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Operation manual

CHV160A series special inverter for water supply

SHENZHEN INVT ELECTRIC CO., LTD.

Contents

Contents 1
SAFETY PRECAUTIONS 3
1. INTRODUCTION 4
1.1 Technology Features 4
1.2 Features of Water Supply System 5
1.3 Description of Nameplate 6
1.4 Working Diagram of CHV160A Water Supply Special Inverter 7
1.5 Selection Guide 7
1.6 Parts Description 8
2. UNPACKING INSPECTION 10
3. DISASSEMBLE AND INSTALLATION 11
3.1 Environmental Requirement 11
4. WIRING 13
4.1 Connections of Peripheral Devices 14
4.2 Terminal Configuration 14
4.3 Typical Wiring Diagram 16
4.4 Wiring the Main Circuits 17
4.5 Wiring Control Circuit Terminals 20
4.6 Installation Guidline to EMC Compliance 22
5. OPERATION 26
5.1 Operating Keypad Description 26
5.2 Operation Process 28

5.3 Running State....30
6. DETAILED FUNCTION DESCRIPTION....31
P0 Group--Basic Function....31
P1 Group--Start and Stop Control....37
P2 Group--Motor Parameters....41
P3 Group --PID Control....42
P4 Group--V/F Control....48
P5 Group--Input Terminals....51
P6 Group -- Output Terminals....56
P7 Group--Display Interface....60
P8 Group--Water-supply Function....66

P9 Group--Timing Watering and Multi-given Function Group....73
PA Group--Protection Parameters....75
Pb Group --Serial Communication....81
PC Group --Enhanced Function....83
Pd Group--PID Enhanced Function....87
PE Group—Factory Setting....88
7. TROUBLE SHOOTINGT....89
7.1 Fault and trouble shooting....89
7.2 Common Faults and Solutions....93
8. MAINTENANCE....94
8.1 Daily Maintenance....94
8.2 Periodic Maintenance....95

8.3 Replacement of wearing parts 96
9. COMMUNICATION PROTOCOL 97
9.1 Interfaces 97
9.2 Communication Modes 97
9.3 Protocol Format 97
9.4 Protocol function 98
9.5 Note 103
9.6 CRC Check 103
9.7 Example 103
10. DESCRIPTION OF WATERING EXTENSION CARD 110
10.1 Description of Model 110
10.2 External Dimension 110
10.3 Installation 110
APPENDIX A RELATIVE DIMENSION OF INVERTER 111
A.1 External Dimension 111
A.2 Installation Space 112
A.3 Dimensions of External Keypad 113
A.4 Disassembly 114
APPENDIX B SPECIFICATIONS OF ACCESSORIES 115
B.1 Specifications of Breaker, Cable, Contactor and Reactor 115
APPENDIX C FUNCTION PARAMETERS 117
APPENDIX D WATERING STANDARD WIRING DIAGRAM 142

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Please read this operation manual carefully before installation, operation, maintenance or

In this manual, the safety precautions were sorted to "WARNING" or "CAUTION".

hazardous situation

In some cases, the contents of "CAUTION" could cause serious accident. Please follow these important precautions in any situation.

★ NOTE is the necessary step to ensure the proper operation.

Warning marks were shown on the front keypad of inverters.
Please follow these indications when using the inverter.

•May cause injury or electric shock.

•Please follow the instructions in the manual before installation or operation.

•Disconnect all power line before opening front cover of unit. Wait at least 5 minute until DC Bus capacitors discharge.

•Use proper grounding techniques.

•Never connect AC power to output UVW terminals

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CHV160A series special inverter for water supply

1. INTRODUCTION

1.1 Technology Features

- **Input & output**
  - ◆ Input voltage range: 380±15%
  - ◆ Input frequency range: 47~63Hz
  - ◆ Output voltage range: 0~rated input voltage
  - ◆ Output frequency range: 0~400Hz
- **I/O features**
  - ◆ Programmable digital input: Provide 8 inputs
  - ◆ Programmable analog input: AI1 and AI2, which can accept 0~10V or 0~20mA.
  - ◆ Relay output: Provide 3 output terminals. 8 outputs can be extended by Water-supply extension card.
  - ◆ Analog output: Provide 2 output terminal(0/4-20mA or 0/2-10V).
  - ◆ Communication interface: standard RS485 serial port
- **Main control function**
  - ◆ Control mode: V/F control.
  - ◆ Overload capacity: 60s with 120% of rated current, 10s with 150% of rated current,
  - ◆ Speed adjusting range: 1:100

- Carrier frequency: 1.0 kHz~16.0 kHz.

- **Functions**
  - Frequency reference source: Digital input, analog input, PID Input,etc.
  - DC braking at starting and stopping
  - Sleep wake function.
  - PID Control Function for water supply or other occasions
  - Programmable digital input and output
  - Skip frequency control function
  - None-Stop when instantaneous power off.
  - Speed Trace Function: Smoothly start the running motor.
  - QUICK/JOG: User defined shortcut key can be realized.
  - Automatic Voltage Regulation Function (AVR):
  - Up to 26 fault protections: Protect from over current, over voltage, under voltage, over temperature, phase failure, over load etc.

1.2 Features of Water Supply System

- Support two kinds of water supply mode: fixed frequency pump mode and circulating pump mode.
- Flexibility control logic to add, subtract pump.
- Up to eight segment pressure settings which change pressure given in different time.
- 16 segment of the pressure given by different combination of input terminals.

- Sleep pump control functions: Support flexible sleep mode, the small sleep pump will start automatically at sleep state in order to maintain sleep pressure effectively. Once meeting the wake-up conditions, the system will come out of hibernation automatically, and stop the small sleep pump.
- Regular rotation control, which can prevent the pump seizing by corrosion effectively, and prevent one pump running all the time. It is suggested that the power of rotation pumps should be fairish, otherwise it will cause the system pressure fluctuating.
- Sewage pump control functions, which is used to detect water level of cesspool and control water level of cesspool.
- Inlet basin water-level detection and control functions, which can detect liquid level of inlet basin, and adjust pressure-given automaticly.
- Ultra- voltage, under-voltage alarm function of pipe network, inverter supports ultra- voltage, under-voltage alarm output functions, which can outputs through programmable relay.
- Set up to motor rated current parameters of no less than seven pumps, and achieve over-current, overload and other protection for the current pump-run.
- Record failure pump: Record failure pump automatically, and if cleared this record, please use function of fault clearance.
- Provides standard RS485 Physics communication mode, using master-slave communication though international standard Modbus communication protocol, electrical parameters in full compliance with international standards, which can be achieved barrier-free communication between CHV160A inverter special for water supply system and the host computer.

1.3 Description of Nameplate

Company name

Model number

Power

Input specification

Output specification

Bar code

SHENZHEN INVT ELECTRIC CO.,LTD.

MODEL: CHV160A-045G-4 SPEC:V2

POWER:45kW

INPUT: AC 3PH 380V±15% 50/60Hz

OUTPUT: 90A AC 0~380V 0~400Hz

Bar code

MADE IN CHINA

Close loop vector control inverter

CHV160A-045G-4

Input voltage
4: 3AC 380V

The first generation

0: Universal type
6: Only for water supply
A: Enhanced

Figure 1.1 Nameplate of inverter

G: Constant torque Power rating

045: 45kW

1.4 Working Diagram of CHV160A Water Supply Special Inverter

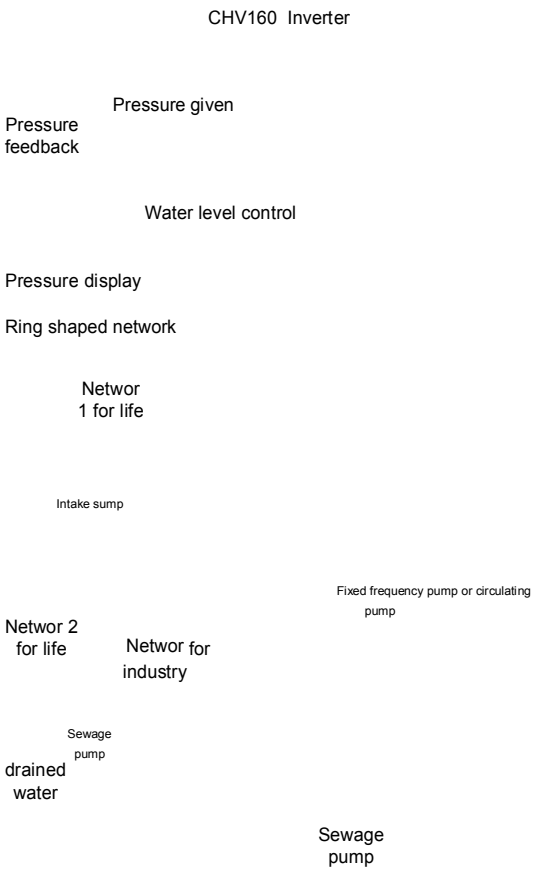

Figure 1.2 Working diagram of the CHV160A water supply special inverter

1.5 Selection Guide

3AC 380V±15%

Model No.	Rated power (kW)	Rated input current (A)	Rated output current (A)
CHV160A-5R5-4	5.5	15.0	13.0
CHV160A-7R5-4	7.5	20.0	17.0
CHV160A-011-4	11.0	26.0	25.0
CHV160A-015-4	15.0	35.0	32.0
CHV160A-018-4	18.5	38.0	37.0
CHV160A-022-4	22.0	46.0	45.0
CHV160A-030-4	30.0	62.0	60.0
CHV160A-037-4	37.0	76.0	75.0

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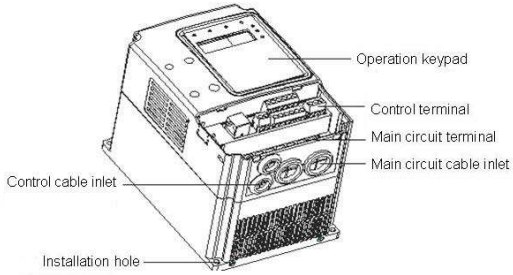
Model No.	Rated power (kW)	Rated input

current (A) **Rated output**			
current (A)			
CHV160A-045-4	45.0	90.0	90.0
CHV160A-055-4	55.0	105.0	110.0
CHV160A-075-4	75.0	140.0	150.0
CHV160A-090-4	90.0	160.0	176.0
CHV160A-110-4	110.0	210.0	210.0
CHV160A-132-4	132.0	240.0	250.0

1.6 Parts Description



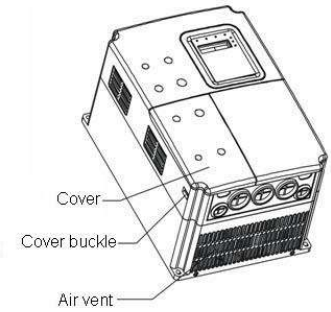


Figure 1.3 Part name of inverter (Less than 18.5kW)

Keypad bracket

Shield plate

Functional card Main circuit terminal Control cable inlet

Installation hole
Cover the fixed hook mouth

Operating keypad Control board Control terminal

PG card expansion

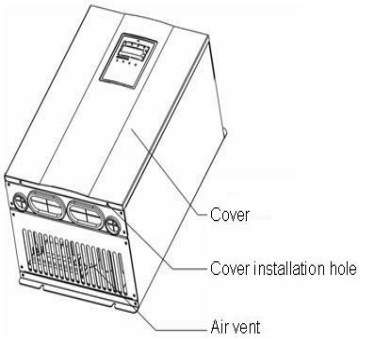


Figure 1.4 Part name of inverter (22kW～132kW)

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• Never install or operate any inverter that is damaged or missing components.

Check the following items when unpacking the inverter,

Inspect the entire exterior of the Inverter to see if there are any scratches or other damage resulting from shipping.

2. Ensure there is operation manual and warranty card in the packing box.

3. Ensure the nameplate that it is you ordered.

4. Ensure the optional parts are what you need if you ordered any optional parts.

Please contact the local agent if there is any damage of inverter or optional parts.

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• Any untrained person working on any parts/systems of inverter or any rule in the being violated, that will

licensed person, who has been trained on design, installation, commissioning and operation of inverter, is permitted to operate this equipment.

• Input power cable must be connected tightly, and the equipment must be grounded

• Even if the inverter is not in operating situation, the following terminals still have dangerous voltage:

- Power Terminals: R, S, T;

- Motor Connection Terminals: U, V, W.

• Can not install the inverter until discharged completely after the power supply is switched off for 5 minutes.

• The section area of grounding conductor must be no less than that of power supply

• Lift the cabinet by its base; do not lift it by holding its panel. Otherwise the main unit will fall off to result in personal injury.

• Install the inverter on top of the fireproofing material (such as, metal) to prevent fire.

• When need install two or more inverters in one cabinet, cooling fan should be applied to make sure that the air temperature is lower than 45°C. Otherwise it could

3.1 Environmental Requirement

Environment temperature

temperature exceeds 40°C.

Less than 95% RH, without dewfall.

Inverter can output the rated power when installed with altitude of lower than 1000m. It

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will be derated when the altitude is higher than 1000m. For details, please refer to the following figure:

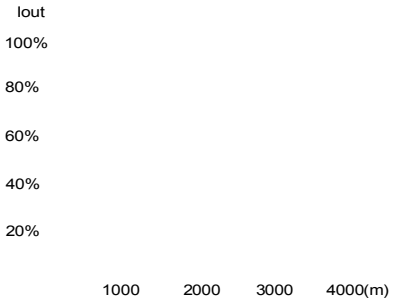

Figure 3.1 Relationship between output current and altitude

3.1.4 Impact and oscillation

It is not allowed that the inverter falls down or suffers from fierce impact or the inverter installed at the place that oscillation frequently. The maximum swing should less than 5.8m/s^2 (0.6g).

3.1.5 Electromagnetic radiation

Keep away from the electromagnetic radiation source.

3.1.6 Water

Do not install the inverter at the wringing or dewfall place.

3.1.7 Air pollution

Keep away from air pollution such as dusty, corrosive gas.

3.1.8 Storage

Do not store the inverter in the environment with direct sunlight, vapor, oil fog and vibration.

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• Wiring must be performed by an authorized person qualified in electrical work.

• Do not test the insulation of cable that connects the inverter with insulation testing devices.

• Can not install the inverter until discharged completely after the power supply is switched off for 10 minutes.

• Be sure to ground the ground terminal.

Ground to 10Ω or less.

Otherwise, an electric shock or fire can occur.

• Connect input terminals (R, S, T) and output terminals (U, V, W) correctly.

Otherwise it will cause damage the inside part of inverter.

• Do not wire and operate the inverter with wet hands.

• Check to be sure that the voltage of the main AC power supply satisfies the rated voltage of the Inverter.

Injury or fire can occur if the voltage is not correct.

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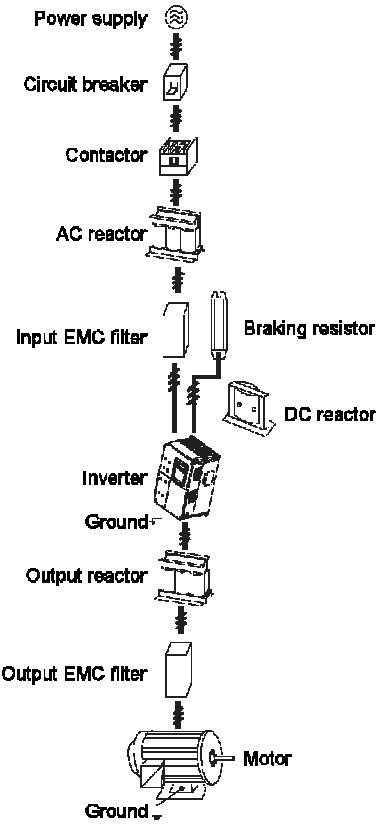

Figure 4.1 Connections of peripheral devices

4.2 Terminal Configuration

4.2.1 Main circuit terminals

Figure 4.3 Main circuit terminals (11～18.5kW)

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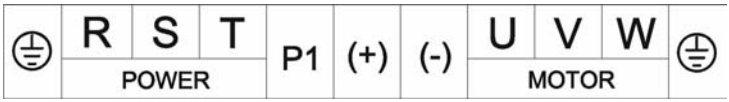


Figure 4.4 Main circuit terminals (22～132kW)

Main circuit terminal functions are summarized according to the terminal symbols in the following table. Wire the terminal correctly for the desired purposes.

Terminal	Description
R、S、T	Terminals of 3 phase AC input
(+)、(-)	Spare terminals of external braking unit
(+)、PB	Spare terminals of external braking resistor
P1、(+)	Terminal of ground
(-)	Terminal of negative DC bus
U、V、W	Terminals of 3 phase AC output
	Terminal of ground

Control Circuit Terminals

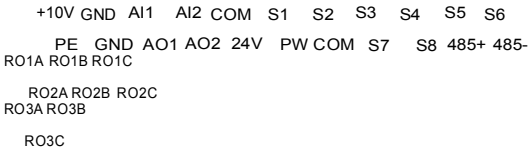


Figure 4.5 Control circuit terminals.

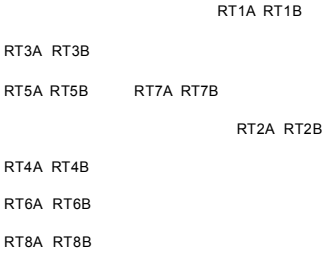
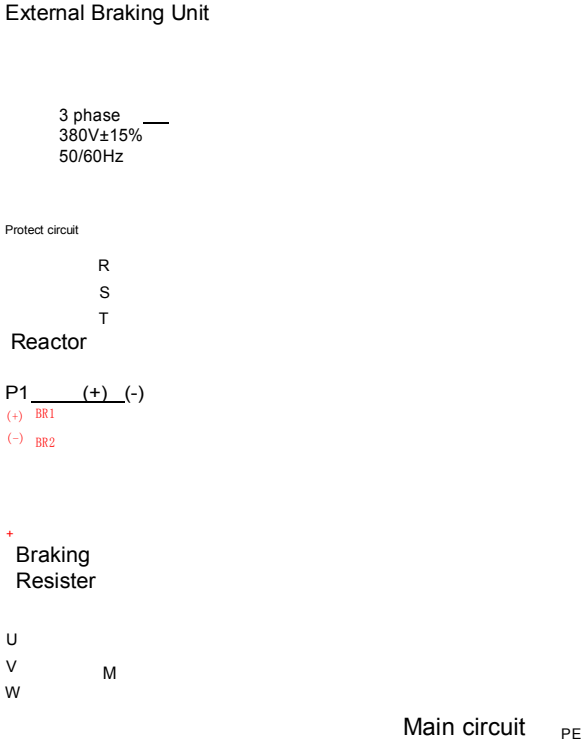
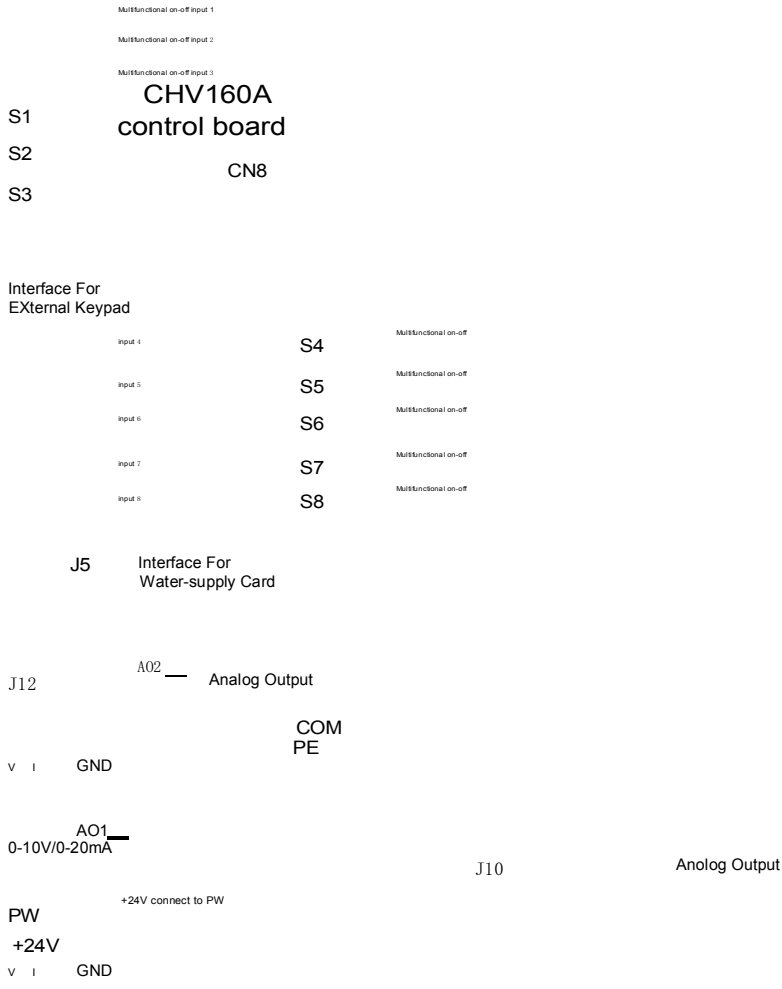


Figure 4.6 terminals on the water supply control card

4.3 Typical Wiring Diagram




Multifunctional on-off input 1
Multifunctional on-off input 2
Multifunctional on-off input 3
CHV160A
control board
S1
S2
S3
CN8
Interface For
EXternal Keypad
input 4
S4
Multifunctional on-off
input 5
S5
Multifunctional on-off
input 6
S6
Multifunctional on-off
input 7
S7
Multifunctional on-off
input 8
S8
Multifunctional on-off
J5
Interface For
Water-supply Card
J12
AO2
Analog Output
COM
PE
V I
GND
AO1
0-10V/0-20mA
J10
Anolog Output
+24V connect to PW
PW
+24V
V I
GND

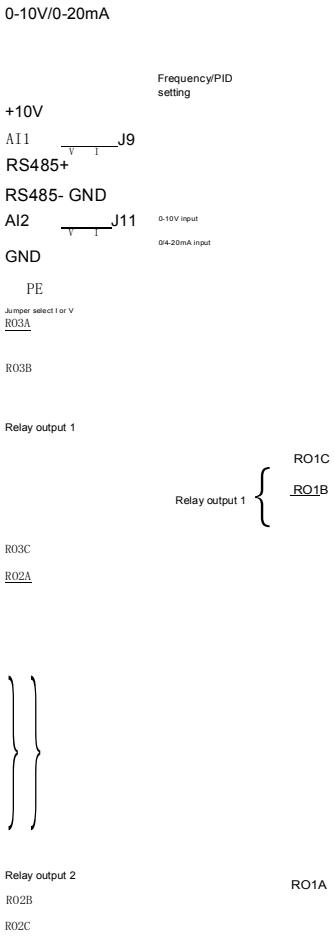

0-10V/0-20mA
Frequency/PID
setting
+10V
AI1
V I
J9
RS485+
RS485- GND
AI2
V I
J11
0-10V input
0/4-20mA input
GND
PE
Jumper select I or V
R03A
R03B
Relay output 1
RO1C
Relay output 1
RO1B
R03C
R02A
Relay output 2
RO1A
R02B
R02C

Figure 4.7 Wiring diagram.

4.4 Wiring the Main Circuits

4.4.1 Wiring at the side of power supply

●Circuit breaker

It is necessary to connect a circuit breaker which is compatible with the capacity of inverter between 3ph AC power supply and power input terminals (R, S, T). The capacity of breaker is 1.5~2 times to the rated current of inverter. For details, see <Specifications of Breaker, Cable, and Contactor.

●Contactor

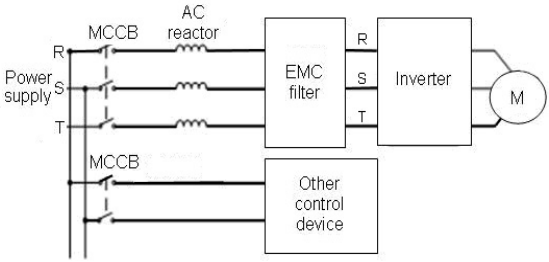
In order to cut off the input power effectively when something is wrong in the system, contactor should be installed at the input side to control the ON-OFF of the main circuit power supply.

●AC reactor

In order to prevent the rectifier damage result from the large current, AC reactor should be installed at the input side. It can also prevent rectifier from sudden variation of power voltage or harmonic generated by phase-control load.

●Input EMC filter

The surrounding device may be disturbed by the cables when the inverter is working. EMC filter can minimize the interference. Just like the following figure.



4.4.2 Wiring for inverter

●DC reactor

Figure 4.8 Wiring at input side.

DC reactor is built in CHV190 inverter from 18.5kW~90kW (380V classification) DC reactor can improve power factor, can avoid bridge rectifier damaged due to large-capacity transformer Ershi resulting in larger input current, can avoid rectifier circuit damage caused by sinusoidal.

●Braking unit and braking resistor

• Inverter of 18.5KW and above need connect external braking unit which should be installed at (+) and (-) terminals. The cable between inverter and braking unit should be less than 5m. The cable between braking unit and braking resistor should be less than 10m.

• The temperature of braking resistor will increase because the regenerative energy will be transformed to heat. Safety protection and good ventilation is recommended.

Notice: Be sure that the electric polarity of (+) (-) terminals is right; it is not allowed to connect (+) with (-) terminals directly, Otherwise damage or fire could occur.

4.4.3 Wiring at motor side of main circuit

●Output Reactor

When the distance between inverter and motor is more than 50m, inverter may be tripped by over-current protection frequently because of the large leakage current resulted from the parasitic capacitance with ground. And the same time to avoid the damage of motor insulation, the output reactor should be installed.

●Output EMC filter

EMC filter should be installed to minimize the leakage current caused by the cable and minimize the radio noise caused by the cables between the inverter and cable. Just see the following figure.

Figure 4.9 Wiring at motor side.

4.4.4 Wiring of regenerative unit

Regenerative unit is used for putting the electricity generated by braking of motor to the grid. Compared with traditional 3 phase inverse parallel bridge type rectifier unit, regenerative unit uses IGBT so that the total harmonic distortion (THD) is less than 4%. Regenerative unit is widely used for centrifugal and hoisting equipment.

R S T
Grid

Figure 4.10 Wiring of regenerative unit.

4.4.5 Wiring of Common DC bus

Common DC bus method is widely used in the paper industry and chemical fiber industry which need multi-motor to coordinate. In these applications, some motors are in driving status while some others are in regenerative braking (generating electricity) status. The regenerated energy is automatically balanced through the common DC bus, which means it can supply to motors in driving status. Therefore the power consumption of whole system will be less compared with the traditional method (one inverter drives one motor).

When two motors are running at the same time (i.e. winding application), one is in driving status and the other is in regenerative status. In this case the DC buses of these two inverters can be connected in parallel so that the regenerated energy can be supplied to motors in driving status whenever it needs. Its detailed wiring is shown in the following figure:

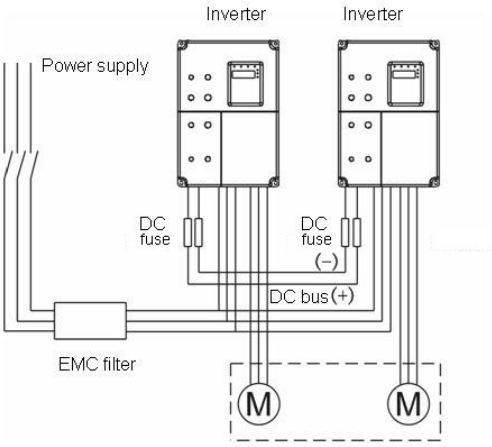


Figure 4.11 Wiring of common DC bus.

Notice: Two inverters must be the same model when connected with Common DC bus method. Be sure they are powered on at the same time.

4.4.5 Ground Wiring (PE)

In order to ensure safety and prevent electrical shock and fire, terminal PE must be grounded with ground resistance. The ground wire should be big and short, and it is better to use copper wire (>3.5mm^2). When multiple inverters need to be grounded, do not loop the ground wire.

4.5 Wiring Control Circuit Terminals

4.5.1 Precautions

- Use shielded or twisted-pair cables to connect control terminals.
- Connect the ground terminal (PE) with shield wire.

The cable connected to the control terminal should leave away from the main circuit and heavy current circuits (including power supply cable, motor cable, relay and

contactor connecting cable) at least 20cm and parallel wiring should be avoided. It is suggested to apply perpendicular wiring to prevent inverter malfunction caused by external interference.

4.5.2 Control circuit and extension card terminals

Terminal	Description
S1～S8	ON-OFF signal input, optical coupling with PW and COM. Input voltage range: 9~30V Input impedance: 3.3kΩ

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Terminal	Description
PW	External power supply. +24V terminal is connected to PW terminal as default setting. If user need external power supply, disconnect +24V terminal with PW terminal and connect PW terminal with external power supply.
+24V	Provide output power supply of +24V. Maximum output current: 150mA
COM	
AI1、AI2	

Common ground terminal for digital signal and +24V (or external power supply).

Analog input, 0~10V/0～20mA which can be switched by J9 or J11.

+10V	Supply +10V for inverter.
GND	Common ground terminal of analog signal and +10V.

AO1、AO2

GND must isolated from COM.

Provide voltage or current output which AO1can be switched by J10 on the control board and AO2 can be switched by J12 on the extension card.

Output range: 0~10V/ 0~20mA.

PE	Ground terminal.
RO1A、RO1B、RO1C	RO1 relay output: RO2C—common; RO2B—NC;
RO2A、RO2B、RO2C	
RO3A、RO3B、RO3C	

RT1～RT8(A、B)

RO2A—NO.

Contact capacity: AC 250V/3A, DC 30V/1A.

RO2 relay output: RO2C—common; RO2B—NC; RO2A—NO.

Contact capacity: AC 250V/3A, DC 30V/1A.

RO3 relay output: RO3C—common; RO3B—NC; RO3A—NO.

Contact capacity: AC 250V/3A, DC 30V/1A.

Eight relay outputs (NO), Contact capacity: AC250V/5A

RS485+,RS485- RS485 serial communication

4.5.3 Jumper on control board

Jumper	Description
J1、J3、J4	It is prohibited to be connected together, otherwise it will cause inverter malfunction.
J6、J7	Do not change factory default connection of J6J(marked with ATX) and J7 (marked with ARX), otherwise it will cause communication malfunction.
J9、J11	Switch between (0~10V) voltage input and (0~20mA) current input.
J10、J12	V connect to GND means voltage input;

I connect to GND means current input.

J9 is the jumper of AI1; J11 is the jumper of AI2

Switch between (0~10V) voltage output and (0~20mA) current output.

V connect to OUT means voltage output;

I connect to OUT means current output.

J10 is the jumper of AO1; J12 is the jumper of AO2

4.6 Installation Guidline to EMC Compliance

4. 6.1 General knowledge of EMC

EMC is the abbreviation of electromagnetic compatibility, which means the device or system has the ability to work normally in the electromagnetic environment and will not generate any electromagnetic interference to other equipments.

EMC includes two subjects: electromagnetic interference and electromagnetic anti-jamming.

According to the transmission mode, Electromagnetic interference can be divided into two categories: conducted interference and radiated interference.

Conducted interference is the interference transmitted by conductor. Therefore, any conductors (such as wire, transmission line, inductor, capacitor and so on) are the transmission channels of the interference.

Radiated interference is the interference transmitted in electromagnetic wave, and the energy is inverse proportional to the square of distance.

Three necessary conditions or essentials of electromagnetic interference are: interference source, transmission channel and sensitive receiver. For customers, the solution of EMC problem is mainly in transmission channel because of the device attribute of disturbance source and receiver can not be changed.

4.6.2 EMC features of inverter

Like other electric or electronic devices, inverter is not only an electromagnetic

interference source but also an electromagnetic receiver. The operating principle of inverter determines that it can produce certain electromagnetic interference noise. And

the same time inverter should be designed with certain anti-jamming ability to ensure the smooth working in certain electromagnetic environment. The following is its EMC features:

- Input current is non-sine wave. The input current includes large amount of high-harmonic waves that can cause electromagnetic interference, decrease the grid power factor and increase the line loss.
- Output voltage is high frequency PMW wave, which can increase the temperature rise and shorten the life of motor. And the leakage current will also increase, which can lead to the leakage protection device malfunction and generate strong electromagnetic interference to influence the reliability of other electric devices.
- As the electromagnetic receiver, too strong interference will damage the inverter and influence the normal using of customers.
- In the system, EMS and EMI of inverter coexist. Decrease the EMI of inverter can increase its EMS ability.

4.6.3 EMC Installation Guideline

In order to ensure all electric devices in the same system to work smoothly, this section, based on EMC features of inverter, introduces EMC installation process in several aspects of application (noise control, site wiring, grounding, leakage current and power supply filter). The good effective of EMC will depend on the good effective of all of these five aspects.

4.6.3.1 Noise control

All the connections to the control terminals must use shielded wire. And the shield layer of the wire must ground near the wire entrance of inverter. The ground mode is 360 degree annular connection formed by cable clips. It is strictly prohibitive to connect the twisted shielding layer to the ground of inverter, which greatly decreases or loses the shielding effect.

Connect inverter and motor with the shielded wire or the separated cable tray. One side of shield layer of shielded wire or metal cover of separated cable tray should connect to ground, and the other side should connect to the motor cover. Installing an EMC filter can reduce the electromagnetic noise greatly.

4.6.3.2 Site wiring

Power supply wiring: the power should be separated supplied from electrical transformer. Normally it is 5 core wires, three of which are fire wires, one of which is the neutral wire, and one of which is the ground wire. It is strictly prohibitive to use the same line to be both the neutral wire and the ground wire

Device categorization: there are different electric devices contained in one control cabinet, such as inverter, filter, PLC and instrument etc, which have different ability of emitting and withstanding electromagnetic noise. Therefore, it needs to categorize these devices into strong noise device and noise sensitive device. The same kinds of device should be placed in the same area, and the distance between devices of different category should be more than 20cm.

Wire Arrangement inside the control cabinet: there are signal wire (light current) and power cable (strong current) in one cabinet. For the inverter, the power cables are categorized into input cable and output cable. Signal wires can be easily disturbed by

power cables to make the equipment malfunction. Therefore when wiring, signal cables and power cables should be arranged in different area. It is strictly prohibitive to arrange them in parallel or interlacement at a close distance (less than 20cm) or tie them together. If the signal wires have to cross the power cables, they should be arranged in 90 angles. Power input and output cables should not either be arranged in interlacement or tied together, especially when installed the EMC filter. Otherwise the distributed capacitances of its input and output power cable can be coupling each other to make the EMC filter out of function.

4.6.3.3 Ground

Inverter must be ground safely when in operation. Grounding enjoys priority in all EMC methods because it does not only ensure the safety of equipment and persons, but also is the simplest, most effective and lowest cost solution for EMC problems.

Grounding has three categories: special pole grounding, common pole grounding and series-wound grounding. Different control system should use special pole grounding, and different devices in the same control system should use common pole grounding, and different devices connected by same power cable should use series-wound grounding.

4.6.3.2 Leakage current

Leakage current includes line-to-line leakage current and over-ground leakage current. Its value depends on distributed capacitances and carrier frequency of inverter. The over-ground leakage current, which is the current passing through the common ground wire, can not only flow into inverter system but also other devices. It also can make leakage current circuit breaker, relay or other devices malfunction. The value of line-to-line leakage current, which means the leakage current passing through distributed capacitors of input output wire, depends on the carrier frequency of inverter, the length and section areas of motor cables. The higher carrier frequency of inverter, the longer of the motor cable and/or the bigger cable section area, the larger leakage current will

occur.

Countermeasure:

Decreasing the carrier frequency can effectively decrease the leakage current. In the case of motor cable is relatively long (longer than 50m), it is necessary to install AC reactor or sinusoidal wave filter at the output side, and when it is even longer, it is necessary to install one reactor at every certain distance.

4.6.3.5 EMC Filter

EMC filter has a great effect of electromagnetic decoupling, so it is preferred for customer to install it.

For inverter, noise filter has following categories:

- Noise filter installed at the input side of inverter;
- Install noise isolation for other equipment by means of isolation transformer or power filter.

4.6.4 If user install inverter and EMI filter according to the installation guideline, we believe inverter system comply with following compliance.

- EN61000-6-4
- EN61000-6-3
- EN61800-3

4.6.5 Notice

- **This type of PDS is not intended to be used on a low-voltage public network which supplies domestic premise;**
- **Radio frequency interference is expected if used on such a network.**

5. OPERATION

5.1 Operating Keypad Description

5.1.1 Keypad schematic diagram

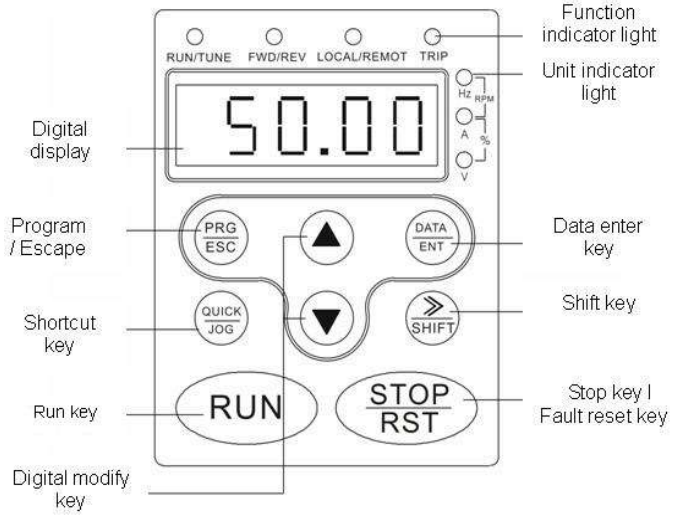

Figure 5.1 Keypad schematic diagrams.

5.1.2 Button function description

Button	Name	Description
	Programming Key	Entry or escape of first-level menu.
	Enter Key	Progressively enter menu and confirm parameters.
	UP Increment Key	Progressively increase data or function codes.

DOWN Decrement Key

Shift Key

Progressive decrease data or function codes.

In parameter setting mode, press this button to select the bit to be modified. In other modes, cyclically displays parameters by right shift

Button	Name	Description
	Run Key	Start to run the inverter in keypad control mode.
	STOP/RESET Key	
	Shortcut Key	In running status, restricted by P7.04, can be used to stop the inverter. When fault alarm, can be used to reset the inverter without any restriction. Determined by Function Code P7.03:

0: Jog operation
1: Switch between forward and reverse
2: Clear the UP/DOWN settings.
3: Quick debugging mode1 (by menu)
4: Quick debugging mode2 (by latest order)
5: Quick debugging mode3 (by non-factory setting parameters)

Combination Key
+
Pressing the RUN and STOP/RST at the same time can achieve inverter coast to stop.

5.1.3 Indicator light description

5.1.3.1 Function indicator light description

Function indicator	Description
RUN/TUNE	
FWD/REV	
LOCAL/REMOT	
TRIP	

Extinguished: stop status

Flickering: parameter autotuning status

Light on: operating status

Extinguished: forward operation

Light on: reverse operation.

Extinguished: keypad control

Flickering: terminal control

Light on: communication control

Extinguished: normal operation status

Flickering: overload pre-warning status

5.1.3.2 Unit Indicator light description

Function indicator	Description
Hz	Frequency unit
A	Current unit
V	Voltage unit
RPM	Rotating speed unit
%	Percentage

5.1.3.3 Digital display

Have 5 digit LED , which can display all kinds of monitoring data and alarm codes such as reference frequency, output frequency and so on.

5.2 Operation Process

5.2.1 Parameter setting

Three levels of menu are:

- Function code group (first-level);
- Function code (second-level);
- Function code value (third-level).

Remarks:

Press both the PRG/ESC and the DATA/ENT can return to the second-class menu from the third-class menu. The difference is: pressing DATA/ENT will save the set parameters into the control panel, and then return to the second-class menu with shifting to the next function code automatically; while pressing PRG/ESC will directly return to the second-class menu without saving the parameters, and keep staying at the current function code.

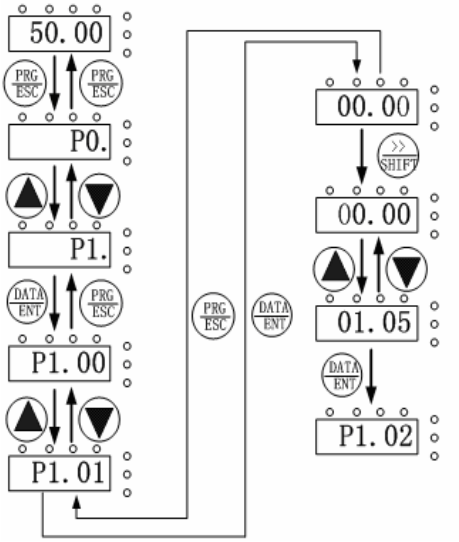

Figure 5.2 Flow chart of parameter setting.

Under the third-class menu, if the parameter has no flickering bit, it means the function code cannot be modified. The possible reasons could be:

parameter, operation records and so on;

This function code is not modifiable in running status, but modifiable in stop

5.2.2 Shortcut menu setting

Shortcut menu, in which parameters in common use can be programmed, provides a quick way to view and modify function parameters. In the shortcut menu, a parameter being displayed as "hP0.11" means the function parameter P0.11. Modifying parameters in the shortcut menu has the same effect as doing at normal programming status.

STOP/RST or according terminals determined by P5 Group to reset the fault. After fault reset, the inverter is at stand-by state. If user does not reset the inverter when it is at fault state, the inverter will be at operation protection state, and can not run.

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5.2.4 Parameter copy

For details, please refer to the instructions of LCD keyboard functions

5.2.5 Password Settings:

CHV160A series inverter provides user password protection function. When P7.00 is zero, which is user's password, quitting code editing state can make password protection effective, then pressing PRG/ESC can enter code editing state, "-----" will be showed. Operator must enter a correct.

To cancel password protection function, setting P7.00 to be zero is ok. User's password has no protection to the parameter on shortcut menu.

5.3 Running State

5.3.1 Power-on initialization

Firstly the system initializes during the inverter power-on, and LED displays "8888". After the initialization is completed, the inverter is on stand-by status.

5.3.2 Stand-by

At stop or running status, parameters of multi-status can be displayed. Whether or not to display this parameter can be chosen through Function Code P7.06 (Running status display selection) and P7.07 (Stop status display selection) according to binary bits, the detailed description of each bit please refer to the function code description of P7.06 and P7.07.

In stop status, there are sixteen parameters which can be chosen to display or not. They are: reference frequency, DC bus voltage, PID setting, PID feedback, input terminal status, output terminal status, analog AI1, analog AI2, and some reserved parameters. Whether or not to display can be determined by setting the corresponding binary bit of P7.07. Press the 》/SHIFT to scroll through the parameters in right order.

5.3.3 Operation

In running status, there are twenty one running parameters which can be chosen to display or not. They are: running frequency, reference frequency, DC bus voltage, output voltage, output current, rotating speed, output power, PID setting, PID feedback, input terminal status, output terminal status, analog AI1, analog AI2 and some reserved parameters. Whether or not to display can be determined by setting the corresponding binary bit of P7.06. Press the 》/SHIFT to scroll through the parameters in right order .

5.3.4 Fault

In fault status, inverter will display parameters of STOP status besides parameters of fault status. Press the 》/SHIFT to scroll through the parameters in right order.

6. DETAILED FUNCTION DESCRIPTION

P0 Group--Basic Function

Function Code	Name	Description
		0:Keypad (LED–"LOCAL/REMOT", extinguished) 1:Terminal
Setting Range		
Factory Setting		

P0.00 Run command

(LED–"LOCAL/REMOT", flickering)

2:Communication

(LED–"LOCAL/REMOT",lights on)

0~2 0

The control commands of inverter include: start, stop, forward run, reverse run, jog, fault reset and so on.

0: Keypad (LED—"LOCAL/REMOT", extinguished);

Both RUN and STOP/RST key are used for running command control. If Multifunction key QUICK/JOG is set as FWD/REV switching function (Details refer to instruction of CODE P7.03).

In running status, pressing RUN and STOP/RST in the same time will cause the inverter coast to stop.

1: Terminal (LED –"LOCAL/REMOT", flickering)

The operation, including forward run, reverse run, forward jog, reverse jog etc. can be controlled by multifunctional input terminals.

2: Communication (LED–"LOCAL/REMOT", lights on)

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

Function Code **Name** **Description**

0: Valid&Save

1: Valid&Not save

Setting Range

Factory Setting

P0.01 UP/DOWN setting

2: Invalid

3: Run valid&Stop reset

0~2 0

0: Valid, save UP/DOWN value when power off.

User can adjust the reference frequency by UP/DOWN. The value of UP/DOWN can be

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saved when power off, Once power on next time, it will be.

1: Valid, do not save UP/DOWN value when power off.

User can adjust the reference frequency by UP/DOWN, but the value of UP/DOWN will not be saved when power off.

2: Invalid.

User can not adjust the reference frequency by UP/DOWN. The value of UP/DOWN will

be cleared if P0.02 is set to 2.

3: Valid during running, clear when power off

User can adjust the reference frequency by UP/DOWN when inverter is running. When inverter power off, the value of UP/DOWN will be cleared

Notice:

- **UP/DOWN function can be achieved by keypad (∧ and ∨) and multifunctional terminals.**
- **Reference frequency can be adjusted by UP/DOWN.**
- **UP/DOWN has highest priority which means UP/DOWN is always active no matter which frequency command source is.**
- **When the factory setting is restored, the value of UP/DOWN will be cleared.**
- **The function code is invalid when P8.00 is set to be 1.**

Function Code	Name	Description	Setting Range	Factory Setting
P0.02	FREQ SOURCE	0: Keyboard 1: AI1 2. AI2 3. Communication		A

4: Multi-Step

0~4 0

0: Keypad: Please refer to description of P0.09.

1: AI1

2: AI2

The reference frequency is set by analog input. AI1 & AI2 are 0-10V voltage inputs or 0(4) ~20mA current input.The input mode is switched by jumpers J9&J11.

Notice:

- **For detailed relationship between analogue input voltage and frequency, please refer to description of P5.12~P5.16.**
- **100% of AI is corresponding to maximum frequency,-100% is correspongding to** reverse maximum frequency**.**

3: Communication

The reference frequency is set through RS485. For details, please refer to Capter 9-Communication protocol.

4:Multi-steps speed

The selection of steps is determined by combination of multi-step speed terminals,and the setting value is determined by P9.18~P9.33,100%- is corresponding to the maximum frequency.

Function Code	**Name**	**Description**

0:AI1

Setting

Range

Factory

Setting

P0.03
FREQ SOURCE

B

1:AI2

2:PID

0~2 0

When Frequency B command acts as the independent reference frequency source. The function is the same with that of frequency A command.

Function

Code

Name **Description**

0: Maximum frequency

Setting

Range

Factory

Setting

P0.04 FREQ B SCALE

1: Frequency A command
0~1 0

0: reference frequency B = AI1 (%) * P0.04 (maximum frequency).

1: reference frequency B = AI1 (%) * reference frequency A.

Function Code	Name	Description
		0: A
Setting Range		
Factory Setting		
P0.05	FREQ SELECTION	1: B 2: A+B 3: Max(A, B)
0~3	0	

This parameter can be used to select the reference frequency command.

0: Only frequency command source A is active.

1: Only Frequency command source B is active.

2: Both Frequency command source A and B are active.

Reference frequency = reference frequency A + reference frequency B.

3: Both Frequency command source A and B are active.

Reference frequency = Max (reference frequency A, reference frequency B).

Notice: The frequency command source can be selected not only P0.05 but also by multifunctional terminals. Please refer to description of P5 Group.

Function Code	Name	Description	Setting Range	Factory Setting
P0.06	Max FREQ	10~400.00Hz	10.0~400.0	50.00Hz

Notice:

- **The frequency reference should not exceed maximum frequency.**
- **Actual acceleration time and deceleration time are determined by maximum frequency. Please refer to description of P0.10 and P0.11.**

Function Code	Name	Description	Setting Range	Factory Setting
P0.07	UP FREQ LIMIT	P0.08~P0.06	P0.08~P0.06	50.00Hz

Notice:

- **Upper frequency limit should not be greater than the maximum frequency (P0.07).**

- **Output frequency should not exceed upper frequency limit.**

Function Code | **Name** | **Description**

LOW FREQ
Setting Range
Factory Setting P0.08

Notice:

LIMIT
0.00Hz~ P0.08 0.00~P0.08 0.00Hz

- **Lower frequency limit should not be greater than upper frequency limit (P0.07).**
- **If frequency reference is lower than P0.09, the action of inverter is determined by P1.11. Please refer to description of P1.11.**

Function Code | **Name** | **Description**

KEYPAD REF
Setting Range
Factory Setting P0.09

FREQ
0.00 Hz ~ P0.08 0.00~P0.08 50.00Hz

When P0.02 is set to be 0, this parameter is the initial value of inverter reference frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.10	ACC TIME	0.0~3600.0s	0.0~3600.0	20.0s
P0.11	DEC TIME	0.0~3600.0s	0.0~3600.0	20.0s

Acceleration time is the time of accelerating from 0Hz to maximum frequency (P0.06).

Deceleration time is the time of decelerating from maximum frequency (P0.06) to 0Hz. Please refer to following figure.

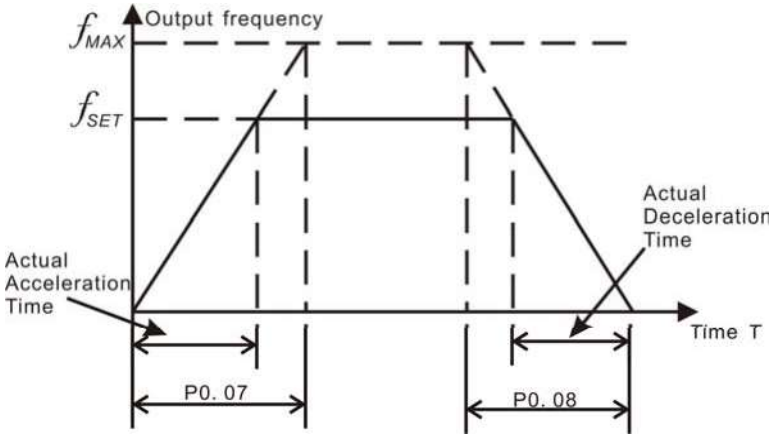


Figure 6.1 Acceleration and Deceleration time.

When the reference frequency is equal to the maximum frequency, the actual acceleration and deceleration time will be equal to the P0.10 and P0.11 respectively.

When the reference frequency is less than the maximum frequency, the actual acceleration and deceleration time will be less than the P0.10 and P0.11 respectively.

The actual acceleration (deceleration) time = P0.10 (P0.11) * reference frequency/P0.06.

Function Code	Name	Description
		0: Default
Setting Range		
Factory Setting		

P0.12 RUN DIRECTION

Notice:

1: Reverse

2: Forbid reverse

0~2 0

- **The rotation direction of motor is corresponding to the wiring of motor.**
- **When the factory setting is restored, the rotation direction of motor may be changed. Please be cautious to use.**
- **If P0.12 is set to 2, user can not change rotation direction of motor by QUICK/JOG or terminal.**

Function Code

Name **Description**

CARRIER FREQ

Setting Range

1~16.0kHz 1~16.0kHz

Factory Setting

Depend on model P0.13

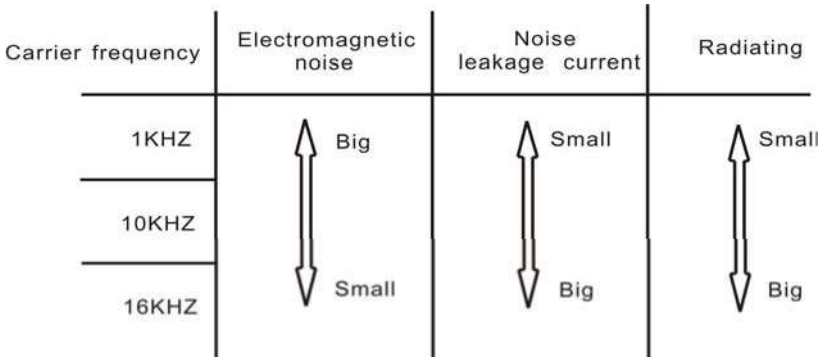


Figure 6.2 Effect of carrier frequency.

Model			
Carrier frequency			
Highest Carrier Frequency(kHz)			
Lowest Carrier Frequency(kHz)			
Factory Setting(kHz)			
G Model: 4~15kW	16	1	6
G Model: 18.5kW	8	1	2

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 setting is optimal in most cases. Modification of this parameter is not recommended.**
- **If the carrier frequency exceeds the factory setting, the inverter must be derated because the higher carrier frequency will cause more switching loss, higher temperature rise of inverter and stronger electromagnetic interference.**
- **If the carrier frequency is lower than the factory setting, it is possible to cause less output torque of motor and more harmonic current.**

Function Code	**Name**	**Description**
P0.14	RESTORE PARA	0: No action 1: Restore factory setting 2: Clear fault records
	Setting Range	0~2
	Factory Setting	0

1: Inverter restores all parameters to factory setting except P2 group.

2: Inverter clear all fault records.

This function code will restore to 0 automatically when complete the function operation，and P2 group will not restore.

Function Code	Name	Description	Setting Range	Factory Setting
P0.15~P0.19	Reserved		0～65535	0

P1 Group--Start and Stop Control

Function Code	Name	Description
		0: Start directly 1: DC break and start

Setting Range

Factory Setting

P1.00 START MODE

2: Speed tracking and start

0~2 0

0: Start directly: Start the motor at the starting frequency determined by P1.01.

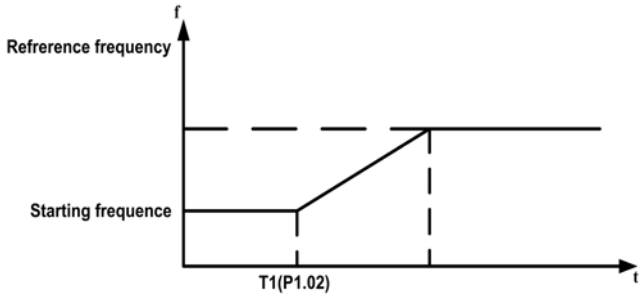
1: DC braking and start: Inverter will output DC current firstly and then start the motor at the starting frequency. Please refer to description of P1.03 and P1.04. It is suitable for the motor which have small inertia load and may reverse rotation when start.

2: Speed tracking and start: Inverter detects the rotation speed and direction of motor, then start running to its reference frequency based on current speed. This can realize smooth start of rotating motor with big inertia load when instantaneous power off.

Function Code	Name	Description	Setting Range	Factory Setting
P1.01	START FREQ	0.00~10.0Hz	0.00~10.00	1.5Hz
P1.02	HOLD TIME	0.0~50.0s	0.0~50.0	0.0s

Notice:

- **Set proper starting frequency can increase the starting torque.**
- **If the reference frequency is less than starting frequency, inverter will be at stand-by status. The indicator of RUN/TUNE lights on, inverter has no output.**
- **The starting frequency could be less than the lower frequency limits (P0.08).**
- **P1.01 and P1.02 take no effect during FWD/REV switching.**



Function Code

Figure 6.3 Starting diagram.

Name **Description**

START BRAK

Setting Range

Factory

Setting

P1.03

P1.04

CURR

START BRAK TIME

0.0~150.0% 0.0~150.0 0.0%

0.0~50.0s 0.0~50.0 0.0s

When inverter starts, it performs DC braking according to P1.03 firstly, then start to accelerate after P1.04.

Notice:

- **DC braking will take effect only when P1.00 is set to be 1.**
- **DC braking is invalid when P1.04 is set to be 0.**
- **The value of P1.03 is the percentage of rated current of inverter. The bigger the DC braking current, the greater the braking torques.**

Function Code

Name **Description**

0: Deceleration to stop

Setting Range

Factory Setting

P1.05 STOP MODE

0: Deceleration to stop

1: Coast to stop
0~1 0

When the stop command takes effect, the inverter decreases the output frequency according to the deceleration mode and the selected acceleration/deceleration time till stop.

1: Coast to stop

When the stop command takes effect, the inverter blocks the output immediately. The motor coasts to stop by its mechanical inertia.

Function Code **Name** **Description**

STOP BRAK
Setting Range Factory Setting

P1.06

P1.07

P1.08

P1.09 FREQ STOP BRAK DELAY STOP BRAK CURR STOP BRAK TIME	0.00~P0.07	0.00~10.00	0.00Hz
	0.0~50.0s	0.0~50.0	0.0s
	0.0~150.0%	0.0~150.0	0.0%
	0.0~50.0s	0.0~50.0	0.0s

Starting frequency of DC braking: Start the DC braking when running frequency reaches starting frequency determined by P1.06.

Waiting time before DC braking: Inverter blocks the output before starting the DC braking. After this waiting time, the DC braking will be started. It is used to prevent over-current fault caused by DC braking at high speed.

DC braking current: The value of P1.08 is the percentage of rated current of inverter. The bigger the DC braking current, the greater the braking torque.

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

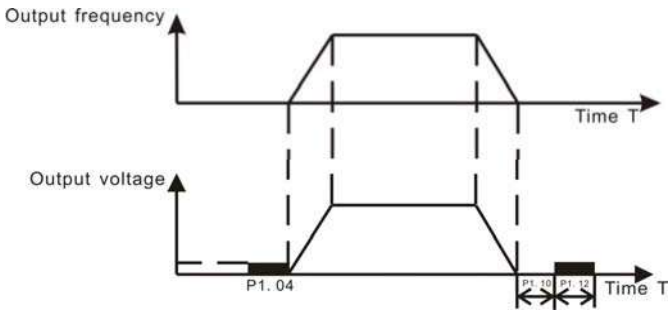


Figure 6.4 DC braking diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P1.10	DEADTIME	0.0~3600.0s	0.0~3600.0	0.0s

Set the hold time at zero frequency in the transition between forward and reverse running.

It is shown as following figure:

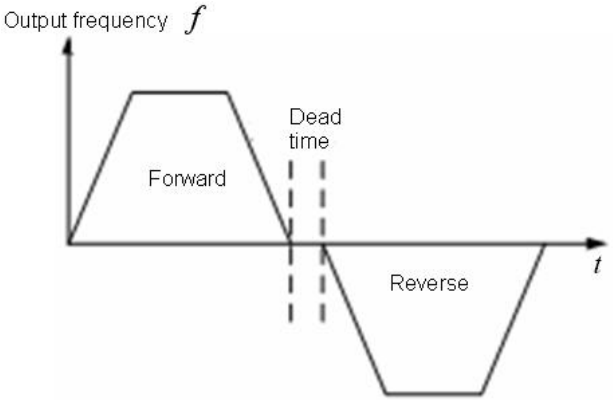


Figure 6.5 FWD/REV dead time diagram.

Function Code	Name	Description	Setting Range	Factory Setting	
UNDER LIMIT					
P1.11	ACT	0~1	0~1	0	
P1.12	LIMIT RUN TIME	0～3600s	0～3600	5	
P1.13	AWOKE DELAY	0～3600s	0～3600	5	

The function code of P1.11determine the running state of inverter when setting frequency is lower than lower frequency limit.

0: UN at lower limit FREQ, Running at the lower frequency limit

1: Run at lower FREQ, then sleep, running at the lower frequency limit, and sleep latency. When P1.11 is set to be 1, inverter will run at lower frequency limit.Once the delay time (P1.12) is over, inverter will coast to stop; When the setting frequency is higer than or equal to the lower frequency limit again, inverter will be waked up and autorun after delay time (P1.13).

Notice: The functions are invalid when P8.00 is set to be 1.

Function Code	**Name**	**Description**	**Setting Range**	**Factory Setting**
P1.14	RESTART	0: Restart disabled 1: Restart enabled	0~1	0
P1.15	RESTR DELAY TIME		0.0~3600.0s	0.0s

0: Disabled: Inverter will not automatically restart when power on again until run command takes effect.

1: Enabled: When inverter is running, after power off and power on again, if run command source is keypad control (P0.00=0) or communication control (P0.00=2), inverter will automatically restart after delay time determined by P1.15; if run command source is terminal control (P0.00=1), inverter will automatically restart after delay time determined by P1.15 only if FWD or REV is active.

Function Code	Name	Description	Setting Range	Factory Setting
P1.16	FWD/REV ENABLE	0: Disabled 1: Enabled	0~1	0

Notice:

- **This function only takes effect if run command source is terminal control.**
- **If P1.16 is set to be 0, when power on, inverter will not start even if FWD/REV terminal is active, until FWD/REV terminal disabled and enabled again.**
- **If P1.16 is set to be 1, when power on and FWD/REV terminal is active, inverter will start automatically.**
- **This function may cause the inverter restart automatically, please be**

cautious.

Function Code	Name	Description	Setting Range	Factory Setting
P1.17~ P1.19	Reserved	0～65535	0～65535	0

P2 Group--Motor Parameters

Function Code	Name	Description	Setting Range	Factory Setting
P2.00	MOTOR RATE POWER	MOTOR RATE 1.5~900.0kW	1.5~900.0	Depend on model
P2.01				

P2.02 FREQ		
P2.03 MOTOR RATE SPEED		
P2.04 MOTOR RATE VOLT		
MOTOR RATE CURR		
0.01Hz~P0.07	0.01~P0.07	50.00Hz
0~36000rpm	0~36000	1460rpm
0~3000V	0~3000	380V
0.1~2000.0A	0.1~2000.0	Depend on model

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Notice: Please set the parameters according to the nameplate of motor.

Function Code	**Name**	**Description**

A PUMP RATE
Setting
Range
Factory
Setting
Depend
P2.05

P2.06

P2.07

P2.08

P2.09

P2.10

P2.11

CURR
B PUMP RATE CURR
C PUMP RATE CURR
D PUMP RATE CURR
E PUMP RATE CURR
F PUMP RATE CURR
G PUMP RATE
CURR
0.1～2000.0A 0.1~2000.0

0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0

on model
Depend on model
Depend on model
Depend on model
Depend on model
Depend on model
Depend
on model

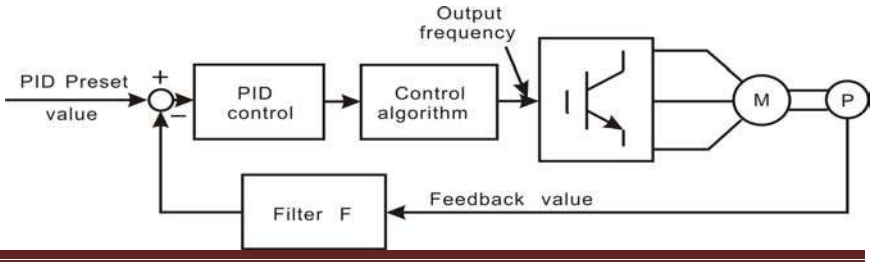
The above parameter is corresponding to the motor rated current of each pump, so please set by the motor nameplates.These parameters can effect the overload protection of motor.

Function Code	Name	Description

Setting				
Range				
Factory				
Setting				
P2.12~P2.15	Reserved	0～65535	0～65535	0

P3 Group --PID Control

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



Function Code	Name	Description	Setting Range	Factory Setting
		Figure 6.6 PID control diagram.		
P3.00	UNIT SEL	0～10 0:MPa 1:kPa 2:Pa 3:℃ 4:A 5:V 6:Hz 7:% 8:rpm 9:h 10:kh	0～10	0

The function is to confirm the units of P3.02~P3.05.-

Function Code	Name	Description	Setting Range	Factory Setting
P3.01	FORMAT	DISPLAY 0～4	0～4	3

The function is to display the radix point numbers of maximum value, upper limit value, lower limit value, feedback value of PID.

Function Code	Name	Description	Setting Range	Factory Setting
P3.02	PID MAX	0.001～65.535	0.001~65.535	1.000
P3.03	PID UPPER	P3.04~P3.02	P3.04~P3.02	1.000
P3.04	PID LOWER	P0.000~P3.03	P0.00~P3.03	0.100
P3.05	KEYPAD PID SET	P3.04~P3.03	P3.04~P3.03	0.500

The unit and radix point numbers of parameters are decided by P3.00 and P3.01.

Function Code	Name	Description	Setting Range	Factory Setting
P3.06	PID PRESET	0~5	0~5	0

0: Keypad: Please refers to the value of P3.05.

1:AI1

2:AI2

PID given is set by the analog, and the setting is similar with analog input of P0.02.But the unit is decided by P3.00.

3: Modbus

The reference frequency is set through RS485. For details, please refer to operation manual of communication card.

4: Time water supply

The function parameter is determined by P9.01~P9.17.

5: Multi-press set

PID given is confirmed by the combination of - terminals status (P5 group) and P9.18~P9.33.

When the frequency source is set to be PID or P8.00 = 1(water-supply function is valid), the function will be valid. When the - target value of - PID is a relative percentage, -100% is corresponding to P3.02 (maximum value of PID).

Function Code	Name	Description
	Setting Range	0: AI1 feed 1: AI2 feed

Factory Setting

P3.07 PID FEEDBACK

2: AI1-AI2 feed

3: Modbus feed

0~3 0

This parameter is used to select PID feedback source.

Notice:

- **Given value and feedback value of PID is percentage value.**
- **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.**

Function Code

Name Description

0: Positive

Setting

Range

Factory Setting

P3.08 PID OUTPUT

1: Negative

0~1 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.

Function

Function Code	Name	Description	Setting Range	Factory Setting
P3.09	PROPORTION GAIN (Kp)	0.00~100.00	0.00~100.00	0.10

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Function Code	Name	Description	Setting Range	Factory Setting
P3.10	INTEGRAL TIME (Ti)	0.01~10.00s	0.01~10.00	0.10s
P3.11	DIFFERENTIA TIME (Td)			

0.00~10.00s 0.00~10.00 0.00s

Optimize the responsiveness by adjusting these parameters while driving an actual load.

Adjusting PID control:

Use the following procedure to activate PID control and then adjust it while monitoring the response.

1. Enabled PID control (P0.03=2)
2. Increase the proportional gain (Kp) as far as possible without creating oscillation.
3. Reduce the integral time (Ti) as far as possible without creating oscillation.
4. Increase the differential time (Td) as far as possible without creating oscillation.

Making fine adjustments:

First set the individual PID control constants, and then make fine adjustments.

- Reducing overshooting

If overshooting occurs, shorten the differential time and lengthen the integral time.

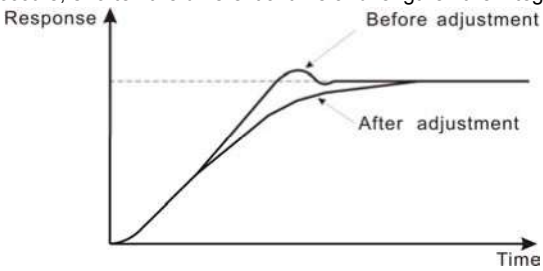

Figure 6.7 Reducing overshooting diagram.

- Rapidly stabilizing control status

To rapidly stabilize the control conditions even when overshooting occurs, shorten the integral time and lengthen the differential time.

- Reducing long-cycle oscillation

If oscillation occurs with a longer cycle than the integral time setting, it means that integral operation is strong. The oscillation will be reduced as the integral time is lengthened.

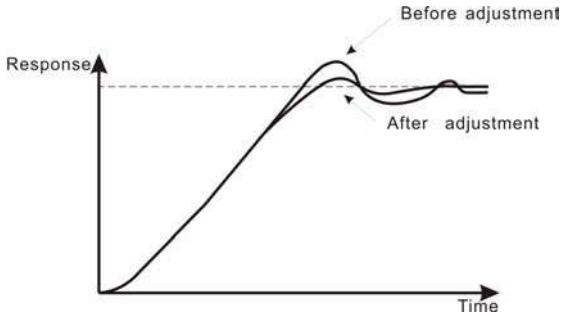

Figure 6.8 Reducing long-cycle oscillation diagram.

- Reducing short-cycle oscillation

If the oscillation cycle is short and oscillation occurs with a cycle approximately the same as the differential time setting, it means that the differential operation is strong. The oscillation will be reduced as the differential time is shortened.

Figure 6.9 Reducing short-cycle oscillation diagram.

If oscillation cannot be reduced even by setting the differential time to 0, then either lower the proportional gain or raise the PID primary delay time constant.

Function Code	Name	Description	Setting Range	Factory Setting
P3.12	SAMPLING CYCLE (T)	0.01~100.00s	0.01~100.00	0.50s
P3.13	BIAS LIMIT	0.0~100.0%	0.0~100.0	0.0%

Sampling cycle T refers to the sampling cycle of feedback value. The PI regulator calculates once in each sampling cycle. The bigger the sampling cycle, the slower the response is.

Bias limit defines the maximum bias between the feedback and the preset. PID stops operation when the bias is within this range. Setting this parameter correctly is helpful to improve the system output accuracy and stability.

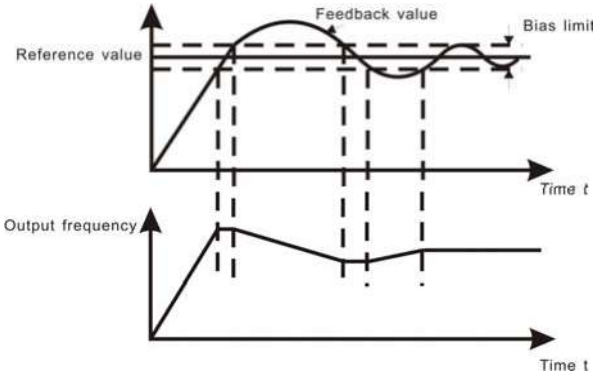

Figure 6.10 Relationship between bias limit and output frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P3.14	FILTER	0.00~10.00s	0.00~10.00	0.00

The bigger the filter time, the better the immunity capability, but the response becomes slow, vice versa.

Function Code

Name	Description		
FEEDBACK LOST	FEEDBACK LOST(t)		
Setting Range	0.0~100.0%	0.0~100.0	0.0%
Factory Setting	0.0~3600.0s	0.0~3600.0	1.0s
P3.15	When feedback value is less than P3.15 continuously for the period determined by P3.16, the inverter will alarm feedback lost failure (PIDE).		
P3.16			

Function Code	Name	Description
PID FRQ		
Setting Range		
Factory Setting		
P3.17		

P3.18 UPPER PID FRQ LOWER -100.0～100.0% -100.0~100.0 100.0%

-100.0～P3.17 -100.0~P3.17 0.0%

100% is corresponding to P0.06 (The maximum frequency).

Notice: When P8.00 =1(Water-supply function is enabled.), the parameters should be positive, ortherwise the system will be abnormal.

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Function Code	Name	Description	Setting Range	Factory Setting
P3.19	Reserved	0~65535	0~65535	0

P4 Group--V/F Control

Function Code	Name	Description
		0: Linear curve 1: User-defined curve

2: 1.3 order torque_stepdown

Setting

Range

Factory

Setting

P4.00 V/F CURVE

3: 1.7 order torque_stepdown

4: 2.0 order

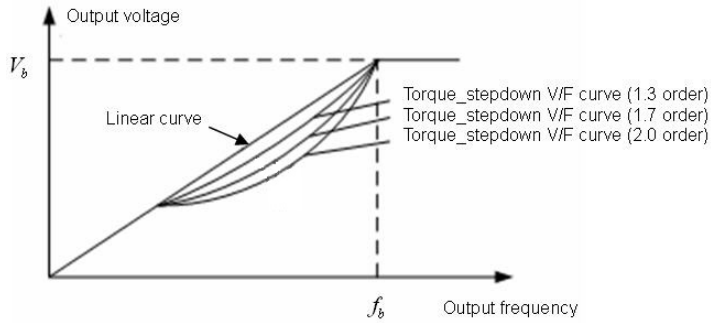
torque_stepdown

0~4 4

0: Linear curve. It is applicable for normal constant torque load.

1: User-defined curve. It can be defined through setting (P4.03~P4.08).

2~4: Torque_stepdown curve. It is applicable for variable torque load, such as blower, pump and so on. Please refer to following figure.



Function

Code

Figure 6.11 Multiple V/F curve diagram.

Name	Description	Setting Range	Factory Setting
P4.01	TORQUE BOOST	0.0%: auto 0.1%~10.0%	1.0%
P4.02	BOOST CUT-OFF	0.0%~50.0% (motor rated frequency)	20.0%

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Torque boost will take effect when output frequency is less than cut-off frequency of torque boost (P4.02). Torque boost can improve the torque performance of V/F control at

low speed.

The value of torque boost should be determined by the load. The heavier the load, the larger the value.

Notice: This value should not be too large, otherwise the motor would be over-heat or the inverter would be tripped by over-current or over-load.

If P4.01 is set to 0, the inverter will boost the output torque according to the load automatically. Please refer to following diagram.

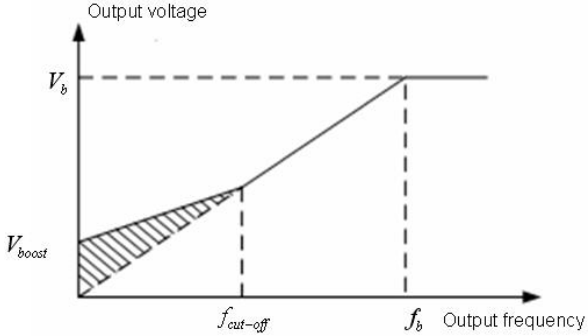

Figure 6.12 Torque boost diagram.

Function Code	Name	Description	Setting Range	Factory Setting

P4.03	V/F FREQ 1	0.00Hz~ P4.05	0.00~P4.05	5.00Hz
P4.04	V/F VOLTAGE 1	0.0%~100.0%	0.0~100.0	10.0%
P4.05	V/F FREQ 2	P4.03~ P4.07	P4.03~ P4.07	30.00Hz
P4.06	V/F VOLTAGE 2	0.0%~100.0%	0.0~100.0	60.0%
P4.07	V/F FREQ 3	P4.05~ P2.01	P4.05~ P2.01	50.00Hz
P4.08	V/F VOLTAGE 3	0.0%~100.0%	0.0~100.0	100.0%

This function is only active when P4.00 is set to be 1. P4.03~P4.08 are used to set the user-defined V/F curve. The value should be set according to the load characteristic of motor.

Notice:

- **0＜V1＜V2＜V3＜rated voltage.**
- **0＜f1＜f2＜f3＜rated frequency.**
- **The voltage corresponding to low frequency should not be set too high, otherwise it may cause motor overheat or inverter fault.**

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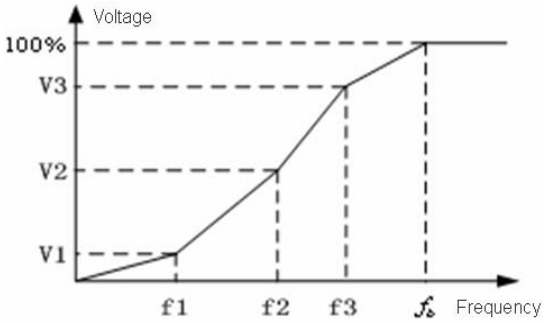

Function Code

Figure 6.13 V/F curve setting diagram.

Name	Description	Setting Range	Factory Setting
P4.09	V/F SLIPCOMP	0.00~10.00Hz	0.00~10.00 0.0Hz

The motor's slip changes with the load torque, which results in the variance of motor speed. The inverter's output frequency can be adjusted automatically through slip compensation according to the load torque. Therefore the change of speed due to the load change can be reduced. The value of compensated slip is dependent on the motor's

rated slip which can be calculated as below:

$$P4.09 = f_b - n * P / 60$$

Where motor rated frequency (P2.01) is, n is motor rated speed (P2.02), and P is pole pairs of motor.

Function Code

Name	Description	Setting
	0: Disabled 1: Enabled all the time	

Range	Factory Setting
P4.10 AVR 2: Disabled during deceleration 0~2	1

AVR (Auto Voltage Regulation) function ensures the output voltage of inverter stable no matter how the DC bus voltage changes. During deceleration, if AVR function is disabled, the deceleration time will be short but the current will be big. If AVR function is enabled all the time, the deceleration time will be long but the current will be small.

Function Code	Name	Description	Setting Range	Factory Setting
P4.11~ P4.15	Reserved	0~65535	0~65535	0

P5 Group--Input Terminals

The CHV160A series provides 8 multi-function digital input terminals and 2 analog inputs terminals.

Function Code	Name	Description	Setting Range	Factory Setting
P5.00	NO/NC SELECT	0~0xFF	0~0xFF	0

This code is to determine terminal status, normal-open or normal-colsed. When corresponding bit is set to be 1, the terminal is normal-colsed input .This parameter is hex-setting.ON-OFF signal corresponding bit is as follows:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
S8	S7	S6	S5	S4	S3	S2	S1

Function Code	Name	Description	Setting Range	Factory Setting
P5.01	INPUT SELECTION	0: Invalid 1: Valid		

0~1 0

0: ON-OFF signal is input through external input terminals.

1: ON-OFF signal is set through serial communication by host device.

Function Code	Name	Description	Programmable Setting Range	Factory Setting
P5.02	S1 FUNCTION	multifunction terminal		
P5.03	S2 FUNCTION			
P5.04	S3 FUNCTION			
P5.05	S4 FUNCTION			
P5.06	S5 FUNCTION			
P5.07	S6 FUNCTION			
P5.08	S7 FUNCTION			

Programmable multifunction terminal		
Programmable multifunction terminal		
Programmable multifunction terminal		
Programmable multifunction terminal		
Programmable multifunction terminal		
Programmable multifunction terminal	0~55	1
	0~55	4
	0~55	5
	0~55	0
	0~55	0
	0~55	0
	0~55	0

Function Code

Name	Description
Setting	Programmable
Range	
Factory Setting	
P5.09	S8 FUNCTION
	multifunction terminal
0~55	0

The meaning of each setting is shown in following table.

Setting value	Function	Description
0	Invalid	Please set unused terminals to be invalid to avoid malfunction.
1	Forward	Please refer to description of P5.13.
2	Reverse	
3	jog enable	

Combine with FWD/REV operation to be 3-wire jog control.

K1	K2	K3	Command
ON	OFF	OFF	Forward running
OFF	ON	OFF	Reverse running
ON	OFF	ON	Forward jogging
OFF	ON	ON	Reverse jogging

4 Coast to stop

The inverter blocks the output immediately. The motor coasts to stop by its mechanical inertia.

5 Reset fault

Resets faults that have occurred. It has the same function as STOP/RST.

6 Running pause

When this terminal takes effect, inverter decelerates to stop and save current status, such as PLC, traverse frequency and PID. When this terminal takes no effect,

inverter restores the status before pause.

7	External fault	Stop the inverter and output a alarm when a fault occurs

Setting value	Function	Description
	input	in a peripheral device.
		The reference frequency of inverter can be adjusted by
		UP command and DOWN command.
8	Up command	
9	DOWN command	
10	Clear UP/DOWN	
11	Switch between A and B	
12	Switch between A and A+B	
13	Switch between	

B and A+B

14 Pause PID

15 ACC/DEC ramp hold

Use this terminal to clear UP/DOWN setting. Please refer to description of P5.11.

P0.06 Terminal action	A	B	A+B
11 valid	B	A	
12 valid	A+B		A
13 valid		A+B	B

PID adjustment will be paused and inverter keeps output frequency unchanged.

Pauses acceleration or deceleration and maintains output frequency. When this terminal is disabled,

acceleration/deceleration is restarted.

16 Multi-step press reference1

16 steps speed control can be realized by the combination of these four terminals. For details, please

17 Multi-step press reference 2 refer to following multi-step speed reference terminal

18 Multi-step press reference 3

status and according step value table.Such as:

0000: select the multi-speed 0; 1111: multi-speed 15.

Notice: multi-speed 1 is low bit, and multi-speed 4 is high bit.

19	Multi-step press reference 4				
Multi-speed terminal 4					
Multi-speed terminal 3					
Multi-speed terminal 2					
Multi-speed terminal 1					
		BIT3	BIT2	BIT1	BIT0

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Setting value		
20		
Function	**Description**	
Manual soft start debugging	Manual soft start of each motor must be corresponding to soft start terminal ,and the status should be	
21		

22~28

29~35

36

37

38

39

40

Manual round-robin command

Manual soft start of motor A~G

Motor A~G
disabled
Inlet reservoir up W LEV ltd
Inlet reservoir low W LEV ltd
Inlet reser W LEV on W short
Sewage reservoir up W LEV ltd
Sewage reser low W level ltd
1.(short-connecting with COM)

These parameters are to set the variable frequency pumps which need to be soft started. Please used together with the enabled terminal.

When the enabled terminal, command of soft start and the running command of inverter are all valid, the motor will be soft started by inverter. And when the frequency reachs to P8.13 (the switching frequency), the motor will switch to be the grid-frequency status.

If several commands of soft start are valid at the same time, the inverter will soft

start and switch motors according to the closed sequency of each terminal.
When the command is valid, relevant motor will be out of switch logic. It's for repair.

Please refer to P8.27.

The signal is a kind of ON-OFF..W hen the sewage level is higher than upper limit, sewage pump will be switched to run; If it is lower than lower limit, the sewage pump will stop running.

When it is valid, PID0 (Defined by P3) will be switched to

41 PID switch

PID1 (Defined by PD), and the corresponding parameters of PID wll also be switched.

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Setting value	Function	Description
42~50	Reserved	

Function Code

Function Code	Name	Description	Setting Range	Factory Setting
P5.10	Sx FILTER TIMES	0~10	0~10	5

This parameter is used to set filter strength of terminals (S1~S8). When interference is heavy, user should increase this value to prevent malfunction.

Function Code	Name	Description	Setting Range	Factory Setting
P5.11	UP/DOWN RATE	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s

This parameter is used to determine how fast UP/DOWN setting changes.

Function Code	Name	Description	Setting Range	Factory Setting
P5.12	AI1 LOW LIMIT	0.00V~10.00V	0.00~10.00	0.00V
P5.13	AI1 LOW			

SETTING
-100.0%~100.0% -100.0~100.0 0.0%

P5.14	AI1 UP LIMIT	0.00V~10.00V	0.00~10.00	10.00V
P5.15	AI1 UP SETTING	-100.0%~100.0%	-100.0~100.0	100.0%
P5.16	AI1 FILTER TIME	0.00s~10.00s	0.00~10.00	0.10s
P5.17	AI2 LOW LIMIT	0.00V~10.00V	0.00~10.00	0.00V
P5.18	AI2 LOW SETTING	-100.0%~100.0%	-100.0~100.0	0.0%
P5.19	AI2 UP LIMIT	0.00V~10.00V	0.00~10.00	10.00V
P5.20	AI2 UP SETTING	-100.0%~100.0%	-100.0~100.0	100.0%
P5.21	AI2 FILTER TIME	0.00s~10.00s	0.00~10.00	0.10s

These parameters determine the relationship between analog input voltage and the corresponding setting value. When the analog input voltage exceeds the range between lower limit and upper limit, it will be regarded as the upper limit or lower limit.

The analog input AI1 can only provide voltage input, and the range is 0V~10V.

For different applications, the corresponding value of 100.0% analog setting is different. For details, please refer to description of each application.

Notice: AI1 lower limit must be less or equal to AI1 upper limit.

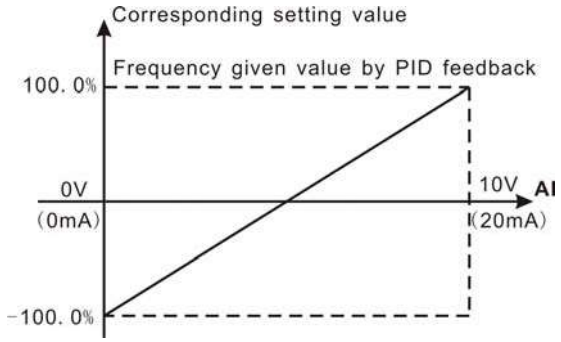

Figure 6.14 Relationship between AI and corresponding setting.

Function Code	Name	Description	Setting Range	Factory Setting
P5.22~ P5.25	Reserved	0~65535	0~65535	0.00V

P6 Group -- Output Terminals

CHV160A series standrad model supplies 3 multifunctional relay output terminals，2 multifunctional analog output terminals. The extension card supplies 8 pump intelligent switched relay output terminals.

Function Code

Name	Description		
RO1 Setting			
Range			
Factory Setting			
P6.00			
P6.01			
P6.02			
SELECTION			
RO2			
SELECTION			
RO3			
SELECTION			
Relay output		0~30	3
Relay output		0~30	21
Relay output		0~30	22

Setting Value	Function	Description
0	No output	Output terminal has no function.
1	Run forward	ON: During forward run.

2	Run reverse	ON: During reverse run.
3	Fault output	ON: Inverter is in fault status.
4	Motor overload	Please refer to description of PA.04~PA.06.

Setting Value	Function	Description
5	Inverter overload	Please refer to description of PA.04~PA.06.
6	FDT reached	Please refer to description of PC.10, PC.11.
7	Frequency reached	Please refer to description of PC.12.
8	Zero speed running	ON: The running frequency of inverter is zero.
9	Running time reached	Please refer to description of PC.09.
10	Upper frequency limit reached	ON: Running frequency reaches the value of P0.07.
11	Lower frequency limit reached	ON: Running frequency reaches the value of P0.08.
12	Run ready	ON: Inverter is ready (no fault, power is ON).
13	Motor running	ON: Inverter has output signal.

14	Stop pulse output	Output pulse signal for 2s when running frequency is lower than 0.1Hz.
15	Over press alarm	Output “ON” when the feedback pressure is equal to or greater than PA.14(Over-pressure protection value) and it lasts the delay time set by PA.15.
16	Under press alarm	Output “ON” when the feedback pressure is equal to or less than PA.16(Under-pressure protection value), and it lasts the delay time set by PA.17.
17	Dormant Operation indication	Output “ON” when the dormancy running status
18	Backup pressure operat indica	
19	Reservoir water short indicat	
20	Faulty pump indication	
21	H pump control	

The terminal will output " ON" when the system is running with reserved pressure . Please refer to P8.32.

Output ON when water level of pool is lower than the shortage level.

Output ON once there is any pump at fault.

In water-supply mode, output "ON" means that .H pump has been switched on.H pump is only suitable for grid frequency control.

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Setting Value	Function	Description
22	I pump control	In water-supply mode, output "ON" means that .I pump has been switched on.I pump is only suitable for grid frequency control.
23~30	Reserved	Reserved

Function Code	Name	Description	Setting Range	Factory Setting
P6.03	RT1 SELECTION	0~14	0~14	0

P6.04	RT2 SELECTION	0~14	0~14	0
P6.05	RT3 SELECTION	0~14	0~14	0
P6.06	RT4 SELECTION	0~14	0~14	0
P6.07	RT5 SELECTION	0~14	0~14	0
P6.08	RT6 SELECTION	0~14	0~14	0
P6.09	RT7 SELECTION	0~14	0~14	0
P6.10	RT8 SELECTION	0~14	0~14	0

These parameters are to set the output function of relay on water-supply card,the detailsis as follows:

Setting value	Function	Description
0	No function	Terminal is invalid.
1	Connect A for var freq CON	
2	Connect A for pow freq CON	
3	Connect B for var freq CON	
4	Connect B for pow freq CON	
5	Connect C for var freq CON	
6	Connect C for pow freq CON	
7	Connect D for var freq CON	
8	Connect D for pow freq CON	
9	Connect E for var freq CON	
10	Connect E for pow freq CON	
11	Connect F for var freq CON	
12	Connect F for pow freq CON	
13	Connect G for var freq CON	
14	Connect G for pow freq CON	

Variable frequency pump needs two control signals: frequency control and grid frequency control,but grid frequency

pump ,sewage pump,anddormancy pump need only one control signal :grid frequency control.

Function Code	Name	Description	Setting Range	Factory Setting
P6.11	AO1 SELECTION	Multifunctional analog output	0~14	0
P6.12	AO2 SELECTION	Multifunctional analog output		

0~14 0

AO/HDO output functions are indicated in the following table:

Setting Value	Function	Range
0	Running frequency	0~maximum frequency (P0.06)
1	Setting frequency	0~ maximum frequency (P0.06)
2	Motor speed	0~2* rated synchronous speed of motor
3	Output current	0~2* inverter rated current
4	Output voltage	0~2* inverter rated voltage
5	Reserved	
6	Reserved	
7	AI1 voltage/current	0~10V/0~20mA
8	AI2 voltage/current	0~10V/0~20mA
9~15	Reserved	

Function Code	Name	Description	Setting Range	Factory Setting
P6.13	AO1 LOW LIMIT	0.0%~100.0%	0.0~100.0	0.0%
P6.14	AO1 LOW OUTPUT	0.00V ~10.00V	0.00~10.00	0.00V
P6.15	AO1 UP LIMIT	0.0%~100.0%	0.0~100.0	100.0%
P6.16	AO1 UP			

OUTPUT 0.00V ~10.00V		0.00~10.00	10.00V		
P6.17	AO2 LOW LIMIT	0.0%~100.0%		0.0~100.0	0.0%
P6.18	AO2 LOW OUTPUT 0.00V ~10.00V	0.00~10.00	0.00V		
P6.19	AO2 UP LIMIT	0.0%~100.0%		0.0~100.0	100.0%
P6.20	AO2 UP OUTPUT 0.00V ~10.00V	0.00~10.00	10.00V		

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These parameters determine the relationship between analog output voltage/current and the corresponding output value. When the analog output value exceeds the range between lower limit and upper limit, it will output the upper limit or lower limit.

When AO is current output, 1mA is corresponding to 0.5V.

For different applications, the corresponding value of 100.0% analog output is different. For details, please refer to description of each application.

Figure 6.15 Relationship between AO and corresponding setting.

Function Code	Name	Description	Setting Range	Factory Setting
P6.21~ P6.24	Reserved	0~65535	0~65535	0.0%

P7 Group--Display Interface

Function Code	Name	Description	Setting Range	Factory Setting
		USER		
P7.00	PASSWORD	0~65535	0~65535	0

The password protection function will be valid when set to be any nonzero data. When P7.00 is set to be 00000, user's password set before will be cleared and the password

protection function will be disabled.

After the password has been set and becomes valid, the user can not access menu if the user's password is not correct. Only when a correct user's password is input, the user can see and modify the parameters. Please keep user's password in mind.

Function Code	Name	Description	Setting Range	Factory Setting
P7.01	LANGUAGE SELECT	0: Chinese 1: English	0~1	0

Function Code	Name	Description	Setting
		0: Invalid	

Range
Factory
Setting

P7.02 PARA COPY

1: Upload

2: Download

0~2 0

P7.02 will take effect when LCD keypad is used.

1: All value of parameters will be uploaded from inverter to LCD.

2: All value of parameters will be downloaded from LCD to inverter.

Notice: When upload or download operation completes, P7.02 will be set to 0 automatically.

Function Code

Name **Description**

0: Quick debugging mode

Setting
Range
Factory
Setting

P7.03 QUICK/JOG FUNC

1: FDW/REV switch

2: Jog

3: Clear UP/DOWN setting

0~3 0

QUICK/JOG is a multifunctional key, whose function can be defined by P7.03.

0: Quick debugging mode: Please refer to description of Chapter 5.

1: FWD/REV switching: Press QUICK/JOG, the running direction of inverter will reverse. It is only valid if P0.01 is set to be 0.

2: Jog: Press QUICK/JOG, the inverter will jog.

3: Clear UP/DOWN setting: Press QUICK/JOG, the UP/DOWN setting will be cleared.

Function Code	Name	Description
		0: Valid when keypad control (P0.01=0) 1: Valid when keypad or terminal control
Setting Range		
Factory Setting		
P7.04		

Notice:
STOP/RST
FUNC
(P0.01=0 or 1)

2: Valid when keypad or
COM control (P0.01=0
or 2)
3: Always valid
0~3 0

- **The value of P7.04 only determines the STOP function of STOP/RST.**

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- **The RESET function of STOP/RST is always valid.**

Function Code	Name	Description
		0: Preferential to external keypad 1: Both display&external
Setting Range		
Factory Setting		
P7.05	KEYPAD DISPLAY	valid. 2: Both display& local key valid. 3: Both display & Both valid.

0~3 0

0: When external keypad exists, local keypad will be invalid.

1: Local and external keypad display simultaneously, only the key of external keypad is valid.

2: Local and external keypad display simultaneously, only the key of local keypad is valid.

3: Local and external keypad display simultaneously, both keys of local and external keypad are valid.

Notice:

- **This function should be used cautiously, otherwise it may cause malfunction.**
- **When P7.05 is set to be 1, local keypad is valid if external keypad is not connected.**
- **When LCD keypad is connected, P7.05 must be set to be 0.**

Function Code **Name** **Description** RUNNING **Setting** **Range** **Factory** **Setting**

P7.06 DISPLAY 0~0xFFFF 0~0xFFFF 0x01F9

P7.06 defines the parameters that can be displayed by LED in running status. If Bit is 0, the parameter will not be displayed; If Bit is 1, the parameter will be displayed. Press 》/SHIFT to scroll through these parameters in right order. Press DATA/ENT +

QUICK/JOG to scroll through these parameters in left order.

The display content corresponding to each bit of P7.06 is described in the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
AI1							
Output terminal status							
Input terminal status							
PID feedback							
PID preset	Reserved	Reserved					
Rotation speed							

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	AI2

For example, if user wants to display rotation speed, output power, output torque, PID preset and AI1, the value of each bit is as the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
1	0	0	0	1	1	1	1
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
0	0	0	0	0	0	0	0

The value of P7.06 is 008Fh.

Notice: I/O terminal status is displayed in decimal. For details, please refer to description of P7.19 and P7.20.

Function Code	Name	Description	Setting Range	Factory Setting
P7.07	STOP DISPLAY	1~0xFFFF	1~0xFFFF	0xFF

P7.07 determines the display parameters in stop status. The setting method is similar with P7.06.

The display content corresponding to each bit of P7.07 is described in the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
						AI2	AI1

PID feedback

PID preset

Output terminal status

Input terminal status

DC bus voltage

Reference frequency

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Function Code	Name	Description	Setting Range	Factory Setting
P7.08	RECTIFIER TEMP	0~100.0℃		
P7.09	IGBT TEMP	0~100.0℃		
P7.10	MCU VERSION			
P7.11	DSP VERSION			
P7.12	TOTAL RUN TIME	0~65535h		

Rectifier module temperature: Indicates the temperature of rectifier module. Overheat protection point of different inverter may be different.

IGBT module temperature: Indicates the temperature of IGBT module. Overheat protection point of different inverter may be different.

MCU Software version: Indicates current software version of MCU.

DSP Software version: Indicates current software version of DSP

Accumulated running time: Displays accumulated running time of inverter.

Notice: Above parameters are read only.

Function Code	**Name**	**Description**
P7.13	3rd LATEST FAULT	
P7.14	2nd LATEST FAULT	
P7.15	CURRENT FAULT	
Setting Range		0~30
Factory Setting		0~30

0~30 0~30

These parameters record three recent fault types. For details, please refer to description of chapter 7.

Function Code	Name	Description	Setting Range	Factory Setting
P7.16	FAULT PREQ	Output frequency at current fault.		
P7.17	FAULT CURR	Output current at current fault.		
P7.18	FAULT DC VOLT	DC bus voltage at current fault.		

P7.19

FAULT Sx STATUS

This value records ON-OFF input terminal status at current fault. The meaning of each bit is as below:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
S8	S7	S6	S5	S4	S3	S2	S1

1 indicates corresponding input terminal is ON, while 0 indicates OFF.

Notice: This value is displayed as decimal.

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Function Code	Name	Description	Setting Range	Factory Setting
P7.20		This value records output terminal status at current fault. The meaning of each bit is as below:		

FAULT DO STATUS

BIT10	BIT9	BIT8	BIT7	BIT6
RT8	RT7	RT6	RT5	RT4
BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
RT3	RT2	RT1	RO3	RO2	RO1

1 indicates corresponding output terminal is ON, while 0 indicates OFF.

Notice: This value is displayed as decimal.

Function Code	**Name**	**Description**	**Setting Range**	**Factory Setting**
P7.21	ERR-PUMP NOTE	In constant pressure water-supply mode, if any pump is at fault, the corresponding bit will be 1.When P8.33 is 1,the corresponding type of faulty pump will be invalid,and the faulty pump will stop running,and stop switching	0~0x1FF	0~0x1FF

BIT9	BIT8	BIT7	BIT6	BIT5
Reserved	Reserved	Reserved	G pump	F pump
BIT4	BIT3	BIT2	BIT1	BIT0

E pump	D pump	C pump	B pump	A pump

For example: When P7.21=23H=00100011b, it means that pump A, pump B and pump F are at fault.

Function Code	Name	Description	Setting Range	Factory Setting
P7.22~ P7.24	Reserved		0~65535	0

P8 Group--Water-supply Function

Function Code	Name	Description	Setting
		WATER	

Range

Factory Setting

P8.00

0：Disabled

SUPPLY SEL

0~1 0~1 1

The water-supply logic is invalid.Inverter is in general control mode.

1: Enabled

It is suitable for constant pressure water-supply system.For example: life and production constant pressure water-supply system, municipal water-supply system and sewage processing system. In other familiar systems,such as constant pressure oil-supply,constant pressure HVAC, it is available too.

Notice: when P8.00 is set to be 1, PID is the default as frequency given.and other frequency sources determined by P0.02-P0.05 are invalid.

Function Code

Name **Description**

CONVERT-PUMP

Setting Range

Factory Setting

P8.01

SEL

0~1 0~1 0

0: Fixed FRQ conversion-pump

Fix one pump as a variable-frequency pump which is drived directly by inverter, and others are grid-frequency pump which are controlled by programmable relay.

So, CHV160A can drive 1 variable-frequency pump and 9 grid-frequency pumps at most.

1: Circular FRQ conversion-pump

Only one pump can be used as an variable frequency pump, and others are as grid-frequency pumps at the same time, the variable frequency pumps can be in turn.

So CHV160A can dirve 4 avariable-frequency pumps and 2 grid-frequency pumps at most.

Function Code	Name	Description	Setting Range	Factory Setting
P8.02	H,I SEL	0~3	0~3	3

0: Disabled

1: H pump enabled

2: I pump enabled

3: H, I both enabled.

Function Code	Name	Description	Setting Range	Factory Setting
P8.03	PUMP A SEL	0~4	0~4	0
P8.04	PUMP B SEL	0~4	0~4	0
P8.05	PUMP C SEL	0~4	0~4	0
P8.06	PUMP D SEL	0~4	0~4	0
P8.07	PUMP E SEL	0~4	0~4	0
P8.08	PUMP F SEL	0~4	0~4	0
P8.09	PUMP G SEL	0~4	0~4	0

0: Pump invalid.

The corresponding pump is not installed or does not work.

1: Variable frequency CON pump

The corresponding pump is started by inverter.When it can not be switched,the pump can adjust the output automatically as variable adjust pump to make sure that the pressure to be constant.

When fulfilling the switching requirement, the pump will switch to run at grid-frequency or stop running.

NOICE: When P8.01=0, and A-G pumps are set as variable frequency pumps,the corresponding pump will be invalid.

2: Power frequency pump

The pump only run at grid-frequency, when the capacity of power network is big enough and the power of pump is less than 15kW, the pumps will be started with total voltage directly.If the power of pump is greater than 18.kW, it is suggested to start with buck

start-up mode, such as Star-Delta step-down start, Auto coupling step-down start and soft start, so as to reduce impact on pipe network and power network system.

3: Dedicated dormant pump

When dormancy conditions are fulfilled, the system will be on the dormancy running status, and start the dormancy grid-frequency pump to maintain the pressure of pipe network.The dormancy pump won't be running until the system exits dormancy status.

4: Dedicated dredge pump

It is a grid-frequency pump, when waterlevel of Sewage-pool control function is enabled, and water level sensors are installed correctly, system will start and stop of sewage pump according to the detected water-level signals (which are).

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Function Code	Name	Description	Setting Range	Factory Setting
P8.10	TOLERA	0.0~30.0%	0.0~30.0	10.0%
P8.11	PUMP ADD FREQ	P8.16~P0.07	P8.16~P0.07	50.00Hz

P8.12	PUMP ADD		
P8.13	DELAY SWITCH FREQUENCY	0~3600s	0~3600 5s
		0.0~P0.07	0.0~P0.07 50.00Hz

The four parameters set the conditions of adding pump.

1: When frequency of variable-frequency pump reach the frequency of P8.11,at the same time, ,pressure feedback value<pressure set value-pressure tolerance,and it lasts for delay time (determined by P8.12),then the system adds pump.

2: 100% of pressure tolerance is corresponding with P3.02 (Maximum of PID).

3: P8.11 is a threshold frequency to add pump.When the pressure conditions are not satisfied, pump-added logic isstarted, which is as follow:

Add variable-frequency pump: Switch current variable-frequency pump to be a grid-frequency pump and start a new variable–frequency pump.

Add grid-frequency pump: Start the pumps using programmable relay ,at the same time, the current variable-frequency pump decelerate to the frequency of minusing pump according to the setted deceleration time determinded by P8.14, and then go on running with PID control.

It can stabilize fluctuate of system pressure and decreace pressure jump when add pump.

4: P8.13 switching frequency of variable-frequency pumps.

In the switch process, there is delay time from disconnecting variable-frequency contactor to closeing grid-frequency contactor, so variable-frequency pump will accelerate to a higher frequency (which is the switch frequency) before switching in order to make up the

depreciation of pipe network pressure in the delay time.

The switch process is as follow: Variable-frequency pump accelerates to the switch frequency, stops output and disconnects the contactor,finally closes grid-frequency contactor.

Function Code	Name	Description	Setting Range	Factory Setting
P8.14	VFP DECELER TIME	0.0~100.0%	0.0~100.0	10.0s

The conditions of adding pump are satisfied,if the added pump is grid-frequency pump,the variable-frequency pump should decelerate to the frequency of minusing pump according with the setting deceleration time,and goes on carring out with PID control.In the process,the deceleration time is set by P8.14.

Function Code

Name	Description			
PUMP REDU TOLERA				
Setting Range	0.0~30.0			
Factory Setting	10.0%			
P8.15	0.0%~30.0%			
P8.16	PUMP REDU FRQ	P8.08~P8.11	P8.08~P8.11	5.00Hz
P8.17	PUMP REDU DELAY	0~3600	5s	
0~3600s				

The three parameters set the conditions of reducing pump.

1: When frequency of variable-frequency pump reach the frequency (determined by P8.16), at the same time, feedback pressure >setting pressure+pressure toleranceand it lasts for delay time (determined by P8.17), then system starts to reduce pump.

2: 100% of the pressure tolerance is corresponding to P3.02 (Maximum of PID).

3: Running frequency of pump reduced

When there are some grid-frequency pumps running, what is more variable-frequency pump decelerate to the frequency of pump reduced, and it last for delay time (determined by P8.17), when these conditions are satisfied, it starts to reduce pump.

Reduce grid-frequency pump: Resect the pump with programmable relay, and the current variable-frequency pump accelerate to the frequency of pump reduced according to the setted acceleration (determined by P8.18), and go on running with PID control.

It can stabilize fluctuate of system pressure when reduces pumps.

Function Code	Name	Description		
VFP ACCELER Setting Range Factory Setting P8.18	TIME			
0.0~100.0%		0.0~100.0	10.0s	

When the conditions of reducing pump are satisfied, the system will cut grid-frequency pump off. The variable frequency pump should accelerate to the frequency of pump added according to the acceleration time, and then go on running with PID control. In the

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process, the acceleration time of variable frequency pump determined by this code.

Function Code	Name	Description
Setting Range Factory Setting		

P8.19	CLOSE DELAY	0.1~9.9%	0.1~9.9	0.5s
P8.20	TRIP DELAY	0.1~9.9%	0.1~9.9	0.5s

It's considered that there are mechanical delay time when contactor closes or opens,even more there are remanence when vairale frequency pump switch to run at grid frequency which may make the action failure. The parameters above are used to solve these problems.

1: Before inverter enables the next available frequency pump,it will send contactor closing command, there are time difference between command has been sent and the inverter starts to output by reason of mechanical delay,that's contactor closing time.

2: The contactor opening time is time defferece from the inverter outputs coast to stop command to inverter outputs grid-frequency contactor closing command.it normally used for which the power of pump is greater than 45kW and the variable-frequency pump needs to be switched to run at grid frequency,It can minish switching current and improve the success percentage of switching.

Function Code	**Name**	**Description**	**Setting Range**	**Factory Setting**
P8.21	PID SLEEP SEL	0: Dormancy enabled AWOKE 1: Running at lower limit		

FRQ

0~1 0
P8.22

TOLERA
P8.10~60.0% P8.10~60.0 10.0%

P8.23 AWOKE DELAY 0~3600s 0~3600 5s

When dormancy function is available, One-and-only-one available frequency pump is running, and the status is eligible for pump reduced condition (include the delay time of pump reduced), the available frequency pump start to sleep and stand by,the system enters dormancy state. If there is sleep lower power pump, it will start to run automatically and keep running till system exists dormancy state.

In the dormancy state, pressure feedback < setting pressure-pressure tolerance of dormancy awaked, and it lasts for the delay time (determined by P8.23), the dormancy state quits, and dormancy pump stops, variable frequency pump starts.

Notice: 100% of the P8.22 is corresponding with P3.02 (Maximum of PID).

Function Code **Name** **Description**

PFP ROU-ROB
Setting Range
Factory Setting

P8.24

PER
0.0~6553.5 0.0~6553.5 0.0h

The parameter set the timing circulation period of grid-frequency pump.

0: Invalid.

Pumps switching logic is First-In-First-Out.

Not 0: Valid.

The setting value is circulation period.It is sugguested that the function should be selected when capacitys of each grid-frequency pump are almost the same(except sewage pump and dormancy pump).

If there are two or more grid-frequency pumps,so all pumps(except sewage pump and dormancy pump) will join the rotation,no rotation if there is only one grid-frequency pump.

Function Code

Name **Description**

VFP ROU-ROB

Setting Range

Factory Setting

P8.25

PER
0.0~6553.5 0.0~6553.5 0.0h

The setting is similar with P8.24; please refer it for the details.

Function Code

Name **Description**

SW FREQ

Setting

Range

Factory

Setting

P8.26

MANUAL

0~P0.07 0~P0.07 50.00Hz

When use manual soft start, the parameter sets the running frequency of inverter before switching to grid-frequency pump.

Function Code

Name **Description**

W IEVEL SI

Setting

Range

Factory

Setting

P8.27

INPUT

0~2 0~2 0

The parameter is set to whether control level of inlet pool or not.

0: No input.

1: Input by digital input termi

The level control signal is switch value.

2: Input by analog input terminal

Level signal input channel is selected by P8.28, and level limit is confirmed by

P8.29~P8.31.

Level control mode:

1: When pool level changes from high to low, and the level is higher than lower limit level, system runs with normal setting pressure mode.When the level is lower than lower limit level and higher than water shortage level, system runs with abnormal spare pressure mode (determined by P8.32); when the level is lower than water shortage level, system stop running.

2. When pool level changes from low level to high level, system do not run when the level is lower than the lower limit level, when the level is higher than lower limit level and lower than the upper limit level, system run with spare pressure mode(determined by P8.32); When the level is higher than upper limit level, system returns to run with normal pressure.

Function Code	Name	Description	Setting Range		Factory Setting
		Figure 6.16 Level change and pressure given			
		0:AI1 input			
P8.28	WL SI ANAL INPUT	1:AI2 input 2:Modbus input	0~2		0
P8.29	UP W IEVEL LTD	0.0~100.0%	0.0~100.0		60.0%
P8.30	Low W IEVEL LTD SHORTAGE W	0.0~P8.29	0.0~P8.29		40.0%
P8.31	LEVELshortage level	0.0~P8.30	0.0~P8.30		20.0%

The pressure percentage is relative to 100% of pool feedback pressure.

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Function Code	Name	Description	Setting Range	Factory Setting
P8.32	PRESSURE BACKUP	0~100.0%	0~100.0	0.0%

Known by the aforementioned, when the pool level is lower than the lower limit level, spare pressure is needed so as to avoid that the level draw too fast and even that pump run without load.

100% of the P8.22 is corresponding with P3.02 (Maximum of PID).

Function Code	Name	Description	Setting Range	Factory Setting
P8.33	FAULT HANDLING	0-1		0

The function code defines the actions in event of the failure.

0: Breakdown of the entire system.

1: To next VFP. No VFP, then PFP.

Current variable frequency pump (which is) at fault is resected automaticly, and switched to next variable-frequency pump.

If there is only one variable-frequency pump, system stops running.

2: Reserved.

Notice: If the fault automatic reset function is enable, after system resets for times set, if the fault is not cleared out, the system will deal with it according to the mode set by this function code.

Function Code	Name	Description	Setting Range	Factory Setting
P8.34~P8.39	Reserved		0~65535	0

P9 Group--Timing Watering and Multi-given Function Group

Function Code	Name	Description	Setting Range
	CURRENT		

Factory

Setting
P9.00

MOMENT
0.00~23.59 0.00~23.59

Set and display current time, users can modify the parameter to set the time,the meaning is as follows:

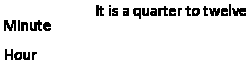

Figure 6.17 meaning of time display

The time is the base standard for setting multi-pressure time, the parameter will update as real-time.

Notice: The system will run constantly when the inveter is power-off, if the clock is stop, please check the battery of control board.

Function Code

Name **Description**

PRESSURE
Setting
Range

Factory Setting P9.01

STEPS 1~8 1~8 1

The parameter set the segment numbers of pressure, only T1 is the default, namely one pressure segment is effective all day.When several segments are selected, it means multi-segment pressure is effective, and the setting is repeated everyday.

The parameter is for setting the pressure segment and corresponding pressure.

1. Principle of setting time: T1≤T2≤T3≤T4≤T5≤T6≤T7≤T8

2. Segment T1 is the time from threshold T1 to threshold T2, segment T2 is the time from threshold T2 to threshold T3, and so forth, segment T8 is the time from threshold T8 to threshold T1.

3. If threshold of one segment is same as ultimate of previous segment, the segment is invalid, and they are merged as one segment.

4. If the segments are equal, only one segment is effective everyday.

Function Code	Name	Description	Setting Range	Factory Setting
P9.18	MULTI SET 0	0.0～100.0%	0.0～100.0	0.0%
P9.19	MULTI SET 1	0.0～100.0%	0.0～100.0	0.0%
P9.20	MULTI SET 2	0.0～100.0%	0.0～100.0	0.0%
P9.21	MULTI SET 3	0.0～100.0%	0.0～100.0	0.0%

P9.22	MULTI SET 4	0.0～100.0%	0.0～100.0	0.0%
P9.23	MULTI SET 5	0.0～100.0%	0.0～100.0	0.0%
P9.24	MULTI SET 6	0.0～100.0%	0.0～100.0	0.0%
P9.25	MULTI SET 7	0.0～100.0%	0.0～100.0	0.0%
P9.26	MULTI SET 8	0.0～100.0%	0.0～100.0	0.0%

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Function Code	Name	Description	Setting Range	Factory Setting
P9.27	MULTI SET 9	0.0～100.0%	0.0～100.0	0.0%
P9.28	MULTI SET 10	0.0～100.0%	0.0～100.0	0.0%
P9.29	MULTI SET 11	0.0～100.0%	0.0～100.0	0.0%
P9.30	MULTI SET 12	0.0～100.0%	0.0～100.0	0.0%
P9.31	MULTI SET 13	0.0～100.0%	0.0～100.0	0.0%
P9.32	MULTI SET 14	0.0～100.0%	0.0～100.0	0.0%
P9.33	MULTI SET 15	0.0～100.0%	0.0～100.0	0.0%

100.0% of pressure given is corresponding to maximum of PID,when P3.06 is set to be 5,the pressure segment is defined by the combination of multi-segment pressure terminals,the corresponding relation between multi-segment pressure and terminals(S1、

S2、S3、 S4) is as follow:

S1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
S3	OFF	OFF	OFF	OFF	ON	ON	ON	ON
S4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Segment	0	1	2	3	4	5	6	7
S1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
S3	OFF	OFF	OFF	OFF	ON	ON	ON	ON
S4	ON	ON	ON	ON	ON	ON	ON	ON
Segment	8	9	10	11	12	13	14	15

Function Code	Name	Description	Setting Range	Factory Setting
P9.34~ P9.37	Reserved		0~65535	0~65535 0

PA Group--Protection Parameters

Function Code	Name	Description
		0: Disabled

Setting

Range

Factory

Setting

PA.00 IN PHASE FALL

1: Enabled
0~1 1

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Function Code **Name** **Description** **Setting** **Range** **Factory Setting**

PA.01

OUT PHASE FALL

0: Disabled

1: Enabled

0~1 1

Notice: Please be cautious to set these parameters as disabled. Otherwise it may cause inverter and motor overheat even damaged.

Function

Code

Name **Description**

0: Disabled

Setting

Range

Factory

Setting

PA.02
MOTOR
OVERLOAD

1: Normal motor

2: Variable frequency motor

0~2 2

1: For normal motor, the lower the speed, the poorer the cooling effect. Based on this reason, if output frequency is lower than 30Hz, inverter will reduce the motor overload protection threshold to prevent normal motor from overheat.

2: As the cooling effect of variable frequency motor has nothing to do with running speed, it is not required to adjust the motor overload protection threshold.

Function

Code

Name **Description**

OVERLOAD

Setting

Range

Factory

Setting
PA.03

CURR
20.0%~120.0% 20.0~120.0 100.0%

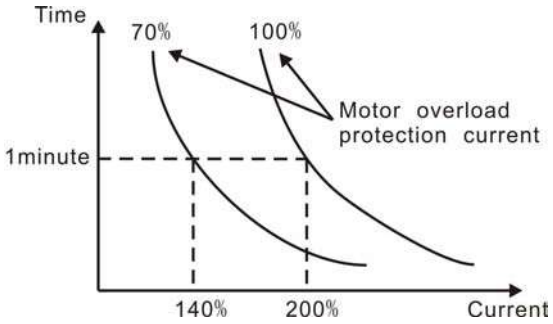


Figure 6.18 Motor overload protection curve.

The value can be determined by the following formula:

Motor overload protection current = (motor rated current / inverter rated current) * 100%.

Notice:

- **This parameter is normally used when rated power of inverter is greater than rated power of motor.**

- **Motor overload protection time: 60s with 200% of rated current. For details, please refer to above figure.**

Function Code

Name	Description	Setting Range	Factory Setting
OL WARN			
PA.04			
PA.05			
PA.06			
CURR			
OL WARN SELECT			
OL WARN DELAY			
20.0%~150.0%		20.0~150.0	110.0%
0: Always based on I motor 1: Detect based on I motor 2: Always based on I INVE 3: Detect based on I INVE		0~3	0
0.0~30.0s		0.0~30.0	5.0s

The value of PA.05 determines the pre-warning category, such as motor overload (OL1) or inverter overload (OL2).

PA.04 determines the current threshold of pre-warning actionn, it is a percentage of the rated current. When output current of inverter exceeds the value of PA.04 and last the duration determined by PA.06, inverter will output a pre-warning signal. Please refer to following diagram:

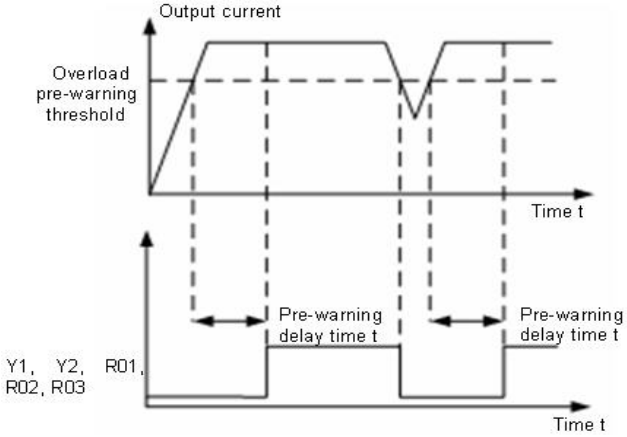


Figure 6.19 Overload pre-warning schematic diagram.

Function Code	Name	Description	Setting Range	Factory Setting
PA.07	TRIPFREE			

POINT

230.0V~600.0V 230.0~600.0 450.0V

Function Code	Name	Description	Setting Range	Factory Setting
PA.08	DECRATE	0.00Hz~P0.07	0.00~P0.07	0.00Hz

If Pb.08 is set to be 0, the trip-free function is invalid.

Trip-free function enables the inverter to perform low-voltage compensation when DC bus voltage drops below Pb.07. The inverter can continue to run without tripping by reducing its output frequency and feedback energy via motor.

Notice: If Pb.08 is too big, the feedback energy of motor will be too large and may cause over-voltage fault. If Pb.08 is too small, the feedback energy of motor will be too small to achieve voltage compensation effect. So please set Pb.08 according to load inertia and the actual load.

Function Code	Name	Description

Setting

Range

Factory

Setting

PA.09

OVER VOLT STALL

OV PROTECT

0: Protection forbidden

1: Protection permitted

0～1 0

PA.10

POINT

120～150% 120～150 125

During the process of deceleration, the load inertia may cause the actual that drop rate of motor speed is lower than the output frequency drop rate, and thereby the motor generates electricity and feeds it back to the inverter, causing the inverter bus voltage going up and even bus over-voltage breakdown which then can cause inverter tripping if no provision is made.

Over-voltage stall protection function is to detect the bus voltage and compare it with the stall over-voltage point defined by Pb.10 (relative to the standard bus voltage). If it exceeds the over-voltage stall point, inverter output frequency stop going down, and when the next bus voltage detected is lower than the over-voltage stall point, the inverter continues to decelerate, as shown by following figure.

Function Code

Figure 6.20 Over-voltage stall function

Name	Description	Setting
	0: Disabled	

Range

Factory Setting

PA.11 OVER CURR

OC

1: Enabled
0~1 1

PA.12

PA.13

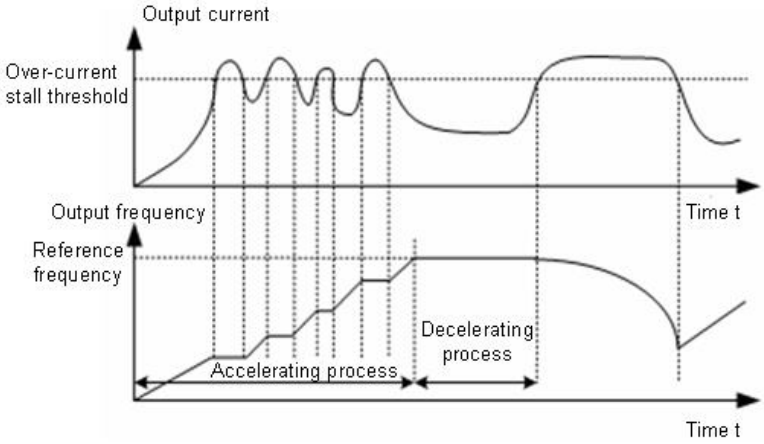
THRESHOLD

FREQ DEC RATE
100~200% 100~200 160%

0.00~50.00Hz/s 0.00~50.00 1.00Hz/s

During acceleration of inverter, the actual motor speed rise rate may lower than the output frequency rise rate because of too big load. If no measures to take, inverter will trip caused by over-current.

The principle of over-current protection is to detect the output current of inverter during inverter operation and compare it with over-current stall threshold determined by PA.12. If it exceeds the value of PA.12 during acceleration, inverter will remain output frequency; if it exceeds the value of PA.12 during constant speed running, inverter will decrease output frequency. When output current of inverter is lower than the value of PA.12, inverter will continue to accelerate until output frequency reach frequency reference. Please refer to following diagram.



Function

Code

Figure 6.21 Over-current stall function.

Name **Description**

OVER PRESS

Setting

Range

	Factory Setting		
PA.14	VALUE	0.0~100.0%	0.0~100.0 90.0%
PA.15	OVER PRESS DELAY	0~3600	0~3600 500s
PA.16	UNDER PRES VALUE	0.0~100.0%	0.0~100.0 10,0%
PA.17	UNDER PRES DELAY	0~3600	0~3600 500s

The parameters are to set the pressure and judgment time of over-pressure and under pressure.

When the pressure of pipe network reaches the over- pressure threshold (determined by PA.14), and it lasts for delay time (determined by PA.15), the system output alarm signal(OP).After it, when the pressure is lower than the over- pressure threshold and it also lasts for delay time (determined by PA.15), the alarm signal can be

eliminated.Under- pressure judgement is similar to over- pressure,and the alarm signal is "UP".

Function Code	Name	Description	Setting Range	Factory Setting
PA.18~ PA.22	Reserved	0~65535	0~65535	0

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Pb Group --Serial Communication

Function Code	Name	Description	Setting Range	Factory Setting
Pb.00		LOCAL		

ADDRESS
1～247 1～247 1

When the master is writing the frame, if the communication address of the slave is set to be 0 (that is the broadcast communication address), all slaves on the MODBUS bus will receive the frame, but the slaves will not make any response. Note that the slave address should not be set to be 0.

The local communication address is a unique address in the communication network. This is the basis for point-to-point communications between the upper computer and the inverter.

Function Code

Name **Description**

0: 1200BPS
1: 2400BPS
2: 4800BPS

Setting Range

Factory Setting

Pb.01 BAUD RATE

3: 9600BPS
4: 19200BPS
5: 38400BPS

0～5 4

This parameter is used to set the data transmission rate between the upper computer and the inverter.

Notice: The baud rate setting of the upper computer should be the same as that of

the inverter. Otherwise, communications cannot be implemented. The higher the baud rate, the faster the communication speed is.

Function Code **Name** **Description**

Setting Range

0: No parity (N,8,1) for RTU

1: Even parity (E,8,1) for RTU

Factory Setting

Pb.02 DATA FORMAT

2: Odd parity (O,8,1) for RTU

3: No parity (N,8,2) for RTU

0～8 1

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Function Code **Name** **Description**

4: Even parity (E,8,2) for RTU

5: Odd parity (O,8,2) for RTU

6: No parity (N,7,1) for ASCII

7: Even parity (E,7,1) for ASCII

8: Odd parity (O,7,1) for ASCII

Setting

Range

Factory

Setting

The data format setting of the upper computer should be the same as that of the inverter. Otherwise, communications cannot be implemented.

Function Code

Name **Description**

COM DELAY

Setting

Range

Factory

Setting

Pb.03

TIME

0～200ms 0～200ms 5ms

Reply delay: refers to the interval time between the end of data receiving of the inverter

and the reply data sending of the upper computer. If the reply delay time is less than the system processing time, take the system processing time as reply delay reference. If the reply delay is longer than the system processing time, after data processing, the system has to wait until the reply delay time is reached before sending data to the upper computer.

Function Code	Name	Description	Setting Range	Factory Setting
Pb.04	COM TIMEOUT	0.0～100.0	0.0～100.0	0.0s

If the functional code is set to 0.0s, the communication delay time parameter is disabled. When the functional code is set to be a valid value, if the interval between the current communication and the next communication exceeds the communication delay time, the system will send a communication fault error (CE).

Normally, it is set to be “disabled”. If this parameter is set in a consecutive communication system, communication status can be monitored.

Code

Name **Description**
Setting

Range
Factory

Setting

Pb.05

RESPONSE ACTION

0: enabled

1: Disabled

0～1 0

Selecting whether replying or not to master command.

Function Code **Name** **Description**

TRANSFERS

Setting

Range

Factory

Setting

Pb.06

ERROR
0~3 0~3 1

0: Alarm and coast to stop

1: No alarm continue run

2: Com mode no alarm stop

3: Any mode no alarm stop

Select inverter operating status to shield CE fault and shut down or continuing running, in which way inverter can continue running when communication fault.

Function Code	Name	Description	Setting Range	Factory Setting
Pb.07~ Pb.09	Reserved		0～65535	0～65535	0

PC Group --Enhanced Function

Function Code	Name	Description	Setting Range	Factory Setting
PC.00	JOG REF	0.00~P0.06	0.00~ P0.06	5.00Hz
PC.01	JOG ACC TIME	0.0~3600.0s	0.0~3600.0	20.0s
PC.02	JOG DEC TIME	0.0~3600.0s	0.0~3600.0	20.0s

The meaning and factory setting of P8.06 and P8.07 is the same as P0.10 and P0.11. No

matter what the value of P1.00 and P1.05 are, jog will start as start directly mode and stop as deceleration to stop mode.

Function Code	Name	Description	Setting Range	Factory Setting
PC.03	SKIP FREQ 1	0.00~P0.07	0.00~P0.07	0.00Hz
PC.04	SKIP FREQ 2	0.00~P0.07	0.00~P0.07	0.00Hz
PC.05	SKIP FREQ RANGE	0.00~P0.07	0.00~P0.07	0.00Hz

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By means of settinzg skip frequency, the inverter can keep away from the mechanical resonance with the load. PC.03 and PC.04 are centre value of frequency to be skipped.

Notice:

- **If PC.05 is 0, the skip function is invalid.**
- **If both PC.03 and PC.04 are 0, the skip function is invalid no matter what PC.05 is.**
- **Operation is prohibited within the skip frequency bandwidth, but changes during acceleration and deceleration are smooth without skip.**

- **The relation between output frequency and reference frequency is shown in following figure.**

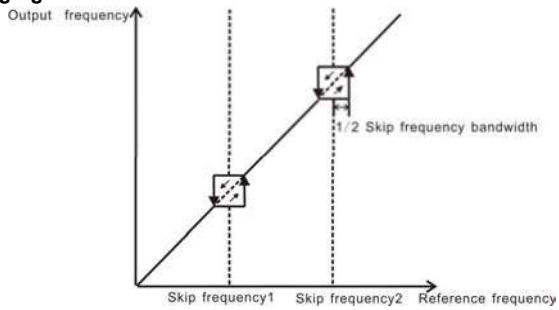

Figure 6.22 Skip frequency diagram.

Function Code	Name	Description	Setting Range	Factory Setting
PC.06	TIMES	0~3	0~3	0
PC.07	FAULT ACTION	0: Disabled		

RESET

1: Enabled
0~1 0
PC.08

INTERVAL
0.1~100.0s 0.1~100.0 1.0s

Auto reset function can reset the fault in preset times and interval. When PC.06 is set to be 0, it means “auto reset” is disabled and the protective device will be activated in case of fault.

PC.07 defines if fault relay active or not during auto reset. If continuous production without interruption is needed, please set PC.07=0.

Notice:

- **The fault such as OUT 1, OUT 2, OUT 3, OH1 and OH2 cannot be reset automatically.**

- **If fault has not occurred for ten minutes after the fault is reset, inverter will automatically clear the previous times of auto reset.**

Function Code

Name **Description**

Setting Range

Factory Setting

PC.09	RUNNING TIME	0~65535h	0~65535	65535 h

If function of output terminal is set as running time reached, when the accumulated running time reaches the preset running time, it will output an ON-OFF signal.

Function Code	Name	Description	Setting Range	Factory Setting
PC.10	FDT LEVEL	0.00~ P0.06	0.00~ P0.06	50.00Hz
PC.11	FDT LAG	0.0~100.0%	0.0~100.0	5.0%

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

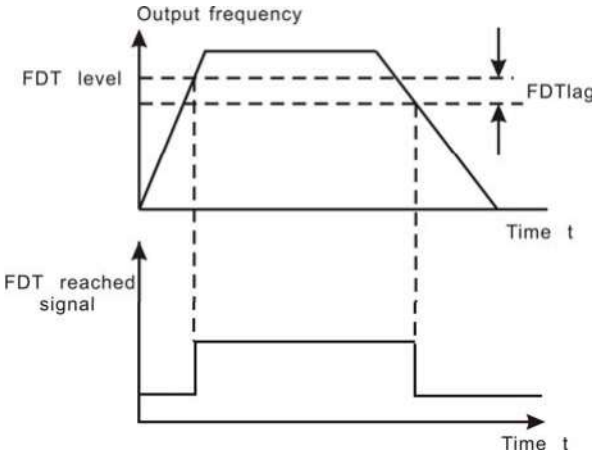

Figure 6.23 FDT Level diagram

Function Code	Name	Description	Setting Range	Factory Setting
PC.12	FAR RANGE	When output frequency is within the detecting range of reference frequency, an ON-OFF	0.0~100.0% (maximum frequency)	0.0~100.0	0.0%

signal will be output.

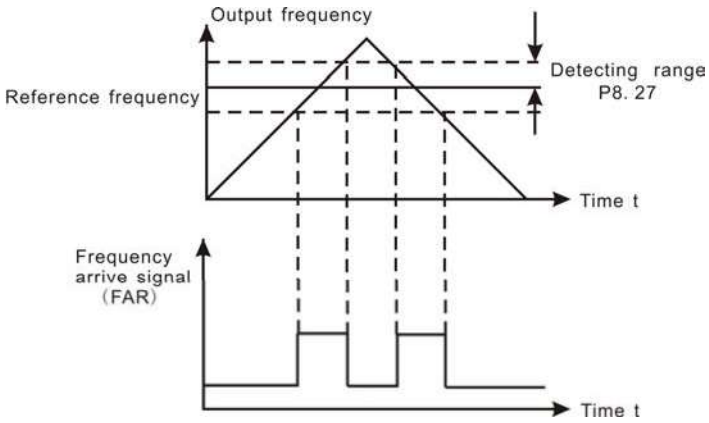

Figure 6.24 Frequency arriving detection diagram.

Function Code	Name	Description	Setting Range	Factory Setting
			320.0~750.	

PC.13 BRAK VOLT 320.0~750.0V
700.0V
0

When the DC bus voltage is greater than the value of PC.13, the inverter will start dynamic braking.

Notice:

- Factory setting is 380V if rated voltage of inverter is 220V.
- Factory setting is 700V if rated voltage of inverter is 380V.
- The value of PC.13 is corresponding to the DC bus voltage at rated input voltage.

Function Code **Name** **Description**

LO FREQ
Setting
Range
Factory
Setting
PC,14

PC.15
RESTRAIN
HI FREQ RESTRAIN
0~10 0~10 2

0~10 0~10 0

The smaller the value of P8.33 and P8.34, the stronger the restraining effect.

Notice: Most motor may have current oscillation at some frequency point. Please be cautious to adjust these parameters to weaken oscillation.

Function Code	Name	Description	Setting Range	Factory Setting
PC.16~				
PC.17	Reserved	0~65535	0~65535	0

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Pd Group--PID Enhanced Function

Function Code	Name	Description	Setting Range	Factory Setting
Pd.00	PID SWITCH	SEL	0~4	0

0: Switch disenabled, PID of P3 is the default, and PID of PD is invalid.

1: Switch by terminal, when multi-function terminal for PID switching is valid, PID1 defined by PID is invalid; PID0 defined by P3 is invalid.

2: Switch by AI1

3: Switch by AI2

4: Switch by Modbus

PID comparison switch:

When the comparison value is greater than threshold value of PD.01 and it lasts for the time (determined by PD.02), PID parameter is switched from PID0 to PID1.

When the comparison value is lower than threshold value of PD.01 and it lasts for the time (determined by PD.03).PID parameter is switched from PID1 to PID0.

Function Code

Name **Description**

PID SWITCH

Setting Range

Factory Setting

Pd.01

POINT

0.0~100.0% 0.0~100.0 50.0%

The parameter set the comparison threshold value of PID switch.

Function Code

Name **Description**

Setting

Range

Factory

Setting

Pd.02 PID-0 TO PID-1 T 0.00~100.00 0.00~100.00 0.50s

When the conditions are meet,switch PID0 to PID1 after the delay time.

Function

Code

Name **Description**

PID-1 TO

Setting

Range

Factory

Setting

Pd.03

PID-0 T

0.00~100.00 0.00~100.00 0.50s

When PID1 is valid and the conditions are satisfied, switch PID1 to PID0 after the delay time.

Function

Code

Name **Description**

PROPORTION

Setting

Range

Factory

Function Code	Name	Description	Setting Range	Factory Setting
Pd.04	GAIN1	0.00~100.00	0.00~100.00	0.10s

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Function Code	Name	Description	Setting Range	Factory Setting
Pd.05	INTEGRAL TIME 1	0.01~10.00s	0.01~10.00	0.10s
Pd.06	DIFFERENTI TIME1	0.00~10.00	0.00~10.00	0.00s
Pd.07	SAMPLING CYCLE 1			

0.00~10.00s		0.00~10.00	0.00s	
Pd.08	BIAS LIMIT 1	0.0~100.0%	0.0~100.0	0.0%
Pd.09	OUTPUT FILTER 1			
0.0~3600.0s		0.0~3600.0	1.0s	

When PID1 is valid, the parameters are valid, please refer P3 for the details.

Function Code	Name	Description	Setting Range	Factory Setting
Pd.10~ Pd.29	Reserved	0~65535	0~65535	0

PE Group—Factory Setting

This group is the factory-set parameter group. It is prohibited for user to access.

7. TROUBLE SHOOTINGT

7.1 Fault and trouble shooting

Fault Code	Fault Type	Reason	Solution
OUT1	IGBT Ph-U fault	1. Acc/Dec time is too short. 2. IGBT module fault.	1. Increase Acc/Dec time. 2. Ask for support.
OUT2	IGBT Ph-V fault		

OUT3	IGBT Ph-W fault	
	Over-current	
3. Malfunction caused by interference.		
4. Grounding is not properly.		
Acceleration time is too short.		
The voltage of power		
3. Inspect external equipment and eliminate interference.		
Increase acceleration time.		
OC1		
OC2		
OC3 when		

acceleration

Over-current when deceleration

Over-current when constant speed running

network is lower.

The power of inverter is lower.

Deceleration time is too short.

The inertial torque of load is too heavy.

The power of inverter is lower.

The mutation and the abnormal of load.

The voltage of power network is lower.

The power of inverter is

lower.
Check the input power.

Select bigger capacity inverter.

Deceleration time is too short.

Added suitable energy braking component is in need.

Select bigger capacity inverter.

Check the load.

Check the input power.

Select bigger capacity inverter.

Over-voltage

Abnormal input voltage. Check the input power

OV1

when acceleration

Restart the rotary motor when power fail suddenly

Avoid restarting the motor.

OV2 Over-voltage

Deceleration time is too Deceleration time is too

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Fault Code	Fault Type	Reason	Solution
		short.	short.
		when deceleration	
		The inertia of load is too heavy.	
		Increase the energy braking component	
		Abnormal input voltage.	Check the input power.
		Abnormal change	
	OV3		

UV

Over-voltage when constant speed running

Bus

Undervoltage

happened in input voltage.

The inertia of load is too heavy.

The voltage of power network is lower.

The voltage of power network is lower.

The rated current of motor

isn't correct.
Install input reactor.

Added suitable energy braking component is in need.

Check the input power.

Check it.

Reset the rated current of motor.

OL1 Motor overload

Inverter

The mutation of locked

rotor or load of motor is too large.

Motor drive heavy load at low speed for a long time.

Acceleration time is too short.

Restart the rotary motor

The voltage of power network is lower.

Check the load,and adjust the lifting capacity of torque.

Select variable frequency motor.

Increase acceleration time.

Avoid restarting the

rotary motor when power fail.

Check it.

OL2

overload

Load is too heavy

The direction of code disc is reverse and running with a low speed for a long time

with closed loop vector
control.
Select bigger capacity inverter.

Adjust the direction of code disc signal.

Fault Code	Fault Type	Reason	Solution
SPI			Check the input power
SPO			

OH1
Input phase
failure

Output phase failure

Rectifier module overheat
Input phases(R,S,T) are
failure

Output phases (U, V, W)
are failure.
Pre-excitation can not be over during pre-excitation if the inverter is
disconnected to the motor.

Transient overcurrent

Three output phases has interphase or grounding short-circuit.

The duct is blocked or the fan is damaged.

Ambient temperature is too high.

The wiring or the plug-in of control board is loose.

The auxiliary power is damaged,and the drive voltage is undervoltage.

The bridge arm of power module is direct.

The control board is

abnormal.

Check the wiring,and installation,

Check the output wiring.

Check the motor and cable.

Refer the solution of overcurrent.

Re-wiring.

Dredge the duct or replace the fan

Install cooling unit.

Check and wiring again.

Ask for help.

Ask for help.

Ask for help.

OH2 IGBT overheat

The control board is abnormal.

Ask for help.

EF External fault

Si External fault input terminal take effect.

Inspect external equipment.

CE Communication fault

Improper baud rate setting. Set proper baud rate.

Receive wrong data Press STOP/RST to

Fault Code	Fault Type	Reason	Solution
			reset, ask for support.

	Current	
Communication is interrupted for long time.		
connectors of control board are loose		
The auxiliary power is damaged		
Check communication interface wiring.		
Check the connectors and re-wiring.		
Ask for support.		
	ITE	
detection fault		
Hall sensor is damaged.		Ask for support.
Amplifying circuit is		
	OPSE	System fault
	EEP	EEPROM fault
abnormal.		
Autotuning overtime.		
Control panel is abnormal for strong interference		
Fault of control panel for noise		

Read/Write fault of control

parameters.
Ask for support.

Check the wiring and the parameter setting.

Press STOP/RST to

reset,ask or add filter on the input side of power.

Press STOP/RST to

reset,ask for support.

Ask for support

EEPROM is damaged. Ask for support

Check the feedback

PIDE

PID feedback
Wiring is disconnected

wiring

fault Feedback source

disappear.

Braking circuit failure or brake tube damaged.

Check the feedback

source.

Inspect braking unit, replace braking tube.

BCE Brake unit fault

Trial time

-END-

		reached	
		Too low resistance of external connected braking resistor. Trial time which determined by factory reached.	Increase braking resistance.
			Contact supplier and ask for support.
LCD-E	LCD is disconnected	LCD is disconnected,the upload and download of parameter is carried out.	Press STOP/RST to reset, connect LCD then download or upload parameter.
TI-E	Clock chip fault	Clock chip is damaged.	Ask for support.
	Reserved		

7.2 Common Faults and Solutions

Inverter may have following faults or malfunctions during operation, please refer to the following solutions.

No display after power on:

- Inspect whether the voltage of power supply is the same as the inverter rated voltage or not with multi-meter. If the power supply has problem, inspect and solve it.

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- Inspect whether the three-phase rectify bridge is in good condition or not. If the rectification bridge is burst out, ask for support.
- Check the CHARGE light. If the light is off, the fault is mainly in the rectify bridge or the buffer resistor. If the light is on, the fault may be lies in the switching power supply. Please ask for support.

Power supply air switch trips off when power on:

- Inspect whether the input power supply is grounded or short circuit. Please solve the problem.
- Inspect whether the rectify bridge has been burnt or not. If it is damaged, ask for support.

Motor doesn't move after inverter running:

- Inspect if there is balanced three-phase output among U, V, W. If yes, then motor could be damaged, or mechanically locked. Please solve it.
- If the output is unbalanced or lost, the inverter drive board or the output module may be damaged, ask for support..

Inverter displays normally when power on, but switch at the input side trips when running:

- Inspect whether the output side of inverter is short circuit. If yes, ask for support.
- Inspect whether ground fault exists. If yes, solve it.
- If trip happens occasionally and the distance between motor and inverter is too far, it is recommended to install output AC reactor.

- **Maintenance, inspection and replacement of parts must be performed only by authorized personnel.**
- **After turning off the main circuit power supply, waiting for 10 minutes before performance maintenance or inspection.**
- **DO NOT directly touch components or devices of PCB board. inverter can be damaged by electrostatic.**
- **After maintenance, all screws must be tightened.**

8.1 Daily Maintenance

In order to prevent the fault of inverter to make it operate smoothly in high-performance for a long time, user must inspect the inverter periodically (within half year). The following

(1)ambient temperature

40℃, otherwise, the rated values should be

decreased. Humidity

examination and

no traces of water

CHV160A series special inverter for water supply

Items to be hecked	Main inspections		Criteria
Inspection content		Frequency	Means/methods
			and smell.
Inverter			
Motor			

Operation status parameters

⑴vibration
⑵cooling and heating
⑶noise

⑴vibration
⑵heat
⑶noise

⑴power input voltage
⑵inverter output voltage
⑶inverter output current

⑷internal

temperature

⑴point

thermometer comprehensive observation

⑵listening

⑴comprehensiv

e observation

Listening

⑵point

thermometer

⑶listening

⑴voltmeter

⑵rectifying

voltmeter

⑶ammeter

⑷point

thermometer

⑴smooth operation

without vibration. ⑵fan

is working in good condition. Speed and air flow are normal. No abnormal heat.

⑶No abnormal noise

⑴No abnormal vibration

and no abnormal noise.

⑵No abnormal heat.

⑶No abnormal noise.

⑴satisfying the specification

⑵satisfying the specification

⑶satisfying the specification

⑷temperature rise is lower than 40℃

8.2 Periodic Maintenance

Customer should check the drive every 3 months or 6 months according to the actual environment

1. Check whether the screws of control terminals are loose. If so, tighten them with a screwdriver;

2. Check whether the main circuit terminals are properly connected; whether the mains cables are over heated;

3. Check whether the power cables and control cables are damaged, check especially for any wear on the cable tube;

4. Check whether the insulating tapes around the cable lugs are stripped;

5. Clean the dust on PCBs and air ducts with a vacuum cleaner;

6. For drives that have been stored for a long time, it must be powered on every 2 years.

When supplying AC power to the drive, use a voltage regulator to raise the input voltage to rated input voltage gradually. The drive should be powered for 5 hours without load.

7. Before performing insulation tests, all main circuit input/output terminals should be short-circuited with conductors. Then proceed insulation test to the ground. Insulation test of single main circuit terminal to ground is forbidden; otherwise the drive might be damaged. Please use a 500V Mega-Ohm-Meter.

8. Before the insulation test of the motor, disconnect the motor from the drive to avoid damaging it.

8.3 Replacement of wearing parts

Fans and electrolytic capacitors are wearing part, please make periodic replacement to ensure long term, safety and failure-free operation. The replacement periods are as follows:

◆Fan: Must be replaced when using up to 20,000 hours;

◆Electrolytic Capacitor: Must be replaced when using up to 30,000~40, 000 hour.

9. COMMUNICATION PROTOCOL

9.1 Interfaces

RS485: asynchronous, half-duplex.

Default: 8-E-1, 19200bps. See Group PC parameter settings.

9.2 Communication Modes

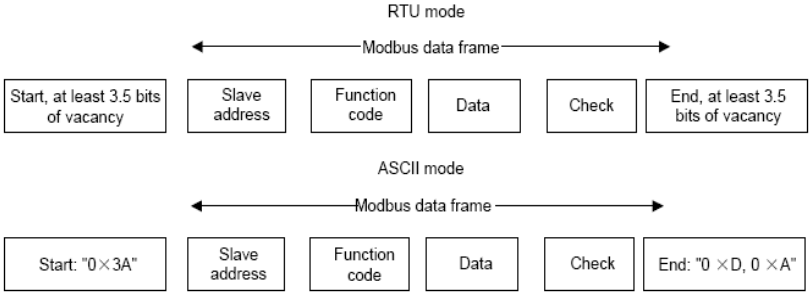
(1) The protocol is Modbus protocol. Besides the common register Read/Write operation, it is supplemented with commands of parameters management.

(2) The drive is a slave in the network. It communicates in 'point to point' master-slave mode. It will not respond to the command sent by the master via broadcast address.

(3) In the case of multi-drive communication or long-distance transmission, connecting a 100~120Ω resistor in parallel with the master signal line will help to enhance the immunity to interference.

9.3 Protocol Format

Modbus protocol supports both RTU and ASCII mode. The frame format is illustrated as follows:



Modbus adopts “Big Endian” representation for data frame. This means that when a numerical quantity larger than a byte is transmitted, the most significant byte is sent first.

RTU mode

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 table below shows the data frame of reading parameter 002 from slave node address 1.

Node addr.	Command	Data addr.		Read No.		CRC	
0x01	0x03	0x00	0x02	0x00	0x01	0x25	0xCA

The table below shows the reply frame from slave node address 1

Node addr.	Command	Bytes No.	Data	CRC

0x01	0x03	0x02	0x00	0x00	0xB8	0x44

ASCII mode

In ASCII mode, the frame head is “0x3A”, and default frame tail is “0x0D” or “0x0A”. The frame tail can also be configured by users. Except frame head and tail, other bytes will be sent as two ASCII characters, first sending higher nibble and then lower nibble. The data have 7/8 bits. “A”~“F” corresponds to the ASCII code of respective capital letter. LRC check is used. LRC is calculated by adding all the successive bytes of the message except the head and tail, discarding any carriers, and then two’s complementing the result.

Example of Modbus data frame in ASCII mode:

The command frame of writing 0x0003 into address “0x1000” of slave node address 1 is shown in the table below:

LRC checksum = the complement of (01+06+10+00+0x00+0x03) = 0xE5

	Frame head	**Node addr.**		**Command**		**Data addr.**			
Code		0	1	0	6	1	0	0	0
ASCII	3A	30	31	30	36	31	30	30	30
	Data to write			**LRC**		**Frame tail**			
0	0	0	3	E	5	CR		LF	
30	30	30	33	45	35	0D		0A	

9.4 Protocol function

Different respond delay can be set through drive’s parameters to adapt to different needs. For RTU mode, the respond delay should be no less than 3.5 bytes interval, and for ASCII mode, no less than 1ms.

The main function of Modbus is to read and write parameters. The Modbus protocol supports the following commands:

0x03	Read inverter’s function parameter and status parameters

0x06 Write single function parameter or command parameter to inverter

All drive's function parameters, control and status parameters are mapped to Modbus

R/W data address.

The data address of control and status parameters please refer to the following table.

Parameter

Description

Address	**Meaning of value**
	0001H: Forward 0002H: Reverse 0003H: JOG forward
R/W	
Feature	
Control command 1000H	
Inverter status 1001H	

Communication setting	2000H

Virtual terminal

0004H: JOG reverse

0005H: Stop

0006H: Coast to stop

0007H: Reset fault

0001H: Forward running

0002H: Reverse running

0003H: Standby

0004H: Fault

Communication Setting Range

(-10000~10000)

Note: the communication setting is the percentage of the relative value (-100.00%~100.00%). If it is set as frequency source, the value is the percentage of the maximum frequency (P0.06). If it is set as PID (preset value or feedback value), the value is the percentage of the PID.

Setting range: 00H~0FFH. Each bit

W/R

R

W/R
input function
setting
2001H
corresponds to S1~S8,
W/R
Status
parameters

3000H	Output speed	R
3001H	Reference speed	R
3002H	DC Bus voltage	R
3003H	Output voltage	R
3004H	Output current	R
3005H	Rotation speed	R
3006H	Reserved	R

Parameter Description	Address R/W	Meaning of value	
Feature			
	3007H	Reserved	R
	3008H	PID given value	R
	3009H	PID feedback value	R
	300AH	Input terminal status	R
	300BH	Output terminal status.	R
	300CH	Input of AI1	R
	300DH	Input of AI2	R
	300EH	Reserved	R
	300FH ~ 3014H		
Reserved	3015H		R
Torque direction (0: forward, 1: reverse)			R
Parameter lock			
3016H Device code			R
**** password check			

address		
Parameter lock password		
command		
address		
4000H		
4001H		R
55AAH		R
Fault info address	5000H	
This address stores the fault type of inverter. The meaning of each value is same as P7.15.		R

The above shows the format of the frame. Now we will introduce the Modbus command and data structure in details, which is called protocol data unit for simplicity. Also MSB stands for the most significant byte and LSB stands for the least significant byte for the same reason. The description below is data format in RTU mode. The length of data unit in ASCII mode should be doubled.

Protocol data unit format of reading parameters:

Request format:

Protocol data unit	**Data length(bytes)**	**Range**

Command	1	0x03

Data Address	2	0~0xFFFF
Read number	2	0x0001~0x0010

Reply format (success):

Protocol data unit	**Data length(bytes)**	**Range**
Command	1	0x03
Returned byte number	2	2* Read number
Content	2* Read number	

If the command is reading the type of inverter (data address 0x3016), the content value in reply message is the device code:

The high 8 bit of device code is the type of the inverter, and the low 8 bit of device code is the sub type of inverter.

For details, please refer to the following table:

High byte	**Meaning**	**Low byte**	**Meaning**
		01	Universal type
		02	For water supply
00	CHV		Middle frequency
03	1500HZ		
04	Middle frequency 3000HZ		
01	CHE		

01	Universal type		
02	Middle frequency		1500HZ
02	CHF	01	Universal type

If the operation fails, the inverter will reply a message formed by failure command and error code. The failure command is (Command＋0x80). The error code indicates the reason of the error; see the table below.

Value	Name	Mean
01H	Illegal command	The command from master can not be executed. The reason maybe: Illegal data address. 1. This command is only for new version and this version can not realize. 2. Slave is in fault status and can not execute it.
02H		Some of the operation addresses are invalid or not allowed to access.
03H	Illegal value	When there are invalid data in the message framed

Value	Name	Mean
		received by slave. Note: This error code does not indicate the data value to write exceed the range, but indicate the message frame is a illegal frame.
06H	Slave busy	Inverter is busy(EEPROM is storing)
10H	Password error	The password written to the password check address is not same as the password set by P7.00.
11H	Check error	The CRC (RTU mode) or LRC (ASCII mode) check not passed.
12H	Written not allowed.	It only happen in write command, the reason maybe: 1. the data to write exceed the range of according parameter 2. The parameter should not be modified now. 3. The terminal has already been used.
13H	System locked	When password protection take effect and user does not unlock it, write/read the

function parameter will return this error.

Protocol data unit format of writing single parameter:

Request format:

Protocol data unit	Data length(bytes)	Range
Command	1	0x06
Data Address	2	0~0xFFFF
Write Content	2	0~0xFFFF

Reply format (success):

Protocol data unit	Data length(bytes)	Range
Command	1	0x06
Data Address	2	0~0xFFFF
Write Content	2	0~0xFFFF

If the operation fails, the inverter will reply a message formed by failure command and error code. The failure command is (Command＋0x80). The error code indicates the reason of the error; see table 1.

9.5 Note

- Between frames, the span should not less than 3.5 bytes interval, otherwise, the message will be discarded.
- Be cautious to modify the parameters of PC group through communication, otherwise may cause the communication interrupted.

- In the same frame, if the span between two .near bytes more than 1.5 bytes interval, the behind bytes will be assumed as the start of next message so that communication will failure.

9.6 CRC Check

For higher speed, CRC-16 uses tables. 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;
        }
  }
return(crc_value);
}
```

9.7 Example

9.7.1 RTU mode, read 2 data from 0004H

The request command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Node address	01H
Command	03H

High byte of start address	00H
Low byte of start address	04H
High byte of data number	00H
Low byte of data number	02H
Low byte of CRC	85H
High byte of CRC	CAH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

The reply is :

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Node address	01H
Command	03H
Returned byte number	04H
Higher byte of 0004H	00H
Low byte of 0004H	00H
High byte of 0005H	00H
Low byte of 0005H	00H
Low byte of CRC	43H
High byte of CRC	07H

END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

9.7.2 ASCII mode, read 2 data from 0004H:

The request command is:

START	':'
Node address	'0'
Command	'0'
High byte of start address	'4'
Low byte of start address	'0'
High byte of data number	'0'
Low byte of data number	'2'

The reply is	
LRC CHK Hi	'F'
LRC CHK Lo	'6'
END Lo	CR
END Hi	LF
START	':'
Node address	'0'
Command	
Returned byte number	
Higher byte of 0004H	
Low byte of 0004H	
High byte of 0005H	

	Low byte of 0005H
‘1’	
‘0’	
‘3’	
‘0’	
‘4’	
‘0’	
‘0’	
‘0’	
‘2’	
‘0’	
‘0’	
‘0’	
‘0’	
LRC CHK Lo	‘F’
LRC CHK Hi	‘6’
END Lo	CR
END Hi	LF

9.7.3 RTU mode, write 5000(1388H) into address 0008H, slave node address 02.

The request command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Node address	02H
Command	06H
High byte of data address	00H
Low byte of data address	08H

High byte of write content	13H
Low byte of write content	88H
Low byte of CRC	05H

High byte of CRC	6DH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

The reply command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
Node address	02H
Command	06H
High byte of data address	00H
Low byte of data address	08H
High byte of write content	13H
Low byte of write content	88H
Low byte of CRC	05H
High byte of CRC	6DH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

9.7.4 ASCII mode, write 5000(1388H) into address 0008H, slave node address 02.

The request command is:

START	':'
Node address	'0'
Command	
High byte of data address	
Low byte of data address	
High byte of write content	
Low byte of write content	
'2'	
'0'	
'6'	
'0'	
'0'	
'0'	
'8'	
'1'	
'3'	
'8'	
'8'	
LRC CHK Hi	'5'
LRC CHK Lo	'5'

END Lo	CR
END Hi	LF

The reply command is:

START	':'
Node address	'0'
Command	
High byte of data address	
Low byte of data address	
High byte of write content	
Low byte of write content	
'2'	
'0'	
'6'	
'0'	
'0'	
'0'	
'8'	
'1'	

'3'

'8'

'8'

LRC CHK Hi	'5'
LRC CHK Lo	'5'
END Hi	CR
END Lo	LF

9.7.5 Command code 08H(0000 1000) for diagnosis

Sub-function Code	Description
0000	Return to inquire information data

For example: The inquiry information string is same as the response information string when the loop detection to address 01H of driver is carried out.

The RTU request command is:

START	T1-T2-T3-T4
Node address	01H
Command	08H
High byte of sub-function code	00H
Low byte of sub-function code	00H
High byte of data content	12H
Low byte of data content	ABH
Low byte of CRC	ADH

High byte of CRC	14H

END	T1-T2-T3-T4

The RTU reply command is:

START	T1-T2-T3-T4
Node address	01H
Command	08H
High byte of sub-function code	00H
Low byte of sub-function code	00H
High byte of data content	12H
Low byte of data content	ABH
Low byte of CRC	ADH
High byte of CRC	14H
END	T1-T2-T3-T4

The ASCII request command is:

START	':'
Node address	'0'
Command	
High byte of sub-function code	
Low byte of sub-function code	
High byte of data content	
Low byte of data content	

'1'

‘0’	
‘8’	
‘0’	
‘0’	
‘0’	
‘0’	
‘1’	
‘2’	
‘A’	
‘B’	
LRC CHK Hi	‘3’
LRC CHK Lo	‘A’
END Hi	CR
END Lo	LF

The ASCII reply command is:

START	‘:’
Node address	‘0’

Command

High byte of sub-function code

Low byte of sub-function code	
High byte of data content	
Low byte of data content	
‘1’	
‘0’	
‘8’	
‘0’	
‘0’	
‘0’	
‘0’	
‘1’	
‘2’	
‘A’	
‘B’	
LRC CHK Hi	‘3’
LRC CHK Lo	‘A’
END Hi	CR
END Lo	LF

10. DESCRIPTION OF WATERING EXTENSION CARD

10.1 Description of Model

The model of watering card is CHV00GS.When the watering card is assembled into inverter,night pumps with industrial frequency can be connected when 4 pumps with variable frequency can be connected.It is convenient to control more pumps better.

10.2 External Dimension

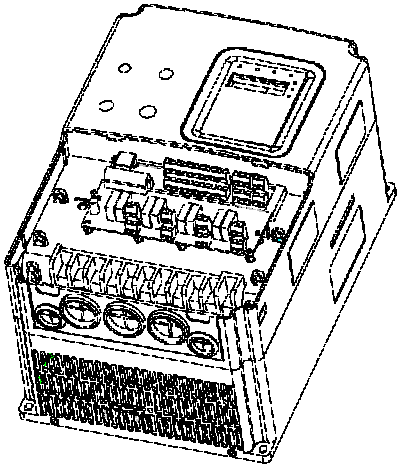


Figure 10.1 Dimensions

10.3 Installation

Figure 10.2 Installation figure

APPENDIX A RELATIVE DIMENSION OF INVERTER

A.1 External Dimension

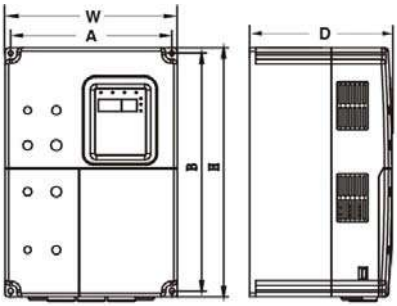
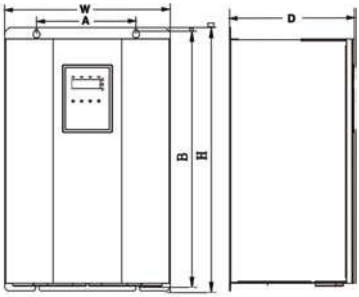


Figure A.1 Dimensions(Less than 18.5kW)



Power

Size
Figure A.2 Dimensions (22kW～132kW)

A(mm) (kW)	B(mm)	H(mm)	W(mm)	D(mm)	Installation		
Installation Hole(mm)	Dimension	External Dimension					
5.5~7.5	C	147.5	237.5	250	160	175	5
11～18.5	D	206	305.5	320	220	180	6
22～37	E	176	454.5	467	290	215	6.5
45～75	F	230.0	564.5	577.0	375.0	270.0	7.0
90～132	G	320.0	738.5	755.0	460.0	330.0	9.0

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A.2 Installation Space

Figure A.4 Installation of multiple inverters.

Notice: Add the air deflector when apply the up-down installation.

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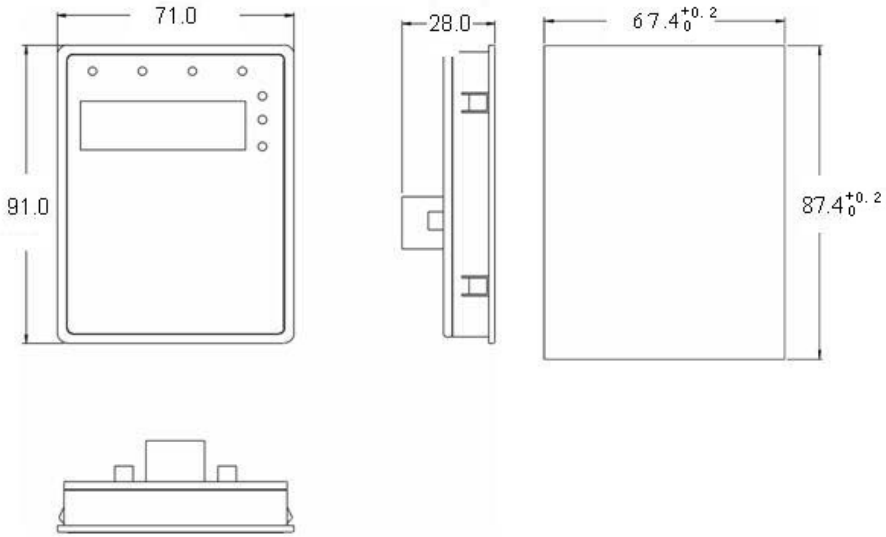

Figure A.5 Dimension of small keypad.

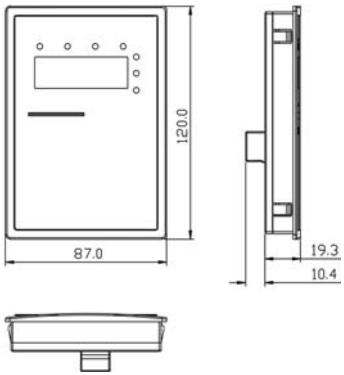

Figure A.6 Dimension of big keypad.

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A.4 Disassembly

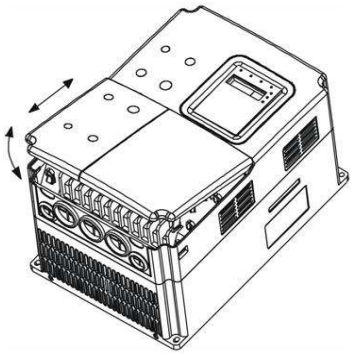

Figure A.7 Disassembly of plastic cover.

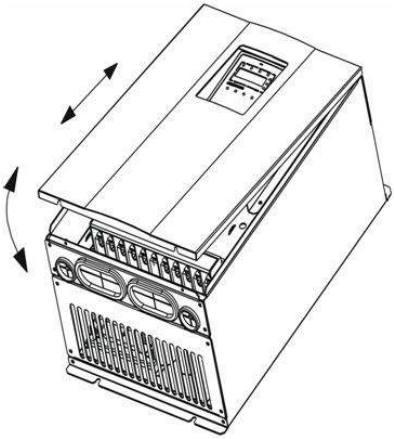

Figure A.8 Disassembly of metal plate cover.

APPENDIX B SPECIFICATIONS OF ACCESSORIES

B.1 Specifications of Breaker, Cable, Contactor and Reactor

B.1.1 Specifications of breaker, cable and contactor

Model No.	Circuit breaker (A)	Input/output cable (mm^2)(Coppery wire)	Rated current of contactor (A)(380V or 220V)
CHV160A-5R5-4	25	4	16
CHV160A-7R5-4	25	4	16
CHV160A-011-4	40	6	25
CHV160A-015-4	63	6	32
CHV160A-018-4	63	6	50
CHV160A-022-4	100	10	63
CHV160A-030-4	100	16	80
CHV160A-037-4	125	25	95
CHV160A-045-4	160	25	120
CHV160A-055-4	200	35	135
CHV160A-075-4	200	35	170
CHV160A-090-4	250	70	230
CHV160A-110-4	315	70	280
CHV160A-132-4	400	95	315

B.1.2 Specifications of AC input/output and DC reactor

Model No.	AC Input reactor Current (A)	Inductance (mH)	AC Output reactor Current (A)	Inductance (mH)	DC reactor Current (A)	Inductance (mH)
CHV160A-5R5-4	10	1.5	10	0.6	12	6.3
CHV160A-7R5-4	15	1.0	15	0.25	23	3.6
CHV160A-011-4	20	0.75	20	0.13	23	3.6
CHV160A-015-4	30	0.60	30	0.087	33	2
CHV160A-018-4	40	0.42	40	0.066	33	2
CHV160A-022-4	50	0.35	50	0.052	40	1.3
CHV160A-030-4	60	0.28	60	0.045	50	1.08
CHV160A-037-4	80	0.19	80	0.032	65	0.80
CHV160A-045-4	90	0.16	90	0.030	78	0.70
CHV160A-055-4	120	0.13	120	0.023	95	0.54

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AC Input reactor AC Output reactor DC reactor

Model No.	Current					
Inductance	Current	Inductance				
Current						
Inductance						
	(A)					
(mH)						
(A)						
(mH)						
(A)						
(mH)						
CHV160A-075-4	150	0.10	150	0.019	115	0.45
CHV160A-090-4	200	0.12	200	0.014	160	0.36
CHV160A-110-4	250	0.06	250	0.011	180	0.33
CHV160A-132-4	250	0.06	250	0.011	250	0.26

APPENDIX C FUNCTION PARAMETERS

CHV series inverter function parameters, which are grouped by functions, have P0-PF total 16 groups among which the PF is the expanded function parameters that user can visit if the inverter has been installed with extension card. Each function group includes a number of function codes, which adopts three-stage menu, for instance, "P8.08"means the 8th function code of P8th function.

For the convenience of setting function code by using operation panel, the function group number is corresponding to Stage 1 menu, the function code is corresponding to Stage 2 menu and the function code parameter is corresponding to Stage 3 menu.

1. The column of function table is described as follows:

The 1st column "Function Code" is the function parameter group and parameter code.

The 2nd column "Name" is the complete name of the function parameter.

The 4th column "Setting Range" is the effective setting value range of the function parameter, shown on the operation panel LCD (liquid crystal display).

The 5th "Default" is the original factory setting value of this function parameter.

The 6th "Modify" is the modification performance of the function parameter (i.e. whether or not it is permitted to modify and the modification conditions), explained as follows,

"○": indicates that the setting value of this parameter can be modified when the inverter is either in stop or operating status;

"◎": means that the setting value of this parameter cannot be modified when the inverter is in operating status;

(Inverter has done the automatic detection restriction to the modification performance of each parameter, helping user to prevent mis-modification.)

The 7th column "LCD Display" is the brief description of function parameter name on the operation panel LCD (liquid crystal display);

2. "Parameter Digital System" is the decimal system. If parameters are expressed in hexadecimal system, the value at each digit is independent when the parameter is edited, and the numeric area of some digits can be hexadecimal (0-F).

3. "LCD Display Description" is only valid when using external LCD operation

panel.

4. "Default" indicates the value of the function code after it is refreshed while doing the manipulation of restoring the factory parameters; but the actually detected parameters or record values cannot be refreshed.

5. In order to effectively protect the parameters, the inverter provides the cryptoguard for the function code. After the user's password is set up (i.e. user's password P7.00 parameter is not 0), when the user press PRG/ESC button to enter function code edit status, the system first enters the user's password verification status, displaying "-----", and the operator must input correctly the user's password, otherwise it is impossible to enter. For the parameters that are factory set up, can enter only if a correct factory password is input as required. (Here remind user DO NOT try to modify the factory parameters, and if the parameters are not set up properly, it can cause inverter malfunction or even damage.) At the state that the cryptoguard is not locked, the user's password can be modified at any time, and the one finally input will be the user's password. If P7.00 is set as 0, the user's password can be cancelled; when the power is on, if P7.00 is not 0, parameters are protected by password. When serial communication is used to modify the function parameters, the function of user's password also fellows above rule.

Function

Name	**Description**	**Setting**

Factory Mod

LCD Display Code

RUN

Range

P0 Group--Basic function

0:Keypad (LED–"LOCAL/RE MOT",extinguished)

1:Terminal

Setting ify

Run

P0.00

P0.01

COMMAND

UP/DOWN SETTING

(LED–“LOCAL/RE

MOT”, flickering)

2:Communication(L ED–“LOCAL/REMO T”,lights on)

0: Valid&Save

1: Valid&Not save

2: Invalid

3: Run valid&Stop reset

0~2 0 ◎

0~2 0 ◎

command

UP/DOWN

setting

Function

Name	**Description**	**Setting**	**Factory**	**Mod**
LCD Display Code				
FREQ	0: Keyboard 1: AI1	**Range**	**Setting**	**ify**
FREQ P0.02				
P0.03				

P0.04

P0.05

SOURCE A

FREQ SOURCE B

FREQ B SCALE

FREQ

2. AI2

3. Communication

4: Multi-Step

0:AI1

1:AI2

2:PID

0: Maximum frequency

1: Frequency A

command

0: A

1: B
0~4 0 ◎

0~2 0 ◎

0~1 0 ○

0~3 0 ○
SOURCE A

FREQ SOURCE B

FREQ B SCALE

FREQ
SELECTION 2: A+B
3: Max(A, B)
SELECTION

P0.06 MAX FREQ 10~400.00Hz 10.0~400.00 50.00Hz ◎ Max FREQ

P0.07

P0.08

P0.09
UP FREQ LIMIT
LOW FREQ LIMIT
KEYPAD
REF FREQ

P0.08~P0.06 P0.08~P0.06 50.00Hz ○

0.00Hz~ P0.08 0.00~P0.08 0.00Hz ○

0.00 Hz ~ P0.08 0.00~P0.08 50.00Hz ○
UP FREQ LIMIT
LOW FREQ LIMIT
KEYPAD REF
FREQ

P0.10	ACC TIME	0.0~3600.0s	0.0~3600.0	20.0s	○	ACC TIME
P0.11	DEC TIME	0.0~3600.0s	0.0~3600.0	20.0s	○	DEC TIME

0: Default

P0.12
RUN
DIRECTION

CARRIER
1: Reverse

2: Forbid reverse

0~2 0 ◎

Depend
RUN
DIRECTION

CARRIER
P0.13

FREQ

RESTORE
1~16.0kHz 1~16.0

0: No action
○
on model

FREQ

RESTORE
P0.14

PARA

1: Restore factory
0~2 0 ◎

PARA

Function

Name Description
Setting
Factory Mod

LCD Display Code						
setting 2: Clear fault records						
Range Setting ify						
P0.15	Reserved	0～65535	0～65535	0	◎	Reserved
P0.16	Reserved	0～65535	0～65535	0	◎	Reserved
P0.17	Reserved	0～65535	0～65535	0	◎	Reserved
P0.18	Reserved	0～65535	0～65535	0	◎	Reserved
P0.19	Reserved	0～65535	0～65535	0	◎	Reserved
P1 Group--Start and Stop Control						
P1.00 START MODE		0: Start directly 1: DC break and START start 2: Speed tracking and start		0	◎	
P1.01 FREQ		0.00~10.0Hz	0.00~10.00	1.5Hz	◎	START FREQ

P1.02 HOLD TIME 0.0~50.0s 0.0~50.0 0.0s ◎ HOLD TIME

P1.03

P1.04

START BRAK CURR

START BRAK TIME

0.0~150.0% 0.0~150.0 0.0% ◎

0.0~50.0s 0.0~50.0 0.0s ◎

0: Deceleration to

START BRAK CURR

START BRAK TIME

P1.05 STOP MODE

STOP BRAK

stop

1: Coast to stop

0~1 0 ○ STOP MODE

STOP BRAK

P1.06

P1.07

P1.08

P1.09 FREQ STOP BRAK DELAY STOP BRAK CURR STOP BRAK TIME	0.00~P0.07	0.00~10.00	0.00Hz ○
	0.0~50.0s	0.0~50.0	0.0s ○
	0.0~150.0%	0.0~150.0	0.0% ○
	0.0~50.0s	0.0~50.0	0.0s ○

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Function

Name	**Description**	**Setting**	**Factory**	**Mod**

LCD Display Code				
FWD/REV				
Range				
Setting				
ify				
FWD/REV				
P1.10				
P1.11				
P1.12				
P1.13				
DEADTIME				
UNDER LIMIT ACT				
LIMIT RUN TIME				
AWOKE DELAY				
0.0~3600.0s	0.0~3600.0	0.0s	○	
0~1	0~1	0	◎	
0～3600s	0～3600	5	○	
0～3600s	0～3600	5	○	

0: Restart disabled

DEADTIME

UNDER LIMIT ACT

LIMIT RUN TIME

AWOKE DELAY

P1.14 RESTART

RESTR

1: Restart enabled
0~1 0 ○ RESTART

RESTR

P1.15

P1.16

DELAY TIME

FWD/REV ENABLE
0.0~3600.0s 0.0~3600.0 0.0s ○

0: Disabled
1: Enabled 0~1 0 ○

DELAY TIME

FWD/REV ENABLE

P1.17	Reserved	0～65535	0～65535	0	◎	Reserved
P1.18	Reserved	0～65535	0～65535	0	◎	Reserved
P1.19	Reserved	0～65535	0～65535	0	◎	Reserved

P2 Group--Motor Parameters

P2.00

MOTOR RATE POWER

MOTOR

1.5~900.0kW	1.5~900.0	Depend on model	◎
MOTOR RATE POWER			
MOTOR P2.01			
P2.02			
P2.03			
RATE FREQ			
MOTOR RATE SPEED			
MOTOR RATE VOLT			
MOTOR 0.01Hz~P0.07	0.01~P0.07	50.00Hz	◎
0~36000rpm	0~36000	1460rpm	◎
0~3000V	0~3000	380V	◎
		Depend	
RATE FREQ			
MOTOR RATE SPEED			

MOTOR RATE VOLT

MOTOR
P2.04

P2.05

RATE CURR

A PUMP RATE CURR
0.1~2000.0A 0.1~2000.0

0.1～2000.0A 0.1~2000.0
◎
on model

Depend
◎
on model

RATE CURR

A PUMP RATE CURR

Function

Name Description
Setting
Factory Mod

LCD Display
Code

P2.06

P2.07

P2.08	B PUMP RATE CURR	0.1～2000.0A
P2.09	C PUMP RATE CURR	0.1～2000.0A
P2.10	D PUMP RATE CURR	0.1～2000.0A
P2.11	E PUMP RATE CURR	0.1～2000.0A
	F PUMP RATE CURR	0.1～2000.0A
	G PUMP RATE CURR	0.1～2000.0A

	Range
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0
0.1～2000.0A	0.1~2000.0

0.1～2000.0A 0.1~2000.0

Setting

Depend on model

Depend on model

Depend on model

Depend on model

Depend on model

Depend

on model

ify

◎

◎

◎

◎

◎

◎

B PUMP RATE CURR

C PUMP RATE CURR

D PUMP RATE CURR

E PUMP RATE CURR

F PUMP RATE CURR

G PUMP RATE CURR

P2.12	Reserved	0～65535	0～65535	0	◎	Reserved
P2.13	Reserved	0～65535	0～65535	0	◎	Reserved
P2.14	Reserved	0～65535	0～65535	0	◎	Reserved
P2.15	Reserved	0～65535	0～65535	0	◎	Reserved

P3 Group--PID Control

P3.00	UNIT SEL	0～10	0～10	0	◎	UNIT SEL

P3.01 DISPLAY FORMAT

0～4 0～4 3 ◎

0.001~ DISPLAY FORMAT

P3.02	PID MAX	0.001～65.535				

65.535
1.000 ◎ PID MAX

P3.03	PID UPPER	P3.04~P3.02	P3.04~P3.02	1.000	◎	PID UPPER
P3.04	PID LOWER	P0.000~P3.03	P0.00~P3.03	0.100	◎	PID LOWER

P3.05 KEYPAD PID SET

P3.04~P3.03 P3.04~P3.03 0.500 ○ KEYPAD PID SET

P3.06 PID PRESET 0~5 0~5 0 ◎ PID PRESET

0: AI1 feed

P3.07

PID

1: AI2 feed

0~3 0 ◎

PID

FEEDBACK 2: AI1-AI2 feed

3: Modbus feed

FEEDBACK

P3.08 PID OUTPUT 0: Positive 0~1 0 ○ PID OUTPUT

Function

Name Description
Setting
Factory Mod

LCD Display
Code

PROPORTIO

1: Negative
Range
Setting
ify

PROPORTIO N GAIN (Kp)	P3.09	0.00~100.00	0.00~100.00	0.10	○
INTEGRAL TIME (Ti)	P3.10	0.01~10.00s	0.01~10.00	0.10s	○
DIFFERENTI A TIME (Td)	P3.11	0.00~10.00s	0.00~10.00	0.00s	○
SAMPLING CYCLE (T)	P3.12	0.01~100.00s	0.01~100.00	0.50s	○
PROPORTIO N GAIN (Kp)	P3.09				
INTEGRAL TIME (Ti)	P3.10				
DIFFERENTI A TIME (Td)	P3.11				
SAMPLING CYCLE (T)	P3.12				
	P3.13	BIAS LIMIT	0.0~100.0%	0.0~100.0	0.0% ○ BIAS LIMIT

P3.14 OUTPUT FILTER				
P3.15 FEEDBACK LOST				
P3.16 FEEDBACK LOST(t)				
P3.17 PID FRQ UPPER				
P3.18 PID FRQ LOWER				
0.00~10.00s	0.00~10.00	0.00	○	
0.0~100.0%	0.0~100.0	0.0%	○	
0.0~3600.0s	0.0~3600.0	1.0s	○	
-100.0～100.0%	-100.0~100.0	100.0%	○	
-100.0～P3.17	-100.0~P3.17	0.0%	○	
OUTPUT FILTER FEEDBACK LOST				

FEEDBACK LOST(t)

PID FRQ UPPER

PID FRQ

LOWER

P3.19 Reserved 0~65535 0~65535 0~65535 ◎ Reserved

P4 Group--V/F Control

0: Linear curve

1: User-defined curve

2: 1.3 order torque_stepdown

P4.00 V/F CURVE

3: 1.7 order torque_stepdown

4: 2.0 order torque_stepdown

0~4 4 ◎ V/F CURVE

P4.01 TORQUE 0.0%: auto 0.0~10.0 1.0% ○ TORQUE

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Function

Name Description Setting Factory Mod

LCD Display Code Range Setting ify

BOOST 0.1%~10.0% BOOST

0.0%~50.0%

P4.02
BOOST
CUT-OFF

(motor rated frequency)

0.0~50.0 20.0% ◎
BOOST
CUT-OFF

P4.03 V/F FREQ 1 0.00Hz~ P4.05 0.00~P4.05 5.00Hz ◎ V/F FREQ 1

P4.04
V/F VOLTAGE 1

0.0%~100.0% 0.0~100.0 10.0% ◎
V/F VOLTAGE 1

P4.05 V/F FREQ 2 P4.03~ P4.07 P4.03~ P4.07 30.00Hz ◎ V/F FREQ 2

P4.06
V/F VOLTAGE 2

0.0%~100.0% 0.0~100.0 60.0% ◎
V/F VOLTAGE 2

P4.07 V/F FREQ 3 P4.05~ P2.01 P4.05~ P2.01 50.00Hz ◎ V/F FREQ 3

P4.08

P4.09
V/F VOLTAGE 3

V/F SLIPCOMP

0.0%~100.0% 0.0~100.0 100.0% ◎

0.00~10.00Hz 0.00~10.00 0.0Hz ○

0: Disabled
1: Enabled all the
V/F VOLTAGE 3
V/F SLIPCOMP

P4.10 AVR
time
2: Disabled during deceleration
0~2 1 ○ AVR

P4.11	Reserved	0~65535	0~65535	0	◎	Reserved
P4.12	Reserved	0~65535	0~65535	0	◎	Reserved
P4.13	Reserved	0~65535	0~65535	0	◎	Reserved
P4.14	Reserved	0~65535	0~65535	0	◎	Reserved
P4.15	Reserved	0~65535	0~65535	0	◎	Reserved

P5 Group--Input Terminals

P5.00

P5.01
NO/NC SELECT
INPUT

0~0xFF	0~0xFF	0	◎
0: Invalid	0~1	0	◎

NO/NC SELECT INPUT SELECTION 1: Valid SELECTION

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Function

Name	**Description**	**Setting**	**Factory**	**Mod**
LCD Display Code				

Sx FILTER

round-robin command

22~28：Manual soft

start of motor A~G

29~35：Motor A~G

disabled

36：Inlet reservoir up W LEV ltd

37：Inlet reservoir low W LEV ltd

38：Inlet reser W

LEV on W short

39：Sewage reservoir up W LEV ltd

40：Sewage reser

low W level ltd

41：PID switch

42~50：Reserved

Range

Setting
ify

Sx FILTER
P5.10

P5.11

P5.12

P5.13 TIMES UP/DOWN RATE AI1 LOW LIMIT AI1 LOW SETTING 0~10 0~10 5 ○

0.01~50.00Hz/s 0.01~50.00 0.50Hz/s ○

0.00V~10.00V 0.00~10.00 0.00V ○

-100.0%~100.0% -100.0~100.0 0.0% ○

TIMES UP/DOWN RATE AI1 LOW LIMIT AI1 LOW SETTING

P5.14 AI1 UP LIMIT 0.00V~10.00V 0.00~10.00 10.00V ○ AI1 UP LIMIT

P5.15

P5.16 AI1 UP SETTING AI1 FILTER TIME

-100.0%~100.0% -100.0~100.0 100.0% ○

0.00s~10.00s 0.00~10.00 0.10s ○

AI1 UP SETTING

AI1 FILTER

TIME

P5.17 AI2 LOW 0.00V~10.00V 0.00~10.00 0.00V ○ AI2 LOW

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Function

Name Description Setting Factory Mod

LCD Display Code

RT1

13：Motor running

14 ： Stop pulse output

15 ： Over press

alarm

16 ： Under press alarm

17 ： Dormant

Operation indication

18 ： Backup pressure operat indica

19：Reservoir water

short indicat

20 ： Faulty pump indication

21：H pump control

22：I pump control

23~30：Reserved

0：No function

Range

Setting

ify

RT1
P6.03
SELECTION 1:Connect A for var freq CON
RT2
2： Connect A for
0～14 0 ◎
SELECTION

RT2

P6.04
SELECTION pow freq CON 0～14 0 ◎
SELECTION

RT3

3:Connect B for var

RT3
P6.05
SELECTION freq CON
4： Connect B for
0～14 0 ◎
SELECTION

RT4

pow freq CON
RT4
P6.06
SELECTION 5:Connect C for var
0～14 0 ◎
SELECTION

RT5

freq CON

RT5
P6.07
SELECTION 6： Connect C for 0～14 0 ◎
SELECTION

Function

Name Description
Setting
Factory Mod

LCD Display
Code

RT6

pow freq CON
Range
Setting
ify

RT6
P6.08

SELECTION 7:Connect D for var freq CON
RT7
8： Connect D for
0～14 0 ◎

SELECTION

RT7
P6.09
SELECTION 0～14 0 ◎
pow freq CON
SELECTION

RT8

9:Connect E for var

RT8

P6.10

SELECTION freq CON

10：Connect E for pow freq CON

11：Connect F for

var freq CON

12：Connect F for pow freq CON

13：Connect G for

var freq CON

14：Connect G for pow freq CON

1:Connect A for var freq CON

0 ： Running

0～14 0 ◎

SELECTION

P6.11

AO1

frequency

0～15 0 ○

AO1

SELECTION 1:Setting frequency

2：Motor speed
3：Output current
4：Output voltage
5：Reserved
SELECTION

P6.12
AO2
SELECTION
6：Reserved
7 ： AI1
voltage/current
8 ： AI2
voltage/current
9~15：Reserved

0～15 0 ○
AO2
SELECTION
P6.13 AO1 LOW 0.0%~100.0% 0.0~100.0 0.0% ○ AO1 LOW

Function

Name Description Setting

Factory Mod LCD Display Code Range Setting ify		
	LIMIT	LIMIT
P6.14		
P6.15		
P6.16		
P6.17		
P6.18		
P6.19		
P6.20		
AO1 LOW OUTPUT		
AO1 UP LIMIT		
AO1 UP OUTPUT		
AO2 LOW LIMIT		
AO2 LOW OUTPUT		
AO2 UP LIMIT		
AO2 UP OUTPUT		

0.00V ~10.00V	0.00~10.00	0.00V	○	
0.0%~100.0%	0.0~100.0	100.0%	○	
0.00V ~10.00V	0.00~10.00	10.00V	○	
0.0%~100.0%	0.0~100.0	0.0%	○	
0.00V ~10.00V	0.00~10.00	0.00V	○	
0.0%~100.0%	0.0~100.0	100.0%	○	
0.00V ~10.00V	0.00~10.00	10.00V	○	
AO1 LOW OUTPUT				
AO1 UP LIMIT				
AO1 UP OUTPUT				
AO2 LOW LIMIT				
AO2 LOW OUTPUT				
AO2 UP LIMIT				
AO2 UP OUTPUT				

P6.21	Reserved	0~65535	0~65535	0.0%	◎	Reserved
P6.22	Reserved	0~65535	0~65535	0.0%	◎	Reserved
P6.23	Reserved	0~65535	0~65535	0.0%	◎	Reserved
P6.24	Reserved	0~65535	0~65535	0.0%	◎	Reserved

P7 Group--Display Interface

P7.00

USER PASSWORD

0~65535 0~65535 0 ○

USER PASSWORD

P7.01

LANGUAGE 0: Chinese

0~1 0 ○

LANGUAGE

SELECT

1: English

0: Invalid

SELECT

P7.02 PARA COPY 1: Upload

2: Download

0: Quick debugging mode

QUICK/JOG

0~2 0 ◎ PARA COPY

QUICK/JOG

P7.03

FUNC

1: FDW/REV switch

2: Jog

3: Clear UP/DOWN

0~3 0 ◎

FUNC

CHV160A series special inverter for water supply

Function

Name Description Setting Factory Mod

LCD Display Code

STOP/RST

setting

0: Valid when keypad control (P0.01=0)

1: Valid when keypad or terminal

control (P0.01=0 or

Range Setting ify

STOP/RST
P7.04

P7.05
FUNC

KEYPAD DISPLAY

RUNNING

1)

2: Valid when keypad or COM control (P0.01=0 or

2)

3: Always valid

0: Preferential to external keypad

1: Both display&external valid.

2: Both display&

local key valid.

3: Both display & Both valid.

0~3 0 ○

0~3 0 ○

FUNC

KEYPAD DISPLAY

RUNNING
P7.06

P7.07

P7.08

DISPLAY

STOP DISPLAY

RECTIFIER

TEMP

0~0xFFFF	0~0xFFFF	0x01F9	○
1~0xFFFF	1~0xFFFF	0xFF	○
0~100.0℃			●

DISPLAY

STOP DISPLAY

RECTIFIER

TEMP

P7.09 IGBT TEMP 0~100.0℃

- IGBT TEMP

P7.10

P7.11

MCU VERSION

DSP VERSION

131

- MCU VERSION
- DSP VERSION

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CHV160A series special inverter for water supply

Function

Name Description Setting Factory Mod

LCD Display

Code		Range	Setting	ify	
P8.05	PUMP C SEL	0~4	0	◎	PUMP C SEL
P8.06	PUMP D SEL	0~4	0	◎	PUMP D SEL
P8.07	PUMP E SEL	0~4	0	◎	PUMP E SEL
P8.08	PUMP F SEL	0~4	0	◎	PUMP F SEL
P8.09	PUMP G SEL	0~4	0	◎	PUMP G SEL
P8.10	PUMP ADD TOLERA	0.0~30.0%	0.0~30.0	10.0%	○
P8.11	PUMP ADD FREQ	P8.16~P0.07	P8.16~P0.07	50.00Hz	○
P8.12	PUMP ADD DELAY SWITCH	0~3600s	0~3600	5s	○

SWITCH FREQUENCY	P8.13 0.0~P0.07	0.0~P0.07	50.00Hz	○
VFP FREQUENCY	P8.14			
VFP	P8.15			
DECELER TIME	P8.16			
PUMP REDU TOLERA	P8.17			
PUMP REDU FRQ	P8.18			
PUMP REDU DELAY	P8.19			
VFP ACCELER TIME				
CLOSE DELAY				

0.0~100.0%	0.0~100.0	10.0s	○
0.0~30.0%	0.0~30.0	10.0%	○
P8.08~P8.11	P8.08~P8.11	5.00Hz	○
0~3600s	0~3600	5s	○
0.0~100.0%	0.0~100.0	10.0s	○
0.1~9.9%	0.1~9.9	0.5s	○

DECELER TIME

PUMP REDU TOLERA

PUMP REDU FRQ

PUMP REDU DELAY

VFP ACCELER TIME

CLOSE

DELAY

P8.20 TRIP DELAY 0.1~9.9% 0.1~9.9 0.5s ○ TRIP DELAY

0: Dormancy

P8.21

PID SLEEP

SEL

enabled

1: Running at lower

0~1 0 ◎
PID SLEEP

SEL

Function

Name Description
Setting
Factory Mod

LCD Display
Code

AWOKE

limit FRQ
Range
Setting
ify

AWOKE
P8.22

P8.23

P8.24

P8.25			
P8.26			
P8.27			
TOLERA			
AWOKE DELAY			
PFP ROU-ROB			
PER			
VFP ROU-ROB			
PER			
SW FREQ MANUAL			
W IEVEL SI INPUT			
WL SI ANAL P8.10~60.0%	P8.10~60.0	10.0%	○
0~3600s	0~3600	5s	○
0.0~6553.5	0.0~6553.5	0.0h	◎
0.0~6553.5	0.0~6553.5	0.0h	◎
0~P0.07	0~P0.07	50.00Hz	◎

0~2 0~2 0 ◎

0:AI1 input

TOLERA

AWOKE DELAY

PFP ROU-ROB

PER

VFP ROU-ROB

PER

SW FREQ MANUAL

W IEVEL SI INPUT

WL SI ANAL
P8.28

INPUT

UP W IEVEL
1:AI2 input

2:Modbus input
0~2 0 ◎

INPUT

UP W IEVEL
P8.29

P8.30

P8.31

P8.32			
P8.33			
LTD			
Low W IEVEL LTD			
SHORTAGE W LEVELshorta ge level			
BACKUP PRESSURE			
FAULT			
HANDLING			
0.0~100.0%	0.0~100.0	60.0%	○
0.0~P8.29	0.0~P8.29	40.0%	○
0.0~P8.30	0.0~P8.30	20.0%	○
0~100.0%	0~100.0	0.0%	○
	0-1	0	◎
LTD			
Low W IEVEL LTD			
SHORTAGE W LEVELshorta ge level			
BACKUP PRESSURE			

FAULT HANDLING					
P8.34	Reserved	0~65535	0~65535	◎	Reserved
P8.35	Reserved	0~65535	0~65535	◎	Reserved

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Function Name	Description	Setting Range	Factory Setting	Mod ify	LCD Display Code
P8.36	Reserved	0~65535	0~65535	◎	Reserved
P8.37	Reserved	0~65535	0~65535	◎	Reserved
P8.38	Reserved	0~65535	0~65535	◎	Reserved
P8.39	Reserved	0~65535	0~65535	◎	Reserved

P9 Group--Timing watering and multi-given function group

P9.00					
P9.01 CURRENT MOMENT PRESSURE STEPS					

0.00~23.59		0.00~23.59	0.00	○		
1~8		1~8	1	○		
CURRENT MOMENT PRESSURE STEPS						
P9.02	Threshold T1	0.00～23.59	0.00～23.59	0.00	○	Threshold T1
P9.03 Pressure of segment T1						
0.0～100.0%		0.0～100.0%	0.0%	○		
Pressure of segment T1						
P9.04	Threshold T2	P9.02～23.59	P9.02～23.59	0.00	○	Threshold T2
P9.05 Pressure of segment T2						
0.0～100.0%		0.0～100.0%	0.0%	○		
Pressure of segment T2						
P9.06	Threshold T3	P9.04～23.59	P9.04～23.59	0.00	○	Threshold T3
P9.07 Pressure of segment T3						
0.0～100.0%		0.0～100.0%	0.0%	○		
Pressure of segment T3						
P9.08	Threshold T4	P9.06～23.59	P9.06～23.59	0.00	○	Threshold T4

P9.09
Pressure of segment T4

0.0～100.0% 0.0～100.0% 0.0% ○
Pressure of segment T4

P9.10 Threshold T5 P9.08～23.59 P9.08～23.59 0.00 ○ Threshold T5

P9.11
Pressure of segment T5

0.0～100.0% 0.0～100.0% 0.0% ○
Pressure of segment T5

P9.12 Threshold T6 P9.10～23.59 P9.10～23.59 0.00 ○ Threshold T6

P9.13
Pressure of segment T6

0.0～100.0% 0.0～100.0% 0.0% ○
Pressure of segment T6

P9.14 Threshold T7 P9.12～23.59 P9.12～23.59 0.00 ○ Threshold T7

P9.15
Pressure of segment T7

0.0～100.0% 0.0～100.0% 0.0% ○
Pressure of segment T7

P9.16 Threshold T8 P9.14～23.59 P9.14～23.59 0.00 ○ Threshold T8

P9.17 Pressure of 0.0～100.0% 0.0～100.0% 0.0% ○ Pressure of

Function

Name	Description	Setting Range	Factory Setting	Mod ify	LCD Display Code
	segment T8				segment T8
P9.18	MULTI SET 0	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 0
P9.19	MULTI SET 1	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 1
P9.20	MULTI SET 2	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 2
P9.21	MULTI SET 3	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 3
P9.22	MULTI SET 4	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 4
P9.23	MULTI SET 5	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 5
P9.24	MULTI SET 6	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 6
P9.25	MULTI SET 7	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 7
P9.26	MULTI SET 8	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 8
P9.27	MULTI SET 9	0.0～100.0%	0.0～100.0	0.0%	○ MULTI SET 9
P9.28					
P9.29					

P9.30				
P9.31				
P9.32				
P9.33				
MULTI SET			10	
MULTI SET			11	
MULTI SET			12	
MULTI SET			13	
MULTI SET			14	
MULTI SET			15	
0.0～100.0%	0.0～100.0	0.0%	○	
0.0～100.0%	0.0～100.0	0.0%	○	
0.0～100.0%	0.0～100.0	0.0%	○	
0.0～100.0%	0.0～100.0	0.0%	○	

0.0～100.0%		0.0～100.0	0.0%	○	
0.0～100.0%		0.0～100.0	0.0%	○	
MULTI SET 10					
MULTI SET 11					
MULTI SET 12					
MULTI SET 13					
MULTI SET 14					
MULTI SET 15					
P9.34	Reserved	0~65535	0~65535	◎	Reserved
P9.35	Reserved	0~65535	0~65535	◎	Reserved
P9.36	Reserved	0~65535	0~65535	◎	Reserved
P9.37	Reserved	0~65535	0~65535	◎	Reserved

PA Group--Protection Parameters

PA.00
IN PHASE FALL
0: Disabled
1: Enabled

0~1 1 ○

IN PHASE FALL

PA.01

OUT PHASE 0: Disabled

0~1 1 ○

OUT PHASE
FALL
1: Enabled
FALL

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Function

Name Description
Setting
Factory Mod

LCD Display
Code

MOTOR

0: Disabled

1: Normal motor
Range
Setting
ify

MOTOR
PA.02

OVERLOAD 2: Variable frequency motor

OVERLOAD
0~2 2 ◎

OVERLOAD

OVERLOAD
PA.03

PA.04

PA.05

PA.06

PA.07

PA.08

CURR

OL WARN CURR

OL WARN SELECT			
OL WARN DELAY			
TRIPFREE POINT			
TRIPFREE DECRATE			
20.0%~120.0%	20.0~120.0	100.0%	○
20.0%~150.0%	20.0~150.0	110.0%	○
0: Always based on I motor 1: Detect based on I motor 2: Always based on I INVE 3: Detect based on I INVE	0~3	0	◎
0.0~30.0s	0.0~30.0	5.0s	○
230.0V~600.0V	230.0~600.0	450.0V	○
0.00Hz~P0.07	0.00~P0.07	0.00Hz	○
0: Protection			

CURR

OL WARN CURR

OL WARN SELECT

OL WARN DELAY

TRIPFREE POINT

TRIPFREE DECRATE

PA.09

OVER VOLT forbidden

0～1 0 ○

OVER VOLT

PA.10

STALL

OV PROTECT POINT

1: Protection

permitted

120～150% 120～150 125 ○

0: Disabled
STALL

OV PROTECT POINT
PA.11 OVER CURR

OC

1: Enabled
0~1 1 ○ OVER CURR

OC
PA.12

THRESHOL
100~200% 100~200 160% ○

137

THRESHOLD
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CHV160A series special inverter for water supply

Function

Name Description
Setting
Factory Mod

LCD Display
Code

D

FREQ DEC
Range
Setting

ify

FREQ DEC	PA.13	0.00~50.00Hz/s	0.00~50.00	1.00Hz/s ○
	PA.14	0.0~100.0%	0.0~100.0	90.0% ○
	PA.15			
	PA.16			
	PA.17			
RATE				
OVER PRESS VALUE				
OVER PRESS DELAY				
UNDER PRES VALUE				
UNDER PRES DELAY				

0~3600		0~3600	500s	○		
0.0~100.0%		0.0~100.0	10,0%	○		
0~3600		0~3600	500s	○		
	RATE					
	OVER PRESS VALUE					
	OVER PRESS DELAY					
	UNDER PRES VALUE					
	UNDER PRES DELAY					
PA.18	Reserved	0~65535	0~65535	0	◎	Reserved
PA.19	Reserved	0~65535	0~65535	0	◎	Reserved
PA.20	Reserved	0~65535	0~65535	0	◎	Reserved
PA.21	Reserved	0~65535	0~65535	0	◎	Reserved
PA.22	Reserved	0~65535	0~65535	0	◎	Reserved

Pb Group --Serial Communication

	Pb.00				
	LOCAL ADDRESS				
1～247		1～247	1	○	
0: 1200BPS					

1: 2400BPS

2: 4800BPS

LOCAL ADDRESS

Pb.01 BAUD RATE

Pb.02 DATA FORMAT

3: 9600BPS

4: 19200BPS

5: 38400BPS

0: No parity (N,8,1)

for RTU

1: Even parity

0～5 4 ○ BAUD RATE

0～8 1 ○ DATA FORMAT

Function

Name **Description**

Setting
Factory Mod

LCD Display
Code

COM DELAY

(E,8,1) for RTU
2: Odd parity
(O,8,1) for RTU
3: No parity (N,8,2)
for RTU
4: Even parity
(E,8,2) for RTU

5: Odd parity (O,8,2) for RTU

6: No parity (N,7,1) for ASCII

7: Even parity (E,7,1) for ASCII

8: Odd parity (O,7,1) for ASCII

Range Setting ify

COM DELAY
Pb.03

Pb.04

TIME

COM TIMEOUT

0～200ms 0～200ms 5ms ○

0.0～100.0 0.0～100.0 0.0s ○

TIME

COM TIMEOUT

Pb.05

RESPONSE 0: enabled

0～1 0 ○

RESPONSE

Pb.06

ACTION

TRANSFERS ERROR
1: Disabled

0~3 0~3 1 ○

ACTION

TRANSFERS ERROR

Pb.07	Reserved	0～65535	0～65535	0	◎	Reserved
Pb.08	Reserved	0～65535	0～65535	0	◎	Reserved
Pb.09	Reserved	0～65535	0～65535	0	◎	Reserved

PC Group--Enhanced function

PC.00	JOG REF	0.00~P0.06	0.00~ P0.06	5.00Hz	○	JOG REF

PC.01

PC.02
JOG ACC TIME
JOG DEC
TIME

0.0~3600.0s 0.0~3600.0 20.0s ○

0.0~3600.0s 0.0~3600.0 20.0s ○
JOG ACC TIME
JOG DEC
TIME

Function Name	Description	Setting Range	Factory Setting	Modify	LCD Display Code
PC.03	SKIP FREQ 1	0.00~P0.07	0.00Hz	○	SKIP FREQ 1
PC.04	SKIP FREQ 2	0.00~P0.07	0.00Hz	○	SKIP FREQ 2

PC.05			
PC.06			
PC.07			
PC.08			
PC.09 SKIP FREQ RANGE	0.00~P0.07	0.00Hz	○
AUTO RESET TIMES	0~3	0	○
FAULT ACTION	0: Disabled 1: Enabled	0	○
RESET INTERVAL	0.1~100.0s	1.0s	○
RUNNING TIME			

0~65535h 0~65535 65535 h ○
SKIP FREQ RANGE
AUTO RESET TIMES
FAULT ACTION
RESET INTERVAL
RUNNING
TIME
PC.10 FDT LEVEL 0.00~ P0.06 0.00~ P0.06 50.00Hz ○ FDT LEVEL
PC.11 FDT LAG 0.0~100.0% 0.0~100.0 5.0% ○ FDT LAG
0.0~100.0%
PC.12 FAR RANGE (maximum frequency)
0.0~100.0 0.0% ○ FAR RANGE
PC.13 BRAK VOLT 320.0~750.0V 320.0~750.0 700.0V ○ BRAK VOLT
PC,14
PC.15
LO FREQ RESTRAIN
HI FREQ
RESTRAIN

0~10 0~10 2 ○

0~10 0~10 0 ○
LO FREQ RESTRAIN
HI FREQ
RESTRAIN

PC.16	Reserved	0～65535	0～65535	0	◎	Reserved
PC.17	Reserved	0～65535	0～65535	0	◎	Reserved
PC.18	Reserved	0～65535	0～65535	0	◎	Reserved
PC.19	Reserved	0～65535	0～65535	0	◎	Reserved

Pd Group--PID Enhanced Function

PD.00

PID SWITCH SEL

PID SWITCH

0~4 0~4 0 ◎

PID SWITCH

PID SWITCH SEL

PID SWITCH

PD.01

POINT
PD.01

POINT
PD.01 ○

POINT

Function

Name Description
Setting
Factory Mod

LCD Display Code		Range	Setting	ify
PID-0 TO PD.02				
PD.03				
PD.04				
PD.05				
PD.06				
PD.07				
PID-1 T				
PID-1 TO PID-0 T				
PROPORTIO N GAIN1	0.00~100.00	0.00~100.00	0.50s	○
INTEGRAL TIME 1	0.00~100.00	0.00~100.00	0.50s	○
DIFFERENTI TIME1				
SAMPLING CYCLE 1				

0.00~100.00 0.00~100.00 0.10s ○

0.01~10.00s 0.01~10.00 0.10s ○

0.00~10.00 0.00~10.00 0.00s ○

0.00~10.00s 0.00~10.00 0.00s ○

PID-1 T

PID-1 TO PID-0 T

PROPORTIO N GAIN1

INTEGRAL TIME 1

DIFFERENTI TIME1

SAMPLING

CYCLE 1

PD.08 BIAS LIMIT 1 0.0~100.0% 0.0~100.0 0.0% ○ BIAS LIMIT 1

PD.09

PD.10~P

OUTPUT FILTER 1

0.0~3600.0s 0.0~3600.0 1.0s ○

OUTPUT FILTER 1

D.29
Reserved 0~65535 0~65535 ◎ Reserved

PE.00				
Factory password				
0～65535	0～65535	*****	●	
Factory password				

APPENDIX D WATERING STANDARD WIRING DIAGRAM

RT1

FR1

Figure D.1 Standard wiring diagram of one variable-frequency pump

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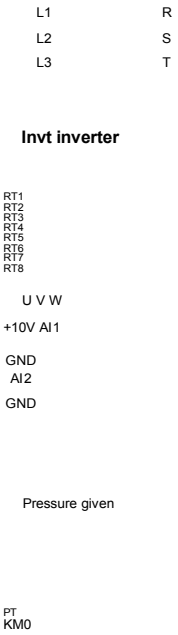
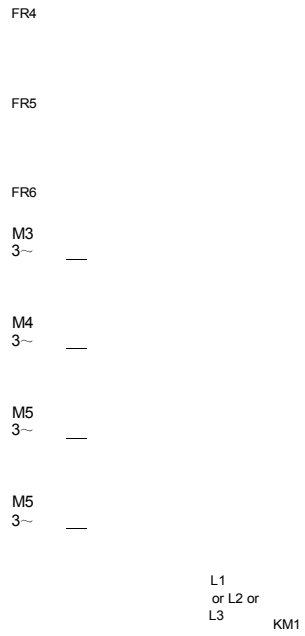


KM1
KM2
FR1
M1
3~
M2
3~
Pressure feedback
KM3
FR2
KM4
KM5
KM6
KM7
FR3


FR4
FR5
FR6
M3
3~
M4
3~
M5
3~
M5
3~
L1
or L2 or
L3
KM1
KM0
KM3
KM2
RT5
RT6
RT7
RT8

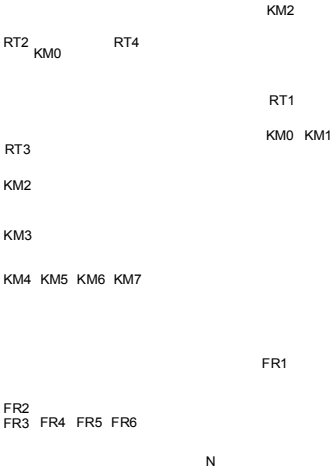
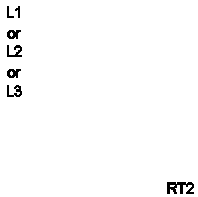


Figure D.2 Standard wiring diagram of two variable-frequency pumps


L1
or
L2
or
L3
RT2

N

Figure D.3 Standard wiring diagram of three variable-frequency pumps

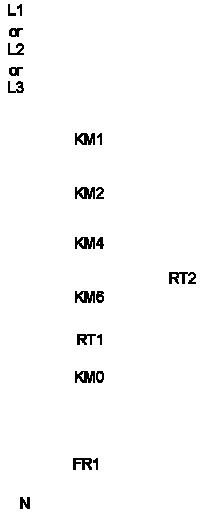


Figure D.4 Standard wiring diagram of four variable-frequency pump

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