-01 is set improperly 2. The load is too heavy or motor blockage occurs 3. Capacity of inverter is too small
Solution	1. Set P9-01 properly 2. Reduce the load, check the status of motor & machinery 3. Select bigger capacity inverter

Fault Name	Input phase failure
Fault Code	E-12
Reason	1. the input three phase power supply is abnormal 2. The power board is abnormal 3. The control board is abnormal 4. The thunder prevention board is abnormal
Solution	1. Check the power supply, and make it in normal 2. Replace the power board 3. Replace the control board 4. Replace the thunder prevention board

Fault Name	Output phase failure
Fault Code	E-13
Reason	1. The connection between inverter and motor is abnormal 2. Output voltage unbalance during the motor running 3. The power board is abnormal 4. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Make sure the motor three phase winding is normal 3. Ask for technical support 4. Ask for technical support

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Fault Name	IGBT module over-heat
Fault Code	E-14
Reason	1. Ambient temperature is too high 2. Air duct is blocked 3. Cooling fans are broken 4. Thermal resistor(temperature sensor) of the module is broken 5. IGBT module is broken
Solution	1. Reduce the ambient temperature 2. Clear the air duct 3. Replace cooling fans 4. Replace the thermal resistor 5. Replace IGBT module

Fault Name	Peripheral device fault
Fault Code	E-15
Reason	1. DI terminal receives an external fault signal generated by peripheral device
Solution	2. Reset running

Fault Name	Communication fault
Fault Code	E-16
Reason	1. Master computer works abnormal 2. Communication cable is abnormal 3. PD group is set improperly
Solution	1. Check the connection of master computer 2. Check the communication connection 3. Set PD group properly

Fault Name	Current detection fault
Fault Code	E-18
Reason	1. Hall device is abnormal 2. The power board is abnormal
Solution	1. Check hall device and connection 2. Replace the power board

Fault Name	EEPROM read/write fault
Fault Code	E-21
Reason	1. EEPROM chip is broken
Solution	1. Replace the main board

Fault Name	Inverter hardware fault
Fault Code	E-22
Reason	1. Over voltage 2. Over current
Solution	1. Handle as over voltage fault 2. Handle as over current fault

Fault Name	Short-circuit to ground fault
Fault Code	E-23
Reason	1. The motor is short-circuit to ground
Solution	1. Replace cables or motor

Fault Name	Accumulated running time arrival fault
Fault Code	E-26
Reason	1. The accumulated running time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Customized fault 1
Fault Code	E-27
Reason	1. DI terminal receives signal of customized fault 1
Solution	1. Reset running

Fault Name	Customized fault 2
Fault Code	E-28
Reason	1. DI terminal receives signal of customized fault 2
Solution	1. Reset running

Fault Name	Accumulated power-on time arrival fault
Fault Code	E-29
Reason	1. The accumulated power-on time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Off-load fault
Fault Code	E-30
Reason	1. The inverter running current is smaller than P9-64
Solution	1. Confirm if the load breaks away and P9-64 & P6-65 are set properly

Fault Name	PID feedback lost fault when running
Fault Code	E-31
Reason	1. PID feedback is smaller than PA-26
Solution	1. Check PID feedback signal or set PA-26 properly

Fault Name	Current-limiting fault
Fault Code	E-40
Reason	1. Whether the load is heavy or the motor is blocked 2. Capacity of inverter is too small.
Solution	1. Reduce the load and detect the motor & machinery condition 2. Select bigger capacity inverter

Fault Name	Water level sensor failure warning
Fault Code	E-41
Reason	1. Loose connection of sensor cables 2. Sensor fault
Solution	1. Check the connection of sensor cables 2. Replace a new sensor

Fault Name	Full water level warning
Fault Code	A-01
Reason	1. Water level is higher than limitation
Solution	1. The inverter will detect it and pause running automatically

Fault Name	Dry pumping warning
Fault Code	A-02
Reason	1. Pump works at low load
Solution	1. Check the water level 2. Check the current value

Fault Name	Weak sunshine warning
Fault Code	A-03
Reason	1. Pump works at min. running frequency
Solution	1. Check the setting of min. running frequency

5.2 Common Faults and Solutions

No.	Fault	Reason	Solution
1	No display when power-on	The input voltage is 0 or too low. The switching power supply on the power board is broken. Rectifier bridge is broken. Buffer resistors are broken. The control board or keypad is broken.	Check the input power-supply. Reconnect the keypad and 40-core flat cable.
2	E-23 is displayed when power-on	The motor or the output line is short circuited to the ground. The inverter is damaged.	Measure the insulation of the motor and output line with magneto-ohmmeter.
3	E-14 is displayed frequently	Carrier frequency is too high. Fans are broken or air duct is broken. The inverter inside components are broken (such as thermistor).	Reduce the carrier frequency (P0-15). Replace fans, clear the air duct.
4	Motor does not run after the inverter runs	Motor and motor cables are abnormal. The inverter parameters are set improperly (motor parameter). The connection of the cables of the power board and control board are not good. The power board is broken.	Make sure the connection of the inverter and motor is very well. Replace the motor or clear the mechanical failure. Check & reset the motor parameters.
5	Digital terminal is invalid	The parameter is set improperly. The external signal is wrong. The jumper between PLC and +24V is loose. The control board is broken.	Check & reset P4 group parameters. Reconnect the external signal cable. Reconnect the jumper between PLC and +24V.
6	Over voltage and over current fault are displayed frequently	Motor parameters are set improperly. The ACC/DEC time is improper. The load fluctuates.	Reset motor parameters or perform auto tuning. Set proper ACC/DEC time.
7	Power on display 	Inverter initialization failure. The relative components of the control board are broken.	Check the keypad and 40-core flat cable. Replace the control board.

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Appendix A Commissioning Guide

1. When PC-00 = 1, if the inverter is running, press the STOP button to stop it.

2. Set Group P1 motor parameters, including P1-01, P1-02, P1-03, P1-04 and P1-05.

3. When PC-19 = 1, the water level detection is by terminal. Connect the high water level detection terminal to D1, low water level detection terminal to D2.
When PC-19 = 2 or 3, the water level detection is by analog input. If the detected water level is higher than the setting value of PC-20, after the delay time of PC-21, the inverter gives full water level warning, and the system stops and enters into standby mode.
Under the full water level warning condition, if the water level is lower than the setting value of PC-20, after the delay time of PC-22, the warning resets and inverter restarts automatically.

When PC-25 is 0, the terminal detects the low water level of well bottom. Connect the high water level detection terminal to D3.
When PC-25 is not 0, if the output current of motor is less than the setting value of PC-25, after the delay time of PC-26, the inverter gives motor underload warning and then stop.
Under the condition of underload warning, after the delay time of PC-27, the warning resets and inverter restarts automatically.

NOTE: The system default detection is by terminal.

4. PC-03 and PC-04 are used to set the minimum and maximum reference voltage under MPPT tracking mode. Make sure the MPPT voltage point must be in this range, the system can achieve the best effect.

When the motor rated voltage is 380V, PC-03 = 460V, PC-04 = 600V. The recommended open circuit voltage is 650 - 700V.
When the motor rated voltage is 220V, PC-03 = 280V, PC-04 = 350V. The recommended open circuit voltage is 350 - 400V.
This parameter requires to be modified according to the site situation. (The minimum voltage should be higher 10V than P9-62, adjust P9-62 when necessary, but please notice the undervoltage point. The undervoltage point of 220V inverters is 200V, the point of 380V inverters is 300V.) No need to modify when the voltage is recommended open circuit voltage.

5. Motor running direction setting
Set PC-00 = 0, observe the water yield when the sunshine is normal. If the running frequency is low or the water yield is less, stop the inverter and set PC-00 = 1. If P0-09 is 1, then modify P0-09 to be 0. If P0-09 is 0, then modify P0-09 to be 1. Finally, set PC-00 to be 0.

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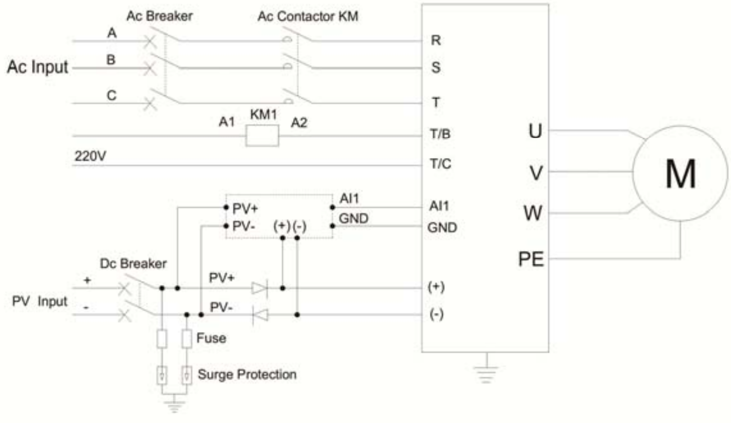
Appendix B Inverter AC / DC Switching Solution 1

Usually the inverter does not allow simultaneous AC and DC connection. To achieve simultaneous AC / DC input, a switching control circuit needs to be configured externally. Here is a reference solution (with rectifier bridge):



Appendix C HD400S-01 AC / DC Switching Module

1. Model No. and Specification

HD400S-01– 110A – T4

① ② ③

①	Product series	HD400S-01 AC/DC switching module
②	Rated current	055A: applicable for 15kW and lower inverters 110A: applicable for 18.5kW~37kW inverters 200A: applicable for 45kW~110kW inverters
③	AC voltage	S2：AC 3PH 220V(-15%) ~ 240(+10%) T4：AC 3PH 380V(-15%) ~ 440(+10%)

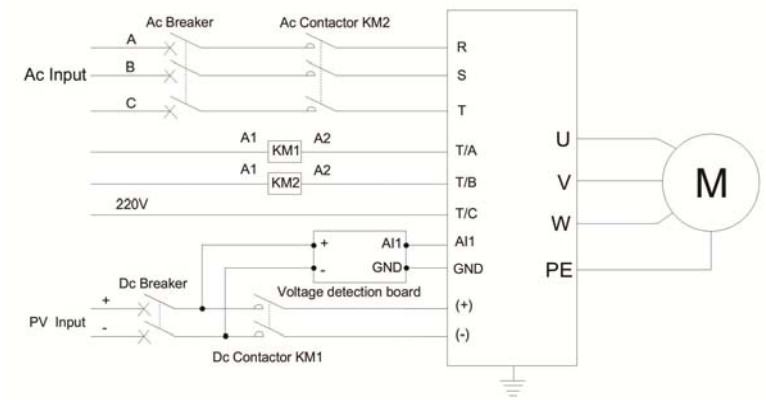
2. Switching Module Terminal Instruction

Terminal	Name	Description
PV +	PV input (+)	Voltage detection board input, connect PV positive input
PV -	PV input (-)	Voltage detection board input, connect PV negative input

(+), (-)	Switching module output	Connect to inverter (+), (-)
AI1, GND	Voltage detection signal	Analog signal, detect PV voltage, connect to inverter AI1, GND terminal

Appendix D Inverter AC / DC Switching Solution 2

Usually the inverter does not allow simultaneous AC and DC connection. To achieve simultaneous AC / DC input, a switching control circuit needs to be configured externally. Here is a reference solution (with the voltage detection board of 220V AC power):



Appendix E Inverter AC / DC Switching Solution 3

Usually the inverter does not allow simultaneous AC and DC connection. To achieve simultaneous AC / DC input, a switching control circuit needs to be configured externally. Here is a reference solution (with the voltage detection board of 380V AC power):