CHV Vector Control Inverter Operation Manual

- Thank you very much for your buying INVT vector control inverter, CHV-series.
- Before use, read through this manual to ensure proper use. Keep this manual at an easily accessible place as to be referred anytime as necessary.

Safety Precautions (Important)

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

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

 WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury and physical damage. This sign is also used for alert of any un-safety operation.

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.

WARNING
● **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 1 minute until DC Bus capacitors discharge.** ● **Use proper grounding techniques.** ● **Never connect AC power to output UVW terminals**

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1. INTRODUCTION

1.1 Technology Features

- **Input & Output**
  - ◆Input Voltage Range: 1140/690/380/220V±15%
  - ◆Input Frequency Range: 47~63Hz
  - ◆Output Voltage Range: 0~rated voltage
  - ◆Output Frequency Range: 0~600Hz
- **External Interface**
  - ◆Programmable Digital Input:

    6 channel inputs. One is the high-speed pulse input (HDI1), another 4 channel inputs can be extended by I/O card.
  - ◆Programmable Analog Input:

    AI1: 0~10V, AI2: 0~10V or 0~14mA, I/O extension card can offer the following 2 inputs: AI3: -10V~10V, AI4: 0~10V or 0~14mA.
  - ◆Programmable Open-Circuit Collector Output:

    1 channel output, I/O extension card can offer another one (Open- circuit collector output or high-speed pulse output).
  - ◆Relay Output:

    2 channel outputs, I/O extension card can offer another one.
  - ◆Analog Output:

    1 channel output, I/O extension card can offer another one, 0/4~20mA or 0/2~10V selectable.
- **Technology Features**
  - ◆Control Mode:

    Sensorless Vector Control, Vector Control with PG, V/F Control.
  - ◆Overload Capacity:

    150% rated current 60s; 180% rated current 10s.
  - ◆Starting Torque:

    Sensorless Vector Control: 0.5Hz/150% (SVC), Vector Control

with PG: 0Hz/180%.

◆Speed-Adjust Ratio:

Sensorless Vector Control: 1:100, Vector Control with PG: 1:1000.

◆Speed-Control Accuracy:

Sensorless Vector Control: ±0.5% of maximum speed, Vector Control with PG: ±0.02% of maximum speed.

◆Carrier Frequency:

1.0KHz~16.0KHz. It can be adjusted automatically according to the features of temperature and load.

●Function Features

◆Frequency-Setting Mode:

Digital Setting, Analog Setting, Pulse Frequency Setting, Serial Communication Setting, Multi-Speed, Simple PLC Setting and PID Setting etc. The switch between the defining combination and the defining mode can be realized.

◆Torque-Control Function:

Offer multimode torque setting.

◆PID Control Function

◆Simple PLC, Multi-segments Speed Control Function:

16 segments speed Control.

◆Traverse Control Function

◆Length and Time Control Function

◆Non-Stop Function while instantaneous power failure

◆Speed trace Function:

Smoothly start the running motor.

◆QUICK/JOG Function:

Multi-function shortcut key defined by user.

◆Automatic Voltage-Adjust Function:

Keep output voltage static automatically when mains voltage fluctuating.

◆Up to 29 functions for failure protection:

Over current, over voltage, under voltage, over temperature, phase failure, over load etc.

1.2 Description of Name Plate

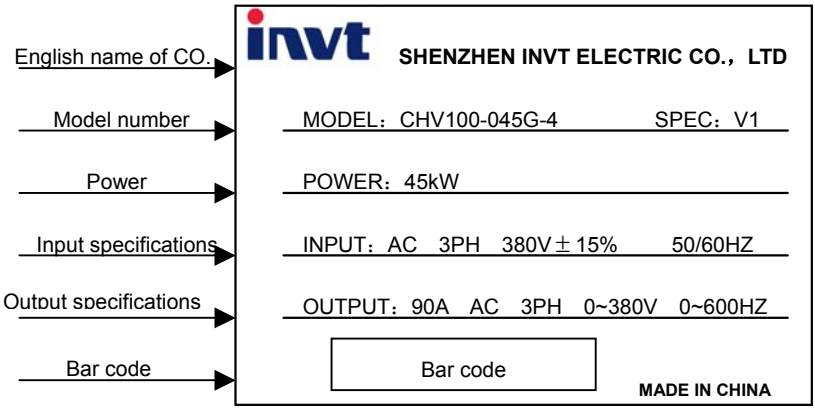
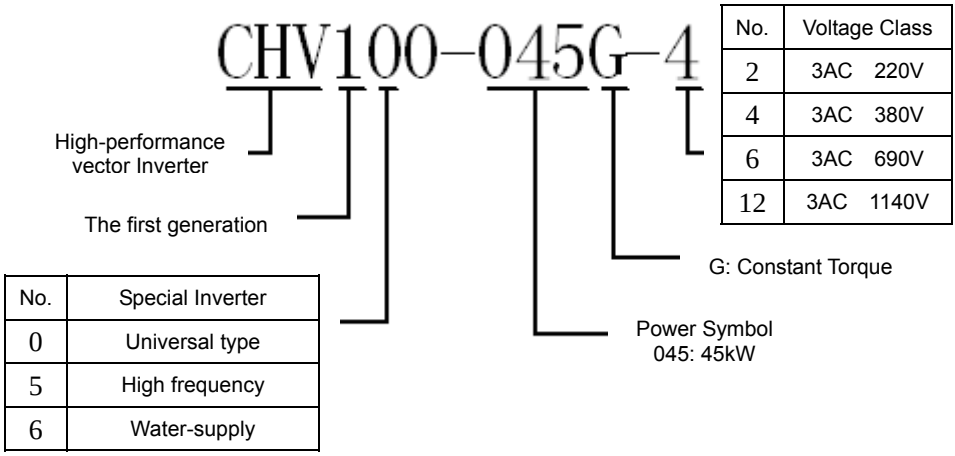


Figure 1.1 The nameplate of inverter.



No.	Voltage Class
2	3AC 220V
4	3AC 380V
6	3AC 690V
12	3AC 1140V

No.	Special Inverter
0	Universal type
5	High frequency
6	Water-supply

Figure 1.2 The model designation.

1.3 Option Guide

1. Power Voltage: 3AC 380V -15%~15%

Model No.	Constant torque (CT)			Size
	Rated Output Power (kW)	Rated Input Current (A)	Rated Output Current (A)	
CHV100-1R5G-4	1.5	5	3.7	C
CHV100-2R2G-4	2.2	5.8	5.0	C
CHV100-004G-4	4	10	9	C
CHV100-5R5G-4	5.5	15	13	C
CHV100-7R5G-4	7.5	20	17	D
CHV100-011G-4	11	26	25	D
CHV100-015G-4	15	35	32	D
CHV100-018G-4	18.5	38	37	E
CHV100-022G-4	22	46	45	E
CHV100-030G-4	30	62	60	E
CHV100-037G-4	37	76	75	F
CHV100-045G-4	45	90	90	F
CHV100-055G-4	55	105	110	F
CHV100-075G-4	75	140	150	G
CHV100-090G-4	90	160	176	G
CHV100-110G-4	110	210	210	G
CHV100-132G-4	132	240	250	H
CHV100-160G-4	160	290	300	H
CHV100-185G-4	185	330	340	H
CHV100-200G-4	200	370	380	I
CHV100-220G-4	220	410	415	I
CHV100-250G-4	250	460	470	I
CHV100-280G-4	280	500	520	I
CHV100-315G-4	315	580	600	I
CHV100-350G-4	350	620	640	J
CHV100-400G-4	400	670	690	J
CHV100-500G-4	500	835	860	J
CHV100-560G-4	560	920	950	J
CHV100-630G-4	630	1050	1100	J

2. Power voltage：3AC 220V -15%~15%

Model No.	Constant torque (CT)			Size
	Rated Power (kW)	Rated Input Current (A)	Rated Output Current (A)	
CHV100-0R7G-2	0.75	5.0	4.5	C
CHV100-1R5G-2	1.5	7.7	7	C
CHV100-2R2G-2	2.2	11	10	D
CHV100-004G-2	4	17	16	D
CHV100-5R5G-2	5.5	21	20	D
CHV100-7R5G-2	7.5	31	30	E
CHV100-011G-2	11	43	42	E
CHV100-015G-2	15	56	55	E
CHV100-018G-2	18.5	71	70	F
CHV100-022G-2	22	81	80	F
CHV100-030G-2	30	112	110	G
CHV100-037G-2	37	132	130	G
CHV100-045G-2	45	163	160	G

3. Power voltage: 3AC 690V -15%~15%

Model No.	Constant torque (CT)			Size
	Rated Output Power (KW)	Rated Input Current (A)	Rated Output Current (A)	
CHV100-022G-6	22	35	28	E
CHV100-030G-6	30	40	35	E
CHV100-037G-6	37	47	45	E
CHV100-045G-6	45	52	52	E
CHV100-055G-6	55	65	63	F
CHV100-075G-6	75	85	86	F
CHV100-090G-6	90	95	98	F
CHV100-110G-6	110	118	121	G
CHV100-132G-6	132	145	150	G
CHV100-160G-6	160	165	175	G
CHV100-185G-6	185	190	198	H
CHV100-200G-6	200	210	218	H
CHV100-220G-6	220	230	240	H

CHV100-250G-6	250	255	270	I
CHV100-300G-6	300	305	320	I
CHV100-315G-6	315	334	350	I
CHV100-350G-6	350	360	380	I
CHV100-375G-6	375	370	390	I
CHV100-400G-6	400	411	430	I
CHV100-500G-6	500	518	540	I
CHV100-560G-6	560	578	600	I
CHV100-630G-6	630	655	680	I

4. Power voltage: 3AC 1140V -15%~15%

Model No.	Constant torque (CT)			Size
	Rated Output Power (KW)	Rated Input Current (A)	Rated Output Current (A)	
CHV100-037G-12	37	27	25	E
CHV100-045G-12	45	32	31	E
CHV100-055G-12	55	38	38	F
CHV100-075G-12	75	51	52	F
CHV100-090G-12	90	57	58	F
CHV100-110G-12	110	72	73	G
CHV100-132G-12	132	85	86	G
CHV100-160G-12	160	102	104	G
CHV100-185G-12	185	113	115	H
CHV100-200G-12	200	130	132	H
CHV100-220G-12	220	141	144	H
CHV100-250G-12	250	158	162	I
CHV100-300G-12	300	176	180	I
CHV100-315G-12	315	203	208	I
CHV100-350G-12	350	210	216	I
CHV100-375G-12	375	220	225	I
CHV100-400G-12	400	252	260	I
CHV100-500G-12	500	317	325	I
CHV100-560G-12	560	356	365	I
CHV100-630G-12	630	390	400	I

1.4 Parts Description

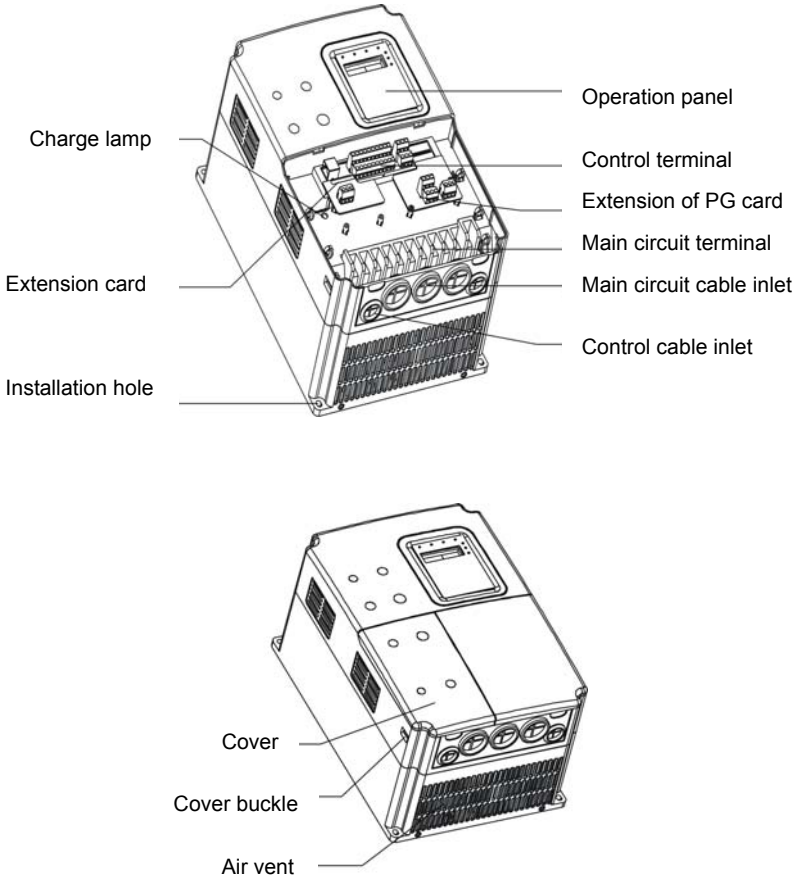


Figure 1.3 Parts of inverters of 15kw and lower.

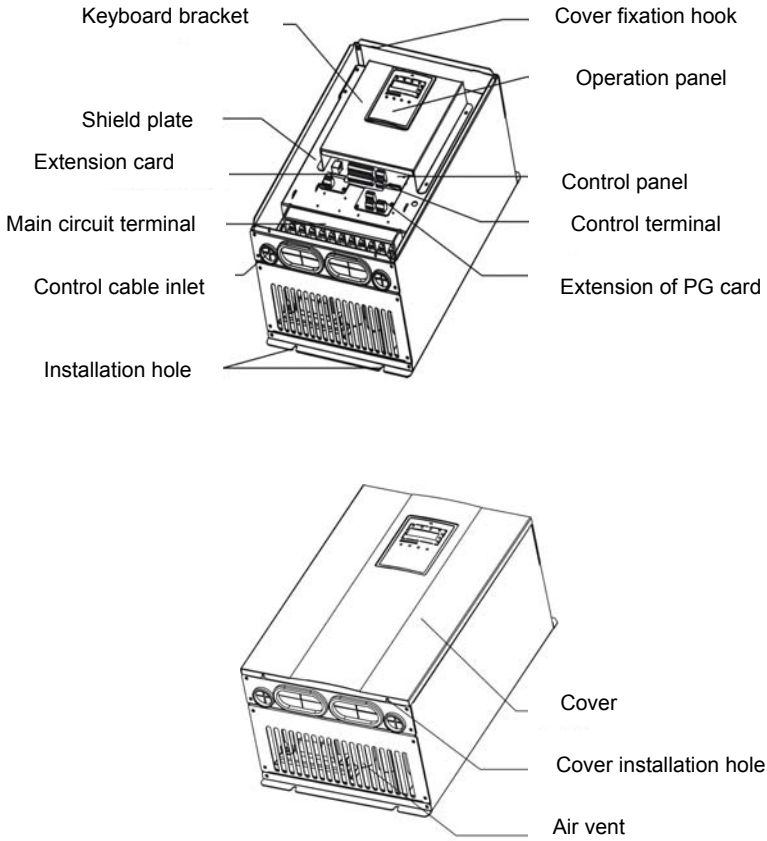


Figure 1.4 Parts of inverters of 18.5kw and higher.

1.5 Description of Extension Card

Adopting the advanced modular design, CHV series inverters are custom design products that could lower the customer's purchasing cost efficiently. In the mean time, we offer an open platform to make the clients realize their customized function easily.

For detailed information, see the operation manual of extension card.

Extension Card	Function
Serial Communication Card	Offer RS232 and RS485 dual physical communication interface 1. RS232 adopts standard D9 master seat. 2. 3-hole RS485 interface, two communication mode can be switched by short-connecting module. 3. In-line MODBUS RTU and ASCII standard communication protocol.
PG Card	Receive high-speed pulse from encoder to realize high-accuracy close-loop vector control. 1. Both push-and-pull input and open-circuit collector input. 2. Offer frequency division output, the frequency-division factor can be selected by dial switch. 3. Connect to the encoder by soft wire.
Injection Moulding Card	Achieve energy saving function for injection moulding machine by collecting and processing pressure and flow signal
Tension Control Card	Wind and unwind control, compensation of moment of inertia, multiple tension setting mode, automatic winding diameter calculation and display, linear speed collect and display, prevent wire broken, prevent overdrive, RS 485 port.
Water Supply Control Card	Realize functions such as close-loop constant of water supply pressure, multi-pumps variable frequency switch, time and multi-segment water supply, dormant protect, prevent water hammer, water level control and synthetic process of supply-discharge etc. RS 232 port.
I/O Extension Card	Offer more input/output terminals to enhance the external function of inverter. RS 485 port is available.

1.6 External Dimension

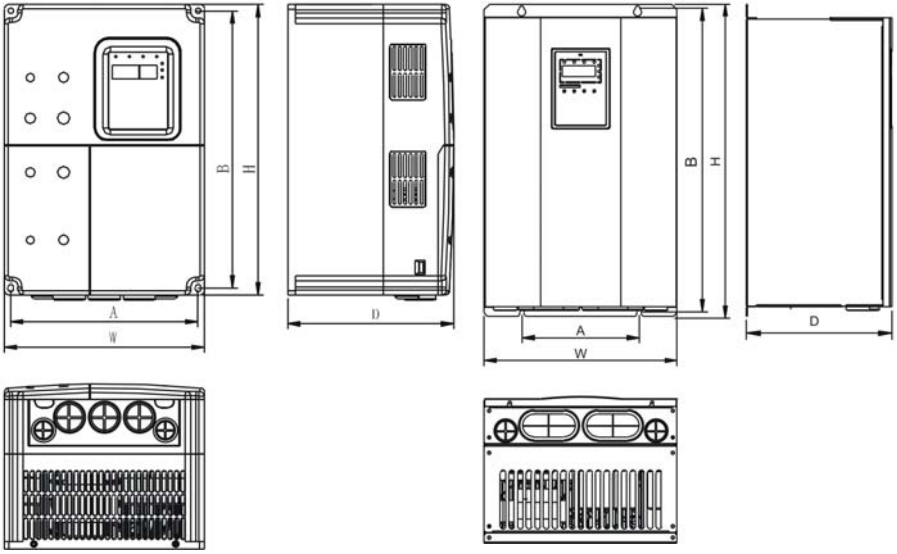


Figure1.5 Dimensions for 15kW and lower.

Figure 1.6 Dimensions for 18.5 ~110kW.

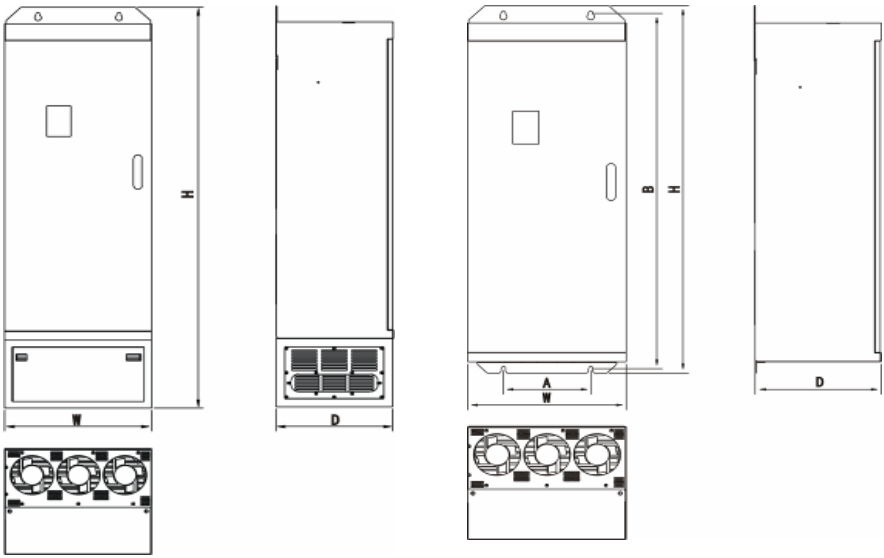


Figure 1.7 Dimensions for 132~315kW.

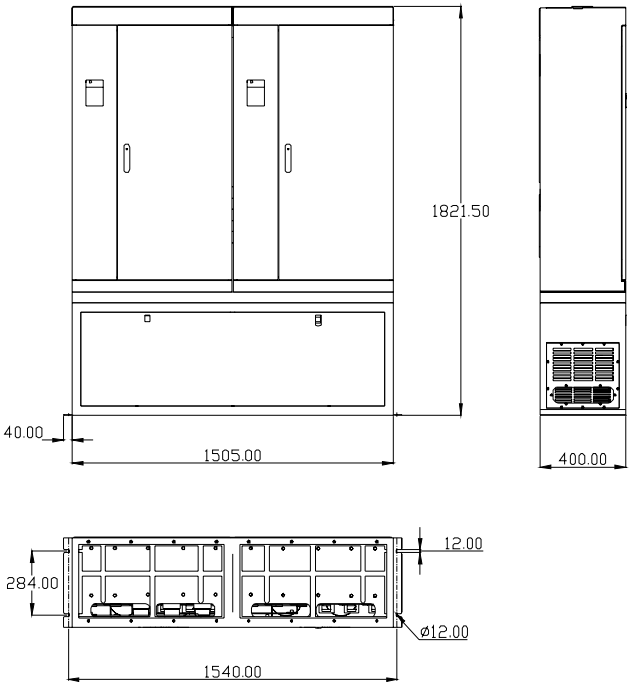


Figure 1.8 Dimensions for 350kw~630kw.

The Dimension of Externality and Installation:

Capacity (kW)	Size	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Installation Hole (mm)
		Installation Dimension		External Dimension			
1.5~5.5	C	147.5	237.5	250	160	175	5
7.5~15	D	206	305.5	320	220	180	6.0
18.5~30	E	176	454.5	467	290	215	6.5
37~55	F	230	564.5	577	375	270	7.0
75~110	G	320	738.5	755	460	330	9.0
132~185	H(without base)	270	1233	1275	490	391	13.0
	H(with base)	—	—	1490	490	391	—
200~315	I(without base)	500	1324	1358	750	402	12.5
	I(with base)	—	—	1670	750	402	—
350~630	J(with base)	See Figure 1.8					

1.7 Braking Unit

1.7.1 Option Guide

When the control equipment driven by inverter is braked fleetly, the braking unit needs to release the energy in the DC bus line. The braking unit is designed in the CHV series inverter (<=15KW), but is not in the Inverter (>=18.5KW). Please select proper braking unit according to the capacity of inverter. For the application whose braking torque is 100% and braking unit usage rate is 10%, option guide of braking unit and braking resistor is in the following table. As to the load that always works in the braking situation, the braking power should be adjusted according to the usage rate of braking unit.

In the longtime working situation, the power of the braking resistance is: $P = P8.32 \times P8.32 / R$, R is the braking resistance.

Option guide of 200V voltage

Inverter Power kW（HP）	Braking Unit		Braking resistor (10% of braking torque)		
	Model No.	Quantity	Equivalent Braking resistor	Equivalent Braking power	Quantity
1.5（2）	Build-in	1	100Ω	260W	1
2.2（3）		1	70Ω	260W	1
4（5）		1	40Ω	390W	1
5.5（7.5）		1	30Ω	520W	1
7.5（11）		1	20Ω	780W	1
11（15）	B5-032	1	13.6Ω	2400W	1
15（20）		1	10Ω	3000W	1
18.5（25）	B5-042	1	8Ω	4000W	1
22（30）		1	6.8Ω	4800W	1
30（40）		1	5Ω	6000W	1
37（50）		1	4Ω	9600W	1
45（60）	B5-052	1	3.4Ω	9600W	1

Option guide of 400V voltage

Inverter Power kW（HP）	Braking Unit		Braking resistor (10% of braking torque)		
	Model No.	Quantity	Equivalent Braking resistor	Equivalent Braking power	Quantity
1.5（2）	Build-in	1	400Ω	260W	1
2.2（3）		1	250Ω	260W	1
4（5）		1	150Ω	390W	1
5.5（7.5）		1	100Ω	520W	1
7.5（11）		1	75Ω	780W	1
11（15）		1	50Ω	1040W	1
15（20）		1	40Ω	1560W	1
18.5（25）	B5-054	1	32Ω	4800W	1
22（30）		1	27.2Ω	4800W	1
30（40）		1	20Ω	6000W	1
37（45）		1	16Ω	9600W	1
45（60）		1	13.6Ω	9600W	1
55（75）	B5-064	1	10Ω	12000W	1
75（100）		1	6.8Ω	12000W	1
90（120）		1	6.8Ω	12000W	1
110（150）		1	6Ω	20000W	1
132（180）		1	6Ω	20000W	1
160（215）		2	5Ω	25000W	2
185（250）		3	4Ω	30000W	3
200（270）		3	4Ω	30000W	3
220（300）		3	4Ω	30000W	3
250（340）		4	3Ω	40000W	4
280（380）		5	3Ω	40000W	5
315（430）		5	3Ω	40000W	5
350（470）		5	3Ω	40000W	5
400（540）		6	2Ω	50000W	6
500（680）		6	2Ω	50000W	6
560（760）		7	2Ω	50000W	7
630（860）		7	2Ω	60000W	7

Notice:

- Please select the resistor value set by our company.
- The resistor value may affect the braking torque. The resistor power that is designed according to 10% of the braking torque is in the table above. If want more braking torque, you can decrease the

amplificatory power of the braking resistor.

1.7.2 Connection Mode

1. Braking Resistor Connection

The braking resistor connection of the CHV100 series inverter (15kw and below) is in the following figure.

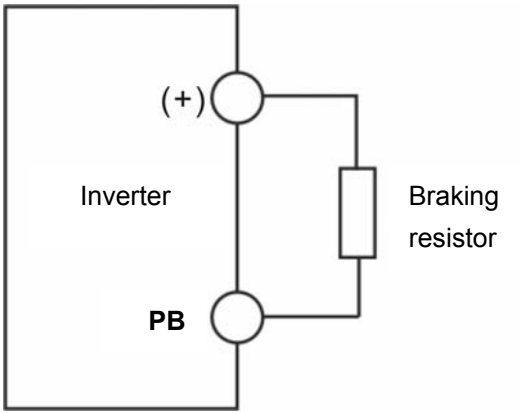


Figure 1.9 Installation of the braking resistor connection.

2. Braking unit connection

The following is the connection between CHV100 series inverter and the braking unit.

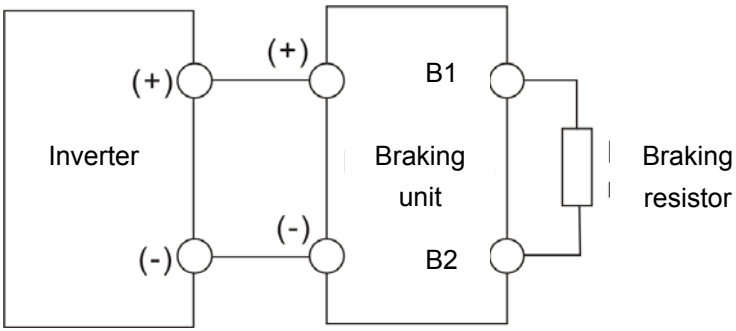


Figure 1.10 Connection Mode of the braking unit.

3. Parallel connection of the braking unit

The maximum power of the braking unit is 45kW. The parallel

connection with two or more braking unit needs to be applied when the power of inverter is greater than 15kW.

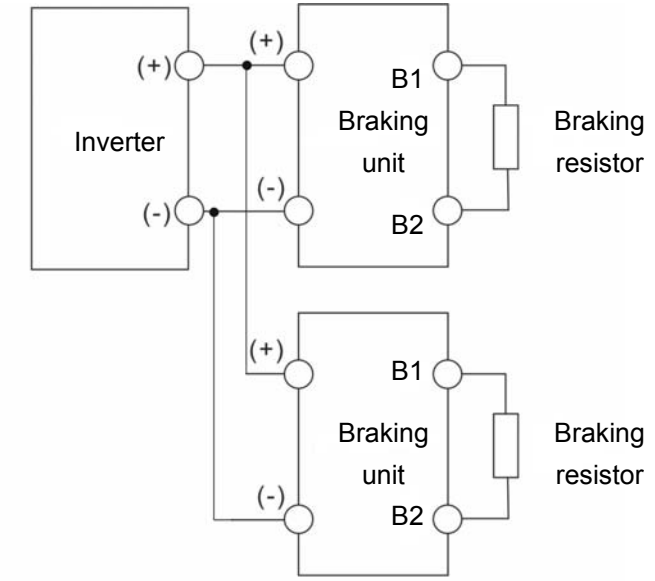


Figure 1.11 Parallel connection Mode of the braking unit.

2. UNPACKING INSPECTION

CAUTION
● **Never install or operate any inverter that is damaged or missing components. Doing so can result in injury.**

Check the following items when unpacking the inverter,

1. 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.

3. DISASSEMBLE AND INSTALLATION

⚠ WARNING

- Any untrained person working on any parts/systems of inverter or any rule in the “Warning” being violated, that will cause severe injury or property damage. Only 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 securely.
- 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 cable.

⚠ CAUTION

- 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 cause fire or damage the device.

3.1 Environmental Conditions for inverter Operation

1. Temperature

Operation temperature range: -10°C ~ +40°C. Decrease rated specifications in excess of 40°C.

2. Humidity

Relative air humidity ≤ 90%, without dewfall.

3. Altitude

Inverter can output the rated power when installed with altitude of lower than 1000m. The output power will decrease when the altitude is higher than 1000m. For details, please refer to the following figure:

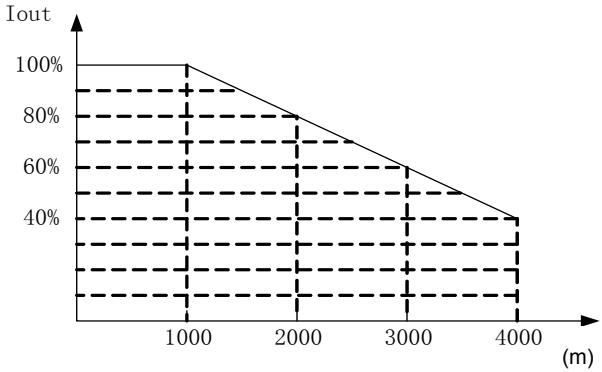


Figure 3.1 The relation between output current and altitude.

4. Impact and Vibration

It is not allowed that the inverter falls down or suffers from fierce impact, or installed at the place that may have often vibration.

5. Electromagnetic Radiation

Keep away from the electromagnetic radiation source.

6. Water

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

7. Air Pollution

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

8. Deposit Environment

Do not install the inverter in the environment with point-blank

sunshine, vapor, oil fog and vibrate.

3.2 Installation Orientation and Space

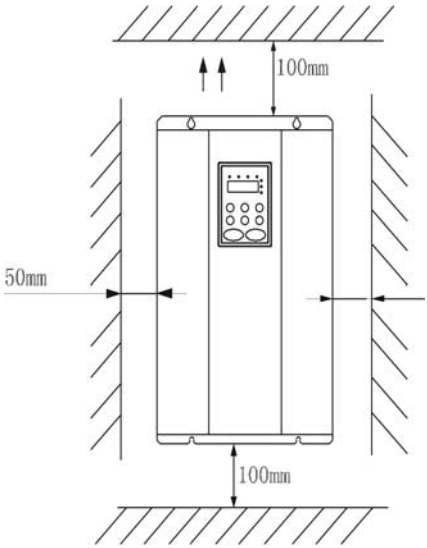


Figure 3.2 Installation orientation and space.

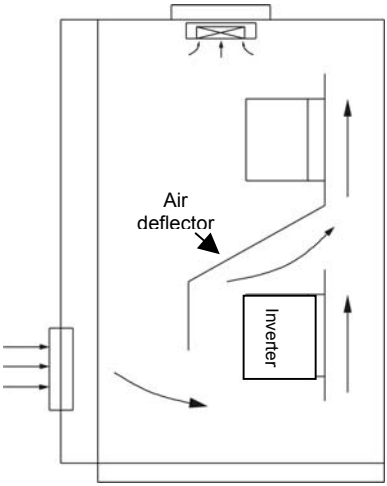


Figure 3.3 Installation of multiple inverters.

Add the air deflector when apply the up-down installation mode.

3.3 Installation Dimensions of Small External Keypad

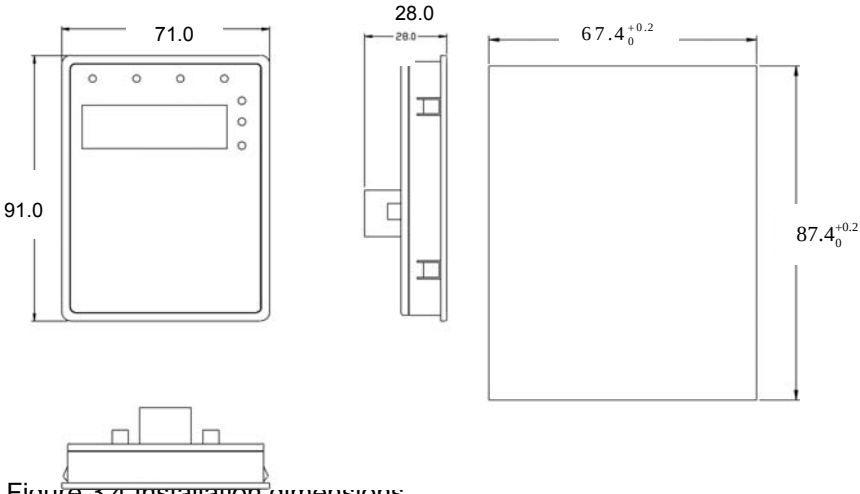


Figure 3.4 Installation dimensions.

Figure 3.5 Position dimensions.

3.4 Installation Dimensions of Big External Keypad

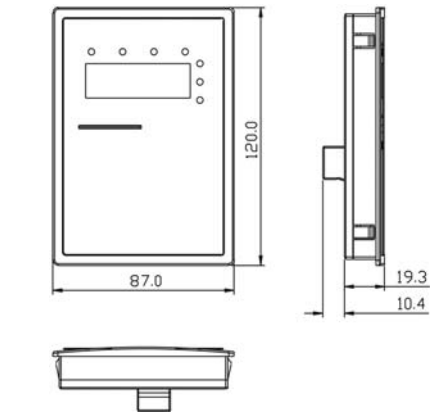


Figure 3.6 Installation dimensions.

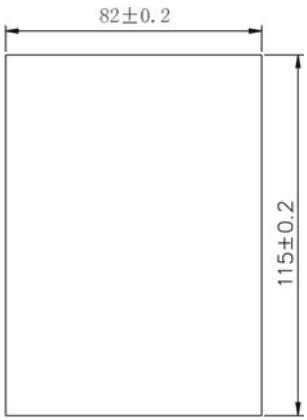


Figure 3.7 Position dimensions.

3.5 Disassembly and Installation of Cover

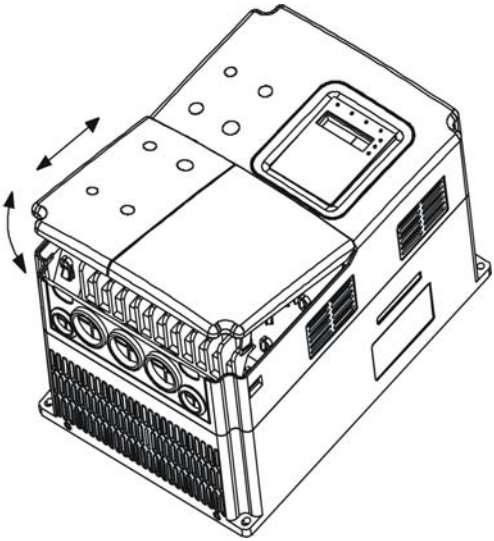


Figure 3.8 Disassembly and installation of plastic cover.

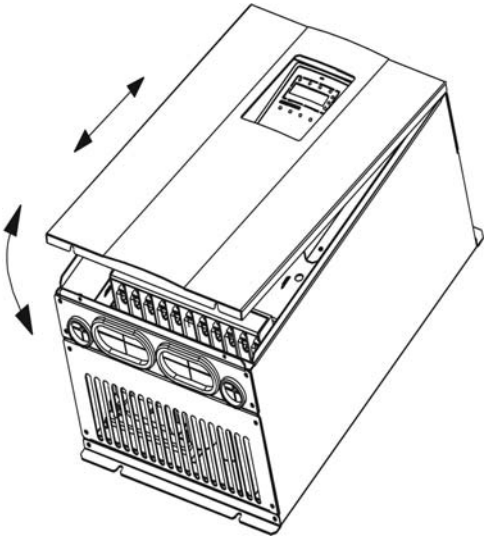


Figure 3.9 Disassembly and installation of metal plate cover.

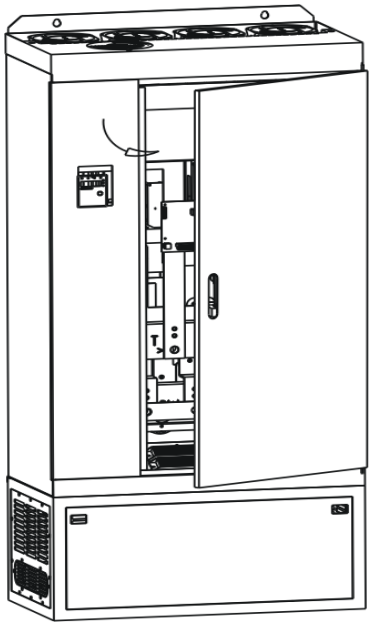


Figure 3.10 Installation of inverter cabinet.

3.6 Disassembly and Installation of Extension Card

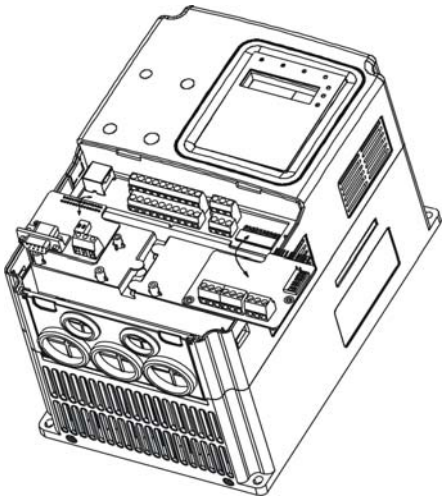


Figure 3.11 Disassembly and installation of extension card.

4. WIRING

⚠ WARNING

- Wiring must be performed by an authorized person qualified in electrical work.
- Do not test the insulation of cable that connects the inverter with high-voltage insulation testing devices.
- Can not install the inverter until discharged completely after the power supply is switched off for 5 minutes.
- Be sure to ground the ground terminal.
  (200V class: Ground to 100Ω or less, 400V class: Ground to 10Ω or less, 660V class: Ground to 5Ω 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.
  Otherwise there is a risk of electric shock.

⚠ CAUTION

- 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.
- Connect power supply cables and motor cables tightly.

4.1 Connections of Peripheral Devices

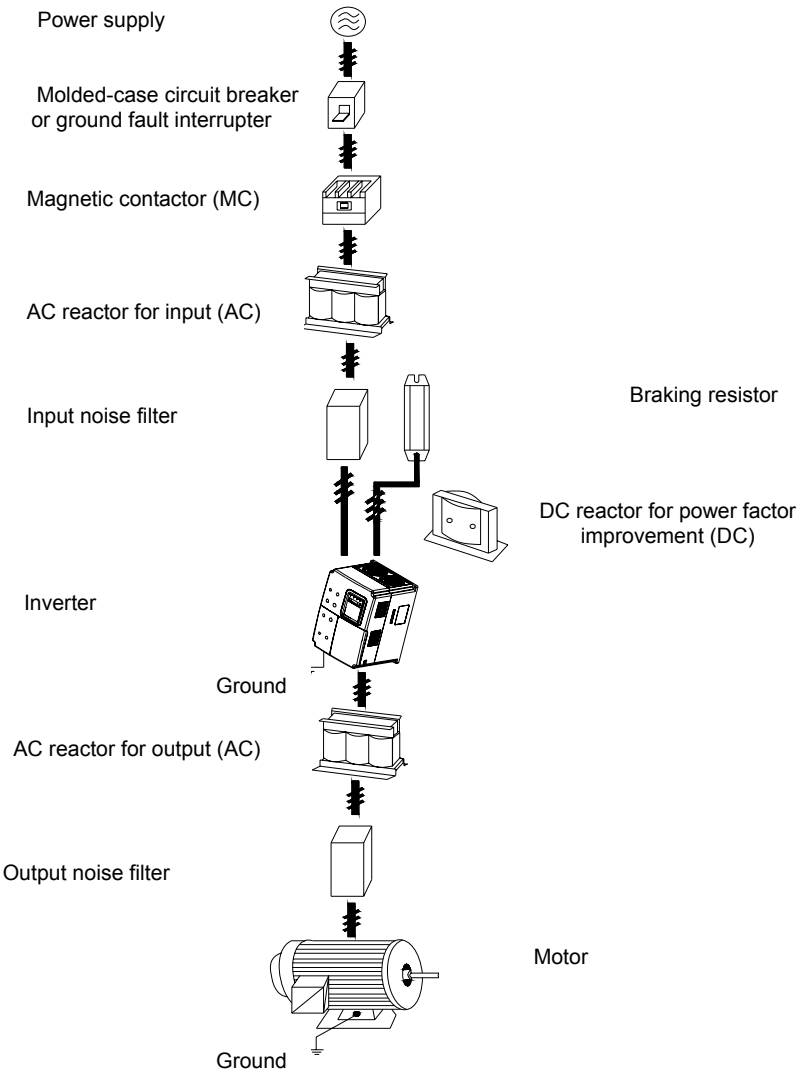


Figure 4.1 Connections of peripheral devices.

4.2 Terminal Configuration

4.2.1 Main Circuit Terminals

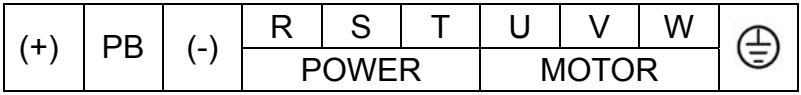


Figure 4.2 Main circuit terminals (1.5~5.5kW).

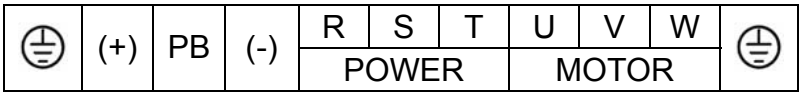


Figure 4.3 Main circuit terminals (7.5~15kW)

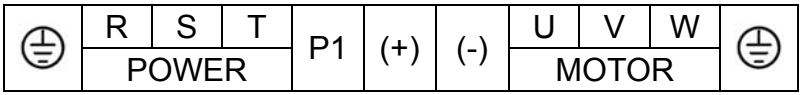


Figure 4.4 Main circuit terminals (18.5~110kW).

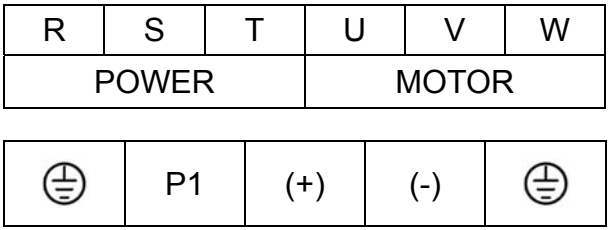


Figure 4.5 Main circuit terminals (132~315kW).

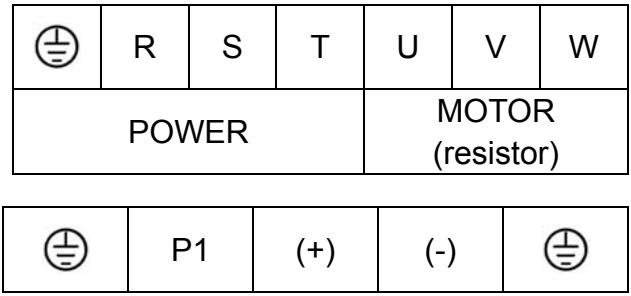


Figure 4.6 Main circuit terminals (350~630kW).

Main Circuit Terminal Functions:

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

Terminal Symbol	Function Description
R、S、T	3 phase power supply terminals
(+)、(-)	Spare terminals for external braking unit
(+)、PB	Spare terminals for external braking resistor
P1、(+)	Spare terminals for external DC reactor
(-)	Output terminals of DC negative busbar
U、V、W	Output terminals of 3 phase AC
⏚	Grounding Terminals

4.2.2 Control Circuit Terminals

S1	S2	S3	S4	S5	HDI1	GND	AI1	AI2	+10V	R01A	R01B	R01C
+24V	PW	COM	Y1	CME	COM	HDO	AO1	GND	PE	R02A	R02B	R02C

Figure 4.7 Terminal diagram of control circuit.

4.3 Typical Wiring Diagram

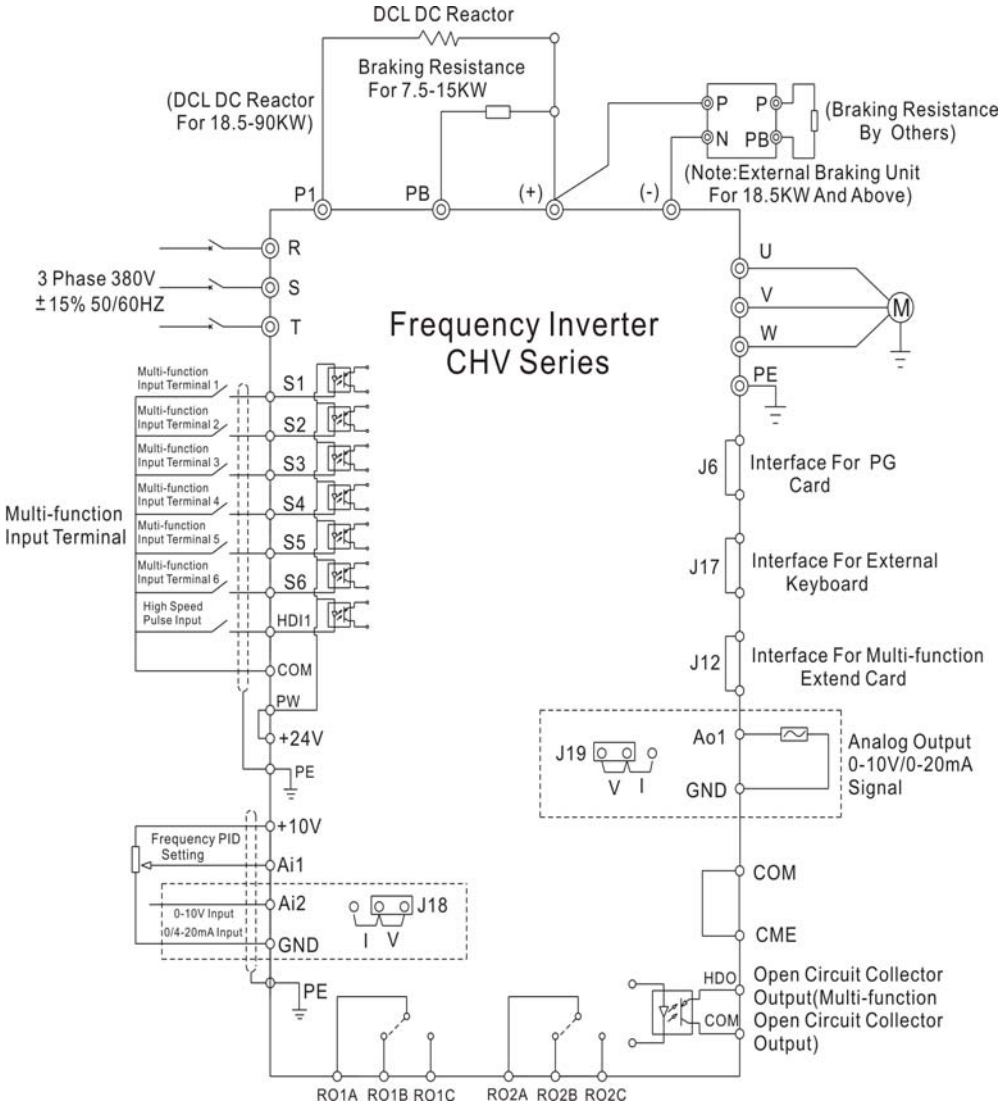


Figure4. 8 Wiring diagram.

4.4 Specifications of Breaker, Cable, Contactor and Reactor

4.4.1 Specifications of breaker, cable and contactor

Model No.	Circuit Breaker (A)	Input/Output (Coppery wire)	Contactor rated current(A) (380V or 220V)
3AC 220V			
CHV100-0R7G-2	16	2.5	10
CHV100-1R5G-2	20	4	16
CHV100-2R2G-2	32	6	20
CHV100-004G-2	40	6	25
CHV100-5R5G-2	63	6	32
CHV100-7R5G-2	100	10	63
CHV100-011G-2	125	25	95
CHV100-015G-2	160	25	120
CHV100-018G-2	160	25	120
CHV100-022G-2	200	35	170
CHV100-030G-2	200	35	170
CHV100-037G-2	200	35	170
CHV100-045G-2	250	70	230
3AC 380V			
CHV100-1R5G-4	16	2.5	10
CHV100-2R2G-4	16	2.5	10
CHV100-004G-4	25	4	16
CHV100-5R5G-4	25	4	16
CHV100-7R5G-4	40	6	25
CHV100-011G-4	63	6	32
CHV100-015G-4	63	6	50
CHV100-018G-4	100	10	63
CHV100-022G-4	100	16	80
CHV100-030G-4	125	25	95
CHV100-037G-4	160	25	120
CHV100-045G-4	200	35	135
CHV100-055G-4	200	35	170
CHV100-075G-4	250	70	230
CHV100-090G-4	315	70	280
CHV100-110G-4	400	95	315
CHV100-132G-4	400	150	380
CHV100-160G-4	630	185	450
CHV100-185G-4	630	185	500
CHV100-200G-4	630	240	580
CHV100-220G-4	800	150x2	630
CHV100-250G-4	800	150x2	700
CHV100-280G-4	1000	185x2	780

CHV100-315G-4	1200	240x2	900

4.4.2 Specifications of AC input/output reactor and DC reactor

Inverter Power (kW)	Input AC reactor		Output AC reactor		DC reactor	
	Current（A）	Inductance（mH）	Current（A）	Inductance（mH）	Current（A）	Inductance（mH）
CHV100-037G-4	60	0.24	63	90	80	0.86
CHV100-045G-4	75	0.235	80	80	100	0.70
CHV100-055G-4	91	0.17	100	60	120	0.58
CHV100-075G-4	112	0.16	125	40	146	0.47
CHV100-090G-4	150	0.12	160	35	200	0.35
CHV100-110G-4	180	0.10	200	30	238	0.29
CHV100-132G-4	220	0.09	224	20	291	0.24
CHV100-160G-4	265	0.08	280	16	326	0.215
CHV100-185G-4	300	0.07	315	13	395	0.177
CHV100-200G-4	360	0.06	400	11	494	0.142
CHV100-220G-4	400	0.05	560	9	557	0.126
CHV100-250G-4	560	0.03	600	8	700	0.10
CHV100-280G-4	640	0.0215	630	5.5	800	0.08

4.5 Wiring the Main Circuits

4.5.1 Wiring at power supply side of main circuit

1. Breaker

It is necessary to connect a 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>.

2. Magnetic contactor

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

3. Input AC reactor

In order to prevent the rectifier damage result from the bigger current when input the high-voltage, AC reactor should be installed at the input side. That can also improve the power factor of input side.

4. Noise filter at input side

The surrounding device may be disturbed by the cables when apply the inverter. This noise filter can minimize the disturbance. Just like the following figure.

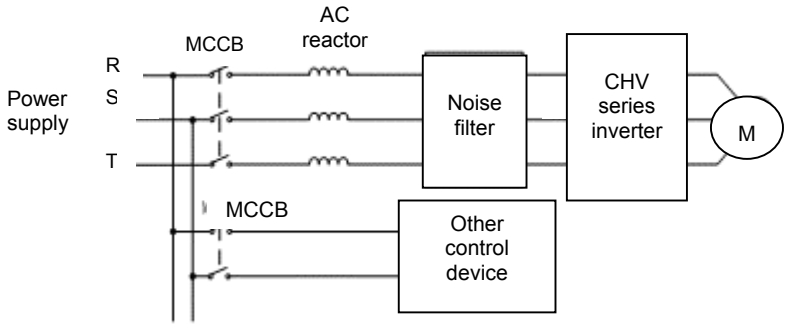


Figure4.9 Power supply connection of main circuit.

4.5.2Wiring at inverter side of main circuit

1. DC Reactor

All series CHV inverter from 18kW to 90kW have DC reactor inside. DC reactor can improve the power factor, and prevent rectifier damage result from the bigger current. It can also prevent rectifier circuit damage that is result from the sudden variation of power voltage or harmonic generated by phase-control load.

2. Braking Unit and Braking Resistor

• The braking unit is installed inside CHV series inverter of 15kW and lower. In order to release the feedback energy generated by braking, the braking resistor should be installed at (+) and PB terminals.

• The wire length of the braking resistor should be less than 5m.

• The temperature of braking resistor will increase because the releasing energy. Notice safety protection and good ventilation when install the braking resistor.

• CHV inverter of 18.5kW and higher has external braking unit. In order to release the feedback energy generated by braking, the braking units should be installed at (+) and (-) terminals, and the braking resistor should be installed at (+) and PB terminals.

• The cable between (+), (-) terminals of inverter and braking unit should be less than 5m. The cable between (+), PB terminals of braking unit and braking resistor should be less than 10m.

Caution: Be sure that the electric polarity of (+) (-) terminals is right; it is not allowed to connect the braking unit (+) (-) terminals. Otherwise the damage or fire can occur.

4.5.3 Wiring at motor side of main circuit

1. Output Reactor

When the distance between inverter and motor is more than 50m, inverter will have frequent over-current protection because of the large leakage current result from the parasitic capacitance to ground.

Meanwhile, the output reactor compensation should be added to avoid the damage of motor insulation.

2. Noise Filter at Output Side

Noise filter should be installed at the output side to minimize leakage current and the wireless noise caused by cable between inverter and motor. Just see the following figure.

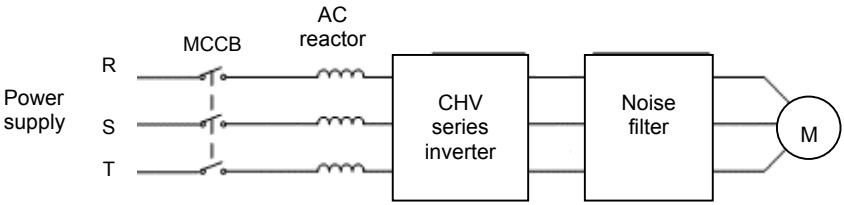


Figure 4.10 Wiring at motor side of main circuit.

4.5.4 Wiring of feedback unit

Feedback unit can feed back the electricity generated by regenerative braking of motor to the grid. Compared with traditional 3-phase inverse parallel bridge-type rectification unit, CHV feedback unit applies IGBT as the rectification feedback. And the harmonic wave aberrance value of feedback is less than 4% of the base harmonic value. That will cause little pollution to the grid. Feedback unit is extensively applied on oil field for pumping unit, centrifugal machine and hoister etc.

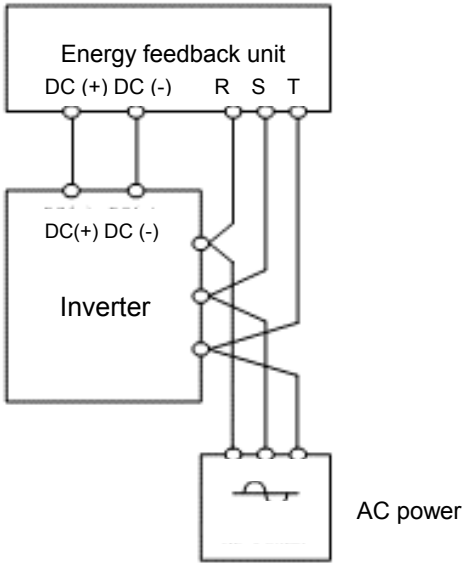


Figure 4.11 Wiring of energy feedback unit.

4.5.5 Wiring of common DC bus

The common bus is always applied in the field of paper manufacturing and chemical fiber industry. At any time, some motors are in electro-motion situation while some others are in regenerative braking (generating electricity) situation. At that time, the regenerated energy is automatically balanced at the DC bus, and it can supply to motors in electro-motion situation. That can decrease the electric energy of the whole system when compared with the traditional method (single inverter for single motor).

When two motors are in operation at the same time (such as winding motor、unreeling motor), one is in electro-motion situation and the other is in electricity generation situation. In this case the DC buses of two inverters can be connected in parallel so that the regenerated energy can be supplied to motors in electro-motion situation to save energy. Its detail wiring is shown in the following figure:

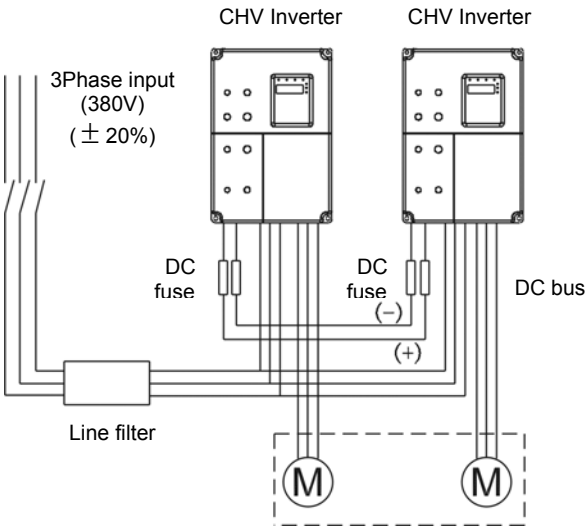


Figure 4.12 Wiring of common DC bus.

Caution: Two inverters should be the same model when connected with DC bus. Be sure they are powered on at the same time.

4.5.6 Ground Wiring (PE)

In order to ensure safety and prevent electrical shock and fire, the ground terminals PE of inverter must be grounding with ground resistance of less than 10Ω. The ground wire should be big and short, it is better to use multiple copper core wire ($\geq 3.5mm^2$). When multiple inverters need to be earth connected, when using more than one inverter, be careful not to loop the ground wire.

4.6 Wiring Control Circuit Terminals

4.6.1 Precautions

Use multi-core shielded or twisted-pair cables to control terminals. Connect the shield wire to ground terminal (PE). The control cable

should be more than 20cm far away from the main circuit and heavy current circuits (including power supply cable, motor cable, relay and contactor connecting cable), and parallel arrangement should be avoided. It is suggested to apply perpendicular arrangement to prevent inverter malfunction caused by external interference.

4.6.2 Control circuit terminals

Terminal No.	Function
S1~S5	Switching signal input, form the optical coupling partition input with PW and COM. Input Voltage Range: 9~30V Input Impedance: 3.3kΩ
HDI1（HDI2）	High speed pulse or switching signal Input, form the optical coupling partition input with PW and COM. Pulse input frequency range: 0~50kHz Input Voltage Range: 9~30V Input Impedance: 1.1kΩ
PW	External power supply. Customers can directly connect it to external power supply (between itself and COM), or use the +24V power supplied by the inverter itself. The +24V is short connected to PW in default when leave factory, disconnected to +24V when using external power supply.
+24V	+24V power supply for the inverter itself. Maximum Output Current: 150mA
AI1（AI3，AI4）	Analog Input, with voltage range: 0~10V Input Impedance: 10kΩ
AI2	Analog Input, with voltage range（0~10V）/Current（0~20mA）selective by J18. Input Impedance:10kΩ(Voltage Input)/250Ω(Current Input）
GND	Referenced zero potential for +10V. (GND is isolated from COM)
Y1（Y2）	Open-circuit collector output terminal. The corresponding common terminal is CME. External Voltage Range: 0~24V Output Current Range: 0~50mA
CME	Common terminal of open circuit collector output

Terminal No.	Function
COM	The common terminal of +24V or external power supply.
+10V	+10V power supply for the inverter itself.
HDO	High-speed pulse output terminal. The corresponding common terminal is COM. Output Frequency Range: 0~50 kHz
AO1（AO2）	Analog output terminal, with selective voltage and current by means of jumper J19. Output Range: voltage（0~10V）/current（0~20mA）
PE	Grounding Terminal.
RO1A、RO1B、RO1C	RO1 relay output, RO1A common terminal, RO1B always close, RO1C always open. Contact Capacity: AC250V/3A, DC30V/1A.
RO2A、RO2B、RO2C	RO2 relay output, RO2A common terminal, RO2B always close, RO2C always open. Contact rating: AC250V/3A, DC30V/1A
RO3A、RO3B、RO3C	RO3 relay output, RO3A common terminal, RO3B always close, RO3C always open. Contact Capacity: AC250V/3A, DC30V/1A.

4.6.3 Jumper on control board

Jumper	Function
J2, J4, J5	The default is not short connection. It is prohibited to be short connected together, otherwise it will cause inverter malfunction.
J13, J14	Do not change factory default connection of J13 (marked with ATX) and J14 (marked with ARX), otherwise it will cause serial communication malfunction.
J18	Jumper for voltage (0~10V) / current (0~20mA) input switch. V jump to GND means voltage input; I jump to GND means current input.
J19	Jumper for voltage (0~10V) /current (0~20mA) output switch V jump to OUT means voltage output; I jump to OUT means current output.

4.7 Installation Guide Based On EMC Requirements

4.7.1 General description of EMC

EMC is the abbreviation of electromagnetic compatibility, which means the device or system has the ability to work normally and can not produce any electromagnetic disturbance to anything under electromagnetic environment.

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

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

Conducted disturbance is the disturbance transmitted by conductor. Therefore, any conductors, such as wire, transmission line, inductor, capacitor and so on, are the transmission channel of disturbance.

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

Electromagnetic disturbance must have three conditions or essentials: disturbance source, transmission channel and sensitive receiver. Any of which is necessary. For customers, the solution of EMC problem is mainly in transmission channel because of the final disturbance source device or receiver.

Different electric or electronic devices have different EMC ability because of the different EMC standard or class.

4.7.2 EMC features of inverter

Like other electric or electronic devices, inverter is not only an electromagnetic disturbance source but also an electromagnetic receiver. The operating principle of inverter determines that it can produce certain electromagnetic disturbance noise. The inverter should be designed with certain anti-jamming ability to ensure the smooth working in certain electromagnetic environment. The following is EMC

features:

1. Input current is non-sine wave. The input current includes plenty of high-harmonic waves that can cause electromagnetic disturbance, decrease the grid power factor and increase the wire loss.

2. Output voltage is high frequency PMW wave, which can influence the temperature-increasing and the using period of motor. The leakage current will be increased, which can make the leakage protection device malfunction and generate strong electromagnetic disturbance to influence the reliability of other electric devices.

3. As the electromagnetic receiver, too strong disturbance will damage the malfunction of inverter and influence the normal using of customers.

4. In system wiring, external disturbance and its anti-jamming of inverter supplement each other. The decreasing of external disturbance can increase the anti-jamming ability.

4.7.3 EMC installation guide

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 is mainly in these five aspects.

1. Noise control

The shielding wire that is applied to connect the control terminals of inverter ground the shielding layer. 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 shielding wires or the separated cable tray. One terminal of metal cover of shielding wires or separated cable tray is connected with ground and the other is connected with the motor cover. Installing a noise filter can reduce the electromagnetic noise greatly.

2. Local wire arrangement

Power supply wiring: the power supply is separated in 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 the neutral and the earth 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 sensitive noise device. The same kinds of device should be installed at the same area, and the distance between different category devices 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 wire arrangement, 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), and even to 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 for installing noise filter. Otherwise the distributed capacitances of its input and output power cable can be coupling each other to make it out of function.

3. Ground

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

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. 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 heavier 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 even longer, it is necessary to install one reactor at every certain distance.

5. Noise Filter

Noise filter has a great effect of electromagnetic decoupling, and so even if the optimal operation is fulfilled, it is preferred for customer to install it.

For inverter, noise filter has following categories:

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

4.7.4 Ensure inverter complies with following criterion when install.

- EN61000-6-4
- EN61800-3

5. OPERATION

5.1 Operating Keypad Description

5.1.1 Keypad schematic diagram

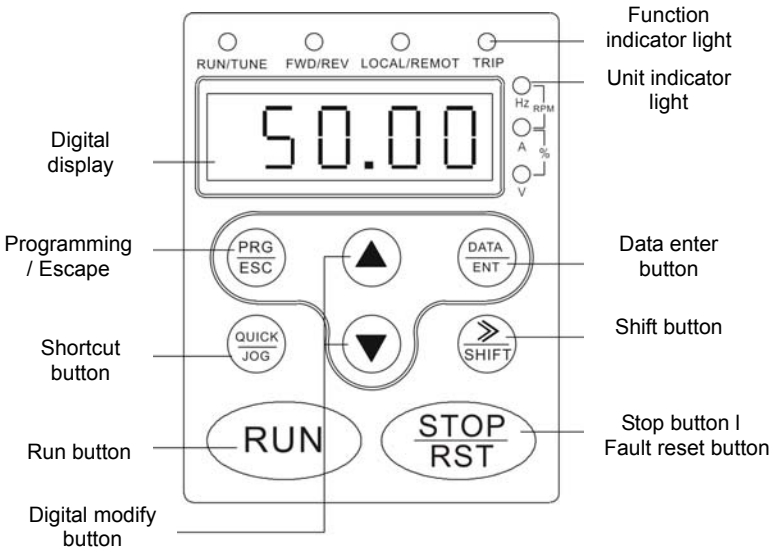
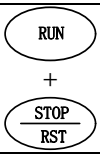


Figure 5.1 Operation keypad schematic diagram.

5.1.2 Button function description

Button Symbol	Name	Function Description
PRG ESC	Programming Button	First-class menu of entry or exit, shortcut parameter deletes.
DATA ENT	Enter Button	Progressively enter menu to confirm parameters.
▲	UP Increment Button	Progressively increase of data or function codes.

	DOWN Decrement Button	Progressive decrease of data or function codes.
	Shift Button	Select the display parameters in stop or operating interface. Select modified bit to modify parameter,.
	Run Button	Running under keypad operating mode.
	STOP/RESET Button	Stop operation at operating state; This function code is restricted by P7.04. When fault alarm, all control modes can use this button to reset operation.
	Shortcut Multifunction Button	Determined by Function Code P7.03: 0: QUICK function of shortcut menu for entering or exiting the first class of shortcut menu 1：FWD/REV switching button to switch between forward and reverse 2: JOG button for Jog operation 3: clear UP/DOWN settings, clear the frequency set by UP/DOW
	Combination	Pressing the RUN button and STOP/REST button at the same time can achieve inverter freely stop.

5.1.3 Indicator light description

1) Function Indicator Light Description

Indicator Light Name	Indicator Light Description
RUN/TUNE	Extinguished light means the inverter is at stop state, and flickering light means parameter autotuning state; bright light means in operation.
FWD/REV	FWD/REV indicating light: Extinguished light means forward operation, bright light means reverse operating.
LOCAL/REMOT	Indicator light for Keypad operation, terminal operationl and telecommunication control. Extinguished light means keypad control mode; flickering light means terminal control mode; bright light means telecommunication mode.

TRIP	Overload pre-warning indicator light. Flickering at overload pre-warning state; extinguished at normal operation state.

2) Unit Indicator Light Description

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

3) Digital Display

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

5.2 Operation Process

5.2.1 Parameter setting

Three classes of menu are:

1. Function code group (first-class);
2. Function code label (second-stage);
3. Function code setting value (third-stage).

Remarks:

Press PRG/ESC or DATA/ENT to return to the second-class menu from the third-class menu. The difference is: pressing PRG/ESC 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; pressing DATA/ENT will directly return to the second-class menu without saving the parameters, and keep staying at the current function code.

For example:

Change the function code P1.01 setting from 00.00Hz to 01.05Hz.

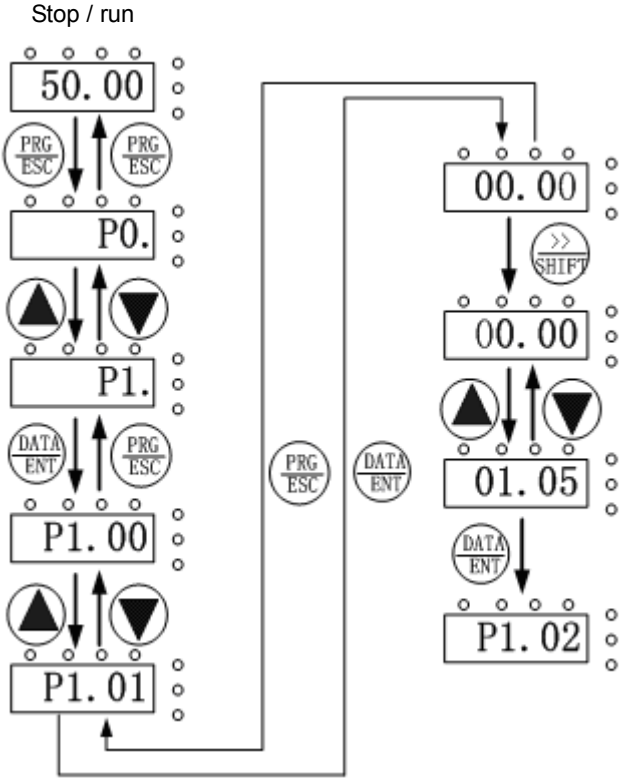


Figure 5.2 Operation flow of the third-class menu.

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

1) This function code is un-modifiable parameter, such as actual detected parameter, operation records and so on;

2) This function coder is un-modifiable under operating state, but modifiable at stop state.

5.2.2 Shortcut menu

Shortcut menu, in which parameters in common use can be set, 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 general programming state.

Maximum 16 function parameters can be put into the shortcut menu, and parameter can be added/deleted when F7-03 is set as 0.

Add shortcut parameter (for example):

Set function code P0.00 as shortcut parameter can be done as follows.

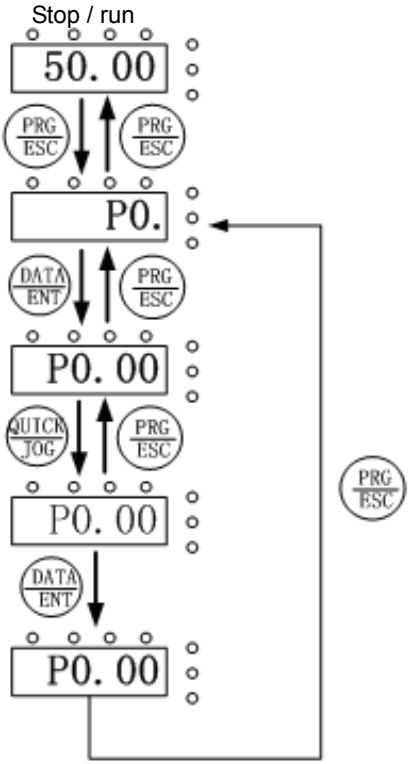


Figure 5.3 Example of adding shortcut menu.

Remarks: If pressing QUICK/JOG under the programmable second-class menu, the display contents will be flickering, asking whether to save this parameter into the shortcut menu. If pressing DATA/ENT to confirm, the display contents will stop flickering, and the

process is finished; if pressing PRG/ESC to cancel, the display contents will stop flickering, and the process is cancelled. If 16 parameters are fully added, “FULLP” will be displayed when trying to save more parameter into the shortcut menu.

Shortcut parameter operation:

Shortcut menu has two stages menus, which are corresponding to the second-class and the third-class menus of general programming method, and has no corresponding first-class menu.

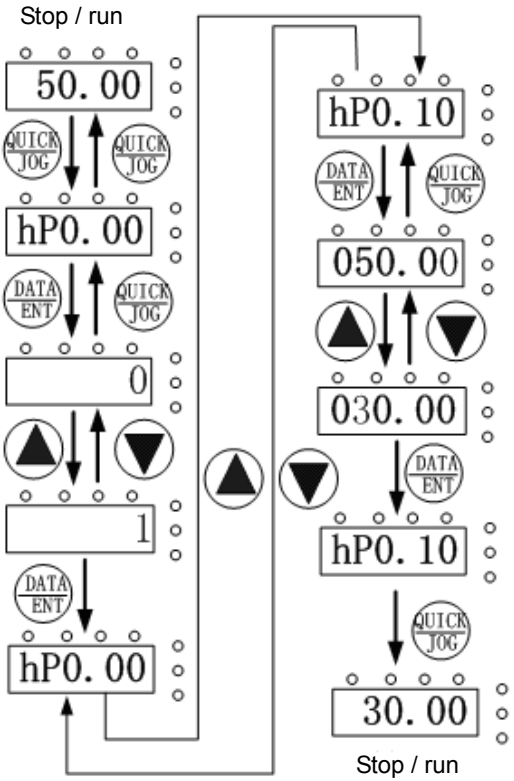


Figure 5.4 Operation example of shortcut menu.

Operation can be illustrated by the example above.

Remarks:

Under stop or operating display interface, press QUICK/JOG to enter the shortcut first-class menu, use Button UP/DOWN to select

different shortcut parameter, and then press DATA/ENT to enter the third-class menu. The method to modify parameter at the third-class menu is the same as that at the general third-class menu. If want to return to last display, press Button QUICK/JOG.

"NULLP" being displayed when enter the QUICK second-class menu indicates the shortcut menu is empty.

Delete shortcut parameters:

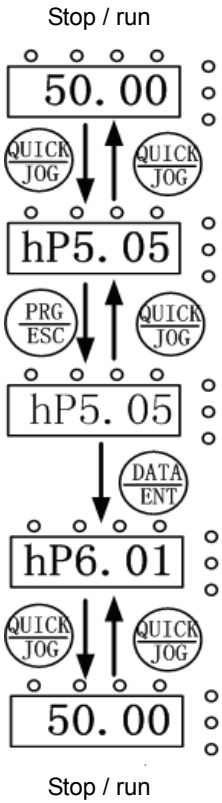


Figure 5.5 Example of deleting shortcut parameter.

Remarks:

If press Button PRG/ESC under the first-class shortcut menu, the display will be flickering, reminding whether or not to delete. Press Button DATA/ENT to confirm, and the display will stop flickering and

jump to next QUICK parameter, ending the delete operation. If press Button QUICK/JOG, the flickering will be stopped and the delete operation will be canceled. If the parameter to delete is the final one, “NULLP” will be displayed after it is deleted, indicating there is no any QUICK parameter.

5.2.3 Fault reset

If the inverter has fault, it will prompt the related fault information. User can use Button STOP/RST or terminal function (P5 Group) to reset 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 it is unable to run.

5.2.4 Parameter Copy

For details, see the function description of LCD external keypad.

5.2.5 Motor parameter autotuning

If “Sensorless Vector Control” mode or “Vector Control with PG” mode is chosen, motor nameplate parameters must be input correctly prior to inverter operation as CHV series inverter matches standard motor parameters based on the nameplate parameters; vector control mode so strongly relies on the motor parameter that correct parameters of the motor which is to be controlled must be obtained if excellent performances are to be achieved.

The procedure of motor parameter autotuning is as follows:

At first, choose the keypad command channel as the operation command channel (P0.01).

And then input following parameters according to the actual motor parameters:

P2.01: motor rated frequency;

P2.02: motor rated speed;

P2.03: motor rated voltage;

P2.04: motor rated current;

P2.05: motor rated power.

Set P0.17 to be 1, and for the detail process of motor parameter autotuning, please refer to the description of Function Code P0.17. And then press Button RUN on the keypad panel, the inverter will automatically calculate following parameter of the motor:

P2.06: motor stator resistance;

P2.07: motor rotor resistance;

P2.08: motor stator and rotor inductance;

P2.09: motor stator and rotor mutual inductance;

P2.10: motor no-load current; then motor autotuning is finished.

Notice: the motor should be uncoupled with its load; otherwise, the motor parameters obtained by autotuning may be not correct.

5.2.6 Password setting

CHV series inverter offers user's cryptoguard function. When P7.00 is set to be nonzero, it is the user's password, and exiting function code edit mode will make the password become effective. If pressing Button PRG/ESC again to try to access the function code edit mode, "-----"will be displayed, and the operator must input correct user's password, otherwise will be unable to access it.

If it is necessary to cancel the cryptoguard function, just set P7.00 to be zero. User's cryptoguard has no protection to the parameters in shortcut menu.

5.3 Running State

5.3.1 Power-on initialization

Firstly the system initializes during the inverter power-on, and LED displays "-CHV-". 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 parameter) and P7.07 (stop parameter) according to binary bits, which definitions can be seen in function-code-description of P7.06 and P7.07.

In stop status, there are sixteen parameters of stop status that can be chosen to display or not. They are: set frequency, bus voltage, on-off input status, open collector output status, PID setting, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage, analog input AI4 voltage, high-speed pulse input 1 (HDI1), high-speed pulse input 2 (HDI2), PLC and multi-speed stage number, actual count value, actual length and some reserved parameters. Whether or not to display can be decided by bit option of Function Code P7.07 (converted into binary system), press 》/SHIFT to switch the display of the chosen parameter.

5.3.3 Motor parameter autotuning

For details, please refer to the description of Function Code P0.17.

5.3.4 Operation

In running status, there are five running parameters: operating frequency, set frequency, bus voltage, output voltage, output current, which are displayed aptoticly. Other sixteen display parameters: output power, output torque, PID setting, PID feedback, on-off input status, open collector output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage, analog input AI4 voltage, high-speed pulse input 1 (HDI1), high-speed pulse input 2 (HDI2), PLC and multi-speed stage number, actual count value, actual length and some reserved parameters, whether or not to display can be decided by the bit option of Function Code P7.07 (converted into binary system), press 》/SHIFT to switch the display of the chosen parameter.

5.3.5 Fault

In fault status, inverter will display parameter of STOP status besides fault status. Press button 》/SHIFT to switch the display parameter of STOP status. CHV series inverter offers a variety of fault

information. For details, see inverter faults and their countermeasures.

5.4 Quick Testing

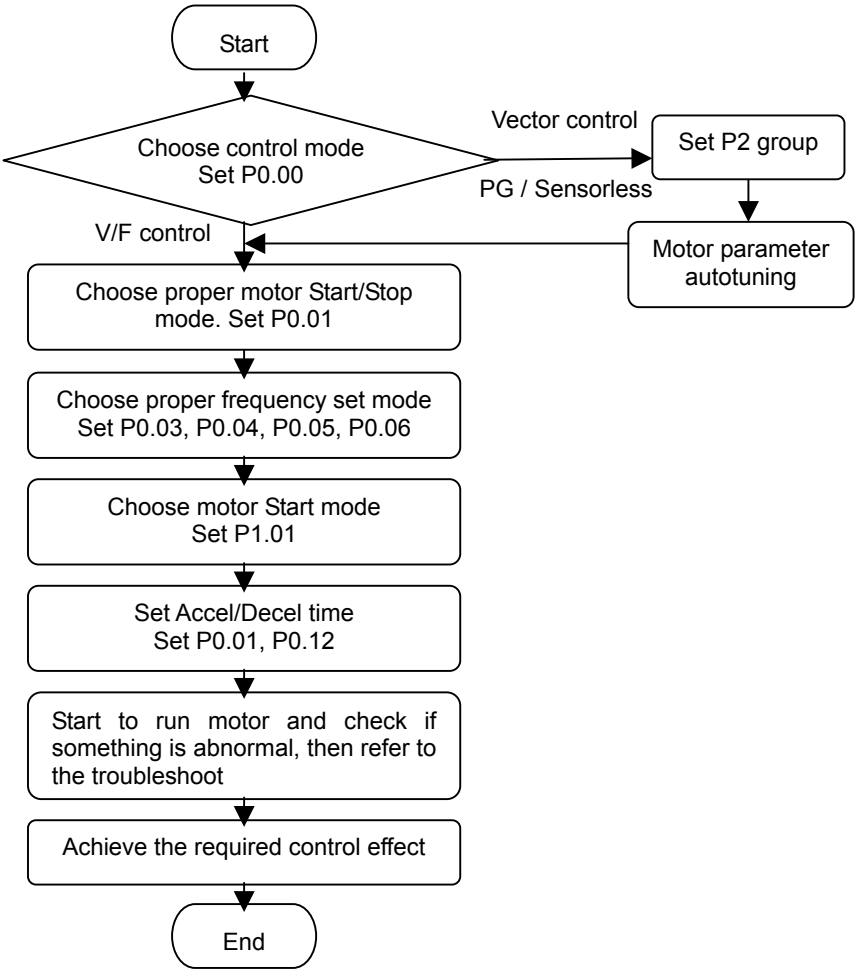


Figure 5.6 Quick testing process flow.

6. DETAILED FUNCTION DESCRIPTION

This chapter explains the functions of inverter in detail. They are classified into fourteen groups.

6.1 P0--Basic Function Group

Function Code	Name	Description	Setting Range	Factory Setting
P0.00	Speed control mode	0:Sensorless vector control 1:Vector control With PG 2:V/F control	0~2	0

Options of speed control mode.

0: Sensorless vector control

This control mode is open-loop vector control, which is suitable for high performance application without coder PG. It requires high torque at low frequency and superior speed control, and one inverter can only drive one motor, such as machine tool, injection moulding machine, centrifugal machine and wire-drawing machine.

1: Vector control with PG

This control mode is close-loop vector control which can achieve high precision speed control and torque control, and so it is very suitable for the application requiring high accuracy speed and torque, such as industries of textile, paper making, lifting and elevator, and so on.

If vector control with PG mode is applied, it is needed to equip with PG card and to correctly select and install the speed feedback encoder.

2: V/F control mode

V/F control mode is suitable for the application that does not require high accuracy control, and also suitable for cases with one inverter driving multiple motors.

Notice: The nameplate parameters of motor must be set correctly when select the vector control mode. The autotuning of

motor parameters should be finished to acquire correct motor parameters before operation. Only obtaining correct motor parameters can exert the high performance of vector control mode. Modulating vector control parameters (P3 Group) can optimize the performance of vector control mode.

Function Code	Name	Description	Setting Range	Factory Setting
P0.01	Operation command channel	0: Keypad (LED extinct) 1: Terminal (LED blinking) 2: Communication (LED light up)	0~2	0

Channel Options for inverter Control Command.

The inverter control commands include: start, stop, forward, reverse, jogging, failure reset and so on.

0: Keypad command channel (LOCAL/REMOT light extinct);

The buttons RUN and STOP/RST on the keypad are for operation command control. Multifunction key QUICK/JOG, if be set as FWD/REV switching function (P7.03 is set up as 1), the rotating orientation will be changed. **When at operation, pushing RUN and STOP/RST in the same time will make the inverter stop freely.**

1: Terminal command channel (LOCAL/REMOT blinking)

Multifunction input terminals of forward, reverse, forward jogging, reverse jogging etc. perform the operation command control.

2: Communication command channel (LOCAL/REMOT light up)

Operation command control is performed through communication pattern by upper position machine. If it is chosen, you should use the serial communication interface card (Optional part) of our company.

Function Code	Name	Description	Setting Range	Factory Setting
P0.02	Keypad and terminal UP/DOWN setting	0: Valid, and the inverter memorizes when power down 1: Valid, and the inverter does not memorize when power down 2: Invalid	0~2	0

CHV series inverter can set up the frequency though ∧ and ∨ buttons on the keypad and terminal UP/DOWN (Frequency setting increase /Frequency setting decrease), and as it has the highest purview, it can combine with any other frequency setting channel to mainly accomplishes the fine adjustment of inverter output frequency during control system commissioning.

0: Valid, and the inverter memorizes when power off.

Can set up frequency command, and memorize the value when inverter is power off. When the power is back, automatically combine it with current frequency setting.

1: Valid, and the inverter does not memorize when power is off.

Can set frequency, but when the inverter power is off, this frequency setting will not be memorized.

2: Invalid.

The frequency set through keypad ∧ and ∨and terminal UP/DOWN is automatically cleared, and the settings through keypad ∧ and ∨and terminal UP/DOWN are invalid.

Notice: After the user restores the default values of inverter function parameters, the frequency value, set through keypad and terminal UP/DOWN, is automatically cleared.

Function Code	Name	Description	Setting Range	Factory Setting
P0.03	A frequency command channel	0: Keypad 1: Analogy value AI1 2: Analogy value AI3 3: High-speed pulse HDI1 4: Simple PLC 5: Multi-speed 6: PID control 7: Tele-communication	0~7	0

Options of frequency command A input channels of inverter. There are 8 main frequency setting channels:

0: Keypad

Accomplish keypad frequency setting by means of modifying the

value of function code P0.10 “Keypad frequency setting”.

1: Analogy value AI1

2: Analogy value AI3

This means that frequency is set by analog input terminals. CHV series inverter standard configuration provides 2 analogy input terminal channels, and besides, optional multi-function I/O extension card can provide 2 analog input terminals (AI3 and AI4). Terminal AI1, AI3 and AI4 are 0~10V voltage input mode, while AI2 can be 0~10V voltage input and also can be 0 (4) ~20mA current input. Voltage input and current input can be switched by Jumper J18.

Notice: When AI2 is set as 0~20mA input, the corresponding voltage is 5V.

100.0% of analog input is corresponding to the maximum frequency (Function Code P0.07), and -100.0% is corresponding to maximum reverse frequency (Function Code P0.07).

3: High-speed pulse HDI1

This means that inverter frequency is set by terminal high-speed pulse input. CHV series inverter standard configuration provides 1 channel of high-speed pulse input (HDI1), and besides, optional multi-function I/O extension card can provide another one channel of high-speed pulse input (HDI2).

Pulse setting signal: pulse voltage range 9~30V, and pulse frequency range 0.0~50.0 kHz.

100.0% of pulse input is corresponding to the maximum frequency (Function Code P0.07), and -100.0% is corresponding to the maximum reverse frequency (Function Code P0.07).

Notice: pulse setting can only be set through multifunction input terminal HDI1 or HDI2. Moreover, P5.00 setting of HDI1 or HDI2 should be set as high-speed pulse input, and P5.35 should be set as “Setting Input”.

4: Simple PLC

If frequency set mode is chosen, the inverter will operate in simple PLC program. It needs to set the parameters of PA Group “Simple PLC

and multi-speed control group" to determine the given percentage and the given frequency, the relation between plus-minus and rotating direction and option of acceleration and Deceleration time. For details, please refer to description of PA Group functions.

5: Multi-speed

The inverter is operated in the mode of multi-speed once this frequency setting mode is chosen. It needs to set the parameters of P5 Group and PA Group "Simple PLC and multistage speed control group" to determine the relation between given percentage and given frequency. In addition, if P0.03 is not in the multi-speed mode, the multi-speed mode will enjoy priority in frequency setting. It can only set 1~15 segment. If P0.03 is not set to be the multi-speed mode, the multi-speed will have no priority.

6: PID control

Choosing this parameter means that the operation mode of inverter is process PID control mode. In this case, it is required to set P9 Group "PID control group". The operation frequency of inverter is the value obtained from PID. Please refer to the description of P9 Group "PID functions" for the definition of PID given source, given value, feedback source and so on.

7: Tele-communication

The frequency command is given in the communication mode by upper position machine. For details, please refer to "CHV Series inverter ModBus Communication Agreement".

Function Code	Name	Description	Setting Range	Factory Setting
P0.04	B Frequency command channel	0: AI2 1: AI4 2: HDI2	0~2	0
P0.05	B Frequency command reference	0: Maximum output frequency 1: A frequency command	0~1	0

When frequency command B acts as the independent frequency setting channel (i.e. frequency source is selected from A to B), the

application is same with frequency command A.

When Frequency Command B acts as overlap setting (i.e. frequency source is chosen as A+B), it has following features:

1:Set input (AI2, AI4). 100% of Input Setting (AI2 and AI4) is corresponding to the reference object chosen by P0.05.when required to adjust based on Frequency Command A, the reference object should be set to be Frequency Command A. Thus 100.0% of Frequency Command B is the setting value of Frequency Command A.

Notice: When AI2 is set to be 0~20mA input, the corresponding voltage is 5V.

2:The frequency source with high-speed pulse input (HDI2) setting is similar to analog setting.

Function Code	Name	Description	Setting Range	Factory Setting
P0.06	Given source combination	0: A 1: B 2: A+B 3: Max（A, B）	0~3	0

This parameter can be used to select the given frequency channel. The frequency setting is achieved by combination of Frequency Command A and Frequency Command B.

(0, 1, 2) combination modes can be switched by terminal function (P5 Group).

Selecting “A+B” can realize the function of frequency overlap setting. CHV series inverter can realize mutually switching between frequency setting modes.

Max（A, B）means that if Frequency Command A is bigger than Frequency Command B, Frequency Command A is set to be the setting frequency. Contrarily, Frequency Command B is set to be the setting frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.07	Maximum output frequency	10.00~600.00Hz	10.00~600.00	50.00Hz

It is used to set the maximum output frequency of inverter. Please note that, it is the basis of frequency setting and Acceleration / Deceleration speed.

Function Code	Name	Description	Setting Range	Factory Setting
P0.08	Frequency upper limit	P0.09~ P0.07 （maximum frequency）	P0.09~P0.07	50.00Hz

It is the upper limit of inverter output frequency, which should be no greater than the maximum output frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.09	Frequency lower limit	0.00 Hz ~ P0.08 (running frequency upper limit)	0.00~P0.08	0.00Hz

It is the lower limit of inverter output frequency, which can be selected by function code P1.14.

When the set frequency is lower than the lower limit frequency, the inverter will operate at the lower limit frequency, stop or be dormant. Maximum output frequency≥ upper limit frequency≥ lower limit frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.10	Keypad setting frequency	0.00 Hz ~ P0.08 (running frequency upper limit)	0.00~P0.08	50.00Hz

When Frequency Command A is chosen as “keypad Setting”, the value of this function code is the initial value of inverter frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.11	Acceleration time 0	0.0~3600.0s	0.0~3600.0	20.0s
P0.12	Deceleration time 0	0.0~3600.0s	0.0~3600.0	20.0s

Acceleration time means the time t1 of accelerating to the maximum output frequency (P0.07) from 0Hz.

Deceleration time is the time t2 of decelerating to 0Hz from the maximum output frequency (P0.07). Just see the following figure.

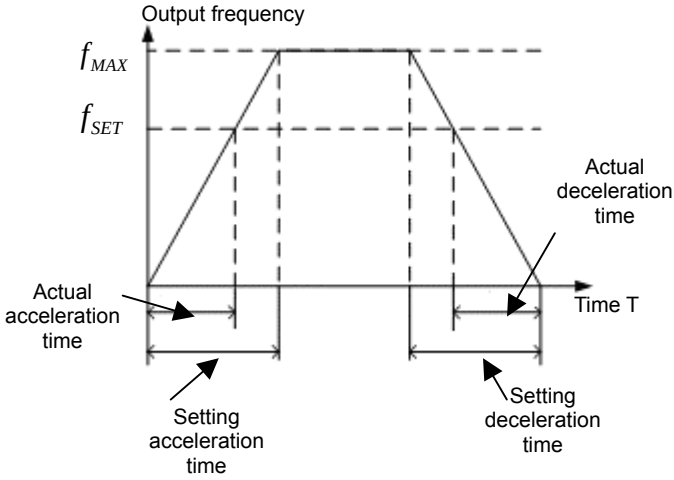


Figure 6.1 Acceleration and Deceleration time.

When the setting frequency is equal to the maximum frequency, the actual Acceleration/Deceleration time is equal to the setting Acceleration/Deceleration time.

When the setting frequency is less than the maximum frequency, the actual Acceleration/Deceleration time is less than the setting Acceleration/Deceleration time.

Actual Acceleration/Deceleration time

= the setting Acceleration/Deceleration time × (setting frequency/max. frequency)

CHV series inverter has 4 groups of Acceleration/Deceleration time.

1st group: P0.11, P0.12; 2nd group: P8.00, P8.01;

3rd group: P8.02, P8.03; 4th group: P8.04, P8.05.

The Acceleration/Deceleration time can be selected by

multifunction digital input terminal (P5 Group) combination.

Function Code	Name	Description	Setting Range	Factory Setting
P0.13	Running direction option	0: Running at default direction 1: Running at reverse direction 2: Forbid inverse running	0~2	0

0: Running at default direction. The inverter runs at the actual direction when power on.

1: Running at reverse direction. By means of changing the function code, the running direction of motor can be changed without changing any other parameters. That is equivalent to change the running direction by exchanging any two of motor cables (U, V, W).

Notice: After the parameters are initialized, the motor running direction can be restored to be its original status. Be caution to use it in the case that changing motor running direction is forbidden after system debugging.

2: Forbid inverse running. It can be used in the specific occasion which forbidding the inverse running.

Function Code	Name	Description	Setting Range	Factory Setting
P0.14	Carrier frequency setting	1.0~16.0kHz	1.0~16.0	Set by model

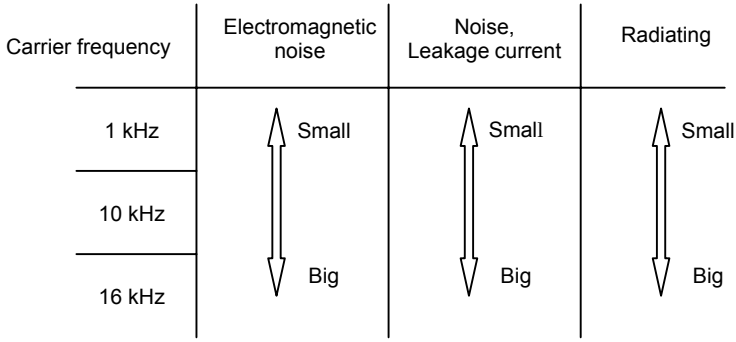


Figure 6.2 Effect of carrier frequency to environment.

The following is the relation between power and carrier frequency.

Power	Default Carrier Frequency (kHz)
1.5~11kW	8
15~55kW	4
75~630kW	2

This function is mainly used to improve the motor running noise and disturbance to external of inverter.

The advantages of high carrier frequency: ideal current wave, less harmonic current and lower motor noise;

The disadvantages of high carrier frequency: more switch loss and higher temperature of inverter. The output capacity of inverter will be influenced and the inverter should be operated at decreasing rated value under high carrier frequency condition. Meanwhile, the increasing leakage current will increase the electromagnetic disturbance.

It will be contrary when using low carrier frequency. But too low carrier frequency can cause unstable operation, torque reduced and even oscillation.

The carrier frequency has been set properly in default. Generally the user does not need to modify this parameter.

It should be operated at decreasing rated value when running at frequency that is higher than the default carrier frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P0.15	PWM option	0: Fixed PWM mode 1: Random PWM mode	0~1	0

Two PWM mode options, fixed PWM mode and random PWM mode, are provided.

0: Fixed PWM with fixed noise frequency of motor.

1: Random PWM mode can restrain the motor noise effectively, but may cause the harmonic wave increasing.

Function Code	Name	Description	Setting Range	Factory Setting
P0.16	Carrier frequency adjustment	0: Do not based on temperature 1: Based on temperature	0~1	0

0: Carrier frequency adjustment does not based on temperature, so the carrier frequency is invariant (the setting value of P0.14)

1: Carrier frequency adjustment based on temperature: the inverter decreases the carrier frequency automatically when temperature-rise is increasing; increases when temperature decreasing. This can prevent the frequent overheat alarm effectively.

Function Code	Name	Description	Setting Range	Factory Setting
P0.17	Motor parameters autotuning	0: No operation 1: Rotating parameters autotuning 2: Static parameters autotuning	0~2	0

0: No operation means forbidding autotuning.

1: Rotating parameters autotuning:

Do not connect a load to the motor when performing autotuning, ensure the motor at no-load condition, and confirm the motor is at static status.

Input the motor nameplate parameters (P2.01－P2.05) before performing autotuning. Otherwise the result of autotuning will be wrong.

Set the Acceleration and Deceleration time (P0.11 and P0.12) properly according to the motor inertia before performing autotuning. Otherwise it may cause over current fault during autotuning.

Set P0.17 to be 1 then press the button DATA/ENT to start the autotuning. Now LED displays “-TUN-” and flickers, then press the button RUN. At this time, “TUN-0”is displayed. After the motor is started, “TUN-1”is display and “RUN/TUNE” light will flicker. When the autotuning is finished, display “-END-” and finally back to the stop status interface. When “-TUN-”is flickering, press the button PRG/ESC

to exit the autotuning status.

Can press the button STOP/RST to stop the autotuning, Please notice, the start and stop of the parameters autotuning can only be controlled by the keypad. This function code will restore to 0 automatically when finish the autotuning.

2: Static parameters autotuning:

Before autotuning, do not need to disconnect the load to the motor, should input the motor nameplate parameters (P2.01－P2.05) correctly. After autotuning, it will detect motor stator resistance, rotor resistance, motor leakage inductance, but the Mutual inductance and no-load current of motor can not be detected, user can input suitable value according to experience.

Function Code	Name	Description	Setting Range	Factory Setting
P0.18	Restore function parameters	0: No operation 1: Restore factory setting 2:Delete failure records 3: Restore parameter of injection moulding machine	0~3	0

1: The inverter restores all parameters to their Factory Setting.

2: The inverter deletes recent failure records.

3: Restore parameter of injection moulding machine

This function code will restore to 0 automatically when complete the function operation.

6.2 P1--Start and Stop Control Group

Function Code	Name	Description	Setting Range	Factory Setting
P1.00	Start Mode	0: Start directly 1: Firstly DC braking and then start 2: Speed tracking and then start	0~2	0

0: start directly, start at the starting frequency.

1: Firstly DC braking and then start.

Perform DC braking (pay attention to set parameters of P1.03 and P1.04) and then start the motor at the starting frequency. It is suitable for small inertia load which can cause reverse rotation when start.

2: Speed tracking and then start.

Firstly the inverter calculates the speed and the direction of motor, then start running to its setting frequency from current speed. This can realize the smoothly no-shock start to moving motor. This mode is suitable for momentary power-down start of the big inertia load.

Notice: There is no speed tracking function with 5.5KW and lower.

Function Code	Name	Description	Setting Range	Factory Setting
P1.01	Starting frequency	0.00~10.00Hz	0.00~10.00	0.00Hz
P1.02	Hold time of starting frequency	0.0~50.0s	0.0~50.0	0.0s

Set proper starting frequency can increase the starting torque. Within the hold time of starting frequency (P1.02), the inverter output frequency is the starting frequency, then run to the target frequency from the starting frequency. If the target frequency (frequency command) is less than the starting frequency, inverter does not operate and is at stand-by status. The starting frequency value is not restricted by the lower limit of frequency.

During FWD/REV switching, the starting frequency is inactive.

Function Code	Name	Description	Setting Range	Factory Setting
P1.03	Braking current before starting	0.0~150.0%	0.0~150.0	0.0%
P1.04	Braking time before starting	0.0~50.0s	0.0~50.0	0.0s

When inverter starts, it performs DC braking according to the presetting starting DC braking current, and begins to accelerate after the presetting starting DC braking time. If the presetting DC braking time is 0, DC braking is invalid.

The bigger the DC braking current, the greater the braking force is.

Function Code	Name	Description	Setting Range	Factory Setting
P1.05	Acceleration / Deceleration mode	0: Linear mode 1: S curve mode	0~1	0

This function is to choose the frequency variety modes during start and stop operation.

0: Linear mode

The output frequency is increasing or decreasing linearly. The Acceleration / Deceleration time varies based on the presetting Acceleration / Deceleration time. CHV series inverter offers 4 kinds of specific Acceleration / Deceleration time, which can be selected through the multifunction digital input terminals (P5 Group).

1: S curve mode

The output frequency is increasing or decreasing in S curve. The S curve mode is always used in applications that require smooth start and stop, such as elevators, belt conveyor. For its parameter definitions, refer to P1.06 and P1.07.

Function Code	Name	Description	Setting Range	Factory Setting
P1.06	S curve beginning scale	0.0~40.0% (ACC/DEC time)	0.0~40.0	30.0%
P1.07	S curve ending scale	0.0~40.0% (ACC/DEC time)	0.0~40.0	30.0%

The t1 in following figure is the time defined by P1.06, within which the output frequency is changed in a gradually increased slope. The t2 is the time defined by P1.07. Within the period between t1 and t2, the frequency vary slope is constant. The curvature of S curve is codetermined by Acceleration range, Acceleration/Deceleration time, beginning time and the ending time.

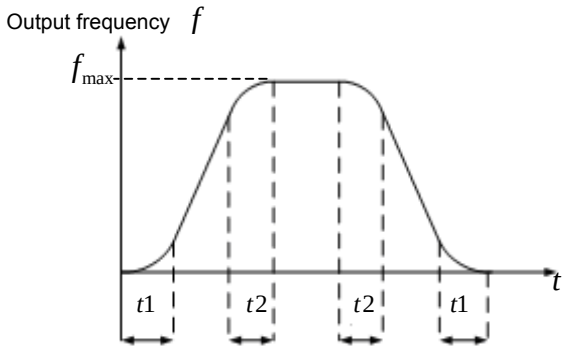


Figure 6.3 The Acceleration/Deceleration diagram of S curve.

Function Code	Name	Description	Setting Range	Factory Setting
P1.08	Stop mode	0: Decelerate to stop 1: Stop freely	0~1	0

0: Deceleration to stop

After the stop command is enabled, the inverter decreases the output frequency according to the Deceleration mode and the defined Acceleration /Deceleration time, and stop when the frequency is 0.

1: Stop freely

Once the stop command is valid, the inverter immediately ends the output. The load is freely stopped by its mechanical inertia.

Function Code	Name	Description	Setting Range	Factory Setting
P1.09	Starting frequency of DC brake	0.00~P0.07	0.00~10.00	0.00Hz
P1.10	Hold time before DC brake	0.0~50.0s	0.0~50.0	0.0s
P1.11	DC brake current	0.0~150.0%	0.0~150.0	0.0%
P1.12	DC brake time	0.0~50.0s	0.0~50.0	0.0s

Starting frequency of DC brake: Start the DC braking when reaches this frequency.

Hold time before DC brake: The inverter blocks the output before start the DC braking. After this delay time, the DC braking is started. It is used to prevent over-current fault caused by DC braking at high speed.

DC brake current: Indicates the applied DC braking energy. The bigger the current, the stronger the DC braking energy should be.

DC brake time: The time of DC brake energy applied. If the time is 0, the DC brake is invalid. The inverter stops the motor based on the presetting Deceleration time.

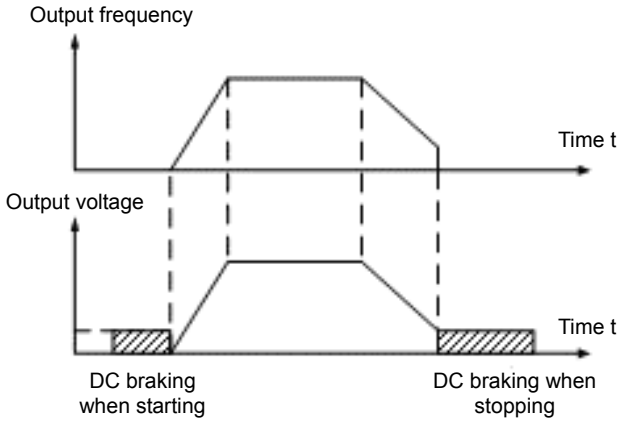


Figure 6.4 DC brake diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P1.13	Dead time	0.0~3600.0s	0.0~3600.0	0.0s

Set the transitional time at zero output frequency in the FOR/REV transitional process of inverter.

It is shown as following figure:

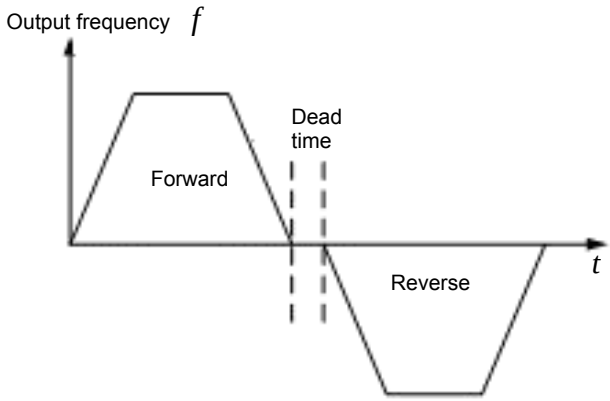


Figure 6.5 For/Rev dead time diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P1.14	Action when operating frequency is less than frequency lower limit	0: Run at the frequency lower limit 1: Stop 2: Stand-by	0~2	0

This function code is to determine the inverter operating status when the presetting frequency is less than the lower limit of frequency.

0: Run at the lower limit of frequency. The inverter runs at the lower limit of frequency when the operating frequency is less than the lower limit of frequency.

1: Stop. In order to prevent motor operating at low speed for a long

time, this function can be used to stop the motor.

2: stand-by. Inverter stops when the presetting frequency is less than the lower limit of frequency. When the presetting frequency is higher than or equal to the lower limit of frequency once more, the inverter starts to run automatically.

Function Code	Name	Description	Setting Range	Factory Setting
P1.15	Power-off restart option	0: Disabled 1: Enabled	0~1	0
P1.16	Restart delay time	0.0~3600.0s	0.0~3600.0	0.0s

0: Disabled. It indicates that the inverter does not automatically restart after the power is down even if the power is back again until input the operating command.

1: Enabled. It indicates that if the inverter is power-off in operation status, when power back, it will automatically restart after the restart delay time (P1.16) no matter whether operation command exists or not in the keypad control or telecommunication control. If in terminal control mode, the terminal control start is valid when power-on. The inverter will automatically restart after the restart delay time (P1.16). But if the power is down at stand-by status, the restart function is invalid.

Notice: the user must choose the permit restart function in caution. Otherwise, it may cause serious result.

6.3 P2--Motor Parameters Group

Function Code	Name	Description	Setting Range	Factory Setting
P2.00	Inverter Model	0:G Model	0~1	0

0: Applicable for constant torque load of designated rated parameter.

Function Code	Name	Description	Setting Range	Factory Setting
P2.01	Motor rated frequency	0.01Hz~P0.07	0.01~P0.07	50.00Hz
P2.02	Motor rated speed	0~36000rpm	0~36000	1460rpm
P2.03	Motor rated voltage	0~460V	0~460	380V
P2.04	Motor rated current	0.1~1000.0A	0.1~1000.0	Set by model
P2.05	Motor rated power	0.4~900.0kW	0.4~900.0	Set by model

Notice: Please set these codes according to motor nameplate parameters. The superior performance of vector control requires precise motor parameters.

CHV series inverter provides parameter autotuning function. Accurate parameter autotuning comes from correct setting of motor nameplate parameters.

In order to ensure the control performance, please set the motor based on the inverter standard adaptive motor. If the bias between motor rated power and standard adaptive motor is too big, the control performances of inverter will be deteriorated distinctly.

Notice: resetting of motor rated power (P2.05) can initialize motor parameter P2.06-P2.10.

Function Code	Name	Description	Setting Range	Factory Setting
P2.06	Motor stator resistance	0.001~65.535Ω	0.001~65.535	Set by model
P2.07	Motor rotor resistance	0.001~65.535Ω	0.001~65.535	Set by model
P2.08	Motor stator and rotor inductance	0.1~6553.5mH	0.1~6553.5	Set by model
P2.09	Mutual inductance of motor stator and rotor	0.1~6553.5mH	0.1~6553.5	Set by model
P2.10	Motor no-load current	0.01~655.35A	0.01~655.35	Set by model

After the autotuning is finished, the setting value of P2.06-P2.10 will be automatically updated. These parameters are the basis of high performance vector control and have direct effect on the control performance.

Notice: Users DO NOT change parameters of this group optionally.

6.4 P3--Vector Control Group

Function Code	Name	Description	Setting Range	Factory Setting
P3.00	Speed loop proportional gain 1	0~100	0~100	20
P3.01	Speed loop integral time 1	0.01~10.00s	0.01~10.00	0.50s
P3.02	Switching low point frequency	0.00Hz~P3.05	0.00~P3.05	5.00Hz
P3.03	Speed loop proportional gain 2	0~100	0~100	25
P3.04	Speed loop integral time2	0.01~10.00s	0.01~10.00	1.00s
P3.05	Switching high point frequency	P3.02~P0.07	P3.02~P0.07	10.00Hz

Above parameters are valid only to vector control, but invalid to V/F control. When frequency is less than the Switching low point frequency (P3.02), the speed loop PI parameters are P3.00 and P3.01, when higher than the Switching high point frequency (P3.05), the speed loop PI parameters are P3.03 and P3.04. Between the switching points, PI parameter is obtained according to the line variation of the two group parameters, as shown in following figure.

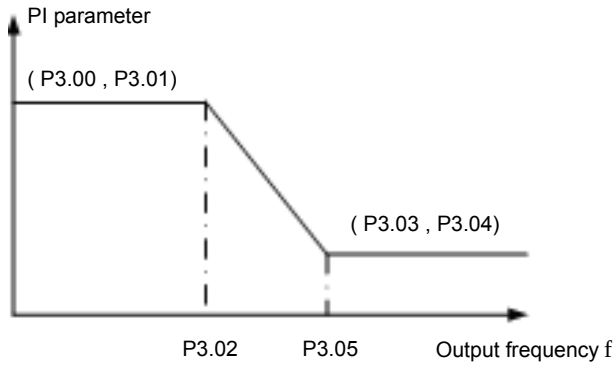


Figure 6.6 PI parameter diagram.

The speed dynamic-response character of vector control can be adjusted by setting the proportional factor and integral time of the speed regulator. Increasing the proportional gain and reducing the integral time can equally improve the dynamic response of speed loop, but either too much proportional gain or too short integral time will cause oscillation and too big overshoot. Too small proportional gain also can result in steady-status oscillation and speed error.

Speed loop PI parameters have an intimate relation with the inertia of motor system, and therefore the user needs to make adjustment on the basis of default PI parameter for different loading character in order to meet different requirement.

Function Code	Name	Description	Setting Range	Factory Setting
P3.06	Current loop proportional factor P	0~65535	0~65535	500
P3.07	Current loop integral factor I	0~65535	0~65535	500

Notice: Two parameters above is PI adjusting parameter of current loop, which has a direct effect on dynamic response speed and control precision. Generally, the user does not need to change its Factory Setting.

Function Code	Name	Description	Setting Range	Factory Setting
P3.08	Speed filter time	0.00~5.00s	0.00~5.00	0.00s

This function code is the filtering time of motor speed detection. It is used to restrain disturbance caused by encoder, and can set this time properly in big disturbance situation.

Function Code	Name	Description	Setting Range	Factory Setting
P3.09	VC slip compensation factor	50%~200%	50~100	100%

The slip compensating factor is used to adjust the slip frequency of

vector control and improve the precision of speed control. Properly regulating this parameter can effectively restrain the speed steady-state error.

Function Code	Name	Description	Setting Range	Factory Setting
P3.10	PG parameter	1~65535	1~65535	1000
P3.11	PG direction option	0: Forward input 1: Reverse input	0~1	0

It sets the per rotation pulse number of encoder.

Notice: When the inverter is PG vector control, it must to set correctly the encoder parameter (PG parameter). Otherwise the motor will not work smoothly. After set the encoder parameters correctly, if the motor is still not running smoothly please change the PG direction (P3.11).

Function Code	Name	Description	Setting Range	Factory Setting
P3.12	Torque setting mode	0: Torque control invalid 1: Keypad 2: AI1 3: AI2 4: AI3 5: AI4 6: HDI1 7: HDI2 8: Telecommunication	0~8	0
P3.13	Keypad torque setting	-100.0%~100.0%	-100.0%~100.0%	50.0%

0: torque control is invalid and the inverter performs speed control. When speed control mode, the inverter outputs frequency according to the presetting frequency command. The output torque is automatically matching the load torque, but it is limited by upper torque limit (P3.14). When the load torque is greater than the presetting upper torque limit, the inverter output torque will be limited and motor speed varies automatically.

1~8: torque control is valid and the inverter performs torque control. When torque control mode, the inverter outputs torque according to the presetting torque command. As output frequency is limited by the upper limit frequency (P0.08), when the load speed is greater than the presetting upper limit frequency, the output frequency will be limited and the output torque is not equal to the presetting torque. When performing torque control, the torque set by P3.12 is the torque command. When the torque command is keypad setting (P3.12 is 1), the torque command is obtained by setting function code P3.13. When the torque is set as negative, the motor will rotate reversely.

Switching between torque control and speed control can be done through multifunction input terminals. When the presetting torque is greater than the load torque, the inverter output frequency will increase, and when the output frequency reaches the upper limit frequency, the inverter will operate at the upper limit frequency all the time.

When the presetting torque of inverter is less than the load torque, the inverter output frequency will decrease, and when the output frequency reaches the lower limit frequency, the inverter will operate at the lower limit frequency all the time.

The 100.0% set by P3.13 is corresponding to the presetting upper limit torque and this is the P3.14. Adjusting either P3.13 or P3.14 can change the presetting torque value.

Notice: When power-off command is active, torque control will be switched to speed control.

Function Code	Name	Description	Setting Range	Factory Setting
P3.14	Upper limit torque setting	0.0~200.0%	0.0~200.0	150.0%

The setting 100.0% is corresponding to the rated output current.

6.5 P4--V/F Control Group

The function code of this group are valid to V/F control (P0.00＝2), but invalid to vector control.

Function Code	Name	Description	Setting Range	Factory Setting
P4.00	V/F curve setting	0: Linear V/F curve 1: Multipoint V/F curve 2: 1.3 exponential decreasing torque V/F curve 3: 1.7 exponential decreasing torque V/F curve 4: 2.0 exponential decreasing torque V/F curve	0~4	0

0: Linear V/F curve. It is applicable for normal constant-torque load.

1: Multipoint V/F curve. It can be defined through setting (P4.03-P4.08).

2~4: multi- exponential V/F curve. It is applicable for variable-torque load, such as blower, pump and so on. Each exponential curve is shown in following figure.

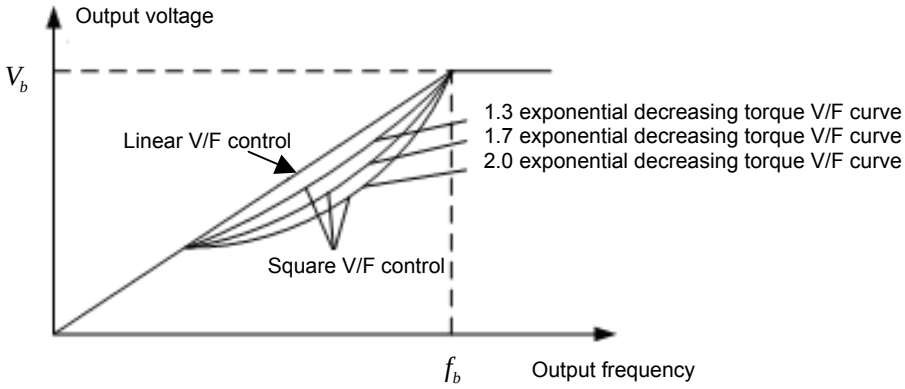


Figure 6.7 V/F curve diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P4.01	Torque boost	0.0%: 0.1%~30.0% (auto)	0.0~30.0	1.0%
P4.02	Torque boost ending point	0.0%~50.0% (relative to motor rated frequency)	0.0~50.0	20.0%

Torque Boost is mainly applied to the occasion with less than cut-off frequency (P4.02). The V/F curve after boost is shown in following figure. Torque boost can improve the low frequency torque performance of V/F control.

The torque should be selected properly according to the load. The bigger load can increase the torque boost, but too big torque boost will result in the motor operating at over-excitation and overheated. The inverter output current will be big and the efficiency will be reduced. When the torque boost is set to be 0.0%, the inverter is at automatic torque boost.

The ending frequency of torque boost: in this frequency, the torque boost is valid; when greater than this frequency, the torque boost will be invalid.

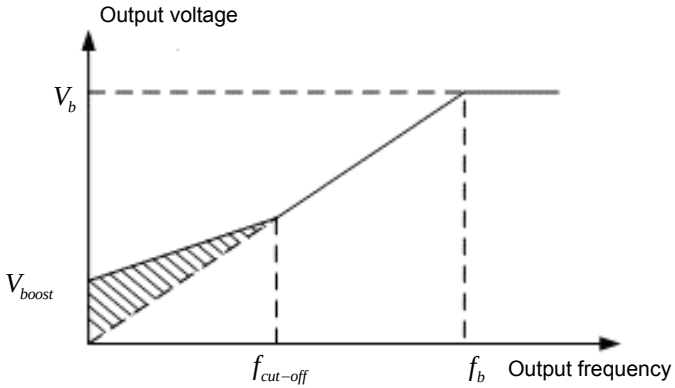


Figure 6.8 Manual torque boost diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P4.03	V/F frequency point 1	0.00Hz~ P4.05	0.00~P4.05	5.00Hz
P4.04	V/F voltage point 1	0.0%~100.0%	0.0~100.0	10.0%
P4.05	V/F frequency point 2	P4.03~ P4.07	P4.03~ P4.07	30.00Hz
P4.06	V/F voltage point 2	0.0%~100.0%	0.0~100.0	60.0%
P4.07	V/F frequency point 3	P4.05~ P2.01	P4.05~ P2.01	50.00Hz
P4.08	V/F voltage point 3	0.0%~100.0%	0.0~100.0	100.0%

The P4.03~P4.08 parameters define the multi-section V/F curve.

The setting values of V/F curve are generally set according to the motor's load performance.

Notice: V1＜V2＜V3, and f1＜f2＜f3. Too high low-frequency voltage setting may cause motor overheated and even burning, and the over-current stall or over-current protection of inverter might occur.

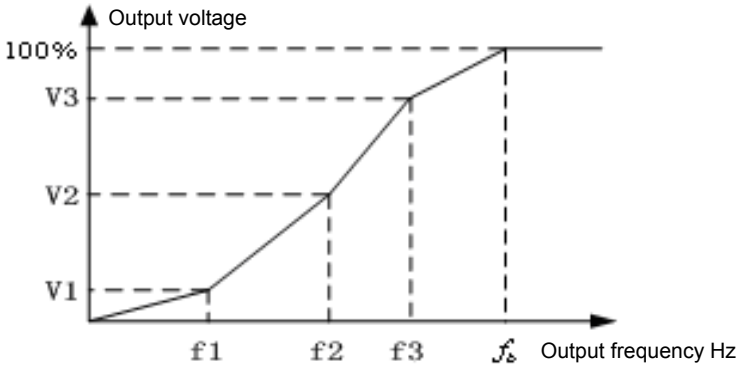


Figure 6.9 V/F curve setting diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P4.09	V/F slip compensation	0.00~10.00Hz	0.00~10.00	0.0Hz

This parameter can be set to compensate the motor speed change because of load in V/F control, to increase the rigidity of motor mechanical performance. This value should be set as the motor rated slip frequency, which can be calculated as below:

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

Where f_b is the motor rated frequency, corresponding to P2.01, n is the motor rated speed, corresponding to P2.02, and P is pole pairs number of motor.

Function Code	Name	Description	Setting Range	Factory Setting
P4.10	AVR option	0: Invalid 1: Always valid 2: Only valid when Decelerating	0~2	1

AVR function is the auto-voltage-regulation function of output voltage. When AVR function is invalid, the output voltage changes as the input voltage (or DC bus voltage) changes; when AVR function is valid, the output voltage does not change as the input voltage (or DC bus voltage) does, and it basically keep constant within the output capacity range. When Deceleration time is too long, AVR function can be canceled so that Deceleration time will be shorten.

Function Code	Name	Description	Setting Range	Factory Setting
P4.11	Energy-saving option	0: No action 1: Auto energy-saving	0~1	0

During the motor operation with no load or light load, the output voltage can be adjusted appropriately by detecting the loading current, to save energy automatically.

Notice: this function is especially effective for loadings like blower and pump.

Function Code	Name	Description	Setting Range	Factory Setting
P4.12	Terminal function test when power on	0: Terminal operation command invalid when power on 1: Terminal operation command valid when power on	0~1	0

When the operation command channel is terminal control, the system will detect automatically the status of operation terminal automatically during the process of power on.

0: Terminal operation command invalid when power on. During power on, the inverter will not run even if with the valid operation command terminal, and the system stays in operation-protection state. Till this operation command terminal is cancelled, then active this terminal again to run the inverter.

1: Terminal operation command valid when power on. During power on, if the operation command terminal is detected valid, the system will start the inverter after initialization.

Notice: User should select this function carefully, or it could cause serious result.

6.6 P5--Input Terminal Group

The standard unit of CHV series inverter has 6 multi-function digital input terminals (in which HDI1 can be used as the high speed pulse input terminal) and 2 analog input terminals. If the system needs more input and output terminals, can install a multifunction I/O extension card.

Function Code	Name	Description	Setting Range	Factory Setting
P5.00	HDI option	0: Both high speed pulse 1: HDI1 is switch input, HDI2 is high speed pulse 2: HDI2 is switch input, HDI1 is high speed pulse 3: Both DI	0~3	0

HDI option determines HDI1 and HDI2 to be high-speed pulse input or digital input.

Function Code	Name	Description	Setting Range	Factory Setting
P5.01	Terminal function input option	0: physical switching input 1: Communication input	0~1	0

This function code determines the terminal input channel.

0: physical switching input, i.e. the digital signal is input through external terminals.

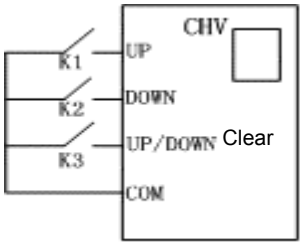
1: Communication input, i.e. digital signal is set through series communication.

Function Code	Name	Description	Setting Range	Factory Setting
P5.02	S1 Terminal function	Programmable multifunction terminal	0~55	1
P5.03	S2 Terminal function	Programmable multifunction terminal	0~55	4
P5.04	S3 Terminal function	Programmable multifunction terminal	0~55	7

P5.05	S4 Terminal function	Programmable multifunction terminal	0~55	0
P5.06	S5 Terminal function	Programmable multifunction terminal	0~55	0
P5.07	HDI1 terminal function	Programmable multifunction terminal	0~55	0
P5.08	HDI2 terminal function	Programmable multifunction terminal	0~55	0
P5.09	S6 Terminal function	Programmable multifunction terminal	0~55	0
P5.10	S7 Terminal function	Programmable multifunction terminal	0~55	0
P5.11	S8 Terminal function	Programmable multifunction terminal	0~55	0

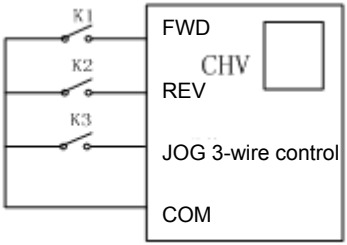
These parameters are used to set the corresponding functions of digital multifunction input terminals.

Setting value	Function	Description
0	No function	Inverter does not run even if input signal. Set unused terminals to be no function to prevent malfunction.
1	Run forward	Control forward or reverse running of inverter by external terminals.
2	Run reverse	
3	3-wire control	Control inverter's operation mode to be 3-wire control mode. For details, please refer to the function code description of P5.13 3-wire control mode.
4	Jog forward	Jog frequency and Jog Acceleration or Deceleration time can be found in detail descriptions of P8.06, P8.07 and P8.08.
5	Jog reverse	
6	Stop freely	The inverter turns off output, and the motor stop process can not be controlled by inverter. It is often applied when the inertia loading is big and there is no requirement on how long to stop. This mode has the same definition as P1.08.
7	Failure reset	This is external failure reset. It has the same function as STOP/RST button on the keypad. Using this function can perform failure reset.
8	Operation pause	Decelerates to stop, but all operation parameters, such as PLC, traverse frequency and PID are in

<table>
<tr><td></td><td></td><td>memory state. After this signal disappears, the inverter restores the operation to the status before pause.</td></tr>
<tr><td>9</td><td>External fault input</td><td>When external fault signal is input into inverter, the inverter reports it and stops.</td></tr>
<tr><td>10</td><td>Frequency setting increase</td><td rowspan="3">When is set by external terminal, the frequency can be modified by increase and decrease command. When is set as digital setting, the set frequency can be regulated up and down.
 

Using terminal can clear UP/DOWN set frequency to restore the frequency setting to be given value of frequency command channel.</td></tr>
<tr><td>11</td><td>Frequency setting decrease</td></tr>
<tr><td>12</td><td>Frequency up/down setting clear</td></tr>
<tr><td>13</td><td>Switching between setting A and B</td><td rowspan="3">Can perform command channel switching. If the current frequency setting channel is A, using Terminal #13 function can switch to B, and using Terminal #15 function can switch to A+B, but Terminal #14 is invalid. Other logics are similar.</td></tr>
<tr><td>14</td><td>Switching between setting A and A+B</td></tr>
<tr><td>15</td><td>Switching between setting B and A+B</td></tr>
<tr><td>16</td><td>Multi-speed terminal 1</td><td rowspan="4">16 stages speed can be set via the combination of four terminals digital state. 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.
<table><tr><td>Multi-speed terminal 4</td><td>Multi-speed terminal 3</td><td>Multi-speed terminal 2</td><td>Multi-speed terminal 1</td></tr><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr></table></td></tr>
<tr><td>17</td><td>Multi-speed terminal 2</td></tr>
<tr><td>18</td><td>Multi-speed terminal 3</td></tr>
<tr><td>19</td><td>Multi-speed terminal 4</td></tr>
</table>

<table>
<tr><td>20</td><td>Multi-speed pause</td><td>Can shield the function of multi-speed terminals and keep the set value as the current state.</td></tr>
<tr><td>21</td><td>Acceleration Deceleration time selection terminal 1</td><td rowspan="2">4 kinds of Acceleration/Deceleration time can be chosen via these two terminals digital state combination.
<table>
<tr><th>Terminal 2</th><th>Terminal 1</th><th>Acceleration/ Deceleration time</th><th>Corresponding Parameter</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Acceleration Time 0</td><td>P0.11、P0.12</td></tr>
<tr><td>OFF</td><td>ON</td><td>Acceleration Time 1</td><td>P8.00、P8.01</td></tr>
<tr><td>ON</td><td>OFF</td><td>Acceleration Time 2</td><td>P8.02、P8.03</td></tr>
<tr><td>ON</td><td>ON</td><td>Acceleration Time 3</td><td>P8.04、P8.05</td></tr>
</table></td></tr>
<tr><td>22</td><td>Acceleration Deceleration time selection terminal 2</td></tr>
<tr><td>23</td><td>Simple PLC reset</td><td>Restart PLC operation.</td></tr>
<tr><td>24</td><td>Simple PLC pause</td><td>PLC pulse during operating process, and runs at the current speed all the time. And continues its process after this function is cancelled.</td></tr>
<tr><td>25</td><td>PID control pause</td><td>PID is out of work temporarily, and inverter keeps its current frequency output.</td></tr>
<tr><td>26</td><td>Traverse frequency pause</td><td>Inverter pauses at its current output frequency. And continue to start its traverse operation at its current frequency after this function is cancelled, c.</td></tr>
<tr><td>27</td><td>Traverse reset</td><td>Back to its center frequency output.</td></tr>
<tr><td>28</td><td>Counter reset</td><td>Clear counter status.</td></tr>
<tr><td>29</td><td>Length reset</td><td>Length clear.</td></tr>
<tr><td>30</td><td>Acceleration Deceleration disable</td><td>Ensure the inverter is not influenced by external signals (excluding stop command) and maintain its current output frequency.</td></tr>
<tr><td>31</td><td>Torque control disable</td><td>Forbid the inverter operating in torque control mode.</td></tr>
<tr><td>32~52</td><td>Reserved</td><td>Reserved for water supply control and tension control.</td></tr>
</table>

<table>
<tr><td>53</td><td>3-wire jog control</td><td>Combine with FWD/REV operation to be 3-wire jog control.
 

<table>
<tr><th>K1</th><th>K2</th><th>K3</th><th>Command</th></tr>
<tr><td>ON</td><td>OFF</td><td rowspan="2">OFF</td><td>Forward running</td></tr>
<tr><td>OFF</td><td>ON</td><td>Reverse running</td></tr>
<tr><td>ON</td><td>OFF</td><td rowspan="2">ON</td><td>Forward jogging</td></tr>
<tr><td>OFF</td><td>ON</td><td>Reverse jogging</td></tr>
</table></td></tr>
<tr><td>54~55</td><td>Reserved</td><td>Reserved</td></tr>
</table>

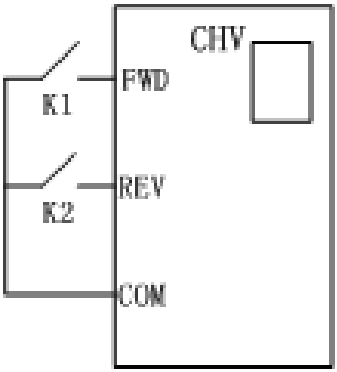
Function Code	Name	Description	Setting Range	Factory Setting
P5.12	Digital signal filter times	1~10	1~10	5

Set S1-S8, sample filter time of HDI1 and HDI2 terminals. In big disturbance situation, this parameter should be increased to prevent maloperation.

Function Code	Name	Description	Setting Range	Factory Setting
P5.13	Terminal control mode	0: 2-wire control, integrate Enable with direction 1: 2-wire control, separate Enable from direction 2: 3-wire control 1 3: 3-wire control 2	0~3	0

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

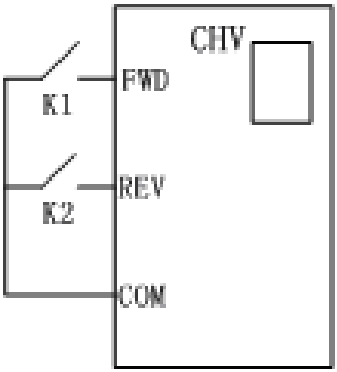
0: 2-wire type control, integrate enable with direction. The most often used 2-wire control mode. The motor forward and reverse operations are determined by the defined FWD and REV terminal command.



K1	K2	Operation command
OFF	OFF	Stop
ON	OFF	FWD
OFF	ON	REV
ON	ON	Stop

Figure 6.10 2-wire operation mode1 (integrate enable with direction).

1: 2-wire control, separate Enable from direction. FWD defined by this mode is enable terminal. The direction is determined by the defined REV state.



K1	K2	Operation command
OFF	OFF	Stop
ON	OFF	FWD
OFF	ON	Stop
ON	ON	REV

Figure 6.11 2-wire operation mode2 (separate enable with direction).

2: 3-wire control mode 1. At this mode, SIn is the Enable terminal with the operating command given by FWD and direction controlled by the defined FWD and REV. SIn terminal signal is always close input.

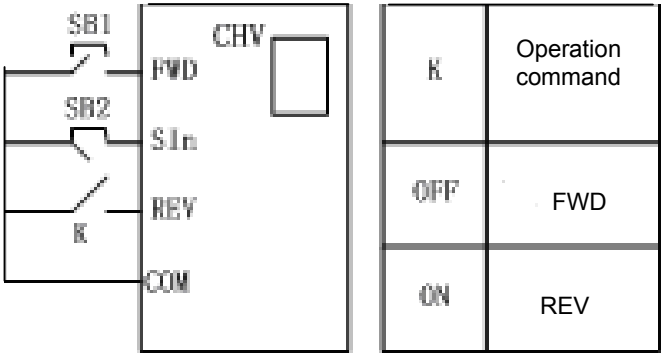


Figure 6.12 3-wire operation mode1.

K: FWD/REV switching SB1: FWD button SB2: REV button

SIn defines the corresponding terminal function to be Function 3 “3-wire operation control”.

3: 3-wire control mode 2. At this mode SIn is the Enable terminal with the operating command given and direction controlled by SB1 or SB3. SB2 defines the stop command.

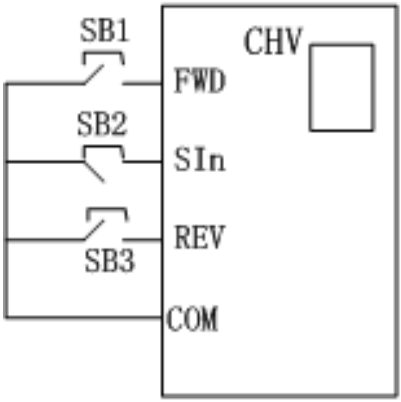


Figure 6.13 3-wire operation mode2.

Notice: For 2-wire operation mode, when FWD/REV terminal is enabled and the stop command produced by other sources stops the equipment, the inverter will not operate after the stop command disappears even if the control terminal FWD/REV is still valid. If needs to operate, it is required to trigger FWD/REV again. For instance, PLC single-loop stop, fixed-length stop, valid STOP/RST stop under terminal operation command channel (Table P7.04).

Function Code	Name	Description	Setting Range	Factory Setting
P5.14	UP/DOWN frequency incremental rate	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s

Terminal UP/DOWN regulates the incremental rate of setting frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P5.15	AI1 lower limit	0.00V~10.00V	0.00~10.00	0.00V
P5.16	AI1 lower limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%
P5.17	AI1 upper limit	0.00V~10.00V	0.00~10.00	10.00V
P5.18	AI1 upper limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.19	AI1 input filter time	0.00s~10.00s	0.00~10.00	0.10s

Function codes above define the relationship between analog input voltage and the corresponding setting value of analog input. When the analog input voltage exceeds the range of the set maximum or minimum input, the beyond portion should be calculated according to maximum input or minimum input.

When the analog input is current input, 0mA~20mA is corresponding to 0V~5V.

For different applications, the corresponding nominal value of

100.0% analog setting is different. For details, please refer to each application description.

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

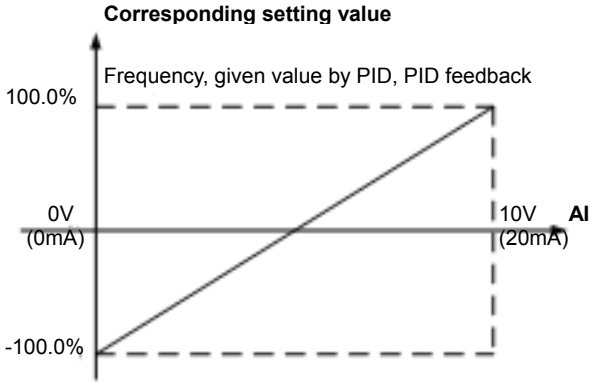


Figure 6.14 Relationship between analog input and setting value.

AI1 input filtering time determines the sensitive degree of analog input. In order to prevent malfunction caused by disturbance to the analog, this parameter be increased to strengthen the anti-jamming ability, but the sensitive degree of analog input will be decreased.

Function Code	Name	Description	Setting Range	Factory Setting
P5.20	AI2 lower limit	0.00V~10.00V	0.00~10.00	0.00V
P5.21	AI2 lower limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%
P5.22	AI2 upper limit	0.00V~10.00V	0.00~10.00	5.00V
P5.23	AI2 upper limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.24	AI2 input filter time	0.00s~10.00s	0.00~10.00	0.10s
P5.25	AI3 lower limit	-10.00V ~10.00V	-10.00~10.00	0.00V
P5.26	AI3 lower limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%

P5.27	AI3 upper limit	-10.00V ~10.00V	-10.00~10.00	10.00V
P5.28	AI3 upper limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.29	AI3 filter time	0.00s~10.00s	0.00~10.00	0.10s
P5.30	AI4 lower limit	0.00V~10.00V	0.00~10.00	0.00V
P5.31	AI4 lower limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%
P5.32	AI4 upper limit	0.00V~10.00V	0.00~10.00	10.00V
P5.33	AI4 upper limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.34	AI4 filter time	0.00s~10.00s	0.00~10.00	0.10s

AI2, AI3 and AI4 function settings are similar to AI1 setting method. AI2 and AI4 can be set as 0~10V or 0~20mA input. When AI2 and AI4 is set to be 0~20mA input, 20mA is corresponding to 5V.

CHV inverter standard unit provides 2 channels of analog input. Using AI3 and AI4 needs to install multifunction I/O extension card.

Function Code	Name	Description	Setting Range	Factory Setting
P5.35	HDI1 function option	0: Setting input 1: Counter input 2: Length input 3: Reserved 4: Reserved	0~4	0
P5.36	HDI2 function option		0~4	0

P5.35 and P3.36 define high-speed pulse input functions respectively.

0: setting input. Correspond to the setting of frequency, torque, PID given, and PID feedback. The setting relation of them is determined by function code P5.37-P5.46.

1: counter input. Count pulse input;

2: length-count input. Length-count pulse input;

3~4: reserved.

Function Code	Name	Description	Setting Range	Factory Setting
P5.37	HDI1 lower frequency limit	0.0 kHz ~50.0kHz	0.0~50.0	0.0kHz
P5.38	HDI1 lower frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%
P5.39	HDI1 upper frequency limit	0.0 kHz ~50.0kHz	0.0~50.0	50.0kHz
P5.40	HDI1 upper frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.41	HDI1 filter time	0.00s~10.00s	0.00~10.00	0.10s
P5.42	HDI2 lower frequency limit	0.0 kHz ~50.0kHz	0.0~50.0	0.0kHz
P5.43	HDI2 lower frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%
P5.44	HDI2 upper frequency limit	0.0 kHz ~50.0kHz	0.0~50.0	50.0kHz
P5.45	HDI2 upper frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%
P5.46	HDI2 filter time	0.00s~10.00s	0.00~10.00	0.10s

These function codes define the relative relation when pulse is used to be the setting input mode. These functions are similar to AI1 function.

6.7 P6--Output Terminal Group

CHV series inverter standard unit has one multifunction digital output terminal, two multifunction relay output terminals, one HDO terminal (can be used to be either high-speed pulse output terminal or open-collector output) and one multifunction analog output terminal. If it is required to add more relay output terminal and analog output terminal, please install multifunction I/O extension card.

Multifunction I/O extension card adds one more multifunction relay output terminal and one more multifunction analog output terminal.

Function Code	Name	Description	Setting range	Factory Setting
P6.00	HDO output option	0:Open-collector high-speed pulse output 1: Open-collector	0~1	0

HDO terminal is programmable diplex terminal.

0: Open-collector high-speed pulse output. The maximum pulse frequency is 50.0 kHz. See P6.09 for its relative function.

1: Open-collector output. See P6.03 for its relative function

Function Code	Name	Description	Setting Range	Factory Setting
P6.01	Y1 output option	Open-collector output function	0~31	1
P6.02	Y2 output option	Open-collector output function	0~31	0
P6.03	HDO open-collector output option	Open-collector output function	0~31	0
P6.04	Relay 1 output option	Open-collector output function	0~31	3
P6.05	Relay 2 output option	Open-collector output function	0~31	0
P6.06	Relay 3 output option	Open-collector output function	0~31	0

Open-collector output functions are indicated in the following table:

Setting Value	Function	Description
0	No output	Output terminal has no function
1	Run forward	Run forward with output frequency. Here output ON signal.
2	Run reverse	Run reverse with output frequency. Here output ON signal.
3	Fault output	Once inverter fault happens, output ON signal.
4	Motor overload pre-warning	Before motor electronic thermal protection is active, it is judged according to predicted overload value. Output ON signal when exceeded pre-warning time. Overload parameter is set at PB.04~PB.06.
5	Inverter overload pre-warning	Based on inverter pre-warning point, output ON signal when exceeded the pre-warning time. Overload parameter is set at PB.04~PB.06.
6	FDT reached	Please refer to the detail description of function code P8.25, P8.26.
7	Frequency reached	Please refer to the detail description of function code P8.27.
8	Zero speed operation	When the inverter output frequency is less than the starting frequency, output ON signal.
9	Setting count pulse value reached	When the counting value is up to the setting value of P8.22, output ON signal.
10	Assigned count pulse value reached	When the counting value reaches the setting value of P8.23, output ON signal. For Counting function, refer to FB Group function description.
11	Length reached	When the actual length is detected to exceeding the setting value of P8.19, output ON signal.
12	PLC circulation finished	When the simple PLC operation finishes one circulation, output a pulse signal with width 200ms.
13	Operation time reached	When the cumulated operating time of inverter exceeds the time set by P8.24, output ON signal.
14	Upper frequency limit reached	When the operating frequency reaches the upper frequency limit, output ON signal.

15	Lower frequency limit reached	When the operating frequency reaches the lower frequency limit, output ON signal.
16	Ready for run	When the inverter is at ready status for operation with main circuit and control circuit power supplied and the inverter protection function not actuated, output ON signal.
17	Start auxiliary motor 1	In the case of simple water-supply system with one inverter driving three pumps, it is for the control of the two auxiliary pumps. For its detail description, see the descriptions of function code P8.29, P8.30 and P8.31.
18	Start auxiliary motor 2	
19	Motor running	Output ON signal when inverter has output signal
20	Output pulse when stop	Output pulse signal of 2s when running frequency is lower than 0.1Hz
21~31	Reserved	Reserved

Function Code	Name	Description	Setting Range	Factory Setting
P6.07	AO1 output option	Multifunction analog output	0~14	0
P6.08	AO2 output option	Multifunction analog output	0~14	0
P6.09	HDO high-speed pulse output option	Multifunction high-speed pulse output	0~14	0

The standard analog output is 0~20mA (or 0~10V). Current or voltage of output can be selected by Jumper J19. The output range of HDO open collector high-speed pulse is set as 0 kHz to 50.0 kHz.

Its corresponding value range is shown as following table:

Setting Value	Function	Range
0	Running frequency	0~maximum output frequency
1	Setting frequency	0~maximum output frequency
2	Motor speed	0~double rated motor speed
3	Output current	0~double rated current of inverter

4	Output voltage	0~double rated voltage of inverter
5	Output power	0~double rated power
6	Output torque	0~double rated current of motor
7	AI1 value	0~10V
8	AI2 value	0~10V/0~20mA
9	AI3 value	0~10V
10	AI4 value	0~10V
11	HDI1 value	0.1~50.0kHz
12	HDI2 value	0.1~50.0kHz
13	Length value	0~setting length
14	Count value	0~setting count value

Function Code	Name	Description	Setting Range	Factory Setting
P6.10	AO1 lower limit	0.0%~100.0%	0.0~100.0	0.0%
P6.11	AO1 lower limit corresponding output	0.00V ~10.00V	0.00~10.00	0.00V
P6.12	AO1 upper limit	0.0%~100.0%	0.0~100.0	100.0%
P6.13	AO1 upper limit corresponding output	0.00V ~10.00V	0.00~10.00	10.00V

Function codes above define the relationship between output value and corresponding output value of analog output. When the output value exceeds the range of maximum output or the minimum output, other portion should be calculated base on maximum output or minimum output.

When analog output is current output, 1mA is equivalent to 0.5V

For different applications, the analog output corresponding to 100% of output value is different. For details, please refer to the instruction of each application.

The following figure can explain several setting mode:

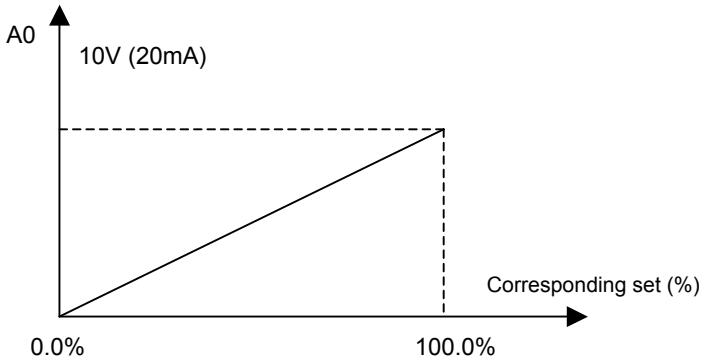


Figure 6.15 Relationship between given value and analog output.

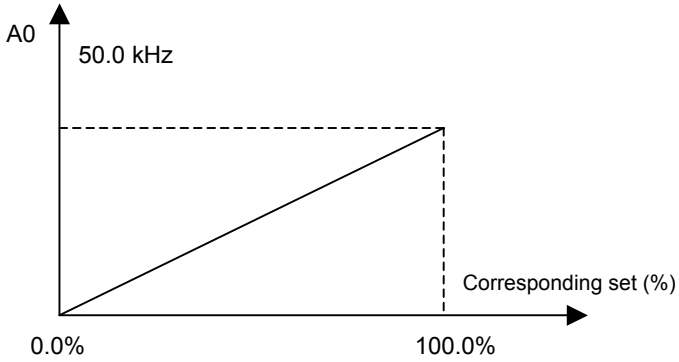


Figure 6.16 Relationship between given value and high-speed pulse.

Function Code	Name	Description	Setting Range	Factory Setting
P6.14	AO2 lower limit	0.0%~100.0%	0.0~100.0	0.0%
P6.15	AO2 lower limit corresponding output	0.00V ~10.00V	0.00~10.00	0.00V
P6.16	AO2 upper limit	0.0%~100.0%	0.0~100.0	100.0%
P6.17	AO2 upper limit corresponding output	0.00V ~10.00V	0.00~10.00	10.00V
P6.18	HDO lower limit	0.0%~100.0%	0.0~100.0	0.0%

P6.19	HDO lower limit corresponding output	0.0 ~ 50.0kHz	0.0~50.0	0.0kHz
P6.20	HDO upper limit	0.0%~100.0%	0.0~100.0	100.0%
P6.21	HDO upper limit corresponding output	0.0 ~ 50.0kHz	0.0~50.0	50.0kHz

Its output corresponding relation is similar to AO1.

6.8 P7--Human-computer Interface Group

Function Code	Name	Description	Setting Range	Factory Setting
P7.00	User password	0~65535	0~65535	0

The password protection function will be valid when set to be any nonzero data.

00000: Clear user's password set before, and disables the password protection function.

After the password has been set and becomes valid, the user can not enter into parameter 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 fix user's password in mind.

Function Code	Name	Description	Setting Range	Factory Setting
P7.01	LCD language option	0: Chinese 1: English	0~1	0

It is valid only to LCD external keypad and it is for choosing LCD display language. The language will be valid according to the selected parameter.

Function Code	Name	Description	Setting Range	Factory Setting
P7.02	Parameter copy	0: No operation 1: Upload parameters to LCD 2: Download parameters from LCD	0~2	0

This function code is to determine the mode of parameter copy. Parameter copy function is build-in external keyboard of LCD.

1: Upload parameters to LCD. Copy the local parameter to the external keyboard of LCD.

2: Download parameters from LCD. Copy Parameters of LCD into computer.

Notice: after 1~2 operations are completed, parameters are automatically restored to zero.

Function Code	Name	Description	Setting Range	Factory Setting
P7.03	QUICK/JOG function option	0: Shortcut QUICK function 1: FDW/REV switching 2: Jog operation 3: Clear UP/DOWN setting	0~3	0

The button QUICK/JOG is multifunction button, whose function can be defined by the setting of QUICK/JOG parameter.

0: Shortcut QUICK function: User can access the shortcut menu. For details, please refer to shortcut function description.

1: FWD/REV switching: Keypad QUICK/JOG button achieves the direction of switching the frequency command. It is only enabled when keypad channel is used.

2: Jog operation: Keypad QUICK/JOG button realizes Jog operation.

3: Clear UP/DOWN setting: Keypad QUICK/JOG button clears the UP/DOWN setting value.

Function Code	Name	Description	Setting Range	Factory Setting
P7.04	STOP/RST function option	0: Only valid to keypad control 1: Valid to both keypad and terminal control 2: Valid to both keypad and communication control 3: Valid to all control	0~3	0

This function code is to define the validity options of STOP/RST stop function. For fault reset, STOP/RST button is valid at any situation.

Function Code	Name	Description	Setting Range	Factory Setting
P7.05	Keypad display option	0: Preferential enable of external keypad 1: Local and external keypad display simultaneously, only the key-press of external keypad is valid. 2: Local and external keypad display simultaneously, only Local key-press is valid. 3: Local and external keypad display simultaneously, both key-press are valid (or logical relation)	0~3	0

This function is to set the logical relation of display and key-press between local keypad and external keypad.

When P7.05 is set to 1, local keypad is valid if external keypad is not connected. When LCD keypad is connected, P7.05 must be set to be 0.

Notice: No. 3 function should be used cautiously. Maloperation may cause serious result.

Function Code	Name	Description	Setting Range	Factory Setting
P7.06	Operation status display option	0~0xFFFF	0~0xFFFF	0x00FF

At operation status, CHV series inverter can display five parameters in default: 1. Running frequency, 2. Presetting frequency, 3. DC bus voltage, 4. Output voltage, 5. Output current.

Other parameters display is affected by this function code. A 16 bits binary digit, if one is 1, its corresponding parameter can be viewed during operation by the button 》/SHIFT. If the bit is 0, its corresponding parameter will not be displayed. When setting function code P7.06, it is required to convert the binary digit into decimal number and input this function code.

The display content indicated by low 8 digits is described in the

following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Analog AI1 value	Output terminal status	Input terminal status	PID feedback value	PID setting value	Output torque	Output power	Running speed

The display content indicated by high 8 digits is described in the following table:

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Count value	Length value	PLC and multi-speed step number	Pulse frequency 2 (HDI2)	Pulse frequency 1 (HDI1)	Analog AI4 value	Analog AI3 value	Analog AI2 value

This I/O terminal status is displayed in decimal, S1 (Y1) corresponding to the lowest bit. For instance, input status displaying 10 indicates that terminal S2 and S4 are closed and others are open. For details, please see description of P7.09 and P7.20.

Function Code	Name	Description	Setting Range	Factory Setting
P7.07	Stop status display option	1~0xFFFF	1~0xFFFF	0x00FF

This function setting is the same as the setting of P7.06. Only when CHV series inverter is at stop status, parameter displaying can be affected by this function code.

Low 8 digits displaying is in the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Analog AI2 value	Analog AI1 value	PID feedback value	PID setting value	Output terminal status	Input terminal status	DC bus voltage	Setting frequency

High 8 digits displaying is in the following table:

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Reserved	Reserved	Length value	PLC and multi-speed current step	Pulse frequency 2 (HDI2)	Pulse frequency 1 (HDI1)	Analog AI4 value	Analog AI3 value

Function Code	Name	Description	Setting Range	Factory Setting
P7.08	Rectify module temperature	0~100.0℃		
P7.09	IGBT module temperature	0~100.0℃		
P7.10	MCU software version			
P7.11	DSP software version			
P7.12	Accumulative run time	0~65535h		

These functions only can be viewed but can not be modified.

Rectify module temperature: indicates the temperature of rectification module. Over-temperature protection value of different inverter may be different.

IGBT module temperature: indicates the temperature of the inverter IGBT module. Over-temperature protection value of different inverter may be different.

MCU software version: MCU software version number.

DSP software version: DSP software version number.

Accumulative run time: Displays inverter accumulative run time. If this time reaches the setting operation time (P8.24), multi-function digital output is actuated.

Function Code	Name	Description	Setting Range	Factory Setting
P7.13	Third latest fault type	0~30	0~30	
P7.14	Second latest fault type	0~30	0~30	
P7.15	Latest fault type	0~30	0~30	

Record three recent fault types: 0 is no fault; 1~30 is 30 different kinds of fault. For details, please see fault analysis.

Function Code	Name	Description	Setting Range	Factory Setting
P7.16	Running frequency at current fault	Output frequency at current fault.		
P7.17	Output current at current fault	Output current at current fault.		
P7.18	Bus voltage at current fault	Bus voltage at current fault.		
P7.19	Input terminal status at current fault	This value is decimal numbers, displaying all digital input terminal status at recent fault. The sequence is: 9 8 7 6 5 4 3 2 1 0 S8 S7 S6 HDI2 HDI1 S5 S4 S3 S2 S1 The corresponding value is 1 when input terminal of the time is ON, while OFF is to 0. This value can show the condition of digital input signal.		
P7.20	Output terminal status at current fault	This value is decimal numbers, displaying all digital output terminal status at recent fault. The sequence is: BIT5 BIT4 BIT3 BIT2 BIT1 BIT0 R03 R02 R01 HDO Y2 Y1 The corresponding value is 1 when output terminal of the time is ON, while OFF is to 0. This value can show the condition of digital output signal.		

6.9 P8--Enhance Function Group

Function Code	Name	Description	Setting Range	Factory Setting
P8.00	Acceleration time 1	0.0~3600.0s	0.0~3600.0	20.0s
P8.01	Deceleration time 1	0.0~3600.0s	0.0~3600.0	20.0s
P8.02	Acceleration time 2	0.0~3600.0s	0.0~3600.0	20.0s
P8.03	Deceleration time 2	0.0~3600.0s	0.0~3600.0	20.0s
P8.04	Acceleration time 3	0.0~3600.0s	0.0~3600.0	20.0s
P8.05	Deceleration time 3	0.0~3600.0s	0.0~3600.0	20.0s

Acceleration/Deceleration time can be chosen from P0.11, P0.12 or above three time settings. Their meanings are same; please refer to P0.11 and P0.12 description.

The Acceleration/Deceleration time of 0~3 at inverter operation can be chosen through different combination of multifunction digital input terminals.

Function Code	Name	Description	Setting Range	Factory Setting
P8.06	Jog frequency	0.00~P0.07	0.00~ P0.07	5.00Hz
P8.07	Jog Acceleration time	0.0~3600.0s	0.0~3600.0	20.0s
P8.08	Jog Deceleration time	0.0~3600.0s	0.0~3600.0	20.0s

Define the inverter presetting frequency and Acceleration/Deceleration time of Jogging operation. START/STOP operation in the Jogging operation process is performed by directly start mode and decelerate to stop mode.

The Jog Acceleration time is the time of inverter to accelerate from 0Hz to the maximum output frequency (P0.07).

The Jog Deceleration time is the time of inverter to decelerate from the maximum output frequency (P0.07) to 0Hz.

Function Code	Name	Description	Setting Range	Factory Setting
P8.09	Skip frequency 1	0.00~P0.07	0.00~P0.07	0.00Hz
P8.10	Skip frequency 2	0.00~P0.07	0.00~P0.07	0.00Hz
P8.11	Skip frequency range	0.00~P0.07	0.00~P0.07	0.00Hz

When the presetting frequency is in the skip frequency range, the actual operating frequency will be near the boundary of skip frequency range.

By means of setting skip frequency, the inverter can keep away from the mechanical resonance point of the load. This inverter has two skip frequency points available. If these two skip frequencies are both set to be 0, this function will be inactive.

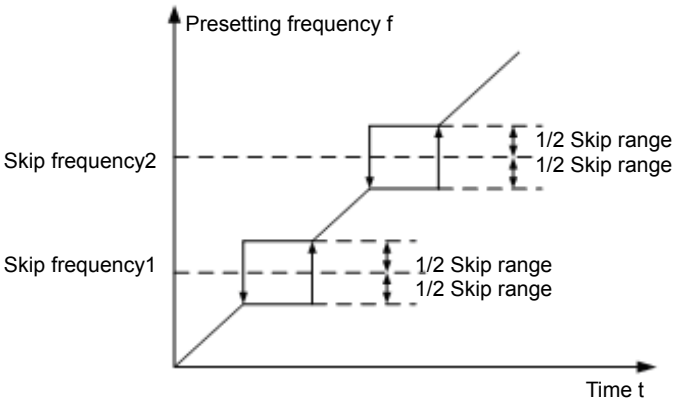


Figure 6.17 Skip frequency diagram.

Function Code	Name	Description	Setting range	Factory Setting
P8.12	Traverse frequency range	0.0~100.0%（relative to presetting frequency）	0.0~100.0	0.0%

P8.13	Kick frequency range	0.0~50.0%（relative to traverse frequency range）	0.0~50.0	0.0%
P8.14	Traverse frequency rise time	0.1~3600.0s	0.1~3600.0	5.0s
P8.15	Traverse frequency fall time	0.1~3600.0s	0.1~3600.0	5.0s

Traverse frequency function is suitable to industries such as textile, fiber and so on, and applications that require traversing and winding functions.

Traverse frequency function means that the inverter output frequency is traversing around the presetting frequency. The operating frequency locus with time axis is shown as following figure, in which the amplitude of traverse is set by P8.12. When P8.12 is set to be 0 (traverse range is 0), the traverse frequency function will be inactive.

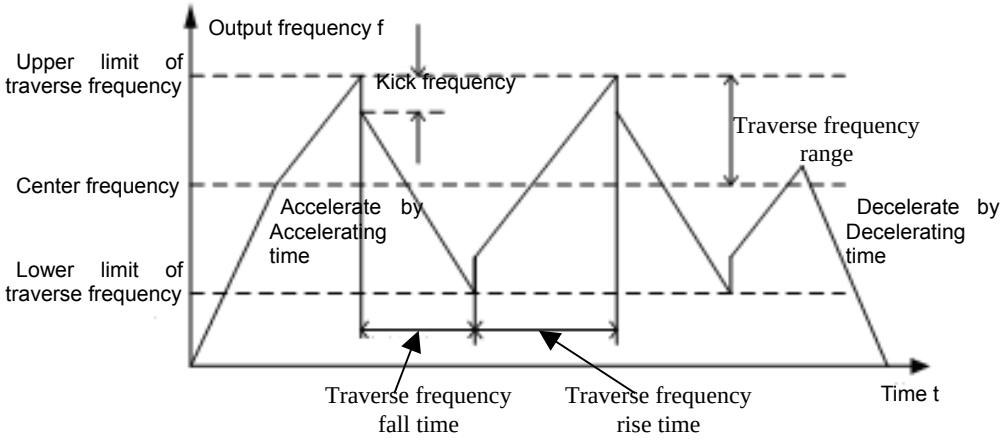


Figure 6.18 Traverse frequency operation diagram.

Traverse frequency range: traverse operation frequency is limited by upper and lower limit frequency.

Traverse range relative to the center frequency: amplitude of traverse AW =center frequency (CF) × AW range P8.12.

Kick frequency = amplitude of traverse AW × Kick Frequency Range P8.13. It is the kick frequency value relative to amplitude of traverse when traverse-frequency operation.

Traverse frequency rise time: the time rising from the lowest traverse frequency to the highest traverse frequency.

Traverse frequency fall time: the time falling from the highest traverse frequency to the lowest traverse frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P8.16	Fault auto-reset times	0~3	0~3	0
P8.17	Fault relay action during auto-reset	0: inactive 1: active	0~1	0
P8.18	Delay time before auto-reset fault	0.1~100.0s	0.1~100.0	1.0s

Fault auto-reset times: Set the auto-reset times when inverter chooses fault auto-reset. If this value is exceeded, inverter will wait for trouble shoot.

Fault relay action during auto-reset: During the period of fault auto-resetting, it can determined whether it is required for the fault relay to be actuated to shield the caused fault alarm, keeping the equipment continue running.

Delay time before auto-reset: Set the delay time between fault occurring and auto-resetting.

Notice: after the fault is automatically reset, the inverter returns to its status before fault occurs. Meanwhile, if fault has not occurred for ten minutes after the fault is reset, the system will automatically clear the previous times of fault-reset.

Function Code	Name	Description	Setting Range	Factory Setting
P8.19	Set length	1~65535	1~65535	1000
P8.20	Actual length	0~65535	0~65535	0
P8.21	Unit Pulse number	0.1~6553.5	0.1~6553.5	100.0

These three function codes are mainly used for fixed-length control.

The length is calculated by input pulse signal of on-off input terminal, and it is required to set the responsive input terminal to be the length count input terminal. Generally, when the pulse frequency is high, it is required to use HDI1 or HDI2 input.

Actual Length = Length count input pulse number/unit pulse number.

When the actual length P8.20 exceeds the set length P8.19, multifunction digital output terminal “Length Reached” outputs ON signal.

Function Code	Name	Description	Setting Range	Factory Setting
P8.22	Set count value	1~65535	1~65535	1000
P8.23	Assign count value	1~65535	1~65535	1000

The count value is counted by pulse signal from the counter input terminal.

When the count value reaches the set count value, on-off input terminal will output a signal that the set count value is reached.

Setting count value is how many pulses are input from pulse input terminal when HDO, RO1 or RO2 output a signal. Assigning count value is how many pulses are input from pulse input terminal when HDO, RO1 or RO2 output a signal till reach the set count value. When the counter continues counting until “set count value” is reached, the counter is cleared to zero, and continues to count the next coming

pulse.

The assigned count value P8.23 should not be greater than the set count value P8.22.

This function is shown as following figure.

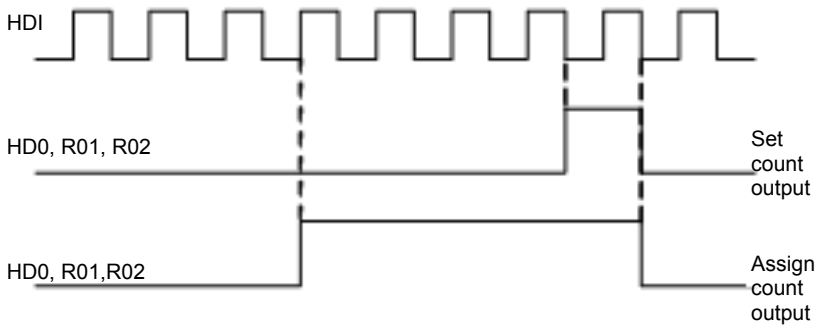


Figure 6.19 Set count value setting and assigned value setting diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P8.24	Set run time	0~65535h	0~65535	65535 h

Preset the inverter run time.

When the accumulated run time reaches the set run time, the inverter multifunction digital output will reach the running time.

Function Code	Name	Description	Setting Range	Factory Setting
P8.25	FDT detection value	0.00~ P0.07	0.00~ P0.07	50.00Hz
P8.26	FDT delay detection value	0.0~100.0%	0.0~100.0	5.0%

Set output frequency detection value and the delay value after output action dismissed, as shown by following figure.

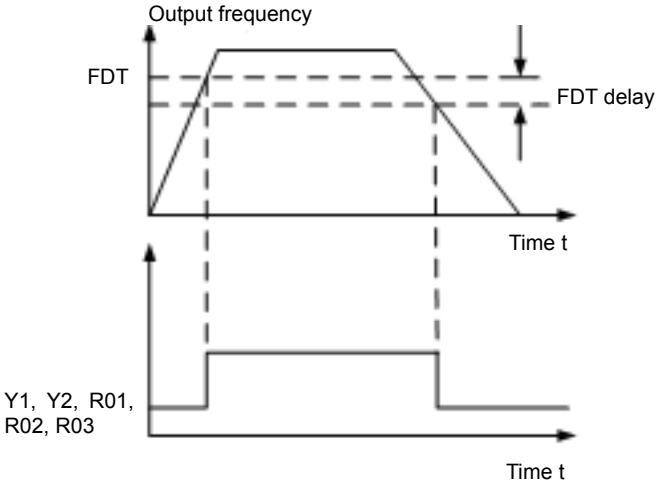


Figure 6.20 FDT Level diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P8.27	Frequency reach detection range	0.0~100.0%（maximum frequency）	0.0~100.0	0.0%

When output frequency reaches the set value, this function can regulate its detection range value, as shown by following figure:

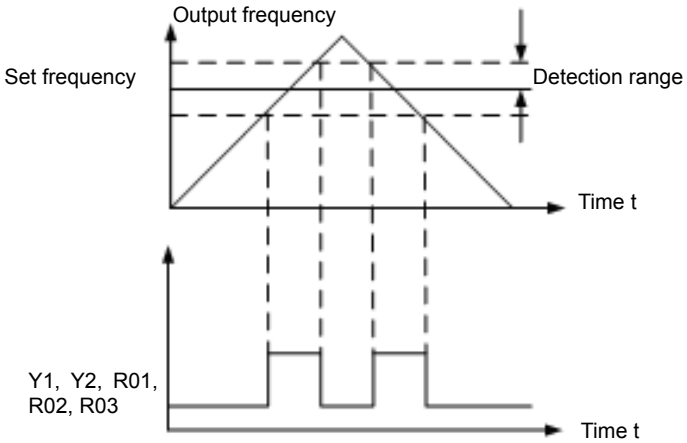


Figure 6.21 Frequency reaching detection range diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P8.28	Droop control	0.00~10.00Hz	0.00~10.00	0.00Hz

When multiple inverters drive one load, uneven load distribution can be caused because of different speed, and the inverter that has higher speed undertakes heavier load. Droop control can balance the load by making the speed droop along with load increasing. User can adjust this parameter from small to big gradually when debugging. The relation between load and output frequency is in the following figure.

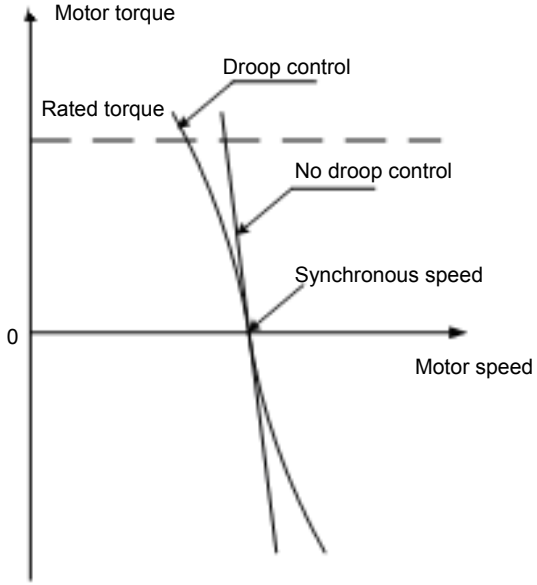


Figure 6.22 Droop control diagram.

This parameter adjusts the frequency variation of inverter with drooping speed.

Function Code	Name	Description	Setting Range	Factory Setting
P8.29	Auxiliary motor option	0: No auxiliary motor 1: Auxiliary motor 1 valid 2: Auxiliary motor 2 valid 3: Auxiliary motor 1 and 2 valid	0~3	0
P8.30	Auxiliary motor1 START/STOP delay time	0.0~3600.0s	0.0~3600.0	5.0s
P8.31	Auxiliary motor 2 START/STOP delay time	0.0~3600.0s	0.0~3600.0	5.0s

The three function codes above are used to achieve simple water-supply function with one inverter drives three pumps. One variable-frequency pump and two power-frequency pumps (boost pumps) constitute the simple constant pressure water supply system. Its correlated logic is shown in Figure 6.23.

Function Code	Name	Description	Setting Range	Factory Setting
P8.32	Brake threshold voltage	550.0~750.0V	550.0~750.0	700.0V

This function is to set the initiative bus voltage of dynamic braking, and it can brake the load if properly regulating this value.

Function Code	Name	Description	Setting Range	Factory Setting
P8.33	Low frequency vibration error	0~9999	0~9999	1000
P8.34	High frequency vibration error	0~9999	0~9999	1000

For most motor, current vibration will appear at some frequency point. Thus the motor will not run smoothly or the inverter will has

over-current. In this circumstance, user can regulate these two parameters to achieve satisfactory result.

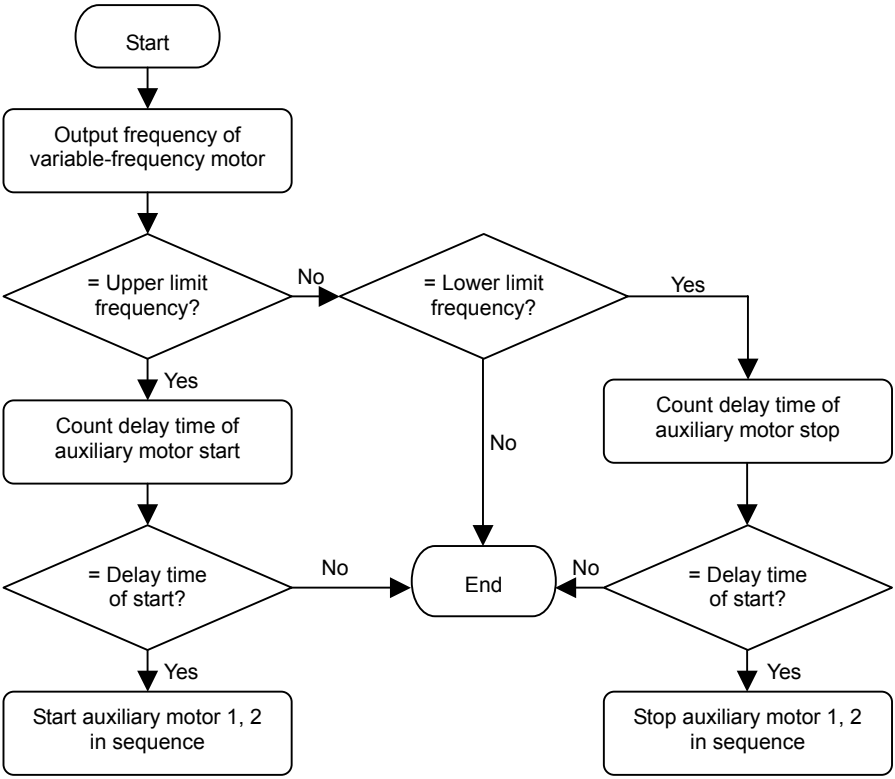


Figure 6.23 Simple water-supply function logical diagram.

6.10 P9--PID Control Group

PID control is a common method in process control, taking proportional gain, integral and differential operation to the bias between feedback signal and target signal, to adjust the output frequency of Inverter. It can be applied in the process control field, such as flow control, pressure control and temperature control. The basic principle is in the following figure.

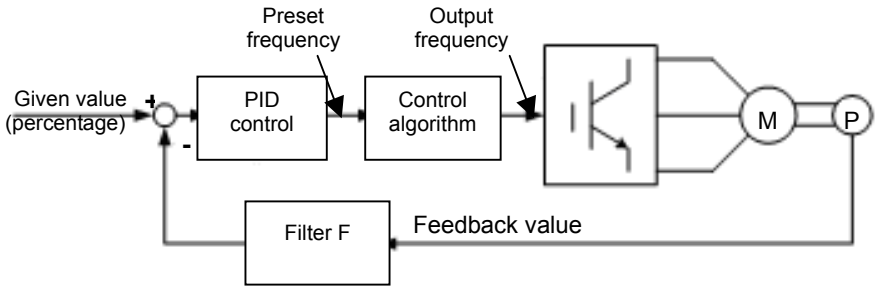


Figure 6.24 PID control diagram.

Function Code	Name	Description	Setting Range	Factory Setting
P9.00	PID setpoint sources option	0: Keypad 1: AI1 2: AI2 3: AI3 4: AI4 5: HDI1 6: HDI2 7: Communication 8: PLC	0~8	0

When frequency source is chosen to be PID (i.e. P0.03 is chosen to be 6), these group functions are active. This parameter is to determine the setpoint channel of the PID target value.

The presetting target value of PID is a relative value, and 100% is corresponding to 100% feedback signal of the controlled system.

The system always performs the calculation according to relative

value (0~100%). For PID setpoint and feedback, 100% is always corresponding to 10.0V.

Notice: The given parameter of PID can set parameters of PA group.

Function Code	Name	Description	Setting Range	Factory Setting
P9.01	Keypad preset PID assignment	-100.0%~100.0%	-100.0~100.0	0.0%

When P9.00=0, i.e. the target source is the keypad, it is required to set this parameter.

The reference value of this parameter is the system feedback value.

Function Code	Name	Description	Setting Range	Factory Setting
P9.02	PID feedback sources option	0: AI1 1: AI2 2: AI3 3: AI4 4: AI1-AI2 5: AI3-AI4 6: HDI1 7: HDI2 8: HDI1- HDI2 9: Communication	0~9	0

The PID feedback channel is chosen by this parameter.

Notice: The assignment channel and the feedback channel can not be in coincidence, otherwise PID is unable to control effectively.

Function Code	Name	Description	Setting Range	Factory Setting
P9.03	PID output characteristics option	0: Positive 1:Negative	0~1	0

PID output is positive characteristic: when the feedback value is greater than the PID given value, the inverter output frequency needs to be decreased to counterbalance the PID, for instance, the winding

tension PID control.

PID output is negative characteristic: when the feedback value is greater than the PID giver value, the inverter output frequency needs to be increased to counterbalance the PID, for instance, the unreeling tension PID control.

Function Code	Name	Description	Setting Range	Factory Setting
P9.04	Proportional gain (Kp)	0.00~100.00	0.00~100.00	0.10
P9.05	Integral time (Ti)	0.01~10.00s	0.01~10.00	0.10s
P9.06	Differential time (Td)	0.00~10.00s	0.00~10.00	0.00s

Proportional gain (Kp): Determines the adjusting strength of PID adjustor. The bigger P, the stronger the adjusting strength is. The value 100 means that when the bias between the PID feedback value and the given value is 100%, the adjusting range of PID to the output frequency command is the maximum frequency (ignore integral action and differential action).

Integral time (Ti): Determines the speed of which PID performs integral action to the bias between the PID feedback value and the given value. When the bias between the PID feedback value and the given value is 100%, the integral controller (ignore proportional action and differential action) continuously adjusts to make the regulating amount to reach the maximum frequency (P0.07). The shorter the integral time, the stronger the adjusting strength is.

Differential time (Td): Determines the adjusting strength of the variance ratio of bias between the PID feedback value and the given value. If the feedback value is changed by 100%, the regulating amount of differential controller will be the maximum frequency (P0.07) (ignore proportional action and integral action). The longer Td, the stronger the controlling strength is.

PID is the most common control mode in process control, with each part playing different role.

The following is parts description of PID:

Proportional adjust (P):

When the bias between feedback value and given value appears, the output value can be adjusted proportional to the bias, and if the bias is constant, the adjusted value will be constant too. The proportional adjusting can not obtain no-error control although it can quickly responds to the variety of feedback. The bigger the proportional gain, the faster speed of the system adjusting, but being too big may cause oscillation of the system.

The adjusting process is as following.

Firstly, design integral time to be long and differential time to be zero, operate the system only with the proportional adjusting.

Secondly, change the given value and observe the bias between feedback value and given value. If the error decreases / increases with the decreasing / increasing of given value, continue decreasing / increasing the proportional gain.

Finally, repeat the step above until the minimum error appears.

Integral time (I):

When the bias between feedback value and given value appears, the output adjusting value will continue accumulating, and if the bias continue exist, the adjusted value will continue increasing until the bias disappears. The integral adjusting can eliminate the error effectively, but the stronger integral controller can result in unstable and oscillate of system.

The parameter of integral time should be adjusted from big to small gradually. Then observe the adjusted result until achieve the stable speed of system.

Differential time (D):

When the bias between feedback value and given value appears, the output value will be adjusted proportional to the variational rate of bias. The adjusted value is only relative to the orientation and the value of bias variation.

The differential controller can be used to adjust the feedback signal

according to the corresponding variety.

It should be caution to use differential adjusting because it may magnify the system disturbance, especially the disturbance with high variational frequency.

Function Code	Name	Description	Setting Range	Factory Setting
P9.07	Sampling time (T)	0.01~100.00s	0.01~100.00	0.50s
P9.08	PID control bias limit	0.0~100.0%	0.0~100.0	0.0%

Sampling time (T): The time to sample the feedback value. In each sampling period the controller runs one time, and the longer the sampling time, the slower the responding is.

PID control bias limit: The allowable maximum bias of PID system output value relative to the closed-loop given value. As shown in following figure, within the bias limit, PID controller stops adjustment. Properly setting this function code can improve the accuracy and stability of PID system.

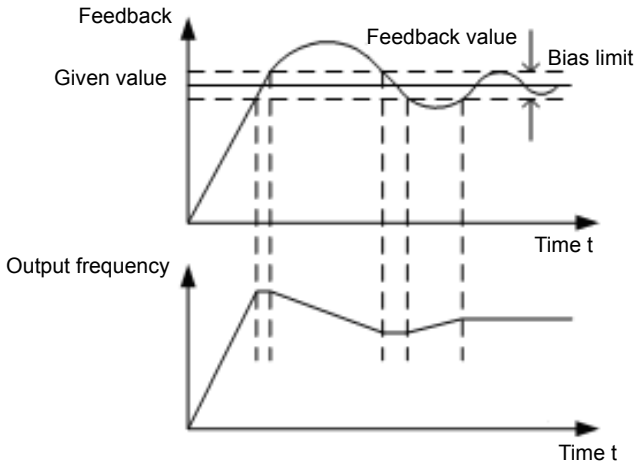


Figure 6.25 The relation of bias limit and output frequency.

Function Code	Name	Description	Setting range	Factory Setting
P9.09	PID output buffering time	0.00~10.00s	0.00~10.00	0.00

PID output buffering time: Filter the analog input signal to prevent frequently jumping disturbance signal on the system. But too long filtering time may affect regulating sensitivity.

Function Code	Name	Description	Setting Range	Factory Setting
P9.10	Feedback broken detecting value	0.0~100.0%	0.0~100.0	0.0%
P9.11	Feedback broken detecting time	0.0~3600.0s	0.0~3600.0	1.0s

Feedback broken detecting value: This detecting value is relative to the full range (100%). The system detects the PID feedback value all the time, and when the feedback value is less than or equal to the feedback broken detecting value, the system starts to detect the time, when exceeds, the system will send an alert of feedback broken failure.

6.11 PA--Simple PLC and Multi-Speed Control Group

Simple PLC function is a programmable logic controller (PLC) which is built-in the inverter to automatically control on the multistage frequency logic. The operating time, operating direction and operating frequency can be set to meet the process requirements.

This series inverter can perform 16 stages speed variation control, with 4 kinds of Acceleration/Deceleration time optional.

After the presetting PLC completes a control loop, an ON signal can be output by multifunction digital output terminal or multifunction relay.

Function Code	Name	Description	Setting Range	Factory Setting
PA.00	Simple PLC mode	0: Stop after one cycle 1: Run at last frequency after one cycle 2: Circular run	0~2	0

0: Stop after one cycle. The inverter automatically stops as soon as it completes one cycle, and it is needed to give operating command to start again.

1: Run at last frequency after one cycle. The inverter automatically keeps running frequency and direction after complete one cycle.

2: Circular run. After one loop is finished, the inverter automatically goes to run next cycle until there is a stop command to stop the system.

Function Code	Name	Description	Setting Range	Factory Setting
PA.01	Multi-stages memory option	0: No memory while power down 1: Memorize while power down	0~1	0

This parameter means memorizing the PLC operating stage and operating frequency before power down.

Function Code	Name	Description	Setting Range	Factory Setting
PA.02	Multi-speed 0	-100.0~100.0%	-100.0~100.0	0.0%
PA.03	0th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.04	Multi-speed 1	-100.0~100.0%	-100.0~100.0	0.0%
PA.05	1st Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.06	Multi-speed 2	-100.0~100.0%	-100.0~100.0	0.0%
PA.07	2nd Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.08	Multi-speed 3	-100.0~100.0%	-100.0~100.0	0.0%
PA.09	3rd Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.10	Multi-speed 4	-100.0~100.0%	-100.0~100.0	0.0%
PA.11	4th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.12	Multi-speed 5	-100.0~100.0%	-100.0~100.0	0.0%
PA.13	5th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.14	Multi-speed 6	-100.0~100.0%	-100.0~100.0	0.0%
PA.15	6th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.16	Multi-speed 7	-100.0~100.0%	-100.0~100.0	0.0%
PA.17	7th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.18	Multi-speed 8	-100.0~100.0%	-100.0~100.0	0.0%
PA.19	8th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.20	Multi-speed 9	-100.0~100.0%	-100.0~100.0	0.0%
PA.21	9th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.22	Multi-speed 10	-100.0~100.0%	-100.0~100.0	0.0%
PA.23	10th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.24	Multi-speed 11	-100.0~100.0%	-100.0~100.0	0.0%

PA.25	11th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.26	Multi-speed 12	-100.0~100.0%	-100.0~100.0	0.0%
PA.27	12th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.28	Multi-speed 13	-100.0~100.0%	-100.0~100.0	0.0%
PA.29	13th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.30	Multi-speed 14	-100.0~100.0%	-100.0~100.0	0.0%
PA.31	14th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.32	Multi-speed 15	-100.0~100.0%	-100.0~100.0	0.0%
PA.33	15th Step operating time	0.0~6553.5s(h)	0.0~6553.5	0.0s

The 100% of the frequency setting corresponds to the maximum frequency (P0.07).

When the inverter is determined to run in the PLC mode, it is necessary to set PA.02~PA.33 to define its characteristics.

Notice: Simple PLC run direction depends on the symbol of multi-step speed. If it is a negative value, it means the inverter will run in the reverse direction.

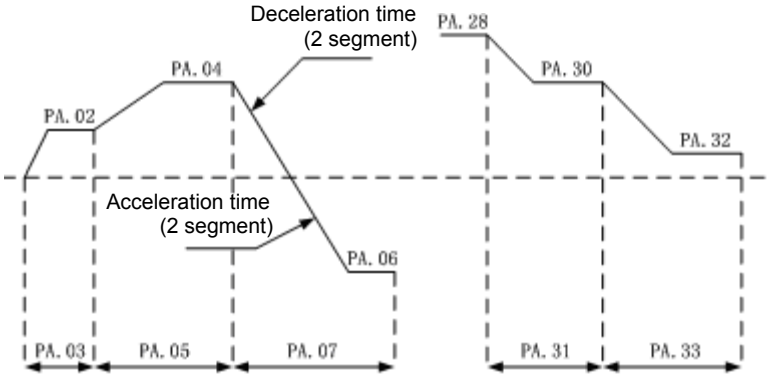


Figure 6.26 Simple PLC diagram.

Multi-step speed can be set continuously in the range of

– Fmax~Fmax.

CHV series inverters support 16-stages speed, which are selected by combinational coding of external terminals S1, S2, S3 and S4. They correspond to multi-stage speed 0 to multi-stage speed 15 respectively.

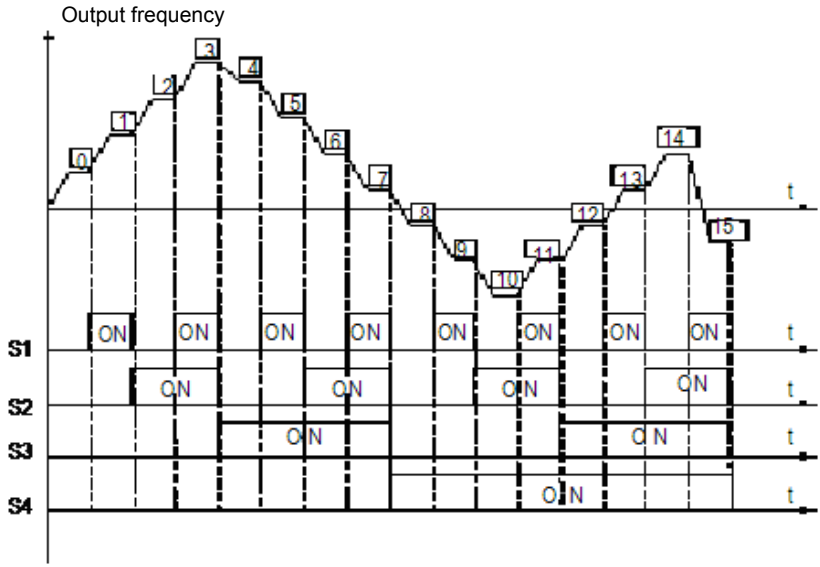


Figure 6.27 Multi-stages speed operating diagram.

When S1=S2=S3=S4=OFF, frequency input mode is determined by the function code P0.03. If S1=S2=S3=S4 terminals are not all OFF, the inverter will run at multi-stages speed. The priority of multi-stages speed is higher than the keypad, analog, high-speed pulse, PLC, and communication frequency input. Through combinational coding of S1, S2, S3 and S4, a maximum of 16-stage speeds are optional.

The start/stop status of the inverter is also determined by the function code P0.01 when it runs at multi-stages speed. Multi-stages speed control process is shown in Figure 6.27. The relationship between S1, S2, S3, S4 terminals and multi-stages speed is shown in the following table.

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

Function Code	Name	Description	Setting Range	Factory Setting
PA.34	Simple PLC stage 0~7 ACC/DEC time option	0~65535	0~65535	0
PA.35	Simple PLC stage 8~15 ACC/DEC time option	0~65535	0~65535	0

Function Code	Binary Digit		Stages No.	ACC/DEC Time 0	ACC/DEC Time 1	ACC/DEC Time 2	ACC/DEC Time 3
PA.34	BIT1	BIT0	0	00	01	10	11
	BIT3	BIT2	1	00	01	10	11
	BIT5	BIT4	2	00	01	10	11
	BIT7	BIT6	3	00	01	10	11
	BIT9	BIT8	4	00	01	10	11
	BIT11	BIT10	5	00	01	10	11
	BIT3	BIT12	6	00	01	10	11
	BIT15	BIT14	7	00	01	10	11
PA.35	BIT1	BIT0	8	00	01	10	11
	BIT3	BIT2	9	00	01	10	11
	BIT5	BIT4	10	00	01	10	11
	BIT7	BIT6	11	00	01	10	11
	BIT9	BIT8	12	00	01	10	11
	BIT11	BIT10	13	00	01	10	11
	BIT3	BIT12	14	00	01	10	11
	BIT15	BIT14	15	00	01	10	11

After the user chooses the ACC/DEC time of relevant stages,

convert the combined 16 digit binary number into decimal number, and then set the relevant function code.

Function Code	Name	Description	Setting Range	Factory Setting
PA.36	Multi-stage time unit option	0: Second 1: Hour	0~1	0

It is to define the operating time unit for each step of 16 stages procedure.

6.12 PB-- Protection Parameters Group

Function Code	Name	Description	Setting Range	Factory Setting
PB.00	Input phase-failure protection	0: Disable 1: Enable	0~1	1
PB.01	Output phase-failure protection	0: Disable 1: Enable	0~1	1

Input phase-failure protection: Select whether or not to protect the input phase-failure situation.

Output phase-failure protection: Select whether or not to protect the output phase-failure situations.

Function Code	Name	Description	Setting Range	Factory Setting
PB.02	Motor overload protection option	0: No protection 1: Normal motor (with low-speed compensation) 2: Variable Frequency motor (without low-speed compensation)	0~2	2

0: No protection. There is no motor overloading protection characteristic (caution to use), thereby the inverter has no protection to the overloaded motor.

1: Normal motor (with low-speed compensation). As general motor has a poor heat emission at low-speed, the relevant electronic thermal protection should be adjusted properly. The low-speed compensation characteristic mentioned here is to switch down the overloading protection threshold for the motor with an operation frequency lower than 30 Hz.

2: Variable frequency motor (without low-speed compensation). As the heat emission of special variable frequency motor is not affected by speed, it is not required to adjust the protection value of low-speed operation.

Function Code	Name	Description	Setting Range	Factory Setting
PB.03	Motor overload protection current	20.0%~120.0%	20.0~120.0	100.0%

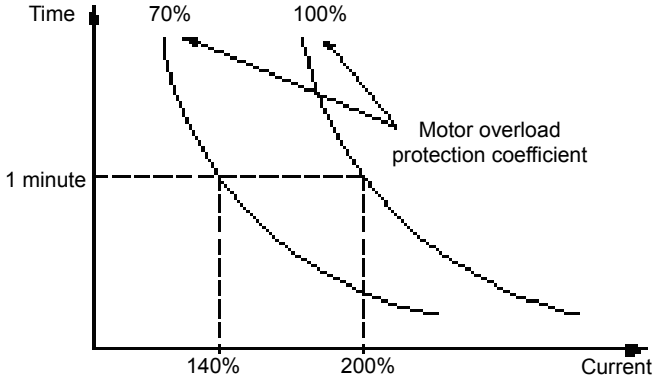


Figure 6.28 Motor overload protection coefficient set.

The value can be determined by the following equation:

Motor overload protection current = (the allowed maximum overload current / inverter rated current)*100%

It is mainly applied to the cases that big inverter drives small motor, requiring to correctly set this function to protect the motor.

Function Code	Name	Description	Setting Range	Factory Setting
PB.04	Overload pre-warning point	20.0%~150.0%	20.0~150.0	130.0%
PB.05	Overload pre-warning option	0: Detect all the time relative to motor rated current 1: Detect with constant speed relative to motor rated current 2: Detect all the time relative to inverter rated current 3: Detect with constant speed relative to inverter rated current	0~3	0

PB.06	Overload pre-warning delay time	0.0~30.0s	0.0~30.0	5.0s

Overload pre-warning option: Determines the warning category, such as motor overload (OL1) and inverter overload (OL2).

Overload pre-warning point: The current threshold of overload pre-warning, and it is set as the percentage relative to the rated current.

Overload pre-warning delay time: When inverter output current is greater than the presetting current of overload pre-warning point, and if the duration exceeds the overload pre-warning delay time, then output a pre-warning signal. It is illuminated as following figure:

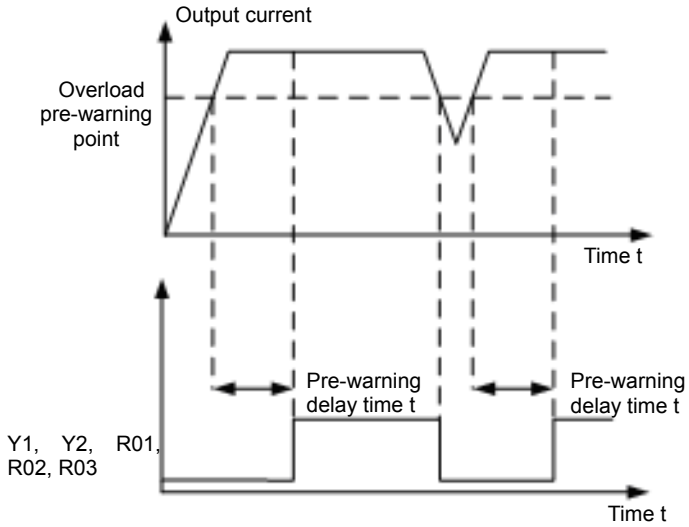


Figure 6.29 Overload pre-warning schematic diagram.

Function Code	Name	Description	Setting Range	Factory Setting
PB.07	Instant power off frequency drop point	400.0V~600.0V	400.0~600.0	450.0V
PB.08	Instant power off frequency drop rate	0.00Hz~P0.07	0.00Hz~P0.07	0.00Hz

If the instant power off drop rate is set to be 0, the instant power off restart function is invalid.

Instant power off frequency drop point: Indicates when the bus voltage drops to the instant power off frequency drop point after the power off, the inverter starts to decrease the running frequency by the instant power off frequency drop rate to enable the motor to generate electricity and keep the bus voltage with the feedback energy. Thus the inverter will operate normally till inverter power is on again.

Notice: Adjusting these two parameters properly can achieve the power network switching instead of causing production shutdown result from inverter protection.

Function Code	Name	Description	Setting Range	Factory Setting
PB.09	Over-voltage stall protection	0: Disabled 1: Enabled	0~1	0
PB.10	Over-voltage stall protection voltage	120~150%	120~150	125%

During deceleration of inverter, the actual motor speed drop rate may lower than the output frequency drop rate because of the load inertia, and thereby the motor will feedback energy to the inverter, that may cause the inverter bus voltage rising and even skipping of inverter caused by bus over-voltage breakdown if no measures to take.

Over-voltage stall protection function is to detect the bus voltage during inverter operation and compare it with the stall over-voltage point value defined by Pb.10 (relative to the standard bus voltage). If it exceeds the over-voltage stall point value, inverter output frequency will 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 in the following figure.

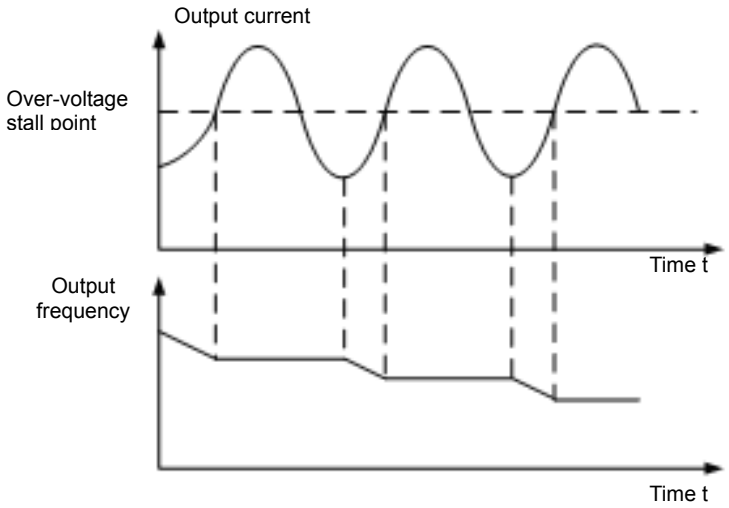


Figure 6.30 Over-voltage stall function.

Function Code	Name	Description	Setting Range	Factory Setting
PB.11	Over-current stall protection	0: Disabled 1: Enabled	0~1	1
PB.12	Over-current stall protection current coefficient	100~200%	100~200	160%
PB.13	Over-current frequency drop rate	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, that may result in the skipping of inverter caused by bus over-current breakdown.

Over-current stall protection function is to detect the output current during inverter operation and compare it with the stall over-current point value defined by PB.12. If it exceeds the stall over-current point value, inverter will run smoothly at current frequency in accelerating operation, and if it running at fixed speed, inverter will decrease the output frequency. When the next output current detected is lower than the over-current stall point, the inverter continues to accelerate, as shown

by following figure.

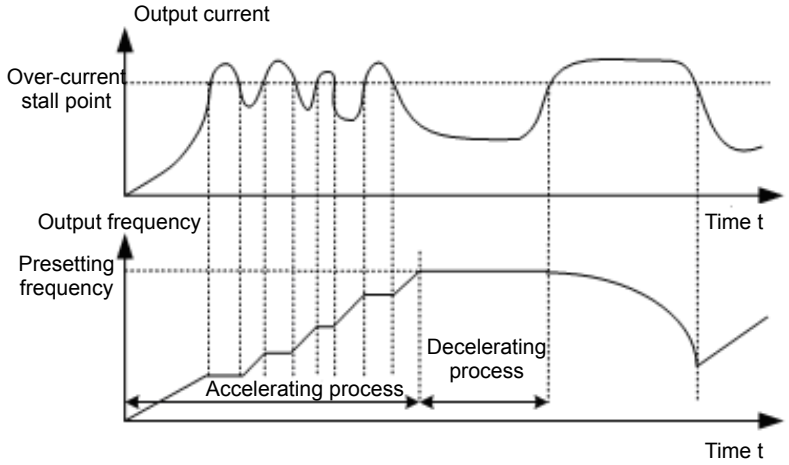


Figure 6.31 Over-current stall function.

6.13 PC--Serial Communication Group

For details, please refer to the serial communication description of 《CHV Series Inverter Fittings User's Guide Description》.

6.14 PD--Supplement Function Group

Function Code	Name	Description	Setting Range	Factory Setting
PD.00	Upper limit frequenc y option	0: Keypad 1: AI1 2: AI2 3: AI3 4: AI4 5: HDI 1 6: HDI 2 7: Communicati on	0~7	0

0: Keypad setting by set upper limit value of operation frequency of P0.08.

1~7: Please refer to the setting of P0.03.

100% setting is corresponding to maximum output frequency (P0.07).

Function Code	Name	Description	Setting Range	Factory Setting
PD.01	Terminal input option	0~0x3FF	0~0x3FF	0

Select always-open and always-close input of on-off input terminal. This parameter is hexadecimal setting. If the relative bit is set to be 1, that means always-close input. The on-off value is in the following table.

BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
S8	S7	S6	HDI2	HDI1	S5	S4	S3	S2	S1

Notice: This setting will be valid only if HDI1 and HDI2 are set to be digital input.

6.15 PE--Factory-set Function Group

This group is the factory-set parameter group. The user DO NOT try to open these group parameters, otherwise it will cause the inverter abnormal operation or damage.

7.FAULT INSPECTION AND ELIMINATION

This chapter describes the fault displays and countermeasure for the inverter.

7.1 Fault Information and Elimination

Failure Code	Failure Type	Possible Failure Reason	Solution
OUT1	IGBT Ph-U fault	1. Accelerate too fast 2. IGBT of this Phase internal damaged. 3. Fault action caused by disturbance. 4. Check the ground is in good condition or not.	1. Increase Acceleration time. 2. Find technical support. 3. Inspect the external equipment to ensure if there is disturbance source or not.
OUT2	IGBT Ph-V fault		
OUT3	IGBT Ph-W fault		
OC1	Acc over-current	1. Accelerate too fast. 2. Main voltage is lower. 3. The capacity of inverter is small.	1. Increase Acceleration time. 2. Inspect the input main power. 3. Select bigger power inverter.
OC2	Dec over-current	1. Decelerate too fast. 2. Inertia Torque of load is too big. 3. The capacity of this inverter is small.	1. Increase Deceleration time. 2. Add suitable external brake unit. 3. Select bigger power inverter.
OC3	Constant speed running over-current	1. Jump or abnormity of load. 2. The main voltage is lower. 3. The capacity of this inverter is small. 4. The encoder disconnect or failure when close-loop vector is running.	1. Inspect the load or decrease the change of load. 2. Inspect the input power. 3. Select bigger power inverter. 4. Inspect the encoder and its connection.

OV1	Acc over-voltage	1. Input voltage abnormity. 2. Re-start the running motor after instant power off.	1. Inspect input power. 2. Avoid this situation.
OV2	Dec over-voltage	1. Decelerate too fast. 2. Load inertia too big. 3. Input voltage abnormity.	1. Increase Deceleration time. 2. Add more brake unit. 3. Inspect input power.
OV3	Constant speed running over-voltage	1. Input voltage abnormity changed. 2. Load inertia too big.	1. Install input reactor. 2. Add suitable external brake unit.
UV	DC bus under-voltage	The main voltage is lower.	Inspect the input main power.
OL1	Motor overload	1. The main voltage is too low. 2. The motor rated current is set improperly. 3. The motor has locked rotor or load change too big. 4. At close-loop vector control, reverse encoder or long time operation at low-speed. 5. The inverter's capacity is much larger than the motor's.	1. Inspect the voltage of main power. 2. Re-set motor rated current. 3. Inspect the load and adjust the torque lifting capacity. 4. Regulate signal direction of the encoder. 5. Chose proper motor.
OL2	Inverter overload	1. Accelerate too fast. 2. Restart the motor while it is rotating. 3. The main voltage is too low. 4. Too big load. 5. At close-loop vector control, reverse encoder or long time operation at low-speed.	1.Increase Acceleration time. 2. Avoid restart the motor after stop is just pressed. 3. Inspect the voltage of main power. 4. Chose inverter with a higher power. 5. Regulate signal direction of the encoder.
SPI	Input phase-loss	Phase-loss of input phases R, S, T.	1. Inspect the input power supply. 2. Inspect the wiring.

SPO	Output phase-loss	1. Output phase-loss of phases U, V, W (or serious asymmetry of the three load phases). 2. If no motor, can not end the pre-excitation during pre-excitation period.	1. Inspect output wiring. 2. Inspect motor and cables.
OH1	Rectify overheat	1. Inverter instant over-current. 2. Grounding short circuit of the three phases. 3. Fan ducting block or fan damaged. 4. Too high ambient temperature. 5. Loose connection of control keypad wire or loose plug-in unit. 6. Auxiliary power supply fault, under –voltage of driven voltage. 7. Power module bridge arm directly connected. 8. Control keypad malfunction.	1. Please refer to Over-current Solution. 2. Rewiring. 3. Clean the ducting or replace the fan. 4. Decrease the ambient temperature. 5. Inspect and reconnect. 6. Ask for service. 7. Ask for service. 8. Ask for service.
OH2	IGBT overheat		
EF	External fault	SI external input terminal fault	Inspect external device input
CE	Communication fault	1. Baud rate improperly set. 2. Miscommunication of serial communication. 3. Long time interrupt of communication.	1. Properly set the baud rate. 2. Press Button STOP/RST to reset, and ask for service. 3. Inspect communication interface wiring.
ITE	Current detect fault	1. Poor connection of control keypad connector. 2. Auxiliary power-supply fault. 3. Hall sensor fault. 4. Amplified circuit fault.	1. Inspect connector, re-plug in. 2. Ask for service. 3. Ask for service. 4. Ask for service.

TE	Autotuning fault	1. Capacity mismatch of motor and inverter. 2. Improper set of motor rated parameters. 3. Too big bias of parameters between autotuning and standard parameters 4. Autotuning overtime.	1. Replace inverter model. 2. Set rated parameters according to motor nameplate. 3. Make the motor no load to re-identify. 4. Inspect motor connection and parameter set.
PCE	Encoder disconnect	1. Vector control with PG, encoder signal interrupted. 2. Encoder fault.	1. Inspect encoder connection and re-wiring. 2. Inspect whether the encoder has output or not.
PCDE	Encoder reverse fault	Vector control with PG, encoder signal wire misconnected.	Inspect coder wiring and adjust wiring.
OPSE	System fault	1. Disturbance seriously leads to main control board unable to operate properly. 2. Ambient noise leads to control board malfunction.	1. Press STOP/RST to reset or add power supply filter at the power supply side. 2. Press STOP/RST to reset and ask for service.
EEP	EEPROM fault	1. Control parameters misread-write. 2. EEPROM fault.	1. Press STOP/RST to reset and ask for service. 2. Ask for service.
PIDE	PID feedback fault	1. PID feedback disconnected. 2. PID feedback source disappears.	1. Inspect PID feedback signal wire. 2. Inspect PID feedback source.
BCE	Brake unit fault	1. Braking circuit failure or brake tube damaged. 2. Too low resistance of externally connected braking resistor.	1. Inspect braking unit, replace braking tube. 2. Increase braking resistance.
-END-	Trial time reached	Trial time reached.	Contact supplier and ask for service.

LCD-E	LCD disconnect	1.Parameter download/upload while LCD disconnect 2. Material broken during tension control	1. Press STOP/RST to reset, connect LCD then download/upload parameter. 2. Check material.
TI-E	Clock chip f fault	Clock chip damaged	Ask for service
	Factory Reserved		

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

Power supply air switch trips off when power on:

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

Motor doesn’t move after inverter operated:

- Inspect if there is balanced three-phase output among U, V, W. If yes, then it could be the damage of motor circuit or itself, or the motor is mechanically locked. Please clear it off.
- There is output but is uneven among the three phases, thus the inverter driver board or the output module is supposed to

be damaged, ask for service.

- If there is no output voltage, it may be the damage of inverter driver board or output module, ask for service.

Inverter displays in normal condition, but the power supply air switch trips off after put in operation:

- Inspect if there is short circuit of phases between output modules. If yes, ask for service.
- Inspect if there is short circuit or ground between motor wires. If yes, eliminate it.
- If the trip-off happens occasionally and the distance between motor and inverter is far, it should be considered to add output AC reactor.

8. MAINTENANCE

WARNING

- **Maintenance must be performed according to designated maintenance methods.**
- **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. Otherwise inverter can be damaged by electrostatic.**
- **After maintenance, all screws must be tightened.**

8.1 Daily Maintenance

It is necessary to do daily maintenance to avoid inverter fault, ensure operation smoothly and extend the inverter's service life. The following table shows daily maintenance contents.

Check Item	Content
Temperature/Humidity	Ensure the environmental temperature is between 0℃~50℃, and humidity is between 20~90%.
Oil mist and dust	Ensure there are no oil mist and dust in the inverter.
Inverter	Inspect the inverter to ensure whether there are abnormity heat and vibration.
Fan	Ensure the fan is running well, nothing inside to block it.
Input Power	Ensure the input power voltage and frequency is in allowed range.
Motor	Inspect the motor to ensure whether there are abnormity vibration and heat or not, whether there are abnormity noise and phase-loss or not.

8.2 Periodic 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 table indicates the inspection content.

Inspection Item	Inspection Content	Solution
Screw of external terminal	Screws are loose or not?	Tighten up
PCB Board	Dust, Dirty object	Clean them completely by dry compressed air
Fan	Abnormity noise and vibration, cumulative time is over 20,000 hours or not?	1. Clean them 2. Replace the fan
Electrolytic Capacitor	Color changed or not, is there any peculiar smell?	Replace electrolytic capacitor
Heat emission	Dust, dirty object	Clean them completely by dry compressed air
Power Components	Dust, dirty object	Clean them completely by dry compressed air

8.3 Replacement of wearing parts

The 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 hours.

8.4 Warranty

The manufacturer warrants its products for a period of 12 months from the date of purchase.

Appendix

--Function Parameters Table

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 access 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 P8 group. PE group is factory reserved parameter, users are forbidden to access these parameters.

For the convenience of setting function code, during using operation keypad, the function group 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": The function parameter group and parameter code.

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

The 3rdcolumn "parameter specification": The specification of function parameter.

The 4th column "Setting Range": The effective setting range of the function parameter.

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

The 6th "Modification": The modification property 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;

"●": Indicate the value of this parameter is the actual detecting value and can not be modified.

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

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

The 8th column "Serial No.": The serial number of this function code in the whole function codes, and also is the communication register address.

2. "Parameter Digital System" is the decimal system.

If parameters are expressed in hexadecimal system, each digital value is independent when the parameter is edited, and the numeric area of some digits can be hexadecimal (0~F).

3. "LCD Display Description": Only valid when using external LCD operation keypad.

4. "Factory Setting": Indicate the value of the function code 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 protect the parameter effectively, inverter offers user's cryptoguard function. After set the password (P7.00 is set to be nonzero). Users can press Button PRG/ESC again to try to access the function code edit mode, "-----"will be displayed, and the operator must input correct user's password, otherwise will be unable to access it.

For factory setting parameter, it needs to set password properly before entering. (Here remind users DO NOT try to modify the factory parameters, and if parameters are not set properly, it can cause inverter malfunction or even damage.) At the state of no-locked cryptoguard, the user's password can be modified at any time, and the final input value will be the user's password. If P7.00 is set to be 0, the user's password can be cancelled; when the power is on, if P7.00 is not

0, parameters are protected by password. The function of user's password also follows above rule when using the serial communication function code.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P0 Group: Basic Function Group							
P0.00	Speed control mode	0:Sensorless Vector Control 1:Vector Control With PG 2:V/F Control	0~2	0	◎	Control Mode	0.
P0.01	Operation command channel	0:Keypad (LED extinct) 1:Terminal (LED blinking) 2:Communic-ation (LED light up)	0~2	0	◎	Command Channel	1.
P0.02	Keypad and terminal UP/DOWN setting	0:Valid, and the inverter memorizes when power down 1:Valid, and the inverter does not memorize when power down 2:Invalid	0~2	0	◎	UP /DOWN	2.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P0.03	A Frequency command channel	0:Keypad 1:AI1 2:AI3 3:HDI1 4:Simple PLC 5:Multi-speed 6:PID 7: Communicatio n	0~7	0	◎	A FREQ Channel	3.
P0.04	B Frequency command channel	0:AI2 1:AI4 2:HDI2	0~2	0	◎	B FREQ Channel	4.
P0.05	B Frequency command reference	0:Maximum frequency output 1:A frequency command	0~1	0	○	B Reference	5.
P0.06	Frequency command combination	0: A 1: B 2: A+B 3: Max (A, B)	0~3	0	○	FREQ COMBIN	6.
P0.07	Maximum output frequency	10.00~ 600.00Hz	10.00~ 600.00	50.00Hz	◎	Max Frequency	7.
P0.08	Upper frequency limit	P0.09~P0.07	P0.09~ P0.07	50.00Hz	○	Upper FREQ limit	8.
P0.09	Lower frequency limit	0.00Hz~ 0.08	0.00~ P0.08	0.00Hz	○	Lower FREQ limit	9.
P0.10	Keypad frequency setting	0.00Hz~ 0.08	0.00~ P0.08	50.00Hz	○	Keypad FREQ set	10.
P0.11	Acceleration time 0	0.0~3600.0s	0.0~ 3600.0	20.0s	○	ACC time 0	11.
P0.12	Deceleration time 0	0.0~3600.0s	0.0~ 3600.0	20.0s	○	DEC time 0	12.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P0.13	Operation direction option	0:Operating at default direction 1:Operating at reverse direction 2:Forbid inverse operating	0~2	0	◎	OPER direction	13.
P0.14	Carrier frequency setting	1.0~16.0kHz	1.0~ 16.0	Set by model	○	Carrier FREQ	14.
P0.15	PWM option	0:Fixed PWM mode 1:Random PWM mode	0~1	0	○	PWM option	15.
P0.16	Carrier frequency adjustment	0: Carrier frequency does not adjust based on temperature 1: Carrier frequency adjusts based on temperature	0~1	0	◎	Carrier FREQ ADJ	16.
P0.17	Motor parameters autotuning	0:No operation 1:Rotating parameters autotuning 2:Static parameters autotuning	0~2	0	◎	PARA autotuning	17.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P0.18	Restore function parameters	0:No operation 1:Restore factory setting 2:Delete failure records 3:Restore parameter for injection moulding machine	0~3	0	◎	Restore PARA	18.
P1 Group: Start/Stop Control Group							
P1.00	Start Mode	0:Start directly 1:DC braking first and then start 2:Speed tracking and then start	0~2	0	◎	Start mode	19.
P1.01	Starting frequency	0.00~ 10.00Hz	0.00~ 10.00	0.00Hz	◎	Start frequency	20.
P1.02	Hold time of starting frequency	0.0~50.0s	0.0~ 50.0	0.0s	◎	Start time	21.
P1.03	Braking current before starting	0.0~150.0%	0.0~ 150.0	0.0%	◎	Brake current	22.
P1.04	Braking time before starting	0.0~50.0s	0.0~ 50.0	0.0s	◎	Brake time	23.
P1.05	Acceleration and Deceleration mode	0:Linear 1:S curve	0~1	0	◎	ACC/DEC mode	24.
P1.06	S curve beginning stage scale	0.0~40.0% (ACC/DEC time)	0.0~ 40.0	30.0%	◎	S curve start	25.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P1.07	S curve ending stage scale	0.0~40.0% (ACC/DEC time)	0.0~ 40.0	30.0%	◎	S curve end	26.
P1.08	Stop Mode	0:Deceleration to stop 1:Stop freely	0~1	0	○	Stop mode	27.
P1.09	Starting frequency of DC brake	0.00~P0.07	0.00~ 10.00	0.00Hz	○	Start DC brake	28.
P1.10	Hold time before DC brake	0.0~50.0s	0.0~ 50.0	0.0s	○	Before DC brake	29.
P1.11	DC brake current	0.0~150.0%	0.0~ 150.0	0.0%	○	DC brake current	30.
P1.12	DC brake time	0.0~50.0s	0.0~ 50.0	0.0s	○	DC brake time	31.
P1.13	Dead time	0.0~3600.0s	0.0~ 3600.0	0.0s	○	Dead time	32.
P1.14	Action when operating frequency is less than lower frequency limit	0: Run at the lower frequency limit 1:Stop 2:Stand-by	0~2	0	◎	Running frequency is lower than the lower limit of frequency	33.
P1.15	Power-off restart option	0:Disabled 1:Enabled	0~1	0	○	Power restart	34.
P1.16	Restart delay time	0.0~3600.0s	0.0~ 3600.0	0.0s	○	Restart delay	35.
P2 Group: Motor Parameter Group							
P2.00	Inverter model	0:G model	0~1	0	◎	Inverter model	36.
P2.01	Motor rated frequency	0.01Hz~ P0.07	0.01~P 0.07	50.00Hz	◎	Rated frequency	37.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P2.02	Motor rated speed	0~36000rpm	0~36000	1460 rpm	◎	Rated speed	38.
P2.03	Motor rated voltage	0~460V	0~460	380V	◎	Rated voltage	39.
P2.04	Motor rated current	0.1~1000.0A	0.1~1000.0	Set by model	◎	Rated current	40.
P2.05	Motor rated power	0.4~900.0kW	0.4~900.0	Set by model	◎	Rated power	41.
P2.06	Motor stator resistance	0.001~65.535Ω	0.001~65.535	Set by model	○	Stator resist	42.
P2.07	Motor rotor resistance	0.001~65.535Ω	0.001~65.535	Set by model	○	Rotor resist	43.
P2.08	Motor stator and rotor inductance	0.1~6553.5mH	0.1~6553.5	Set by model	○	STAT/ROT induct	44.
P2.09	Mutual inductance of motor stator and rotor	0.1~6553.5mH	0.1~6553.5	Set by model	○	Mutual induct	45.
P2.10	Motor no-load current	0.01~655.35A	0.01~655.35	Set by model	○	No-load current	46.
P3 Group: Vector Control Group							
P3.00	Speed loop proportional gain 1	0~100	0~100	20	○	PROPORT gain 1	47.
P3.01	Speed loop integral time 1	0.01~10.00s	0.01~10.00	0.50s	○	Integral time 1	48.
P3.02	Switching low point frequency	0.00Hz~P3.05	0.00~P3.05	5.00Hz	○	Switch low FREQ	49.
P3.03	Speed loop proportional gain 2	0~100	0~100	25	○	PROPORT gain 2	50.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P3.04	Speed loop integral time2	0.01~10.00s	0.01~ 10.00	1.00s	○	Integral time 2	51.
P3.05	Switching high point frequency	P3.02~P0.07	P3.02~ P0.07	10.00Hz	○	Switch high FREQ	52.
P3.06	Current loop proportional factor P	0~65535	0~ 65535	500	○	PROPOR T factor	53.
P3.07	Current loop integral factor I	0~65535	0~ 65535	500	○	Integral factor	54.
P3.08	Speed filter time	0.00~5.00s	0.00~ 5.00	0.00s	○	Filter time	55.
P3.09	VC slip compensatio n factor	50%~200%	50~200	100%	○	VC COMP factor	56.
P3.10	PG parameter	1~65535	1~ 65535	1000	◎	PG parameter	57.
P3.11	PG direction option	0:Forward input 1:Reverse input	0~1	0	◎	PG direction	58.
P3.12	Torque setting mode	0:Torque control invalid 1: Keypad 2:AI1 3:AI2 4:AI3 5:AI4 6:HDI1 7:HDI2 8:Communic-a tion	0~8	0	○	Torque setting	59.
P3.13	Keypad torque setting	-100.0%~ 100.0%	-100.0 %~100. 0%	50.0%	○	Keypad setting	60.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P3.14	Upper torque limit setting	0.0~200.0%	0.0~ 200.0	150.0%	○	Upper TORQ limit	61.
P4 Group: V/F Control Group							
P4.00	V/F curve setting	0:Linear V/F curve 1: Multipoint V/F curve 2: 1.3 exponential decreasing torque V/F curve 3: 1.7 exponential decreasing torque V/F curve 4: 2.0 exponential decreasing torque V/F curve	0~4	0	◎	V/F curve set	62.
P4.01	Torque boost	0.0%: auto 0.1%~30.0%	0.0~ 30.0	1.0%	○	Torque boost	63.
P4.02	Torque boost ending point	0.0%~50.0%	0.0~ 50.0	20.0%	◎	Boost ending	64.
P4.03	V/F frequency point 1	0.00Hz~ P4.05	0.00~P 4.05	5.00Hz	◎	V/F FREQ 1	65.
P4.04	V/F voltage point 1	0.0%~ 100.0%	0.0~ 100.0	10.0%	◎	V/F voltage 1	66.
P4.05	V/F frequency point 2	P4.03~ P4.07	P4.03~ P4.07	30.00Hz	◎	V/F FREQ 2	67.
P4.06	V/F voltage point 2	0.0%~ 100.0%	0.0~ 100.0	60.0%	◎	V/F voltage 2	68.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P4.07	V/F frequency point 3	P4.05~ P2.01	P4.05~ P2.01	50.00Hz	◎	V/F FREQ 3	69.
P4.08	V/F voltage point 3	0.0%~ 100.0%	0.0~ 100.0	100.0%	◎	V/F voltage 3	70.
P4.09	V/F slip compensate -on	0.00~ 10.00Hz	0.00~ 10.00	0.0Hz	○	V/F slip COMP	71.
P4.10	AVR option	0: Invalid 1:Always valid 2:Only valid when Deceleration	0~2	1	○	AVR option	72.
P4.11	Energy saving option	0: No action 1:Auto energy saving	0~1	0	○	Energy saving	73.
P4.12	Terminal function test when power on	0:Terminal operation command invalid when power on 1:Terminal operation command valid when power on	0~1	0	○	Terminal command	74.
P5 Group: Input Terminal Group							
P5.00	HDI option	0: Both pulse 1: HDI1 is DI, HDI2 is pulse 2: HDI2 is DI, HDI1 is pulse 3: Both DI	0~3	0	◎	HDI option	75.
P5.01	Terminal function input option	0: Digital 1: Communicatio n	0~1	0	◎	Terminal option	76.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.02	S1 Terminal function	0:No function 1:Run forward 2:Run reverse 3:3-wire control 4:Jog forward 5:Jog reverse 6:Coast to stop 7:Failure reset 8:Operation pause 9:External fault 10:FREQ up 11:FREQ down 12:FREQ up clear 13:Switch setting A and B 14:Switch setting A and A+B 15:Switch setting B and A+B 16: Multi-Spee1 17: Multi-Spee2 18: Multi-Spee3 19:	0~55	1	◎	S1 function	77.
P5.03	S2 Terminal function		0~55	4	◎	S2 function	78.
P5.04	S3 Terminal function		0~55	7	◎	S3 function	79.
P5.05	S4 Terminal function		0~55	0	◎	S4 function	80.
P5.06	S5 Terminal function		0~55	0	◎	S5 function	81.
P5.07	HDI1 terminal function		0~55	0	◎	HDI1 function	82.
P5.08	HDI2 terminal function		0~55	0	◎	HDI2 function	83.
P5.09	S6 Terminal function		0~55	0	◎	S6 function	84.
P5.10	S7 Terminal function		0~55	0	◎	S7 function	85.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.11	S8 Terminal function	Multi-Spee4 20: Multi-speed pause 21: ACC/DEC Time1 22: ACC/DEC Time 2 23: PLC reset 24:PLC pause 25:PID pause 26:Traverse pause 27:Traverse reset 28:Counter reset 29:Length reset 30:ACC/DEC disabled 31:Torque control disabled 32~52: Water supply control 53: 3-wire jog control 54~55: reversed	0~55	0	◎	S8 function	86.
P5.12	Digital signal filter times	1~10	1~10	5	○	DI filter times	87.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.13	Digital input control mode	0: 2-wire control, integrate Enable with direction 1: 2-wire control, separate Enable from direction 2: 3-wire control, integrate Enable with direction 3: 3-wire control, separate Enable from direction	0~3	0	◎	DI control mode	88.
P5.14	UP/DOWN frequency incremental rate	0.01~ 50.00Hz/s	0.01~ 50.00	0.50Hz/s	○	FREQ INC rate	89.
P5.15	AI1 lower limit	0.00V~ 10.00V	0.00~ 10.00	0.00V	○	AI1 lower limit	90.
P5.16	AI1 lower limit correspondi ng setting	-100.0%~ 100.0%	-100.0~ 100.0	0.0%	○	AI1 L limit set	91.
P5.17	AI1 upper limit	0.00V~ 10.00V	0.00~ 10.00	10.00V	○	AI1 upper limit	92.
P5.18	AI1 upper limit correspondi ng setting	-100.0%~ 100.0%	-100.0~ 100.0	100.0%	○	AI1 U limit set	93.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.19	AI1 filter time	0.00s~0.00s	0.00~ 10.00	0.10s	○	AI1 filter time	94.
P5.20	AI2 lower limit	0.00V~ 10.00V	0.00~ 10.00	0.00V	○	AI2 lower limit	95.
P5.21	AI2 lower limit corresponding setting	-100.0%~ 100.0%	-100.0~ 100.0	0.0%	○	AI2 L limit set	96.
P5.22	AI2 upper limit	0.00V~ 10.00V	0.00~ 10.00	5.00V	○	AI2 upper limit	97.
P5.23	AI2 upper limit corresponding setting	-100.0%~ 100.0%	-100.0~ 100.0	100.0%	○	AI2 U limit set	98.
P5.24	AI2 filter time	0.00s~ 10.00s	0.00~ 10.00	0.10s	○	AI2 filter time	99.
P5.25	AI3 lower limit	-10.00V ~10.00V	-10.00~ 10.00	0.00V	○	AI3 lower limit	100.
P5.26	AI3 lower limit corresponding setting	-100.0%~ 100.0%	-100.0~ 100.0	0.0%	○	AI3 L limit set	101.
P5.27	AI3 upper limit	-10.00V ~10.00V	-10.00~ 10.00	10.00V	○	AI3 upper limit	102.
P5.28	AI3 upper limit corresponding setting	-100.0%~ 100.0%	-100.0~ 100.0	100.0%	○	AI3 U limit set	103.
P5.29	AI3 filter time	0.00s~ 10.00s	0.00~ 10.00	0.10s	○	AI3 filter time	104.
P5.30	AI4 lower limit	0.00V~ 10.00V	0.00~ 10.00	0.00V	○	AI4 lower limit	105.
P5.31	AI4 lower limit corresponding setting	-100.0%~100. 0%	-100.0~ 100.0	0.0%	○	AI4 L limit set	106.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.32	AI4 upper limit	0.00V~10.00V	0.00~10.00	10.00V	○	AI4 upper limit	107.
P5.33	AI4 upper limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%	○	AI4 U limit set	108.
P5.34	AI4 filter time	0.00s~10.00s	0.00~10.00	0.10s	○	AI4 filter time	109.
P5.35	HDI1 function option	0: Setting input 1: Counter input 2: Length input 3: Reserved 4: Reserved	0~4	0	◎	HDI1 function	110.
P5.36	HDI2 function option		0~4	0	◎	HDI2 function	111.
P5.37	HDI1 lower frequency limit	0.0 KHz ~50.0KHz	0.0~50.0	0.0KHz	○	HDI1 L FRE limit	112.
P5.38	HDI1 lower frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	0.0%	○	HDI1 L limit set	113.
P5.39	HDI1 upper frequency limit	0.0 KHz ~50.0KHz	0.0~50.0	50.0KHz	○	HDI1 U FRE limit	114.
P5.40	HDI1 upper frequency limit corresponding setting	-100.0%~100.0%	-100.0~100.0	100.0%	○	HDI1 U limit set	115.
P5.41	HDI1 filter time	0.00s~10.00s	0.00~10.00	0.10s	○	HDI1 filter time	116.
P5.42	HDI2 lower frequency limit	0.0 KHz ~50.0KHz	0.0~50.0	0.0KHz	○	HDI2 L FRE limit	117.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P5.43	HDI2 lower frequency limit correspondi ng setting	-100.0%~ 100.0%	-100.0~ 100.0	0.0%	○	HDI2 L limit set	118.
P5.44	HDI2 upper frequency limit	0.0 KHz ~50.0KHz	0.0~ 50.0	50.0KHz	○	HDI2 U FRE limit	119.
P5.45	HDI2 upper frequency limit correspondi ng setting	-100.0%~ 100.0%	-100.0~ 100.0	100.0%	○	HDI2 U limit set	120.
P5.46	HDI2 filter time	0.00s~ 10.00s	0.00~ 10.00	0.10s	○	HDI2 filter time	121.
P6 Group: Output Terminal Group							
P6.00	HDO option	0: HDO 1: Open-collector	0~1	0	◎	HDO option	122.
P6.01	Y1 output option	0: NO output 1: Run forward 2: Run reverse 3: Fault output 4: Motor overload 5: Inverter overload 6: FDT out 7: Frequency reach 8: Zero speed run 9: Set Count reach	0~31	1	○	Y1 output OPT	123.
P6.02	Y2 output option		0~31	0	○	Y2 output OPT	124.
P6.03	HDO open collector output option		0~31	0	○	Open output OPT	125.
P6.04	Relay 1 output option		0~31	3	○	R1 output OPT	126.
P6.05	Relay 2 output option		0~31	0	○	R2 output OPT	127.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P6.06	Relay 3 output option	10: Assign count reach 11: Length reach 12: PLC finish 13: Operate time reach 14: Upper freq limit reach 15: Lower freq limit reach 16: Ready to run 17: Start motor1 18: Start motor2 19: Motor running 20: Pulse output when stop 21~31: Reserved	0~31	0	○	R3 output OPT	128.
P6.07	AO1 output option	0: Running frequency 1: Setting frequency 2: Motor	0~14	0	○	AO1 output OPT	129.
P6.08	AO2 output option		0~14	0	○	AO2 output OPT	130.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P6.09	HDO high speed pulse output option	speed 3: Output current 4: Output voltage 5: Output power 6: Output torque 7: AI1 value 8: AI2 value 9: AI3 value 10: AI4 value 11: HDI1 value 12: HDI2 value 13: Length value 14: Count value	0~14	0	○	Pulse output OPT	131.
P6.10	AO1 lower limit	0.0%~ 100.0%	0.0~ 100.0	0.0%	○	AO1 Lower limit	132.
P6.11	AO1 lower limit corresponding setting	0.00V ~10.00V	0.00~ 10.00	0.00V	○	AO1 L limit set	133.
P6.12	AO1 upper limit	0.0%~ 100.0%	0.0~ 100.0	100.0%	○	AO1 upper limit	134.
P6.13	AO1 upper limit corresponding setting	0.00V ~10.00V	0.00~ 10.00	10.00V	○	AO1 U limit set	135.
P6.14	AO2 lower limit	0.0%~ 100.0%	0.0~ 100.0	0.0%	○	Lower limit 2	136.
P6.15	AO2 lower limit corresponding setting	0.00V ~10.00V	0.00~ 10.00	0.00V	○	L limit to AO2	137.
P6.16	AO2 upper limit	0.0%~ 100.0%	0.0~ 100.0	100.0%	○	Upper limit 2	138.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P6.17	AO2 upper limit corresponding setting	0.00V ~10.00V	0.00~ 10.00	10.00V	○	U limit to AO2	139.
P6.18	HDO lower limit	0.0%~ 100.0%	0.0~ 100.0	0.0%	○	Lower limit 3	140.
P6.19	HDO lower limit corresponding setting	0.0 ~ 50.0kHz	0.0~ 50.0	0.0kHz	○	L limit to HDO	141.
P6.20	HDO upper limit	0.0%~ 100.0%	0.0~ 100.0	100.0%	○	Upper limit 3	142.
P6.21	HDO upper limit corresponding setting	0.0 ~ 50.0kHz	0.0~ 50.0	50.0kHz	○	U limit to HDO	143.
P7 Group: Main-machine Interface Group							
P7.00	User password	0~65535	0~ 65535	0	○	User password	144.
P7.01	LCD language option	0: Chinese 1: English	0~1	0	○	Language option	145.
P7.02	Parameter copy	0: No operation 1: Upload parameters to LCD 2: Download parameter from LCD	0~2	0	◎	Parameter copy	146.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P7.03	QUICK/JOG function option	0: Shortcut QUICK function 1: FDW/REV switching 2: Jog operation 3: Clear UP/DOWN setting	0~3	0	◎	QUICK/JOG FUNC	147.
P7.04	STOP/RST function option	0: Only valid to keypad control 1: Valid to both keypad and terminal control 2: Valid to both keypad and communication control 3: Valid to all control	0~3	0	○	STOP/RST FUNC	148.
P7.05	Keypad display option	0: Option 0 1: Option 1 2: Option 2 3: Option 3	0~3	0	○	Keypad display	149.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P7.06	Operation status display option	1.Run freq 2.Set freq 3.DC bus voltage 4.Output voltage 5.Output current Other parameters display is affected by 16 bit binary digit BIT0: Running speed BIT1: Output power BIT2: Output torque BIT3: PID set BIT4: PID feedback BIT5: In terminal status BIT6: Out terminal status BIT7: AI1 BIT8: AI2 BIT9: AI3 BIT10: AI4 BIT11: HDI1 BIT12: HDI2 BIT13: Multi-speed steps BIT14: Length value BIT15: Count value	0~ 0xFFFF	0x00FF	○	Operate display	150.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P7.07	Stop status display option	BIT0: Setting freq BIT1: Bus voltage BIT2: In terminal status BIT3: Out terminal status BIT4: PID set BIT5: PID feedback BIT6: AI1 BIT7: AI2 BIT8: AI3 BIT9: AI4 BIT10: HDI1 BIT11: HDI2 BIT12: Multi-speed current step BIT13: Length value BIT14: Reserved BIT15: Reserved	1~ 0xFFFF	0x00FF	○	Stop display	151.
P7.08	Diode module temperature	0~100.0℃			●	Diode TEMP	152.
P7.09	IGBT module temperature	0~100.0℃			●	IGBT TEMP	153.
P7.10	MCU software version				●	MCU version	154.
P7.11	DSP software version				●	DSP version	155.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P7.12	Accumulative run time	0~65535h			●	ACCU run time	156.
P7.13	Third latest fault type	0: No fault 1:OUT1 2: OUT2 3: OUT3 4: OC1 5: OC2 6: OC3 7: OV1 8: OV2 9: OV3 10: UV 11: OL1 12: OL2 13: SPI 14. SPO 15: OH1 16: OH2 17: EF 18: CF 19: ITE 20: TE 21: PCE 22: PCDE 23: OPSE 24: EEP 25: PIDE 26: BCE 27: Reserved			●	3rd latest fault	157.
P7.14	Second latest fault type				●	2nd latest fault	158.
P7.15	Latest fault type				●	Latest fault	159.
P7.16	Running frequency at current fault				●	FREQ at fault	160.
P7.17	Output current at current fault				●	Current at fault	161.
P7.18	Bus voltage at current fault				●	DC VOLT at fault	162.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P7.19	Input terminal status at current fault				●	Input TERM	163.
P7.20	Output terminal status at current fault				●	Output TERM	164.
P8 Group: Enhance Function Group							
P8.00	ACC Time 1	0.0~3600.0s	0.0~ 3600.0	20.0s	○	ACC time 1	165.
P8.01	DEC Time 1	0.0~3600.0s	0.0~ 3600.0	20.0s	○	DEC time 1	166.
P8.02	ACC Time 2	0.0~3600.0s	0.0~ 3600.0	20.0s	○	ACC time 2	167.
P8.03	DEC Time 2	0.0~3600.0s	0.0~ 3600.0	20.0s	○	DEC time 2	168.
P8.04	ACC Time 3	0.0~3600.0s	0.0~ 3600.0	20.0s	○	ACC time 3	169.
P8.05	DEC Time 3	0.0~3600.0s	0.0~ 3600.0	20.0s	○	DEC time 3	170.
P8.06	Jog frequency	0.00~P0.07	0.00~ P0.07	5.00Hz	○	Jog FREQ	171.
P8.07	Jog Acceleration time	0.0~3600.0s	0.0~ 3600.0	20.0s	○	Jog ACC time	172.
P8.08	Jog Deceleration time	0.0~3600.0s	0.0~ 3600.0	20.0s	○	Jog DEC time	173.
P8.09	Skip frequency 1	0.00~P0.07	0.00~ P0.07	0.00Hz	○	Skip FREQ 1	174.
P8.10	Skip frequency 2	0.00~P0.07	0.00~ P0.07	0.00Hz	○	Skip FREQ 2	175.
P8.11	Skip frequency range	0.00~P0.07	0.00~ P0.07	0.00Hz	○	Skip FREQ range	176.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P8.12	Traverse frequency range	0.0~100.0%	0.0~ 100.0	0.0%	○	Traverse range	177.
P8.13	Kick frequency range	0.0~50.0%	0.0~ 50.0	0.0%	○	Kick FREQ range	178.
P8.14	Traverse frequency rise time	0.1~3600.0s	0.1~ 3600.0	5.0s	○	Rise time	179.
P8.15	Traverse frequency fall time	0.1~3600.0s	0.1~ 3600.0	5.0s	○	Fall time	180.
P8.16	Fault auto reset times	0~3	0~3	0	○	Reset times	181.
P8.17	Fault relay action during auto reset	0: Disabled 1: Enabled	0~1	0	○	Relay action	182.
P8.18	Delay time before auto reset	0.1~100.0s	0.1~ 100.0	1.0s	○	Delay time	183.
P8.19	Set length	1~65535	1~ 65535	1000	○	Set length	184.
P8.20	Actual length	0~65535	0~ 65535	0	○	Actual length	185.
P8.21	Pulse number	0.1~6553.5	0.1~ 6553.5	100.0	○	Pulse number	186.
P8.22	Set count value	1~65535	1~ 65535	1000	○	Set count	187.
P8.23	Assign count value	1~65535	1~ 65535	1000	○	Assign count	188.
P8.24	Set operation time	0~65535h	0~ 65535	65535 h	○	Operation time	189.
P8.25	FDT detection value	0.00~ P0.07	0.00~ P0.07	50.00Hz	○	FDT level	190.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P8.26	FDT delay detection value	0.0~100.0%	0.0~ 100.0	5.0%	○	FDT delay	191.
P8.27	Frequency reach detection range	0.0~100.0%	0.0~ 100.0	0.0%	○	FREQ reach detect	192.
P8.28	Droop control	0.00~ 10.00Hz	0.00~ 10.00	0.00Hz	○	Droop control	193.
P8.29	Auxiliary motor option	0: No auxiliary motor 1: Auxiliary motor 1 2: Auxiliary motor 2 3: Both auxiliary motor 1&2	0~3	0	◎	Auxiliary motor	194.
P8.30	Auxiliary motor 1 delay time	0.0~3600.0s	0.0~ 3600.0	5.0s	○	Delay time 1	195.
P8.31	Auxiliary motor 2 delay time	0.0~3600.0s	0.0~ 3600.0	5.0s	○	Delay time 2	196.
P8.32	Brake threshold voltage	550.0~ 750.0V	550.0~ 750.0	700.0V	○	Brake voltage	197.
P8.33	Low frequency vibration restrain	0~9999	0~9999	1000	○	L FREQ vibrate	198.
P8.34	High frequency vibration restrain	0~9999	0~9999	1000	○	H FREQ vibrate	199.
P9 Group: PID Control Group							

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P9.00	PID setpoint sources option	0: Keypad 1: AI1 2: AI2 3: AI3 4: AI4 5: HDI1 6: HDI2 7: Communication 8: PLC	0~8	0	○	PID set point	200.
P9.01	Keypad preset PID Assignment	0.0%~ 100.0%	0.0~ 100.0	0.0%	○	Preset PID	201.
P9.02	PID feedback option	0: AI1 1: AI2 2: AI3 3: AI4 4: AI1-AI2 5: AI3-AI4 6: HDI1 7: HDI2 8: HDI1-HDI2 9: Communication	0~9	0	○	PID feedback	202.
P9.03	PID output character option	0: Positive 1: Negative	0~1	0	○	PID character	203.
P9.04	Proportional gain (Kp)	0.00~100.00	0.00~ 100.00	0.10	○	Proportion gain	204.
P9.05	Integral time (Ti)	0.01~10.00s	0.01~ 10.00	0.10s	○	Integral time	205.
P9.06	Differential time (Td)	0.00~10.00s	0.00~ 10.00	0.00s	○	Differentia time	206.
P9.07	Sampling time (T)	0.01~ 100.00s	0.01~ 100.00	0.50s	○	Sampling time	207.
P9.08	PID bias limit	0.0~100.0%	0.0~ 100.0	0.0%	○	PID bias. limit	208.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
P9.09	PID output buffering time	0.00~10.00s	0.00~ 10.00	0.00	○	PID buffer time	209.
P9.10	Feedback broken detection value	0.0~100.0%	0.0~ 100.0	0.0%	○	BRK detect value	210.
P9.11	Feedback broken detection time	0.0~3600.0s	0.0~ 3600.0	1.0s	○	BRK detect time	211.
PA Group: Simple PLC and Multi-Speed Control Group							
PA.00	Simple PLC mode	0: Stop after one cycle 1: Run at last frequency after one cycle 2: Circular run	0~2	0	○	Simple PLC mode	212.
PA.01	Multi-stage memory option	0: No memory while power down 1: Memorize while power down	0~1	0	○	Power down MEMO	213.
PA.02	Multi-speed 0	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 0	214.
PA.03	0^{th} Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	0^{th} stage time	215.
PA.04	Multi-speed 1	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 1	216.
PA.05	1^{st} Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	1^{st} stage time	217.
PA.06	Multi-speed 2	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 2	218.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PA.07	2nd Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	2nd stage time	219.
PA.08	Multi-speed 3	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 3	220.
PA.09	3rd Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	3rd stage time	221.
PA.10	Multi-speed 4	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 4	222.
PA.11	4th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	4th stage time	223.
PA.12	Multi-speed 5	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 5	224.
PA.13	5th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	5th stage time	225.
PA.14	Multi-speed 6	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 6	226.
PA.15	6th Stage operating time	0.0~6553.5s(h)	0.0~ 6553.5	0.0s	○	6th stage time	227.
PA.16	Multi-speed 7	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 7	228.
PA.17	7th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	7th stage time	229.
PA.18	Multi-speed 8	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 8	230.
PA.19	8th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	8th stage time	231.
PA.20	Multi-speed 9	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-speed 9	232.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PA.21	9th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	9th stage time	233.
PA.22	Multi-speed 10	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 10	234.
PA.23	10th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	10th stage time	235.
PA.24	Multi-speed 11	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 11	236.
PA.25	11th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	11th stage time	237.
PA.26	Multi-speed 12	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 12	238.
PA.27	12th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	12th stage time	239.
PA.28	Multi-speed 13	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 13	240.
PA.29	13th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	13th stage time	241.
PA.30	Multi-speed 14	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 14	242.
PA.31	14th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	14th stage time	243.
PA.32	Multi-speed 15	-100.0~ 100.0%	-100.0~ 100.0	0.0%	○	Multi-spee d 15	244.
PA.33	15th Stage operating time	0.0~ 6553.5s(h)	0.0~ 6553.5	0.0s	○	15th stage time	245.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PA.34	Simple PLC stage 0~7 ACC/DEC time	0~65535	0~ 65535	0	○	Stage 0~7 ACC time	246.
PA.35	Simple PLC stage 8-15 ACC/DEC time	0~65535	0~ 65535	0	○	Stage 8-15 ACC time	247.
PA.36	Multi-speed time unit option	0: Second 1: Hour	0~1	0	◎	Time unit	248.
PB Group: Protection Parameter Group							
PB.00	Input phase-fault protection	0: Disabled 1: Enabled	0~1	1	○	SPI protect opt	249.
PB.01	Output phase-fault protection	0: Disabled 1: Enabled	0~1	1	○	SPO protect opt	250.
PB.02	Motor overload protection	0: No protection 1: Normal motor 2: VF motor	0~2	2	◎	OL1 protect opt	251.
PB.03	Motor overload protection current	20.0%~ 120.0%	20.0~ 120.0	100.0%	○	OL1 protect CURR	252.
PB.04	Motor overload pre-warning	20.0%~ 150.0%	20.0~1 50.0	130.0%	○	OL1 warn	253.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PB.05	Motor overload pre-warning option	0: Detect all the time relative to motor rated current 1: Detect when speed is constant relative to motor rated current 2: Detect all the time relative to inverter rated current 3: Detect when speed is constant relative to inverter rated current	0~3	0	◎	OL1 warn opt	254.
PB.06	Motor overload pre-warning delay time	0.0~30.0s	0.0~30.0	5.0s	○	OL1 delay time	255.
Pb.07	Instant power off frequency drop point	400.0V~600.0V	400.0~600.0	450.0V	○	FREQ drop point	256.
PB.08	Instant power off frequency drop rate	0.00Hz~P0.07	0.00Hz~P0.07	0.00Hz	○	FREQ drop rate	257.
PB.09	Over-voltage stall protection	0: Disabled 1: Enabled	0~1	0	○	OV stall protect	258.
PB.10	Over-voltage stall protection voltage	120~150%	120~150	125%	○	OV stall voltage	259.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PB.11	Over-current stall protection	0: Disabled 1: Enabled	0~1	1	○	OC Stall Protect	260.
PB.12	Over-current stall protection current ratio	100~200%	100~200	160%	○	OC Stall Current	261.
PB.13	Over-current frequency drop rate	0.00~50.00Hz/s	0.00~50.00	1.00 Hz/s	○	OC FREQ drop-rate	262.
PC Group: Series Communication Group							
PC.00	Local Inverter Communication Address	1~247, 0: broadcast address	1~247	1	○	Local COMM ADDR	263.
PC.01	Communication baud rate setting	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	0~5	3	○	Baud rate	264.
PC.02	Data bit check setting	0: Null (N，8,2) 1: Even (E,8,1) 2: Odd (O,8,1)	0~2	0	○	Bit check	265.
PC.03	Communication response delay	0~14ms	0~14	0	○	Response delay	266.
PC.04	Communication overtime fault time	0.0（invalid）,0.1~100.0s	0.0~100.0	0.0s	○	COMM overtime	267.
PC.05	Reserved function	0~1	0~1	0	○	Reserved	268.
PC.06	Reserved function	0~65535	0~65535	0	◎	Reserved	269.
PC.07	Reserved function	0~65535	0~65535	0	◎	Reserved	270.

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PC.08	Reserved function	0~65535	0~ 65535	0	◎	Reserved	271.
PC.09	Reserved function	0~65535	0~ 65535	0	◎	Reserved	272.
PD Group: Supplement Function Group							
PD.00	Upper limit of frequency option	0: Keypad 1: AI1 2: AI2 3: AI3 4: AI4 5: HDI 1 6: HDI 2 7: communicatio n	0~7	0	○	Upper limit of frequency option	273.
PD.01	Terminal input option	0~0x3FF	0~ 0x3FF	0x000	◎	Terminal input option	274.
PD.02	Reserved function	0~65535	0~ 65535	0	◎	Reserved	275.
PD.03	Reserved function	0~65535	0~ 65535	0	◎	Reserved	276.
PD.04	Reserved function	0~65535	0~ 65535	0	◎	Reserved	277.
PD.05	Reserved function	0~65535	0~ 65535	0	◎	Reserved	278.
PD.06	Reserved function	0~65535	0~ 65535	0	◎	Reserved	279.
PD.07	Reserved function	0~65535	0~ 65535	0	◎	Reserved	280.
PD.08	Reserved function	0~65535	0~ 65535	0	◎	Reserved	281.
PD.09	Reserved function	0~65535	0~ 65535	0	◎	Reserved	282.
PE Group: Factory-set Function Group							

Function Code	Name	Description	Setting Range	Factory Setting	Modify	LCD Display	Serial No.
PE.00	Factory Password	0~65535	0~ 65535	*****	●	Factory password	283.
PF Group: Expanded Function Group							
PF.00 ~ PF.99	For details, please refer to related product description						296 ~ 395