Vectorque™

Constant Pressure Water Supply VFD

V&T

E5−PA Series

User Manual

FOREWORD

The E5-PA series VFD is a kind of new product special for constant pressure water supply provided by Shenzhen V&T Technologies Co., Ltd.

E5-PA series VFD can realize multi-pump constant pressure water supply function with expansion card. E5-PA VFD has built-in PID function. In order to realize 1~4 pumps under the same power's constant pressure water supply, the pressure sensor will test current water pressure and automaticly switching to work with four pumps. In the same time, it can also achieve overpressure alarm, lack-pressure alarm, multi-period constant pressure water supply, constant pressure water supply with specific date, sleep function, change pumps on time.

Please use this manual with E5-H universal VFD manual.

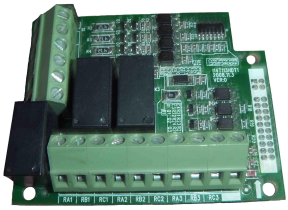
E5-PA is light-duty type of E5-H frequency inverter, E5-PA is special for constant pressure water supply. Such as, E5-PA-4T11G 11KW frequency inverter actually is E5-H-4T7.5G/11L frequency inverter. (7.5KW for heavy-duty, 11KW for light-duty.)

CONTENT

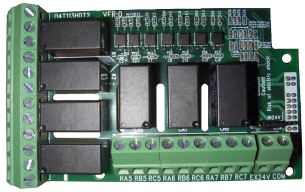
Chapter 1 Hardware Equipment

1.1 Hardware Equipment

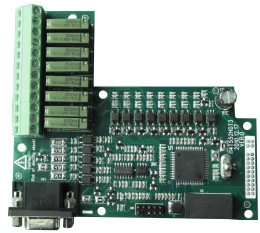
Matching V&T constant pressure water supply expansion card according to the demand. Setting H.00 when choosing different expansion card. Expansion card model and pictures as follows:



EX-DT01 card（H0.00=1）



EX-DT02 card（H0.00=2）



EX-DT03 card（H0.00=3）

Note:

◆ The water supply control card must be installed in completely power off, and install it on the VFD expansion slot.

◆ Please confirm the setting value is the same as the installed expansion card when setting the function code. If not, it may cause the disorder of terminal initialization, affect the use.

1.2 Performance and Application

Technical parameter	Data
Startup torque	0.50Hz 180%
Overload capacity	160% rated load keep working for 0.5 second；120% rated load keep working for 1 minute
Speed stabilization precision	± 0.5%
Added pumps	1 to 4 pumps

1.3 Constant Pressure Water Supply Expansion Card Selection

Multi-split	Optional expansion card	Clock control	Pump quantity	VFD power range
E5-P/EX-DT01	EX-DT01	N	1～3	0.75～400kW
E5-P/EX-DT02	EX-DT02	N	1～4	7.5～400kW
E5-P/EX-DT03	EX-DT03	Y	1～4	7.5～400kW

Note: The quantity of pumps do not include the sleeping pump, it refer to the equivalent power pump.

1.4 The Excellent Features of Constant Pressure Water Supply

◆ E5-PA has many features like high performance E5-H, with large startup torque and complete

protect function.

- Small sleeping pump control function: enable the system enter the sleeping control status and control the dedicated small sleeping pump. If programming small sleeping pump function will enable the power frequency pump in small flow supplying. variable frequency will change to sleeping mode.
- Timing cycle switching function: It can effectively avoid pump getting rusty and a single pump prolonged working. Usage condition: equivalent pumps power rating and vacant pump available in the system.
- Automatic switching function: When supplying with large flow water, it will automatically switch tthe control of the power frequency pump.
- Overpressure & Lack-pressure control: It can reach real time monitoring function for system, instruction for overpressure alarm and lack-pressure alarm, and optionally stop the pump.
- Multi-period pressure control: According to the daily cyclical demand changes of water requirements, setting the change of multi-period pressure smoothly switch the water supply pressure, save electricity and water, carrying out the circulation each day.
- Setting constant pressure water supply in specific day: If the pressure will obviously change on weekends or fixed some day, the fixed pressure water supply can be settled: carrying out the circulation per week.
- Switching smoothness : it is specially designed to prevent the current surge and water hammer in switching process, user can do the self-regulating based on the application site.

1.5 Application Precaution

- At low speed, is E5-H series constant pressure water supply special VFD, mainly used for dragging pump motor load. Due to pump fixed dead zone characteristics at low speed, it cannot effectively supply water cause electricity waste, and in low speed, the heat dissipation features of pump become worse, pump cannot long-time running in low speed.
- At power frequency bypass, to prevent the short-circuit damage of VFD and other device between frequency VFD output and power supply, it need use mechanical interlock type AC contactor, and realize logical interlock in electric control circuit.As shown in following case. The VFD output terminal U、V、W phase order must in accordance with power frequency bypass terminal L1、L2、L3. Otherwise, in the process of motor switching from variable frequency to power frequency, it will cause a suddenly reverse of motor, will lead to suddenly trip or machine damage .
- For multiple motors control, when one VFD work with multiple pump motors, multiple motors cannot connect in parallel, it should use multiple pumps circulation way to supply water. At the same time, one VFD only control one motor.

Chapter 2 Description of Expansion Card Control Terminal

2.1 Description of EX-DT01 Expansion Card Terminals

RA1	RB1	RC1	RA2	RB2	RC2	RA3	RB3	RC3

P24	X8	X9	X10	X11	COM

Type	Terminal symbol	Terminal name	Description	Terminal function description
Power Supply	P24	24V power supply	24V power supply	Internal 24V power supply
	COM	24V GND		Public grounding
EX-DT01 Relay	RA1	RA1 contact	RA1 relay	250VAC/5A 30VDC/5A
	RB1	RA1-RB1 normally-closed contact		
	RC1	RA1-RC1 normally open contact		
	RA2	RA2 contact	RA2 relay	
	RB2	RA2-RB2 normally-closed contact		
	RC2	RA2-RC2 normally open contact		
	RA3	RA3 contact	RA3 relay	
	RB3	RA3-RB3 normally-closed contact		
	RC3	RA3-RC3 normally open contact		
X Terminal	P24	24V power supply	Power supply	Internal 24V power supply
	COM	24V GND		Public grounding
	X8	X8 digital terminal input	Extension terminal	Input specification:24VDC，5mA Frequency range:0～200Hz Voltage range:24V±20%
	X9	X9 digital terminal input		
	X10	X10 digital terminal input		
	X11	X11digital terminal input		

2.2 Description of EX-DT02 Expansion Card Terminals

RA1	RB1	RC1	RA2	RB2	RC2	RA3	RA3	RC3	RA4	RB4	RC4

RA5	RB5	RC5	RA6	RB6	RC6	RA7	RB7	RC7	EX24V	COM

Type	Terminal symbol	Terminal name	Description	Terminal function description
Power Supply	EX24V	24V power supply	Power supply for EX-DT02 relay	Outside 24V power supply
	COM	24V GND		Public grounding

Type	Terminal symbol	Terminal name	Description	Terminal function description
EX-DT02 Relay	RA1	RA1 contact	RA1 relay	250VAC/5A 30VDC/5A 250VAC/5A 30VDC/5A
	RB1	RA1-RB1 normally-closed contact		
	RC1	RA1-RC1 normally open contact		
EX-DT02 Relay	RA2	RA2 contact	RA2 relay	250VAC/5A 30VDC/5A 250VAC/5A 30VDC/5A
	RB2	RA2-RB2 normally-closed contact		
	RC2	RA2-RC2 normally open contact		
	RA3	RA3 contact	RA3 relay	
	RB3	RA3-RB3 normally-closed contact		
	RC3	RA3-RC3 normally open contact		
	RA4	RA4 contact	RA4 relay	
	RB4	RA4-RB4 normally-closed contact		
	RC4	RA4-RC4 normally open contact		
	RA5	RA5 contact	RA5 relay	
	RB5	RA5-RB5 normally-closed contact		
	RC5	RA5-RC5 normally open contact		
	RA6	RA6 contact	RA6 relay	
	RB6	RA6-RB6 normally-closed contact		
	RC6	RA6-RC6 normally open contact		
	RA7	RA7 contact	RA7 relay	
	RB7	RA7-RB7 normally-closed contact		
	RC7	RA7-RC7 normally open contact		

Note:The wire jumper terminal in EX-DT02 expansion card please jump to IN24V, stand for inside power supply, otherwise EX-DT02 can't working. When outside 24V power supply connecting with EX24V terminal, the wire jumper terminal please jump to EX24V.

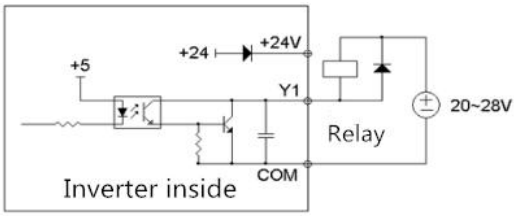
2.3 Description of EX-DT03 Expansion Card Terminals

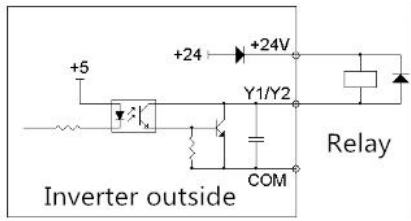
K1	K2	KCM	K3	K4	KCM	K5	K6	KCM	K7	K8	KCM

DP15 port:

Base pin	Name
6	EX1
7	EX2
10	EX4
11	EX3
15	COM

Type	Terminal symbol	Terminal name	Terminal function description
EX-DT03 Relay terminal	K1	K1 relay	250VAC/5A 30VDC/5A
	KCM	External public terminal	
	K2	K2 relay	
	KCM	External public terminal	
	K3	K3 relay	
	KCM	External public terminal	
	K4	K4 relay	
	KCM	External public terminal	
	K5	K5 relay	
	KCM	External public terminal	
	K6	K6 relay	
	KCM	External public terminal	
	K7	K7 relay	
	KCM	External public terminal	
	K8	K8 relay	
	KCM	External public terminal	
X Terminal	EX1	EX1 digital terminal input	Input specification: 24VDC，5mA Frequency range: 0～200Hz Voltage range: 24V±20%
	EX2	EX2 digital terminal input	
	EX3	EX3 digital terminal input	
	EX4	EX4 digital terminal input	
	COM	Public terminal	





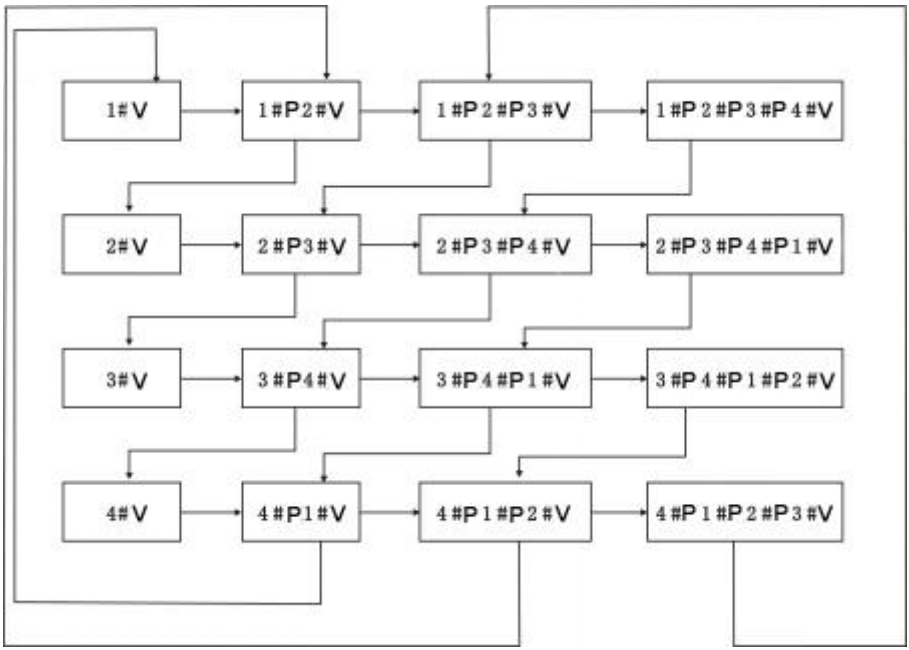
The output terminal wiring mode of control board Y1、Y2 use internal +24V power supply with external power supply

Note: When this wiring mode is adopted, if Y1 or Y2 terminal is damaged, the polarity of the external diode must be checked to ensure the correctness.

Chapter 3 Working Process

3.1 Switching Process of the Auto Cycle

For example of the one inverter control four pumps, the main pump starts to work when the power on, if the pump working on the full frequency for some time can't reach the setted pressure, the current pump change to the power frequency pump, and the second pump will start working for varying the frequency, if the second pump can reach the setted frequency and back to the lower limit frequency, delaying for some time and remove the power frequency inverter. If working under the full frequency for some time still can't reach the setted pressure, then change the current pump to the power frequency pump again, starting the third pump working for varying the frequency, if can reach the setted frequency and back to the lower limit frequency, delaying for some time and remove one power frequency inverter. After removing the power inverter if it is still can reach the setted frequency and back to the lower limit frequency, then keep working for some time remove another power frequency inverter, according to the same rule, the system in accordance with the principles of first start first stop. As the following pic:



V=Variable Frequency P=Power Frequency

3.2 Switching Process of Timing Cycle

During the frequency inverter auto cycle process, with the timing cycle process. On the process of the auto cycle, if reached the setting time, and there are vacant pump do not start working, will stop the current variable frequency pump, switch to the next pump on variable frequency working, it will automatically switch to the auto cycle process after switching ends. The timing cycle process can avoid the single pump prolonged working which may cause the overheat problem, in the meantime it will also avoid the spare pumps getting rusty.

3.3 The Use of Small Sleeping Pump

The system can add a small sleeping pump, during the night or small water consumption, the frequency inverter enter the sleeping mode, opening the small sleeping pump for water supply can save electricity. When water consumption increase, the system will auto wake up for the variable frequency cycle water supply.

Chapter 4 List of Constant Pressure Water Supply Function Codes

Meanings of each item in Function Code Parameter Table

Item	Meanings
Function Code number	The number of function code, such as H0.00
Function code name	The name of function code, which explains the function code's meanings.
Factory setting	Restore the settings of the function code after the product is delivered (Refer P0.01).
Setting range	The value from minimum value to maximum value that permit to set accord to the function code.
Property	○: This function code can be changed during operation: ×: This function code can only be changed during stopping status; *: The setting of this function code is read-only and cannot be changed.
Unit	V: Voltage: A: Current: ºC: Celsius degree: Ω: Ohm: mH: Milli-henry: rpm: Rotating speed: %: Percentage: bps: baud rate: Hz, kHz: Frequency: ms, s, min, h, kh: Time: kW: Power:/: No unit
Function code selection	Function code parameter setting list

4.1 List of Constant Pressure Water Supply Function Codes

Function code number	Function code name	Factory setting	Range	Property	Unit	Function code selection
Parameter selection of water supply mode						
H0.00	Expansion card selection	0	0～3	×	/	0:Invalid 1:EX-DT01 2:EX-DT02 3:EX-DT03
H0.01	Water supply mode selection	0	0～1	×	/	0:Invalid 1:Normal water supply mode
H0.02	The number of working pumps for water supply	1	1～4	×	/	1:Single-pump operation 2:2 pumps operation 3:3 pumps operation 4:4 pumps operation
Water supply digital input enhancement function code						
H0.03	X1 Input terminal of water supply enhancement function selection	99	0～99	×	/	0～35:refer to the detailed list of the following input terminals 36:pool water level upper limit 37:pool water level lower limit 38:water shortage water level
H0.04	X2 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.05	X3 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.06	X4 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.07	X5 Input terminal of water supply enhancement function selection	99	0～99	×	/	0～35:refer to the detailed list of the following input terminals 36:pool water level upper limit

H0.08	X6 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.09	X7 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.10	X8 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.11	X9 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.12	X10 Input terminal of water supply enhancement function selection	99	0～99	×	/	
H0.13	X11 Input terminal of water supply enhancement function	99	0～99	×	/	
H0.14	X terminal for positive and negative logic selection	0	0～7ff	×	/	Use hexadecimal control , the hexadecimal number : 0:positive logic 1:negative logic
Water Supply(open-collector) output enhancement function code						
H0.15	RA1/K1 Relay output function selection	71	0～71	×	/	EX-DT01 card has relay from RA1～RA3 ,EX-DT02 card has relay from RA1～RA7, EX-DT03 card has relay from K1～K8 Control board has RA、Y1、Y2 0~31:refer to the detailed list of the following input terminals 32:Pump 1 for variable frequency control 33:Pump 1 for power frequency control 34:Pump 2 for variable frequency control 35:Pump 2 for power frequency control 36:Pump 3 for variable frequency control 37:Pump 3 for Power frequency 38:Pump 4 for variable frequency control 39:Pump 4 for power frequency control 40:Sleep pump control 41:Over pressure 42:Under pressure 43:standby pressure 44:water shortage
H0.16	RA2/K2 Relay output function selection	71	0～71	×	/	
H0.17	RA3/K3 Relay output function selection	71	0～71	×	/	
H0.18	RA4/K4 Relay output function selection	71	0～71	×	/	
H0.19	RA5/K5 Relay output function selection	71	0～71	×	/	
H0.20	RA6/K6 Relay output function selection	71	0～71	×	/	
H0.21	RA7/K7 Relay output function selection	71	0～71	×	/	
H0.22	K8 Relay output function selection	71	0～71	×	/	
H0.23	RA Relay output function selection	71	0～71	×	/	
H0.24	Y1 open-collector output function selection	71	0～71	×	/	
H0.25	Y2 open-collector output function selection	71	0～71	×	/	
H0.26	Output terminal for positive and negative logic selection	0	0～7ff	×	/	Use hexadecimal control , the hexadecimal number : 0:Positive logic 1:Negative logic

Closed loop control parameter for water supply						
H0.27	Close loop control pressure reference channel selection	0	0～2	○	/	0:Perssure value reference(H0.28) 1:AI1 Analog reference 2:AI2 Analog reference
H0.28	Pressure value setting	000.0	0～100.0%	○	%	0～100.0%
H0.29	Target pressure setting	/	/		Mpa	/
H0.30	Calculate digital pressure setting value by target pressure setting value	/	Read only		%	/
H0.31	Minimum reference	00.0	0.00～H0.32	○	V	0.00～H0.32
H0.32	Maximum reference	10.00	0.00～10.00	○	V	0.00～10.00
H0.33	Analog feedback close loop control feedback channel	1	1～2	○	/	1:AI1 2:AI2
H0.34	Feedback minimum analog correspond to the pressure	0.00	0.00～H0.35	○	Mpa	Feedback the sensor minimum digital corresponding pressure
H0.35	Feedback maximum analog correspond to the pressure	1.0	0.00～1000.0	○	Mpa	Feedback the sensor maximum digital corresponding pressure
H0.36	Minimum reference correspond to the feedback sensor input	0.00	0.00～H0.37	○	V	Feedback the sensor minimum digital input
H0.37	Maximum reference correspond to the feedback sensor input	10.00	0.00～10.00	○	V	Feedback the sensor maximum digital input
H0.38	Water supply PID proportional gain Kp	0.200	0.000～10.000	○	/	0.000～10.000
H0.39	Water supply PID integral gain Ki	0.500	0.000～10.000	○	/	0.000～10.000
H0.40	Water supply PID differential gain Kd	0.000	0.000～2.710	○	/	0.000～2.710
H0.41	Water supply PID sampling cycle	0.002	0.001～30.000	○	s	0.001～30.000s
H0.42	Water supply PID deviation limit	5.0	0.0～20.0	○	%	0.0～20.0%
H0.43	Water supply PID adjustment selection	00	00～11	○	/	Ones place: Integral mode 0: Frequency reaches upper/lower limit, stop integral regulation: 1: Frequency reaches upper/lower limit, continue integral regulation Tens place: output frequency 0: Be consistent with preset direction: 1: Reverse to preset direction
H0.44	Water supply PID positive or negative function	0	0～1	○	/	0～1
H0.45	Reserved	/	/	/	/	/
H0.46	Reserved	/	/	/	/	/
Water Supply Basic Parameter						

H1.00	Main pump start selection	1	1～1	×	/	Selecting the first start main pump
H1.01	Delay time of adding pump in low pressure	5.0	0～3600.0	○	s	0～3600.0
H1.02	Delay time of reducing pump in high pressure	5.0	0～3600.0	○	s	0～3600.0
H1.03	Delay time of switching power frequency to variable frequency	0.8	0.5～10.0	×	s	0.5～10.0
H1.04	Upper limit frequency	40.00	P0.13～P0.14	○	Hz	P0.13～P0.14
H1.05	Lower limit frequency	25.00	P0.13～P0.14	○	Hz	P0.13～P0.14
H1.06	Acceleration time to upper limit frequency when reducing pump	10.0	0～3600.0	○	s	0～3600.0
H1.07	Deceleration time to lower limit frequency when frequency pump timing switch	10.0	0～3600.0	○	s	0～3600.0
H1.08	The time of frequency pump timing cycle	60.0	0.5～3600.0	○	Min	Variable frequency pump timing cycle
H1.09	Switch delay time of frequency pump timing cycle	0.8	0.5～10.0	×	s	0.5～10.0
H1.10	Over pressure stop selection	0	0～1	×	/	0:Over pressure don't stop, indicate the over pressure failure 1:Over pressure stop, indicate the over pressure failure
H1.11	Over pressure value setting	100.0	0.00～100.0	○	%	The maximum pressure value for the system running
H1.12	Judge time in over pressure	2.0	0～3600.0	×	s	0～3600.0
H1.13	Lower pressure stopping selection	0	0～1	×	/	0:lower pressure don't stop, indicate the lower pressure failure 1:Lower pressure stop, Stop when no-load for a long time
H1.14	Lower pressure value setting	0.00	0.00～100.0	○	%	Minimum pressure for running the system
H1.15	Judge time in lower pressure	2.0	0～3600.0	×	s	0～3600.0
H1.16	Sleeping pump working mode selection	0	0～3	×	/	0:invalid, do not use the sleep pump 1:pressure testing add to sleep pump 2:sleep frequency add to sleep pump 3:Fixed time add to sleep pump (EX-DT03)
H1.17	Sleeping pressure value setting	0.0	0.00～100.0	○	%	0.00～100.0%
H1.18	Wake up pressure value setting	0.0	0.00～100.0	○	%	0.00～100.0%
H1.19	Sleeping frequency setting value	20.00	P0.13～P0.14	○	Hz	P0.13～P0.14，H1.16=2 is valid
H1.20	Testing time for entering sleeping	10.0	0～3600.0	○	s	0～3600.0
H1.21	Delay time of waking up from sleep mode	10.0	0～3600.0	○	s	0～3600.0

H1.22	Delaying time for stopping without load for a long time	60.0	0～3600.0	○	s	When setting H1.13=1, after passed the time,pressure still lower than the setted value,stop the pump.
H1.23	Signal selection for intake sump water level	0	0～3	×	/	0: No input, no liquid level control 1:Input by swichting value 2:Input by anlonogy quantity 3:Input by swiching value, only use for lower water level limit and lack water level signal, no hysteresis control
H1.24	Analog input channel selection for intake sump water level	0	0～2	×	/	0:AI1 1:AI2 2:AI3
H1.25	Analog input for upper limit of intake sump water level	0.00	0.00～10.00	○	V	Water level signal input need to be connected in order. Need to install water level sensor in intake sump.
H1.26	Analog input for lower limit of intake sump water level	0.00	0.00～10.00	○	V	
H1.27	Analog input for intake sump water level	0.00	0.00～10.00	○	V	
H1.28	Standby pressure	0.00	0～100.0	○	%	0.00～100.0%
H1.29	Reserved	/	/	/	/	/
H1.30	Downtime interval for pump when press the stop key one by one	0.5	0.5～3600.0	○	s	Downtime interval
Regular day water supply timing control (adapt to EX-DT03)						
H1.31	Multi-section pressure setting selection	0	0～1	○	/	0: No use of multi-pressure water supply 1: Use multi-pressure water supply
H1.32	T1 period pressure	50.0	0～100.0	○	%	T1 period pressure
H1.33	T2 period pressure	50.0	0～100.0	○	%	T2 period pressure
H1.34	T3 period pressure	50.0	0～100.0	○	%	T3 period pressure
H1.35	T4 period pressure	50.0	0～100.0	○	%	T4 period pressure
H1.36	T5 period pressure	50.0	0～100.0	○	%	T5 period pressure
H1.37	T6 period pressure	50.0	0～100.0	○	%	T6 period pressure
H1.38	Reserved	/	Reserved	/	/	/
H1.39	T1 starting time	00.00	0.00～23.59	○	H	T1 starting time
H1.40	T2 starting time	00.00	0.00～23.59	○	H	T2 starting time
H1.41	T3 starting time	00.00	0.00～23.59	○	H	T3 starting time
H1.42	T4 starting time	00.00	0.00～23.59	○	H	T4 starting time
H1.43	T5 starting time	00.00	0.00～23.59	○	H	T5 starting time
H1.44	T6 starting time	00.00	0.00～23.59	○	H	T6 starting time

H1.45	Special day setting	0	0～f	○	/	Carry out weekly cycle, invalid for 7～f
H1.46	Special day pressure setting	0.0	0～100.0	○	%	Target pressure setting in appointed day
H1.47	Opening real time for small sleeping pump	0.00	0.00～23.59	○	H	0.00～23.59
H1.48	Closing real time for small sleeping pump	6.00	0.00～23.59	○	H	0.00～23.59
H1.49	Current time-year	----	2011～2099	*	/	2011～2099
H1.50	Current time-month/day	----	0000～1231	*	/	Ones/tens place:day Hundreds/thousands place:month
H1.51	Current time-week	-	0～f	*	/	Valid for week 0～6
H1.52	Current time-hour/minute	----	0.00 ～ 23.59	*	/	0.00～23.59
H1.53	Current time-second	--	0～59	*	/	0～59
H1.54	Reserved	/	/	/	/	/
H1.55	The quantity of running power frequency pump	0	0～3	*	/	Show the quantity of running power frequency pump
H1.56	Variable frequency pump running position	0	0～4	*	/	Show the quantity of current running variable frequency pump
H1.57	Total running time for Pump1	0	0～65535	*	H	0～65535
H1.58	Total running time for Pump2	0	0～65535	*	H	0～65535
H1.59	Total running time for Pump3	0	0～65535	*	H	0～65535
H1.60	Total running time for Pump4	0	0～65535	*	H	0～65535
H2.00～H2.10	Reserved	/	/	/	/	/

Note:

- ◆ The time display all for hexadecimal number.
- ◆ Pls check if inverter panel shows -No-, it means wrong setting for function code.

1) Wrong setting for input channel or output channel, choose the same channel as reference or feedback.

2) Wrong setting for inverter upper limit or lower limit.

3) Wrong setting for forbidden setting place, such as EX-DT01 expansion card forbid setting 1 inverter for 4 pumps mode.

4) Use EX-DT01, H0.18～H0.22 forbid setting relay function, as EX-DT01 card has no these standard relay.

5) Use EX-DT02, H0.22 forbid setting relay function, as EX-DT01 card has no these standard relay.

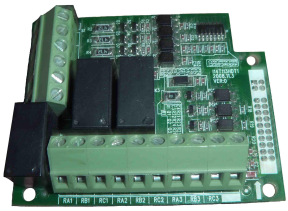
6) When inverter using together with EX-DT03 card, inverter forbid setting H0.00=1 or H0.00=2.

Chapter 5 Description of Function Codes

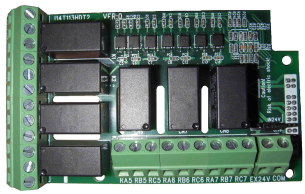
5.1 Optional parameter for water supply mode

H0.00	Expansion card selection	0～3

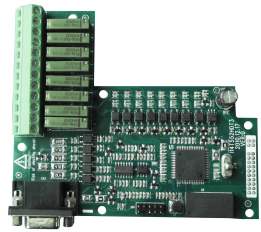
This function code is used for selecting expansion card. Please select the expansion card as following picture. If do not use the card, pls set H0.00=0, if use EX-DT01 card, pls set H0.00=1; if use EX-DT02 card, pls set H0.00=2; if use EX-DT03 card, pls set H0.00=3.



5-1 EX-DT01 expansion card



5-2 EX-DT02 expansion card



5-3 EX-DT03 expansion card

Note:Pls confirm the setting value in accord with the actual installed card. Otherwise, it will cause the disorder of terminal initialization when setting procedure initialize the expansion card.

H0.01	Water supply mode selection	0～1

This function code is used for setting water supply mode. Pls set P0.03=1 as close loop control when setting water supply mode. Setting H0.01=1, invalid for water supply mode (1 inverter for several pumps). Setting H0.01=1, water supply control mode. Pls set H0.01=1 if need water supply control mode (1 inverter for several pumps).

H0.02	The number of working pumps for water supply	1～4

This function code is used for setting the number of working pumps for water supply. Such as setting H0.02=1, single pump working, setting H0.02=2, two pumps running cycle, setting H0.02=3, three pumps running cycle, setting H0.02=4, four pumps running cycle.

Note:The number of working pumps refer to the equivalent power pump, no include the small sleeping pump.

5.2 Digital input terminal water supply enhancement parameter

H0.03	X1 Input terminal of water supply enhancement function selection	0～99
H0.04	X2 Input terminal of water supply enhancement function selection	0～99
H0.05	X3 Input terminal of water supply enhancement function selection	0～99
H0.06	X4 Input terminal of water supply enhancement function selection	0～99
H0.07	X5 Input terminal of water supply enhancement function selection	0～99
H0.08	X6 Input terminal of water supply enhancement function selection	0～99
H0.09	X7 Input terminal of water supply enhancement function selection	0～99
H0.10	X8 Input terminal of water supply enhancement function selection	0～99
H0.11	X9 Input terminal of water supply enhancement function selection	0～99

H0.12	X10 Input terminal of water supply enhancement function selection	0～99
H0.13	X11 Input terminal of water supply enhancement function selection	0～99
H0.14	X terminal for positive and negative logic selection	0～7ff

Note:

- ◆ EX-DT01 card expand input X terminals from X8～X11.
- ◆ EX-DT03 card expand EX1～EX4 input terminals..
- ◆ Multifunction input X terminals polarity use hexadecimal control, Bit0～Bit11 correspond to X1～X11.

Multifunction switching value input terminal function definition:

SN	Function definition	SN	Function definition
0	Jog FWD	28	Counter trigger input
1	Jog REV	29	Counter trigger reset
2	Forward (FWD)	30~35	Reserved
3	Reverse (REV)	36	Upper limit water level input of intake sump
4	Three−wire operation control	37	Lower limit water level input of intake sump
5	Reserved	38	Water-short water level input of intake sump
6	Multi−section digital voltage terminal 1	39-46	Reserved
7	Multi−section digital voltage terminal 2	47	Close loop control single-phase pulse input
8	Multi−section digital voltage terminal 3	48	Command switching to operation panel
9	Multi−section frequency terminal 1	49	Command switching to terminal
10	Multi−section frequency terminal 2	50	Command switching to host computer
11	Multi−section frequency terminal 3	51	Main frequency source close loop and open loop switching input
12	Multi−section frequency terminal 4	52	Main frequency source switching to digital
13	Acceleration/deceleration terminal 1	53	Reserved
14	Acceleration/deceleration terminal 2	54	Main frequency source switching to AI1
15	Digital regulating frequency reset	55	Main frequency source switching to AI2
16	Frequency increase instruction	56	Main frequency source switching to AI3
17	Frequency decrease instruction	57	Main frequency source switching to DI
18	Acceleration and deceleration disable instruction	58	Auxiliary frequency source switching to disabled
19	External failure input	59	Reserved
20	Terminal failure reset input	60	Auxiliary frequency source switching to AI1
21	External interrupt contact input	61	Auxiliary frequency source switching to AI2
22	VFD running disabled	62	Auxiliary frequency source switching to AI3
23	Shutdown via terminal	63	Auxiliary frequency source switching to DI
24	Free shutdown via terminal	64～66	Reserved
25	Shutdown via terminal with DC braking 1	67	Closed loop output forced to be 0
26	Emergency shutdown 1 (fastest shutdown)	68	PID positive or negative function
27	Shutdown via terminal with DC braking 2		

0：Terminal jog forward input

1：Terminal jog reverse input

2：Terminal forward run input (FWD)

3：Terminal reverse run input (REV)

The functions of above items 0 to 3 are only enabled in the terminal running command reference mode (P0.06=1). Interlocking of running command and jog command means that the jog command will not be executed in the running status and the running command will not be executed in the jog status.

4：Three−line running control

It is only enabled in the terminal running command reference mode ((P0.06=1). Refer to P5.11 for the instructions about its application.

5：Reserved

6：Multi−section digital voltage terminal 1

7：Multi−section digital voltage terminal 2

8：Multi−section digital voltage terminal 3

Refer to P4.15 ~ P4.21 for the instructions about its application.

9：Multi−section digital voltage terminal 1

10：Multi−section digital voltage terminal 2

11：Multi−section digital voltage terminal 3

12：Multi−section digital voltage terminal 4

Refer to P4.22 ~ P4.36 for the instructions about its application.

13：Acceleration/deceleration time terminal 1

14：Acceleration/deceleration time terminal 2

Refer to P4.09 ~ P4.14 for the instructions about its application.

15：Digital regulating frequency reset

It is used to reset the change values of the setup frequency regulated by terminal UP/DN. When this terminal is enabled, terminal UP/DN are disabled.

16：Frequency increase command

17：Frequency decrease command

The two terminals are used to modify the setup frequency with UP/DN key.

18：Acceleration/deceleration disable command

If this terminal is enabled, the running frequency will remain unchanged unless stop command is executed.

19：External failure input

When this terminal is enabled, inverter will stop running and display “E.oUt” failure.

20：Terminal failure reset input

This terminal is used to implement failure reset, which can also be done with the STOP/RST key on the operation panel and the host computer command.

21：External interrupt contact input

It is used to interrupt the inverter for a short while. At this time, the inverter output frequency will be zero but the inverter is still in the running status and the RUN indictor is ON. The inverter will continue

running after cancel interrupt signal.

22：Inverter running disabled

Once this terminal is enabled, the inverter will coast to stop immediately. Once this terminal is disabled, the inverter will start normally.

23：Terminal shutdown

When the inverter is in the running status, the inverter will stop running once this terminal is enabled.

24：Coast to stop via terminal

When the inverter is in running status the inverter will coast to stop immediately once terminal is enabled.

25：DC injection braking stop 1 via terminal

When the inverter is in the running status, this terminal can be used to stop the inverter. When the running frequency is lower than the DC braking frequency (P3.06), the inverter will start DC braking. The braking current is set by P3.07, and the braking time is the longer one between the function retention time of this terminal and the DC braking time(P3.08).

26：Emergency shutdown 1 (fastest stop)

When this terminal is enabled, the inverter will stop in the fastest way. The inverter will automatically determine the deceleration time according to the load torque and stop as fast as possible.

27：DC injection braking stop 2 via terminal

Once the stop command is executed on the inverter, when the running frequency is lower than the DC braking frequency (P3.06), the inverter will start DC braking. The brakeing current is set by P3.07, and the brakeing time is the longer one between the function retention time of this terminal.and the DC braking time at stop (P3.08).

28：Counter trigger input

It can input pulses with frequency of below 200Hz, such as work counting and other slow−speed pulse signals. For details, refer to P5.12 and P5.13.

29：Counter trigger reset

It is used to reset the counting value of the counter trigger input X terminal.

30～35：Reserved.

36：Water pool upper limit water level input

37：Water pool lower limit water level input

38：Water pool water-short level input

Water pool water level detection signals must be connected in order. Water level signal control has hysteresis protection control. When water level changes from high to low, the system will run as standby pressure if the water level is between water-short and lower limit level, , the system(including all the pumps) will stop running if the water level is lower than water-short level. When water level changes from low to high, the system will not be in water-short status. When water level changes from low to high, the system will exit from water-short status to run as standby pressure, if the water level is between upper and lower limit, the system will return to run as normal pressure if it the water level is higher than upper limit.

48：Command switching to operation panel

49：Command switching to terminal

50：Command switching to host computer

The above three functions are set to facilitate the switching of running command reference mode. When he terminal is switching from disabled status to enabled status, the edge trigger is valid.

51：Main frequency source close loop and open loop switching input

It is the process open loop operation and process close loop operation switching terminal. When this terminal is enabled, it means process close loop operation and when the terminal is disable, it means process open loop operation.

52：Main frequency source switching to digital voltage reference

53：Reserved

54：Main frequency source switching to AI1

55：Main frequency source switching to AI2

56～57：Reserved

The above three functions are set to facilitate the switching of main frequency source. When the terminal is switching from disabled status to enabled status, The edge trigger is valid. When this terminal is enabled, it will switch from the current main frequency source mode to the main frequency source mode corresponding to this terminal function.

58：Auxiliary frequency source switching to disabled

59：Reserved

60：Auxiliary frequency source switching to AI1

61：Auxiliary frequency source switching to AI2

62～66：Reserved

67：Closed loop output forced to be 0

Under process closed loop control, when the terminal is valid, the output frequency of the inverter process closed loop adjustment is forced to set as 0.

68：PID positive or negative function

PID is positeve function at default. It should enable negative function when feedback value is greater than reference value and the frequency needed increase. This function can realized through setting H0.44=1 or multi-function terminal function setting as 68.

Note：

- H0.44=0, Terminal function is invalid: Positive; H0.44=1, Terminal function is valid: Positive;
- H0.44=1, Terminal function is invalid: Negative; H0.44=0, Terminal function is valid: Negative.

69～98：Reserved.

5.3 Water relay (open-collector) output function enhancement parameter

H0.15	RA1/K1 Relay output function selection	0～71
H0.16	RA2/K2 Relay output function selection	0～71
H0.17	RA3/K3 Relay output function selection	0～71
H0.18	RA4/K4 Relay output function selection	0～71

H0.19	RA5/K5 Relay output function selection	0～71
H0.20	RA6/K6 Relay output function selection	0～71
H0.21	RA7/K7 Relay output function selection	0～71
H0.22	K8 Relay output function selection	0～71
H0.23	RA Relay output function selection	0～71
H0.24	Y1 open-collector output function selection	0～71
H0.25	Y2 open-collector output function selection	0～71
H0.26	Output terminal for positive and negative logic selection	0～7ff

Note:

◆ EX-DT01 card has RA1~RA3、RA、Y1、Y2 output control.

◆ EX-DT02 card has RA1~RA7、RA、Y1、Y2 output control.

◆ EX-DT03 card has K1~K8、RA、Y1、Y2 output control, the relay output electrode displacement control, Bit0~Bit7 correspond to K1～K8、Bit8−RA、Bit9−Y1、Bit10−Y2.

Multifunction switching value input terminal function definition:

Function setting	Meanings	Function setting	Meanings
0	Signal indicating that the inverter is running (RUN)	20	Output X2
1	Frequency arrival signal (FAR)	21	Reserved
2	Frequency level detection signal 1(FDT1)	22	Zero current detection arrival (relative to motor)
3	Frequency level detection signal 2(FDT2)	23	Stop command indication
4	Pre-warning signal indicating inverter or motor overload (OL)	24～31	Reserved
5	Stop and lock due to under voltage (LU)	32	Pump1 variable frequency control
6	Stop due to external failure (EXT)	33	Pump1 power frequency control
7	Frequency upper limit(FHL)	34	Pump2 variable frequency control
8	Frequency lower limit (FLL)	35	Pump2 power frequency control
9	Inverter is running at zero speed	36	Pump3 variable frequency control
10	Preset counting value action	37	Pump3 power frequency control
11	Counting value arrival action	38	Pump4 variable frequency control
12	Reserved	39	Pump4 power frequency control
13	End of Inverter ready for operation (RDY)	40	Small sleeping pump control

Function setting	Meanings	Function setting	Meanings
14	Inverter failure	41	Over pressure alarm
15	Inverter alarm	42	Lack pressure alarm
16～18	Reserved	43	Standby pressure running instruction
19	Output X1	44	Water pool lack water instruction

0：Signal indicating that the inverter is running (RUN)

The signal is enabled when the inverter is running.

1：Frequency arrival signal (FAR)

When the deviation between the output frequency and the setup frequency of the inverter is in the setup range of the frequency arrival detection width, the signal is enabled. Refer to P7.19 for details.

2：Frequency level detection signal 1(FDT1)

When the output frequency of the inverter is higher than FDT1 level upper limit, the signal is enabled. When the output frequency less than FDT1 level lower limit, the signal is disabled. Refer to P7.20 ~ P7.21 for details.

3：Frequency level detection signal 2(FDT2)

When the output frequency of the inverter is higher than FDT2 level upper limit, the signal is enabled. When the output frequency less than FDT2 level lower limit, the signal is disabled. Refer to P7.22 ~ P7.23 for details.

4：Pre-warning signal indicating inverter overload or motor overload (OL)

When the output current is higher than the overload pre-warning detection level and the retention time is higher than the overload pre-warning detection time, the signal is enabled. When the current is lower than the detection level, the signal is disabled. Refer to PA13 ~ PA.15 for details.

5：Stop and lock due to under voltage (LU)

When the inverter bus voltage is lower than the under voltage action value, the signal is enabled.

6：Stop due to external failure(EXT)

When the inverter is in the protection status due to failure of peripherals (“E.oUt” appears on the operation panel), the signal is enabled.

7：Frequency upper limit (FHL)

When the output frequency of the inverter reaches setup frequency upper limit, the signal is enabled.

8：Frequency lower limit (FLL)

When the output frequency of the inverter reaches setup frequency lower limit, the signal is enabled.

9：Inverter is running at zero speed.

When the output frequency of the inverter is 0, the single is enable.

10：Preset counting value action

11：Counting value arrival action

When the counting value of inverter input terminal complies with action, the signal is enabled, Refer to P5.12 and P5.13 for details.

13: Inverter ready for operation (RDY)

When the auto-test of the inverter is normal after power on and the inverter operation disable function is invalid or disable, the signal is enabled.

14: Inverter fault

When the inverter is in the stop status due to failure, the signal is enabled.

15: Inverter alarm

When the inverter is in the alarm status due to fault but does not stop, the signal is enabled.

17: Setting the total running time

VFD run multiple times the cumulative time after setting, signal effectively: Useing timing reset, see Pb.14.

18: Setting the continuous running time

VFD single continuous operation time after setting, signal effectively: Stop condition timing reset, the signal is invalid: See the Pb. 13.

19:X1 output

X1 terminal state by Y terminal output multi-function input, X1, effective signal effectively.

20:X2 output

Multi-function input X2 terminal state by Y terminal output, X2, effective signal effectively.

22: Zero current is detected

VFD output current is less than zero current detection at run time width value, the signal effectively: See P7.18 instructions.

23: Stopping command instruction

VFD have downtime command or in standby state, signal effectively.

32～39: Pump function selection, each pump only set one function.

40: Small sleeping pump control

When the relay function set to No.40 function, the relay will control the small sleeping pump.

Note: The small sleeping pump control must be used with H1.16 setting function.

41: Over pressure alarm

After setting H1.11 and H1.12, the system will indicate over pressure.

42: Lack pressure alarm

After setting H1.14 and H1.15, the system will indicate lack pressure.

43: Standby pressure running instruction

After setting H1.13 function, it can indicate system standby pressure running when check intake sump signal.

44: Intake sump water lack instruction

After setting H1.13 function, it can indicate system water lack situation when check intake sump signal.

5.4 Closed Loop Control Parameter for Water Supply

H0.27	Close loop control pressure reference channel selection	0～2

This function code is enable to set close loop target for pump close loop control and confirm the target pressure reference channel by H0.27.

When setting H0.27=0, the pressure target value of pump is confirmed by H0.28.

When setting H0.27=1, the pressure target value of pump is confirmed by AI1 input terminal analog.

When setting H0.27=2, the pressure target value of pump is confirmed by AI2 input terminal analog.

Note: The analog input can choose jumper wire on the control panel of 0 ~ 10 v input or 0 to 20 ma.

H0.28	Pressure value setting	0～100%

This function is used for digital target setting value under close loop control, percentage setting. 0 ~ 10 v corresponding to 0 ~ 100%.

H0.29	Target pressure setting	/
H0.30	Calculate digital pressure setting by target pressure setting value	Only read

H0.29 is the target pressure value of user setting, for example user want to set the target pressure 0.4Mpa then set H0.29=0.4Mps. In this way, the frequency inverter will work out target setting value. After setting H0.30=40.0 which means target given is 40.0%. Set this value to H0.28. After user finished H0.31 and H0.37 setting and frequency inverter in smooth running, the system pressure should be 0.4Mpa.

H0.31	Minimum reference	0～H0.32
H0.32	Maximum reference	0～10.00V

This function is used for setting the range of given sensor. When using to given by digital value, calibration span is 0~10.00V. Pls set the real range if use sensor.

H0.33	Analog feedback close loop control feedback channel	1～2
H0.34	Feedback minimum analog corresponding to the pressure	0.00～H0.35
H0.35	Feedback maximum analog corresponding to the pressure	0.00～1000.0Mpa
H0.36	Minimum reference correspond to the feedback sensor input	0.00～H0.37
H0.37	Maximum reference correspond to the feedback sensor input	0～10.00V

H0.33 can realize to set actual pressure feedback channel for water pump.

When setting H0.33=1，the actual pressure feedback for water pump is confirmed by AI1 input terminal analog.

When setting H0.33=2，the actual pressure feedback for water pump is confirmed by AI2 input terminal analog.

H0.34～H0.37 is used to set the range of feedback sensor and the relationship between the voltage V and Mpa pressure.

Note:

◆ The function codes above must be set before operation, otherwise it will affect the precision of close loop control.

◆ Analog feedback input can select wire jumper from 0 ~ 10V or 0 to 20 mA input through the control panel.

H0.38	Water supply PID proportional gain Kp	0.000～10.000
H0.39	Water supply PID integral gain Ki	0.000～10.000
H0.40	Water supply PID differential gain Kd	0.000～10.000

The higher the Kp value is, the faster the response is, but if the Kp value is too high, it may easily generate oscillation and the deviation cannot be eliminated completely. It can use Ki to eliminate the residual deviation. The higher the Ki value is, the faster the response of the inverter to the deviation change, but it may easily generate oscillation if the Ki value is too high. If the system has frequent feedback to the jump, it needs to use Kd because Kd can respond to the deviation change between the system feedback and the reference quickly. The higher the Kd value is, the faster the response is, but it may easily generate oscillation if the value is too high.

H0.41	Water supply PID sampling cycle	0.001～30.000S

This function is used to set the sampling cycle of the feedback signal. The lower this parameter value is, the faster the response of the system to the deviation between the reference and the feedback, but if the sampling cycle is too fast, the associate requirement for the system PID gain adjustment will be higher, which may result in system oscillation.

H0.42	Water supply PID deviation limit	0.0～20.0%

When this function determines the certain level of the deviation between the feedback signal and the reference signal, it will stop the internal PID adjustment and maintain stable output. Only when the deviation between the feedback value and the reference value of the close loop exceeds the deviation limit of H0.42 will the output be updated. Setting the deviation limit needs to take the system control precision and stability into consideration.

H0.43	Water supply PID adjustment selection	00～11

This function determines the specific running mode during the process of close loop adjustment.

Display of operation panel	
Ones place	Integration mode 0: Frequency reached its upper limit and lower limit, the integration adjustment is stopped 1: Frequency reached its upper limit and lower limit, the integration adjustment is continues
Tens place	Output frequency 0: It must consistent with the setup running direction 1: It can be against the setup running direction

If the output value of the close loop adjustment reaches frequency upper limit or lower limit (P0.13 or P0.14), there are two actions for selection in the integration section.

0: Stop integration adjustment: the integration value remains unchanged. When there is change occurring to the deviation between the reference value and the feedback value, the integration value will follow that change trend.

1: Continue integration adjustment: The integration value will give immediate response to the change between the reference value and the feedback value unless this value unless this value reaches the internal integration limit. When there is change occurring to the deviation between the reference value and the feedback value changes, it needs to take longer time to offset the impact brought by the continuous integration so that the integration value can catch up that change trend.

If the output value of the close loop adjustment is inconsistent with the current setup running direction,

the close loop output value has two actions for selection.

0: It must be consistent with the setup running direction: When the output value of the close loop adjustment is inconsistent with the current setup running direction, the current output value will be forced to be 0 internally.

1: It can be against the setup running direction: When the output value of the close loop adjustment is inconsistent with the current setup running direction, the close loop adjustment opposite to the current setup running direction will be executed.

H0.44	Water supply PID positive or negative function	0～1

PID is positive function as default. It needed negative function when feedback value is greater than reference value and the frequency needed increase. This function can realized through setting H0.44=1 or multi-function terminal function setting as 68.

- H0.44=0, Terminal function is invalid, Positive; H0.44=1, Terminal function is valid, Positive;
- H0.44=1, Terminal function is invalid, Negative; H0.44=1, Terminal function is valid, Negative.

5.5 Water Supply Basic Parameter

H1.00	Main pump start selection	1

This function set firstly the main pump.

H1.01	Delay time of adding pump in low pressure	0～3600.0S

This function realize adding pump operation, when getting to the condition of adding pump, delay time after setting H1.01, then add pump.

It means the frequency control operate to the upper limit, through delay time after setting H1.01, pressure feedback is less than the set value, after H1.01 delay time, the pressure still can not meet the target, the current pump turn into power frequency, start the next vacant pump as variable frequency control. This parameter should be set by the pressure change speed. Under the condition without oscillation, setting time shorter is better. (in seconds)

H1.02	Delay time of reducing pump in high pressure	0～3600.0S

This function realize reducing pump operation, when getting to the condition of reducing pump, delay time after setting H1.02, then reduce pump.

It means variable frequency control open by power frequency pump, frequency control operate to the lower limit, through delay time after setting H1.02,the feedback pressure still over given value, close the pump control by power frequency. This parameter should be set by the pressure change speed. Under the condition without oscillation, setting time shorter is better. (in seconds)

H1.03	Delay time of switching power frequency to variable frequency	0.5～10.0S

This function realize the operation of switching power frequency pump to variable frequency pump, delay time of switching out.

It means when adding pump in low pressure, the time interval of removing variable frequency pump and open power frequency pump. The interval time can not set too short, otherwise it will cause current impulse in the switching process. If setting the interval time too long, water pressure decline fast and with water strike. (in seconds)

H1.04	Upper limit frequency	P0.13～P0.14

This function realize the process of reducing pump, it maintains the stable process of system pressure. It means the frequency inverter first speed up to the upper limit frequency in the switching process, next for PID adjustment. The function can assure the stability when adding or reducing pump and prevent the sudden increase of system pressure.

H1.05	Lower limit frequency	P0.13～P0.14

It means in the switching process of variable frequency pump timing cycle control and switch power frequency to variable frequency, before remove the current pump, the frequency inverter first slow down to the lower limit frequency. The function can assure the stability when adding or reducing pump and prevent the sudden lack of system pressure.

H1.06	Acceleration time to upper limit frequency when reducing pump	0～3600.0S

This function means it both have power frequency control pump and variable frequency control pump, when pressure rise, close the power frequency pump, turn to variable frequency control, after H1.06 time speed up to the upper limit frequency, next for PID adjustment.

H1.07	Deceleration time to lower limit frequency when frequency pump timing switch	0～3600.0S

The deceleration time of timing switch slow down to lower limit frequency is the delay time of frequency inverter switch and slow down to the lower limit of frequency. Setting time as needed, it can adjust the pressure change condition in switching process. (in seconds)

H1.08	The time of frequency pump timing cycle	0.5～3600.0Min
H1.09	Switch delay time of frequency pump timing cycle	0～3600.0S

This function realize the timing cycle control of variable frequency pump. It can prevent pump rust after long time no use, and also prevent pump over heating after long time use. This function assure the same operation time for several kinds pumps and prolong the pump using time.

It means in the system operation process, system pressure is stable, with the vacant variable frequency pump. After setting H1.08 time, switch to vacant pump, the current pump turn to rotation rest. The delay time of switching out setted in H1.09. (in seconds)

H1.10	Over pressure stop selection	0～1
H1.11	Over pressure value setting	0.00～100.0%
H1.12	Judge time in over pressure	0～3600.0S

This function realize system over pressure setting value and action selection.

H1.10=0, system don't stop under over pressure, if set the relay over pressure instruction, it will indicate the system in over pressure statue when output.

H1.10=1, system stop under over pressure, after setting relay over pressure instruction, it will indicate the system in over pressure statue when output.

H1.11, set the value when system over pressure, show by percentage. For example when input 0~10V correspond to 100% given system, set 60.0, that is 6.00V is the set value when over pressure.

H1.12, set the delay time judge by over pressure, that is when meet the condition for over pressure setting, delay this setting time, and make a judgment.

H1.13	Lower pressure stopping selection	0～1
H1.14	Lower pressure value setting	0～3600.0S
H1.15	Judge time in lower pressure	0.00～100.0%

This function realize system lack pressure setting value and action selection.

H1.13=0, system don't stop under lack pressure, if set the relay lack pressure instruction, it will indicate the system in lack pressure statue when output.

H1.13=1, system carry out prolong stop, that is system pressure lower than lack pressure setting value, through H1.22(delay time of prolong stop), the pressure lower than lack pressure setting value, carry out prolong stop. If set relay lack pressure instruction, it will indicate the system in lack pressure statue when output.

H1.14, set the value when system lack pressure, show by percentage. For example when input 0~10V correspond to 100% given system, set 30.0, that is 3.00V is the set value when lack pressure.

H1.15, set the delay time judge by lack pressure, that is when meet the condition for lack pressure setting, delay this setting time, and make a judgment (output lack pressure instruction signal judgment).

H1.16	Sleeping pump working mode selection	0～3

This function realize the control selection for the small sleeping pump.

H1.16=1, sleeping by pressure setting way, carry out H1.17 and H1.18 setted pressure detection for sleeping control.

H1.16=2, sleeping by sleep frequency setting way, carry out H1.19 setted sleeping frequency detection for sleeping control.

H1.16=3, start to sleeping by real time setting way, carry out H1.47 and H1.49 setted real time for sleeping control.

Note:

◆ Pls set relay function to control the small sleeping pump.

◆ H1.16=3 only used for EX−DT03 expansion card, only EX−DT03 has clock function.

H1.17	Sleeping pressure value setting	0.00～100.0%
H1.18	Wake up pressure value setting	0.00～100.0%

This function code is used for setting sleeping pressure and wake up pressure. Carry out when H1.16=1. Show by percentage, 0~10V correspond to 0~100%.

H1.19	Sleeping frequency setting value	P0.13～P0.14

This function code is used for setting sleeping frequency. Carry out when H1.16=2.

H1.20	Testing time for entering sleeping	0～3600.0S
H1.21	Delay time of wake up from sleep mode	0～3600.0S

This function code is used for meeting the sleeping conditions, carry out the operation after delay time, that is go into sleeping or wake up.

H1.22	Delaying time for stopping without load for a long time	0～3600.0S

This function code is used for setting delay time for lack pressure stop. When H1.13=1, reach to the

condition of lack pressure stop, through this function code setting time, carry out stop protection. Not often used for general application.

H1.23	Signal selection for intake sump water level	0～3

This function is used for the delay time setting when lack pressure stop. Only use when install with intake sump water level detect sensor.

H1.23=0, no water level detection, system carry close loop adjustment according to setted pressure.

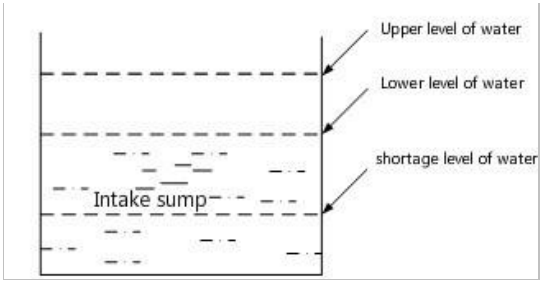
H1.23=1, apply for the water level sensor with input switch, water level adjustment has hysteresis protection function.

H1.23=2, apply for the water level sensor with input analog, water level adjustment has hysteresis protection function.

H1.23=3, apply for the water level sensor with input switch, no hysteresis protection function. Only apply for intake pump lower limit water level and lack water level.

Control of water level (with hysteresis protection function) as follow:

When the water level change from high to low level, the system running with spare pressure; when water level lower than lower limit water level, the system stop running (all pumps stop). When water level change from low to high, the system exit lack water statue, running with spare pressure; when water level higher than upper limit water level, the system recover running by common pressure.



Picture 5-4 Level control signal

Note: Input for water level signal, it must install the water level sensor in intake sump, signal connected in order.

H1.24	Analog input channel selection for intake sump water level	0～2

This function realize when detected the water level by analog input, select the input channel.

H1.24=0: AI1

H1.24=1: AI2

H1.24=2: AI3

H1.25	Analog input for upper limit of intake sump water level	0.00～10.00
H1.26	Analog input for lower limit of intake sump water level	0.00～10.00
H1.27	Analog input for water-short water level	0.00～10.00

This function can detect each water level pressure when intake sump input by analog.

H1.28	Standby pressure	0.00～10.00

This function code is used for setting spare pressure, show by percentage. 0～10.0V correspond to 0～100%.

H1.30	Downtime interval for pump when press the stop key one by one	0.5～3600.0

This function code is used for setting the interval time when each pump stop. When set this function can prevent the system pressure change often.

5.6 Regular day water supply timing control (adapt to EX−DT03)

H1.31	Multi-section pessure setting	0～1

H1.31 is used for selecting multi-section pressure setting. When set H1.31=0, target voltage was setted by H0.28, when set H1.31=1, start using multi-section pressure setting and realize 24 hours smooth regulation.

H1.32	T1 period pressure	0～100.0%
H1.33	T2 period pressure	0～100.0%
H1.34	T3 period pressure	0～100.0%
H1.35	T4 period pressure	0～100.0%
H1.36	T5 period pressure	0～100.0%
H1.37	T6 period pressure	0～100.0%
H1.38	Reserved	Reserved
H1.39	T1 starting time	0.00～23.59
H1.40	T2 starting time	0.00～23.59
H1.41	T3 starting time	0.00～23.59
H1.42	T4 starting time	0.00～23.59
H1.43	T5 starting time	0.00～23.59
H1.44	T6 starting time	0.00～23.59

H1.32～H1.43 realize multi-section pressure setting. Above parameters are used for each pressure setting in multi-section water supply. Time setting principle: T1≤T2≤T3≤T4≤T5≤T6. T1 period means T1 starting time to T2 starting time; T2 period means T2 starting time to T3 starting time... T6 period time means T6 starting time to T1 starting time. This part function carry out days-cycle.

H1.45	Special day setting	0～F
H1.46	Special day pressure setting	0～100.0%

This function used for setting special pressure running in special day. When time reach to the special setting day, the system auto switch to running with the target pressure setted by H1.46.

H1.47	Opening real time for small sleeping pump	0.00～23.59
H1.48	Closing real time for small sleeping pump	0.00～23.59

When setting H1.16=3, this function can realize timing open function and close the small sleeping pump.

Note: This function only used with EX-DT03 expansion card.

H1.49	Current time-year	2011～2099
H1.50	Current time-month/day	0000～1231
H1.51	Current time-week	0～6
H1.52	Current time-hour/minute	0.00～23.59
H1.53	Current time-second	0～59

This function is used for real-time display of current time. Read only.

H1.54	Reserved	Reserved
H1.55	The quantity of running power frequency pump	0～3
H1.56	Variable frequency pump running position	0～4

This function can used for indicating the running statue for current pump. Read only.

H1.57	Total running time for Pump1	0～65535
H1.58	Total running time for Pump2	0～65535
H1.59	Total running time for Pump3	0～65535
H1.60	Total running time for Pump4	0～65535

This function can used for working out the pump running total time.

Chapter 6 Constant Pressure Water Supply Applications

6.1 Constant pressure water supply(1 inverter for 3 pumps)

6.1.1 Technics Requirements

Pumps cycle control of three conventional pumps;

T6 period pressure water supply.

6.1.2 Pump Configuration

Three conventional variable frequency pumps: motors 7.5KW (Rated Current:15.4A, Voltage:380V);

One small sleeping pump: motor 1.5KW (Rated Current: 3.99A, voltage:380V)

6.1.3 Lectotype of Piezometer

Remote piezometer: DC0V～10V, range 0～1Mpa。

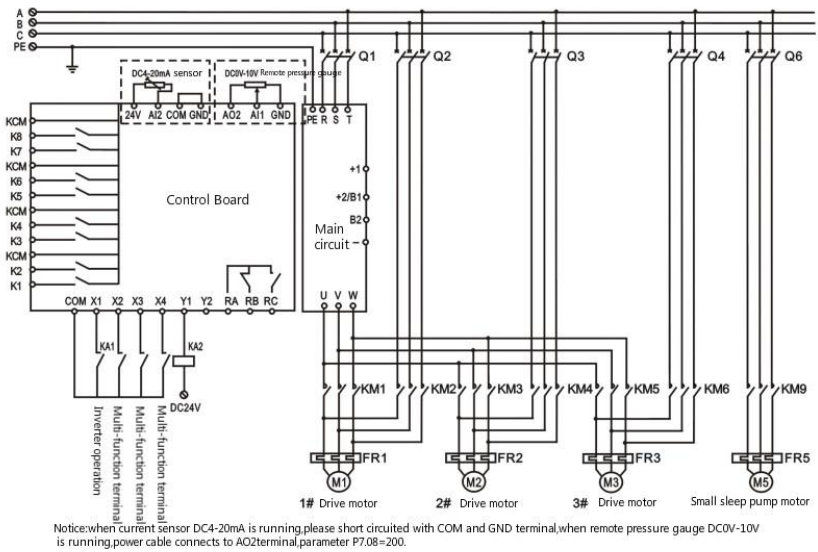
6.1.4 Lectotye of frequency inverter

Select the frequency inverter type according to site conditions, the frequency inverter is E5-PA series special for constant pressure water supply.

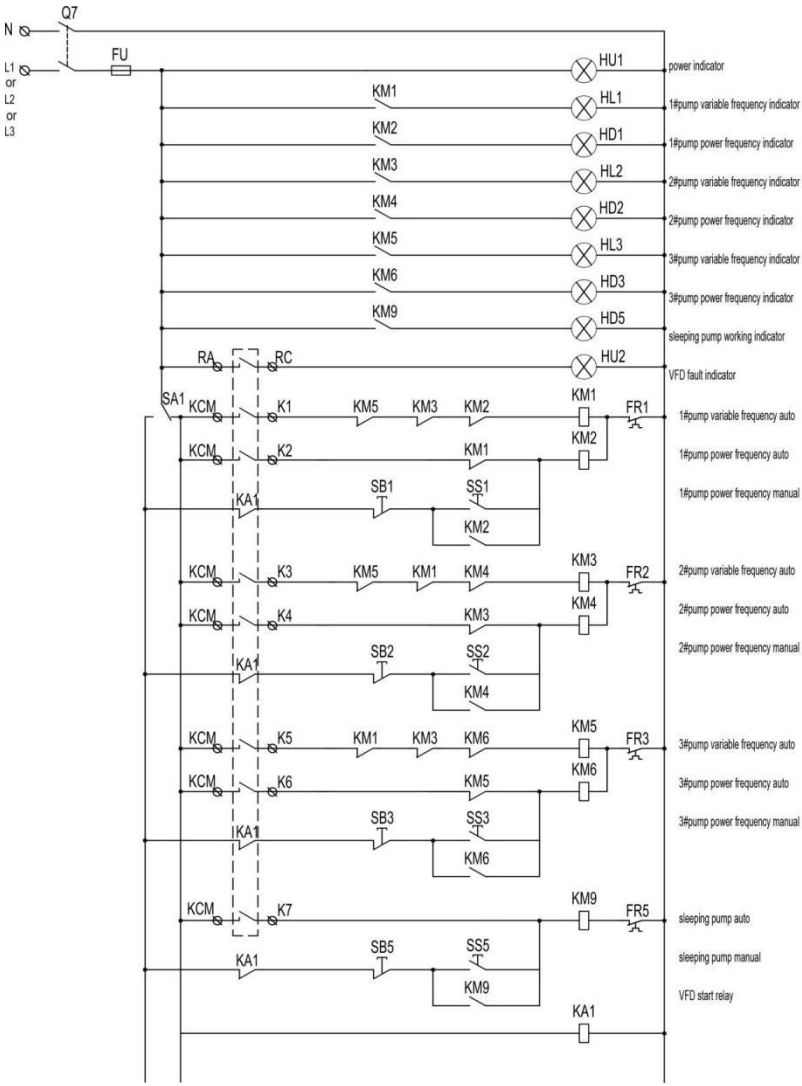
6.1.5 Lectotype of Expansion Card

EX-DT03 expansion card special for constant pressure water supply.

6.1.6 Hardware connection Diagram



Picture 6-1 （water supply 1 VFD for 3 pumps+small sleeping pump connection 1）



Picture 6-2 （water supply 1 VFD for 3 pumps+small sleeping pump connection 2）

6.1.7 Function Parameter Settings

No.	Function code name	Factory setting	Description
1	P0.03	1	PID process close loop control
2	P7.08	200	AO2 Output bias%
3	P9.01～P9.04		Motor parameters: setting by site situation
Water Supply Mode Selection			
4	H0.00	3	Select DT03 expansion card
5	H0.01	1	Select common water supply mode
6	H0.02	3	Allow 3 conventional pumps running
Frequency inverter multi-function input/output terminal definition			
7	H0.03	02	Frequency inverter external X1 terminal running
8	H0.15	32	Definite K1 terminal as variable frequency pump1 control
9	H0.16	33	Definite K2 terminal as power frequency pump1 control
10	H0.17	34	Definite K3 terminal as variable frequency pump2 control
11	H0.18	35	Definite K4 terminal as power frequency pump2 control
12	H0.19	36	Definite K5 terminal as variable frequency pump3 control
13	H0.20	37	Definite K6 terminal as power frequency pump3 control
14	H0.21	40	Definite K7 terminal as sleeping pump control
15	H0.23	14	Definite RA and RC terminal as VFD fault output
PID close loop control parameters			
16	H0.28	50	Digital pressure setting (%)
17	H0.34	0.0	The pressure correspond to feedback sensor minimum analog (MPa)
18	H0.35	1.0	The pressure correspond to feedback sensor maximum analog (MPa)
19	H0.36	0.0	Feedback sensor minimum analog input (V)
20	H0.37	10	Feedback sensor maximum analog input (V)
21	H0.38～H0.44		PID control parameters setted by site situation
Basic parameters for water supply			
22	H1.00	1	Select the first start pump as pump1
23	H1.08	1440	Timing cycle time (minute) 24h
24	H1.16	3	The working mode of small sleeping pump: fixed time to add the small sleeping pump
25	H1.47	00.00	Sleeping pump start at 00:00
26	H1.48	06.00	Sleeping pump stop at 06:00
Multi-section pressure control parameters			
27	H1.31	1	Use multi-section pressure water supply running
28	H1.32～H1.37		Select multi-section water pressure by site situation
29	H1.39～H1.44		Select the time of multi-section water pressure by site situation

Note: Please setting the motor parameters, PID parameters, given and feedback channel and sensor range by site situation. Other function code can be auto setted as n by reference manual.

If need recovery factory default parameters, pls first set P0.01=5, then set P0.01=4.

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