PowerXL DF1 Series VFD

User Manual

Effective February 2020

Powering Business Worldwide

Contents

1. Manual Guide

1.1 Safety instructions

Thank you for choosing Eaton inverters of DF1 series. This instruction introduces how to correctly use this inverter. Before using this inverter, always carefully read this User Manual and moreover, please understand the safety instructions.

Safety Instructions
• **Installation, operation, maintenance and inspection must be performed by qualified personnel.**
• **In this instruction, the safety instruction levels are classified into "Warning" and "Caution".**
⚠ **Warning: Incorrect handling may cause hazardous conditions, resulting in death or severe injury.**
⚠ **Caution: Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.**

⚠ Warning
• While the inverter power is ON, do not open the front cover or the wiring cover. Do not run the inverter with the front cover or the wiring cover removed. Otherwise you may access the exposed high voltage terminals or the charging part of the circuitry and get an electric shock.
• It is crucial to turn off the motor drive power before any wiring installation or inspection is made. Before the inverter CHARGE light is OFF, which indicates that there is still high voltage in it, please do not touch the internal circuit and components. Operation must be made after measuring the voltage which is less than 24 VDC between +/P and -/N and with avometer.
• The inverter must be connected to the ground properly.
• Do not operate or touch the radiator or handle the cables with wet hands. Otherwise you may get an electric shock.
• Do not change the cooling fan while power is ON. It is dangerous to change the cooling fan while power is ON.

⚠ Caution
• The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
• Do not conduct a pressure test on the components inside the inverter, for semiconductor of the inverter is easily to be broke down and damaged by high voltage.
• While power is ON or for some time after power-OFF, do not touch the inverter as it will be extremely hot. Touching these devices may cause a burn.
• The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
• The polarity (+ and -) must be correct. Otherwise burst, damage, etc. may occur.
• Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heatsink on the rear side, etc.). Mounting it to or near flammable material may cause a fire.
• If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current may cause a fire.
• Do not connect a resistor directly to the DC terminals +/P and -/N. Doing so could cause a fire.

1.2 Definitions of terminologies

Output frequency, target frequency, steady output frequency

- The actual output current frequency of the inverter is called "output frequency."
- The frequency set by user (viaparameter unit, multi-speed terminals, voltage signal, and current signal or communication settings) is called "target frequency."
- When the motor starts running, the output frequency of the inverter will gradually accelerate to the target frequency before it finally runs steadily at the target frequency. This output frequency is called "stead output frequency."

Parameter settings

- Detail explanation on parameter settings are provided in Chapter 5.For users who are not familiar with these settings, arbitrary adjustment of the parameter may result in abnormal operations.All parameters can be reset to their default values by the parameter of 00-02. For setting procedures of this parameter, please refer to 00-02 in Section 5.1.2.

The "operation mode" and "working mode" of the parameter unit

- The operating mode determines the reference source for the target frequency and the signal source for starting. A total of nine operating modes are provided in each Eaton inverter. Please refer to Section 4.3 for details.
- The parameter unit is used mainly for monitoring the numeric values, setting parameters and target frequency. There are a total of five working modes on the Eaton parameter unit. Please refer to Section 4.2 for details.

The difference between "terminal name" and "function name":

- Printed letters can be found near the terminals of either the control board or the main board. They are used to distinguish each terminal and care called "terminal name."
- For "multi-function control terminal" and "multi-function output terminal," besides the terminal name, it is also necessary to define the "function name." The function name indicates the actual functions of the terminal.
- When explaining the function for a terminal, the name used is its "function name".

The difference between "on" and "turn on":

- When explaining the function for the "multi-function control terminal", two words "on" and "turn on" are often used.
- The word "on" is used to indicate that the external switch of the terminal is in close state, and thus it belongs to the description of the state.
- The word "turn on" is used to describe the action that the external switch of the terminal is shut from the open state to the close state, and thus belongs to the description of action. Similarly, the words "off" and "turn off" belong to the above-mentioned states and actions.

2. Delivery Check

Each DF1-TYPE inverter has been checked thoroughly before delivery, and is carefully packed to prevent any mechanical damage. Please check for the following when opening the package.

- Checking out whether the product was damaged during transportation.
- Whether the model of inverter coincide with what is shown on the package.

2.1 Type instruction

DF1 - 34 4D2 FB - C20C

Series	Voltage level	Current level				Accessories	Protection level
		3AC 200~240V		3AC 380~480V			
DF1	-32：3AC 200~240V -34：3AC 380~480V	8D0：1.5kW 011：2.2kW 017：3.7kW 025：5.5kW 033：7.5kW 049：11kW 065：15kW 075：18.5kW 090：22kW	120：30kW 145：37kW 170：45kW 215：55kW 288：75kW 346：90kW 432：110kW 506：132kW	4D2：1.5kW 6D0：2.2kW 9D0：3.7kW 012：5.5kW 017：7.5kW 024：11kW 032：15kW 038：18.5kW 045：22kW 060：30kW 073：37kW 091：45kW	110：55kW 150：75kW 180：90kW 220：110kW 260：132kW 310：160kW 425：220kW 480：250kW 620：315kW 683：355kW	FB: with internal RFI filter, with brake chopper FN: with internal RFI filter, without brake chopper	C20C C: Coated PCB 20: IP20 C: with keypad

3. Inverter Introduction

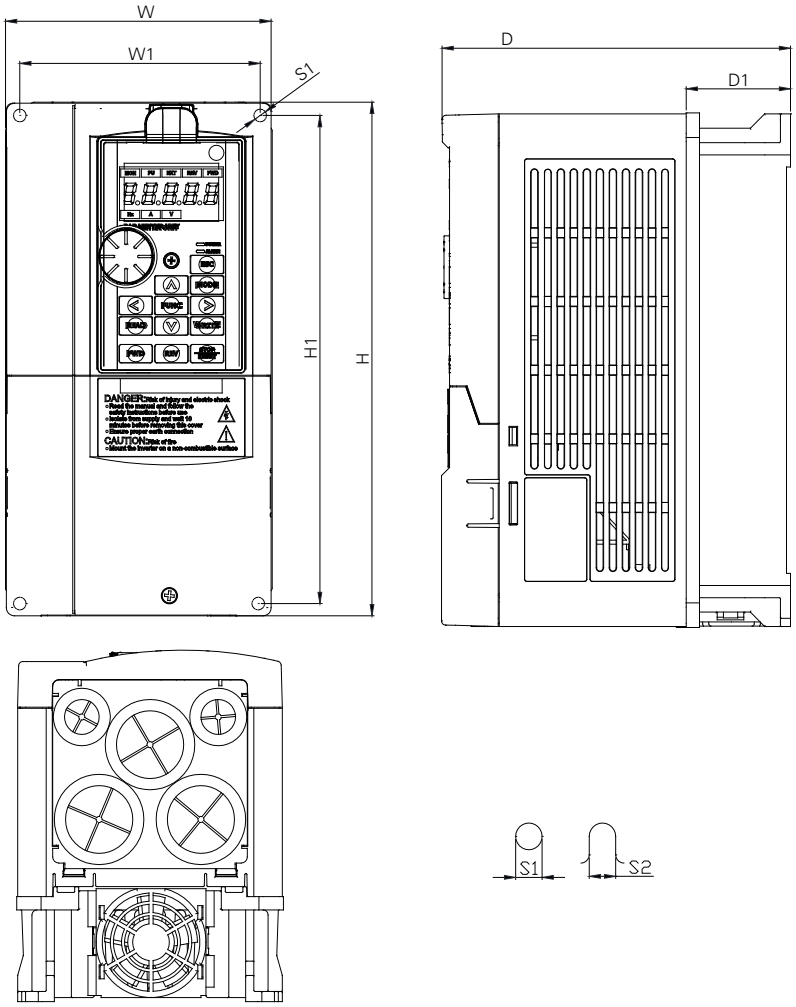
3.1 General specification

Control method		SVPWM control, V/F control, close-loop V/F control (VF+PG), general flux vector control, sensorless vector control (SVC), close-loop vector control (FOC+PG), torque control (TQC+PG)
Output frequency range		0~650.00Hz
Frequency setting resolution	Digital setting	The resolution is 0.01Hz
	Analog setting	0.01Hz/60Hz (terminal AI1: -10 ~ +10V / 13bit) 0.015Hz/60Hz (terminal AI1: 0 ~ ±10V / 12bit; terminal AI2: 0~10V, 4-20mA / 12bit) 0.03Hz/60Hz (terminal AI1, AI2; 0 ~ 5V / 11bit) 0.06Hz/60Hz (terminal AI3: 0~10V, 4-20mA / 10bit) 0.12Hz/60Hz (terminal AI3: 0 ~ 5V / 9bit)
Output frequency accuracy	Digital setting	Maximum target frequency ±0.01%
	Analog setting	Maximum target frequency ±0.1%
Speed control range		IM: WhenSVC, 1:200; when FOC+PG, 1:1000; PM: When SVC,1:20; when FOC+PG, 1:1000
Start torque		150% 0.3Hz (SVC),180% 0Hz (FOC+PG)
V/Fcharacteristics		Constant torque curve, variable torque curve, five-point curve, VF separation
Acceleration / deceleration curve characteristics		Linear acceleration / deceleration curve, S pattern acceleration / deceleration curve 1 & 2 & 3
Drive motor		Induction motor (IM), permanent magnet motor (SPM, IPM)
Stalling protection		The stalling protection level can be set to 0~400% (06-01(P.22)). The default value is 150%
Target frequency setting		Parameter unit setting, DC 0~5V/10V signal, DC -10~+10V signal, DC 4~20 mA signal, multiple speed stage level setting, communication setting, DIH setting
PID control		Please refer to 08-00~08-01 / 08-04~08-14 / P.170~P.182 in chapter 4
Built-in simple PLC		Supports 21 basic instructions and 14 application instructions, including PC editing software
Operation Panel	Operation monitoring	Output frequency, output current, output voltage, PN voltage, output torque, electronic thermal accumulation rate, temperature rising accumulation rate, output power, Analog value input signal, digital input and output terminal status…; alarm history 12 groups at most, the last group of alarm message is recorded
	LED indication lamp (10)	Forward rotation indication lamp, reverse rotation indication lamp, frequency monitoring indication lamp, voltage monitoring indication lamp, current monitoring indication lamp, NET indication lamp, PU-controlindication lamp, EXT indication lamp, PLC indication lamp and MON monitoring indication lamp
Communication function		RS-485 communication, can select Eaton/Modbus communication protocol, communication speed-38400bps or below, built-in CanOpenprotocol (DF1-DXF-NET-CAN expanded board can be optional), double RJ-45 connectors (the connector can also be connected to parameter unit)
Protection mechanism / alarm function		Output short circuit protection, Over-current protection, over-voltage protection, under-voltage protection, motor over-heat protection (06-00(P.9)), IGBT module over-heat protection, communication abnormality protection, PTC temperature protection etc, electrolytic capacitor overheat, input and output phase failure, to-earth (ground) leakage currents protection, circuit error detection...

Environment	Ambient temperature	Over load: -10 ~ +50°C (non-freezing), Light load: -10 ~ +40°C (non-freezing)
	Ambient humidity	Below 90% Rh (non-condensing)
	Storage temperature	-20 ~ +65°C
	Surrounding environment	Indoor, no corrosive gas, no flammable gas, no flammable powder
	Altitude	Altitude below 3000 meters, when altitude is above 1,000m, derate the rated current 2% per 100m. Note 1: according to the safety of CE certification to meet specification EN61800-5-1, this series of frequency converter, using at an altitude of less than 3000m, can be installed under the environment that could satisfy the requirement of the overvoltage level II, while usingat an altitude of less than 2000m, can be installed in conditions that could satisfy the requirement of overvoltage level III worse environment
	Vibration	Vibration below 5.9m/s^2 (0.6G)
	Grade of protection	Frame 1, 2, 3, IP20 / NEMA TYPE 1, Frame 4 and above IP00 / UL OPEN TYPE (IP20 option can be selected)
	The degree of environmental pollution	2
	Class of protection	Class I
International certification		CE

3.2 Appearance and dimensions

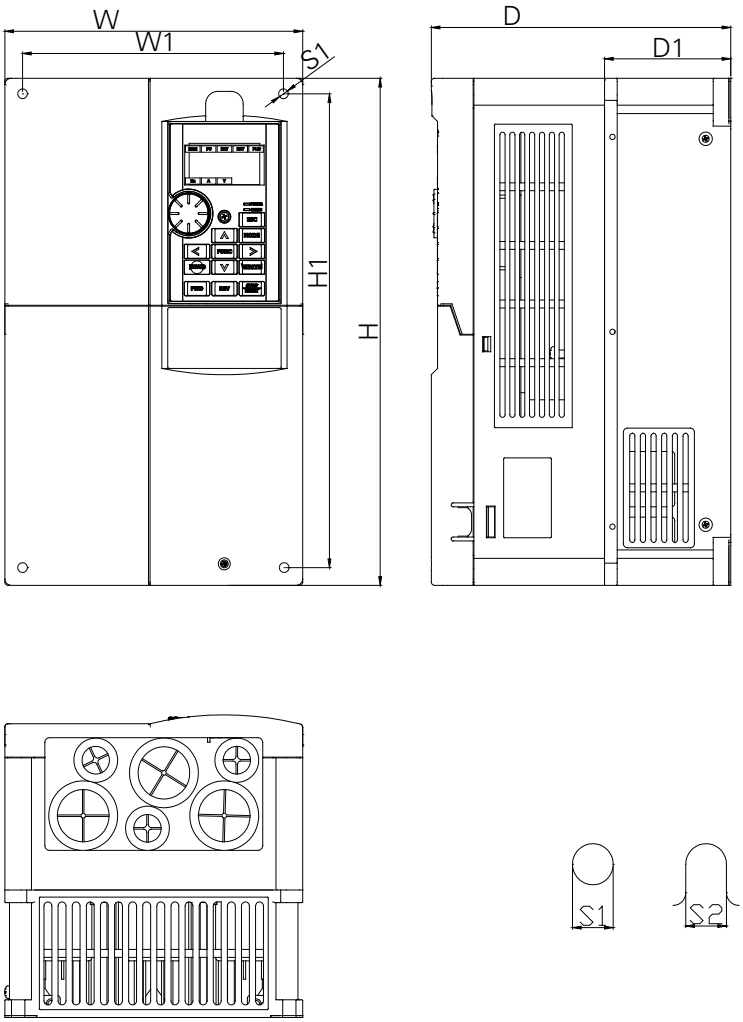
3.2.1 Frame 1



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
DF1-344D2FB-C20C	130.0	116.0	250.0	236.0	170.0	51.3	6.2	6.2
DF1-346D0FB-C20C								
DF1-349D0FB-C20C								
DF1-34012FB-C20C								
DF1-34017FB-C20C								
DF1-328D0FB-C20C								
DF1-32011FB-C20C								
DF1-32017FB-C20C								
DF1-32025FB-C20C								

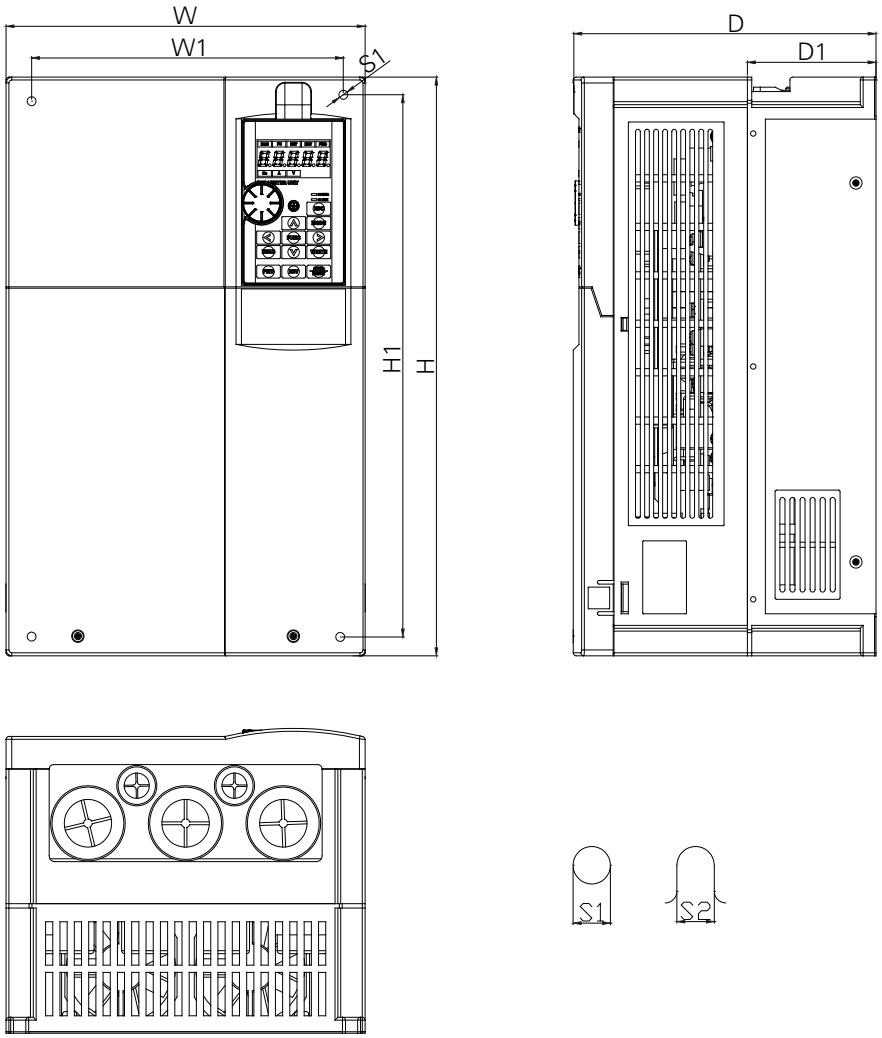
3.2.2 Frame 2



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
DF1-344D2FB-C20C	190.0	173.0	320.0	303.0	190.0	80.5	8.5	8.5
DF1-346D0FB-C20C								
DF1-349D0FB-C20C								
DF1-34012FB-C20C								
DF1-34017FB-C20C								
DF1-328D0FB-C20C								
DF1-32011FB-C20C								
DF1-32017FB-C20C								
DF1-32025FB-C20C								

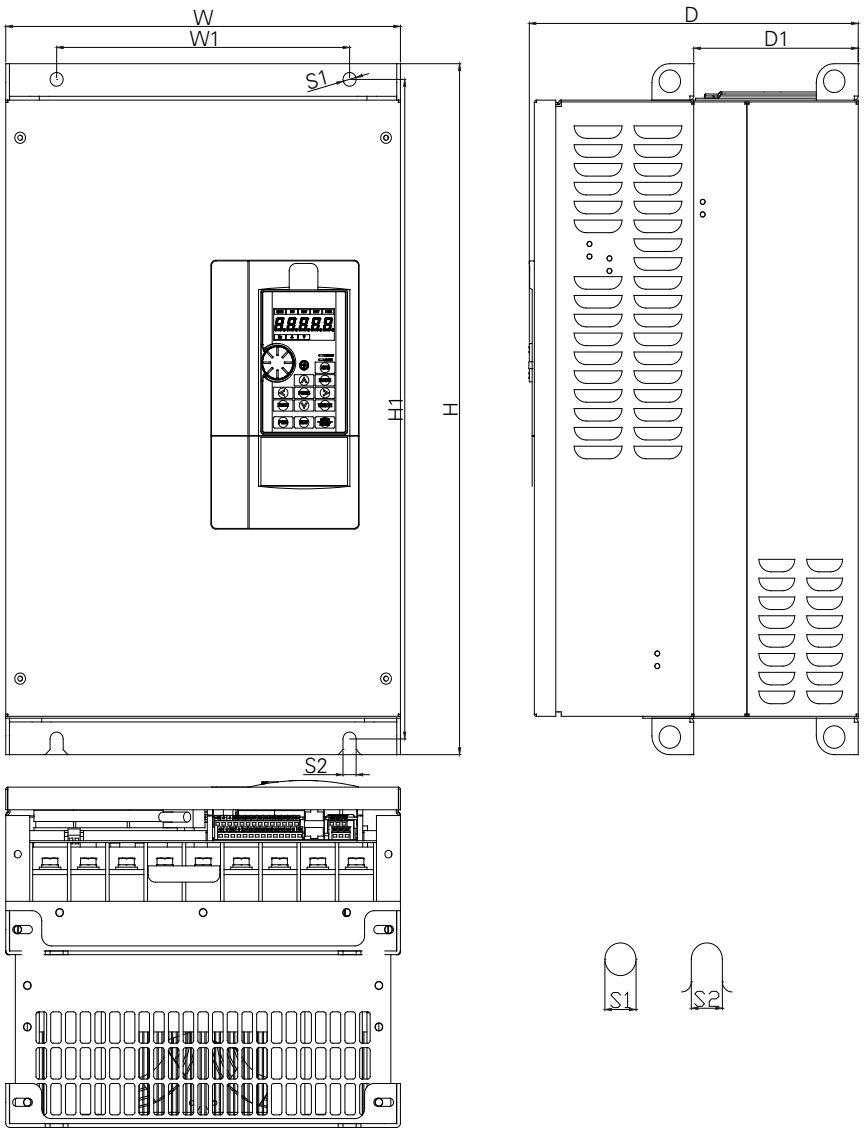
3.2.3 Frame 3



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
DF1-34045FB-C20C	250.0	231.0	400.0	381.0	210.0	89.5	8.5	8.5
DF1-34060FB-C20C								
DF1-34073FB-C20C								
DF1-32075FB-C20C								
DF1-32090FB-C20C								

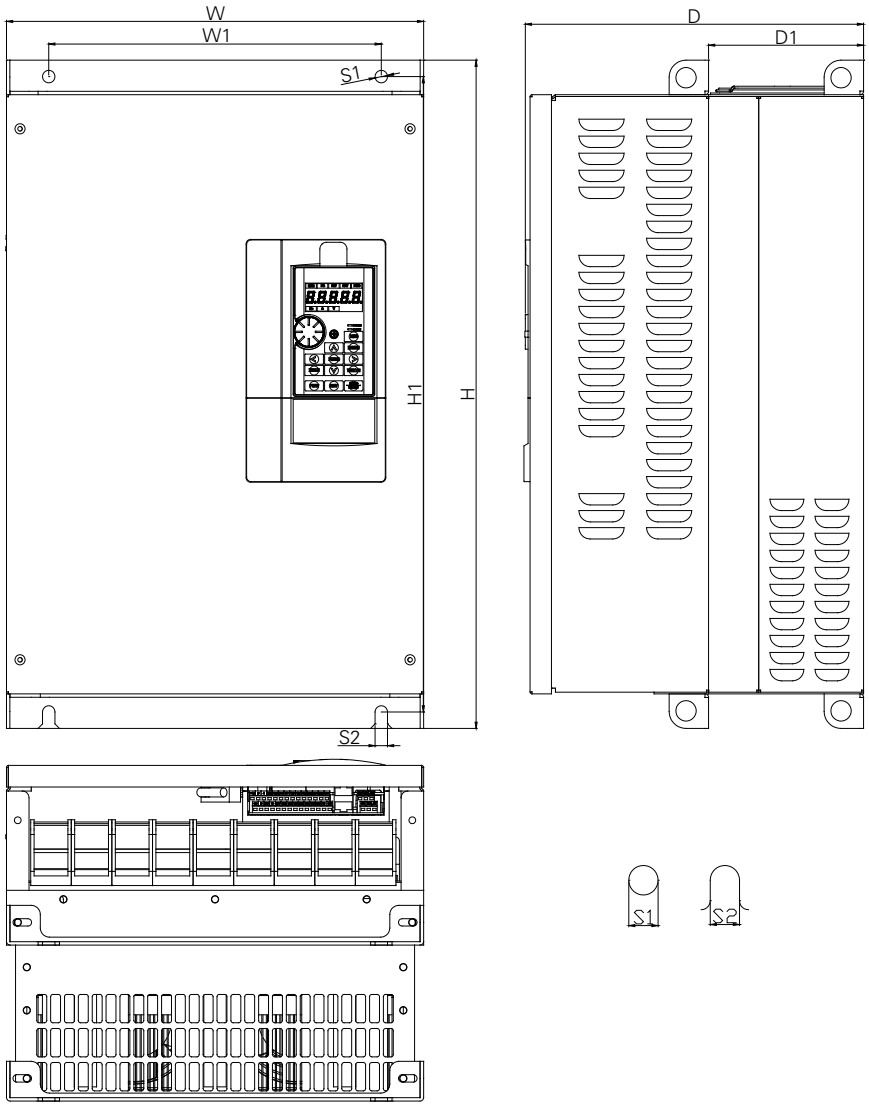
3.2.4 Frame 4



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
DF1-34091FN-C20C	330.0	245.0	550.0	525.0	275.0	137.5	11.0	11.0
DF1-34110FN-C20C								
DF1-34150FN-C20C								
DF1-34180FN-C20C								
DF1-32120FN-C20C								
DF1-32145FN-C20C								
DF1-32170FN-C20C								

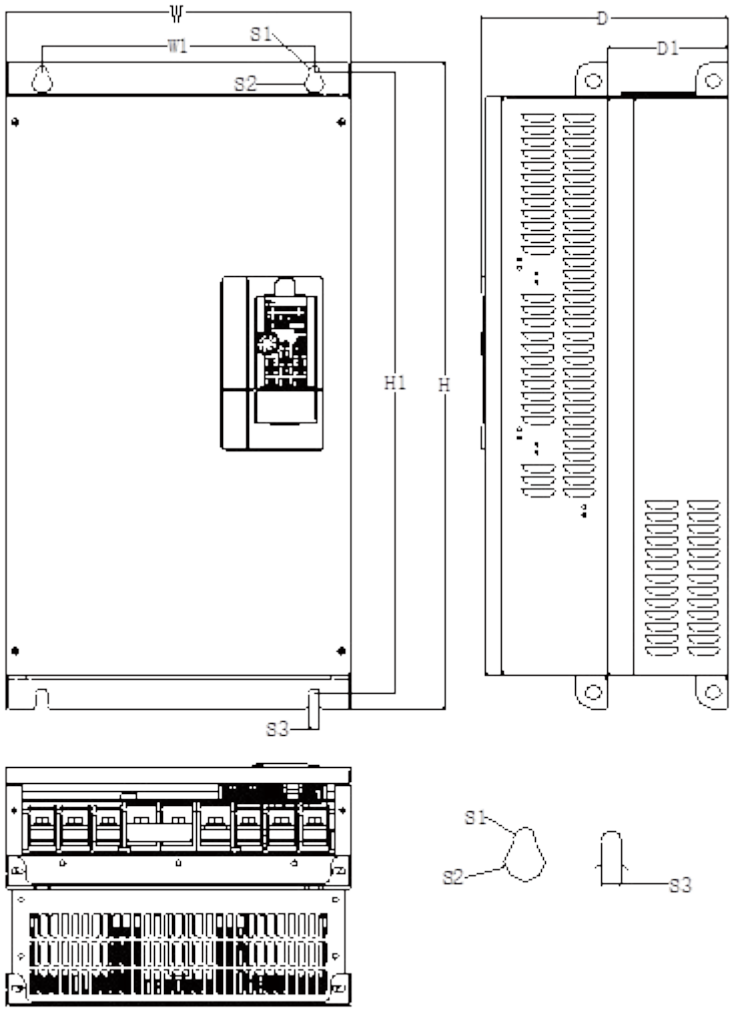
3.2.5 Frame 5



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
DF1-34220FN-C20C	370.0	295.0	589.0	560.0	300.0	137.5	11.0	11.0
DF1-34260FN-C20C								
DF1-32215FN-C20C								
DF1-32288FN-C20C								

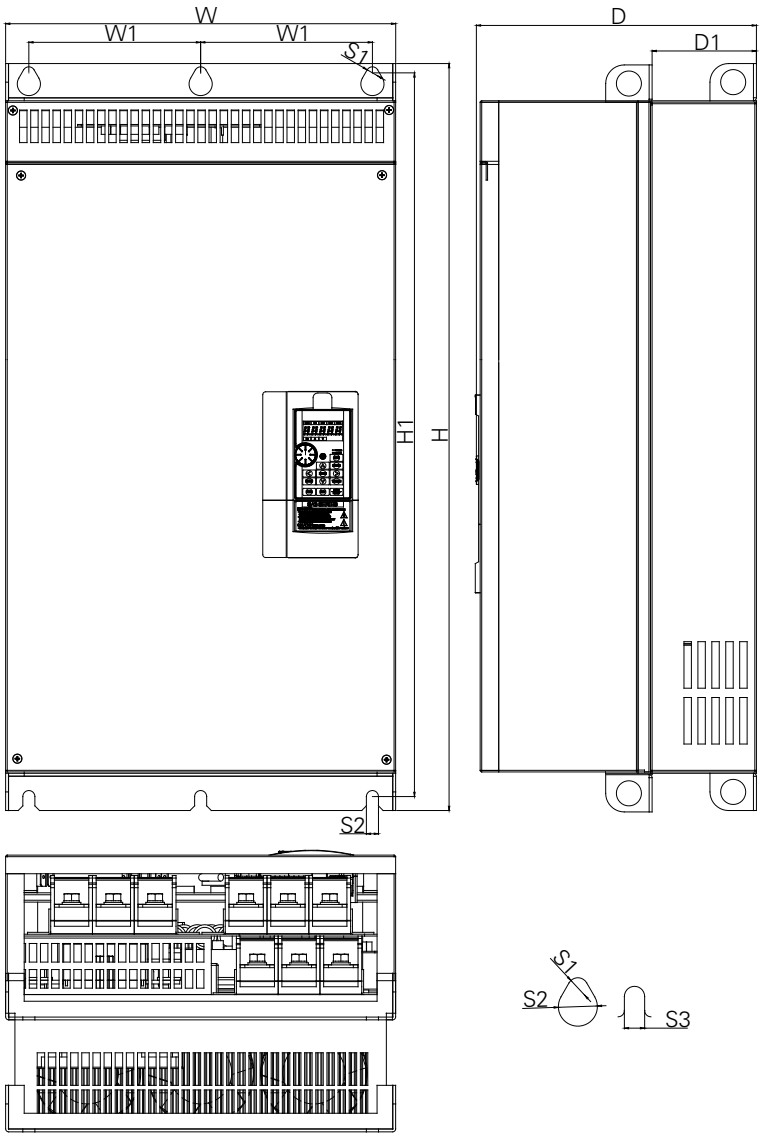
3.2.6 Frame 6



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
DF1-34310FN-C20C	420.0	330.0	800.0	770.0	300.0	145.5	13.0	25.0	13.0
DF1-32346FN-C20C									

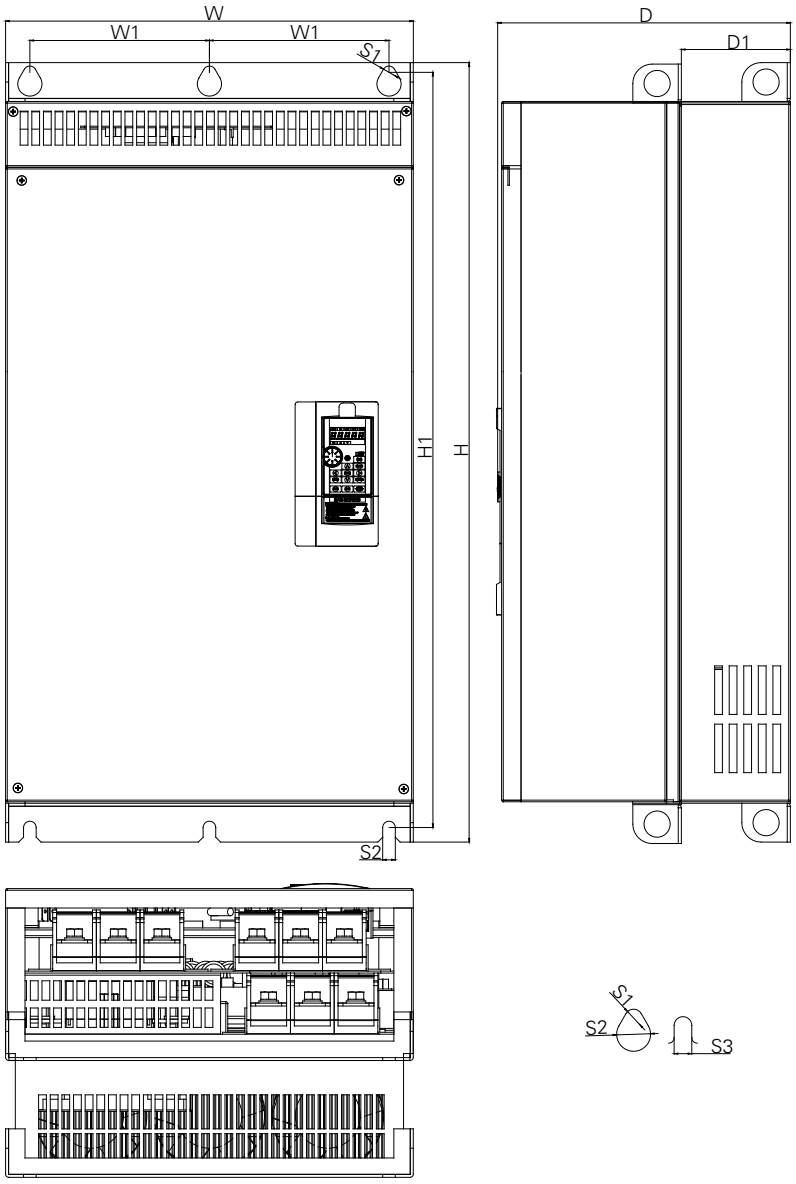
3.2.7 Frame 7



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
DF1-34340FN-C20C	500.0	180.0	870.0	850.0	360.0	150.0	13.0	25.0	13.0
DF1-34425FN-C20C									
DF1-34480FN-C20C									
DF1-34530FN-C20C									
DF1-32432FN-C20C									
DF1-32506FN-C20C									

3.2.8 Frame 8



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
DF1-34340FN-C20C	500.0	180.0	870.0	850.0	360.0	150.0	13.0	25.0	13.0
DF1-34425FN-C20C									
DF1-34480FN-C20C									
DF1-34530FN-C20C									
DF1-32432FN-C20C									
DF1-32506FN-C20C									

3.3 Installation and wiring

3.3.1 Transportation

Take the pedestal when carrying and don't only take the cover or any part of the inverter, otherwise it may drop down.

3.3.2 Stockpile

Keep this product in the packaging before installation and when not in use. To change the frequency that meets the manufacturer's warranty and maintenance conditions, please pay attention to the following regarding storage:

1. Must be placed in dry and without dirt place.
2. The environment temperature for storage position must range from -20ºC to +65ºC.
3. The relative humidity for storage position must range from 0% to 95%, and no condensation.
4. Avoid storing in the environment which contains corrosion gas or liquid.
5. It had better be packed properly and kept on shelf or table.

Note: 1. Even if the humidity meets the standard requirements, icing and condensation can also occurwhen the temperature changes rapidly. And the place should avoid.

2. Don't place it on the ground, and it should be placed on appropriate shelf. If in the bad surroundings, the desiccant should be placed in the packaging bag.

3. If the custody period is more than 3 months, the ambient temperature should not be higher than 30ºC. It is to consider that the character will easily degrade in high temperature when the electrolytic capacitors are deposited without electricity.

4. If the inverter is installed in device or control board when not in use (especially in construction site or the humid and dusty place), the inverter should be removed and put in suitable environment according with the above storage conditions.

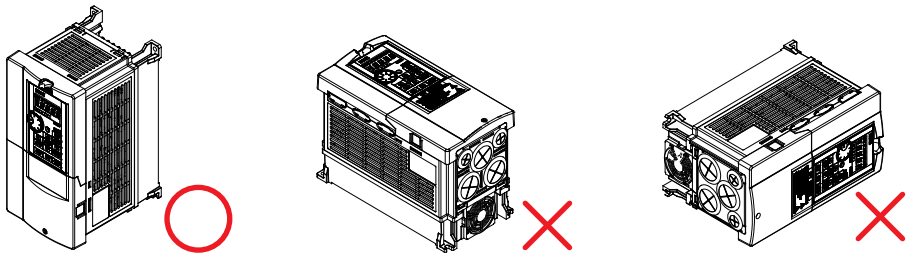
5. If the electrolytic capacitors are long-term no electricity, the character will degrade. Do not place it in the state of no electricity for more than one year.

3.3.3 Installation notice

- Before installating, please confirm whether meet the conditions listed in the table below:

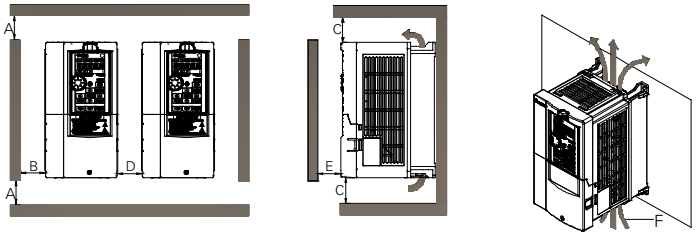
Ambient temperature	Heavy load: -10 ~ +50ºC (non-freezing), Light load: -10 ~ +40ºC (non-freezing), please refer to 3.4.5 Class of protection and operation temperature for details
Ambient humidity	Under 90% RH (non condensing)
Storage temperature	-20 ~ +65ºC
Surrounding environment	Indoor, no corrosive gas, no flammable gas, no flammable powder
Altitude	Altitude below 3000 meters,when altitude is above 1,000 m, derate the rated current 2% per 100m. Note 1: according to the safety of CE certification to meet specification EN61800-5-1, this series of frequency converter, using at an altitude of less than 3000m, can be installed under the environment that could satisfy the requirement of the overvoltage level II, while usingat an altitude of less than 2000m, can be installed in conditions that could satisfy the requirement of overvoltage level III worse environment
Vibration	Vibration below 5.9m/s^2 (0.6G)
Grade of protection	Frame 1, 2, 3, IP20 / NEMA TYPE 1, Frame4 and above IP00 / UL OPEN TYPE (IP20 option can be selected)
The degree of environmental pollution	2
Class of protection	Class I

- Please ensure vertical arrangement to keep the cooling effect:



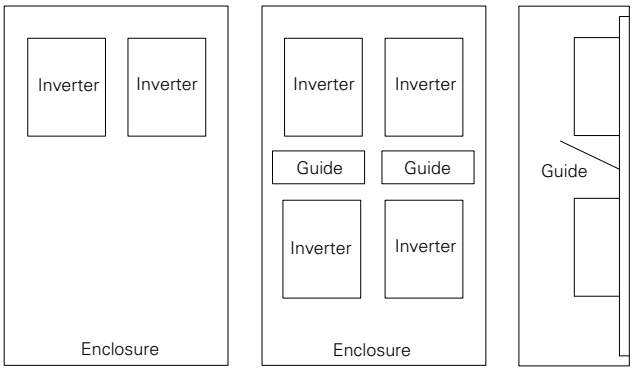
(a) Vertical arrangement (b) Horizontal arrangement (c) Level arrangement

- Please comply with installation conditions shown below to ensure enough ventilation space and wiring space for inverter cooling:
  - Arrangement of single or paralleling inverter:



Size	Frame 1	Frame 2 3	Frame 4 8
A	50	50	100
B	10	50	100
C	100	100	200
D	10	50	100
E	10	50	50
F	Ventilation direction		

  - Arrangement of multiple inverters:



(a) Horizontal arrangement (b) Vertical arrangement

Note: 1. When mounting inverters of different sizes in parallel, please align the clearance above each inverter to install, which is easy to change the cooling fan.

2. When it is inevitable to arrange inverters vertically to minimize space, take such measures as to provide guides since heat from the bottom inverters can increase the temperatures in the top inverters, causing inverter failures.

3.3.4 EMC installation instructions

Just as other electrical and electronic equipments, an inverter is the source of electromagnetic interference and an electromagnetic receiver when working with a power system. The amount of electromagnetic interference and noise is determined by the working principles of an inverter. In order to guarantee the inverter working reliably in the electromagnetic environment, it must have a certain ability of anti-electromagnetic interference in design. In order to make the drive system work normally, please meet the following several aspects requirements in installation:

- Field wiring

  Power line supply electric independently from power transformer, five or four core line are generally used, null line and ground sharing a single line is forbidden.

  Commonly signal wire (weak) and power wire (heavy) are in control cabinet, for the inverter, power wire is divided into input line and output line. Signal wire is easily interfered by power wire, so that causing the misoperation of the device. When wiring, signal wire and power wire should be distributed in different areas, parallel lines and interlaced lines are forbidden at close range(within 20cm), and especially don't bundle up the two lines. If the signal cables must pass via the power lines, the two should keep 90 degree Angle. Interlace lines and banding together is also forbidden for the input and output line of power wire, especially on the occasions which noise filter is installed. It will cause the coupling of electromagnetic noise via the distributed capacitance of the input and output lines, thus the noise filter will out of action.

  Generally a control cabinet has different electric equipments such as inverter, filter, PLC, measurement instrument, their ability of emitting and bearing electromagnetic noise are diverse from each other, and this requires classifying these equipments. The classification can be divided into strong noise equipment and noise sensitive equipment, Install the similar equipments in the same area and, and keep a distance more than 20cm among inhomogeneous equipments.

- Input noise filter, input and output magnet ring (Zero phase reactor)

  Adding noise filter to the input terminal, the inverter will be isolated from the other equipments, and its ability of conduction and radiation will be reduced effectively. The better EMI suppression effect will be obtained by installing the input reactor recommended by this manual. By adding winding ferrite bead to the input and output terminal and coordinating with internal filter, the inverters will have a better effect.

- Shielding

  Good shielding and grounding can greatly reduce the interference of inverter, and can improve the anti-interference ability of the inverter. Sealing off the inverter with the good conductive sheet metal and connecting the sheet metal to ground, the radiation interference will be reduced effectively. To reduce the interference of inverter and improve the anti-interference ability, cable with shielding layer should be used in input and output and the both ends of it should be connected to ground. Shielding cable is suggested to be used in control connecting and communication connecting of the inverter external terminals under bad electromagnetic environment. Generally, the both ends of shielding layer should be connected to the control /communication ground, and they can also be connected to ground.

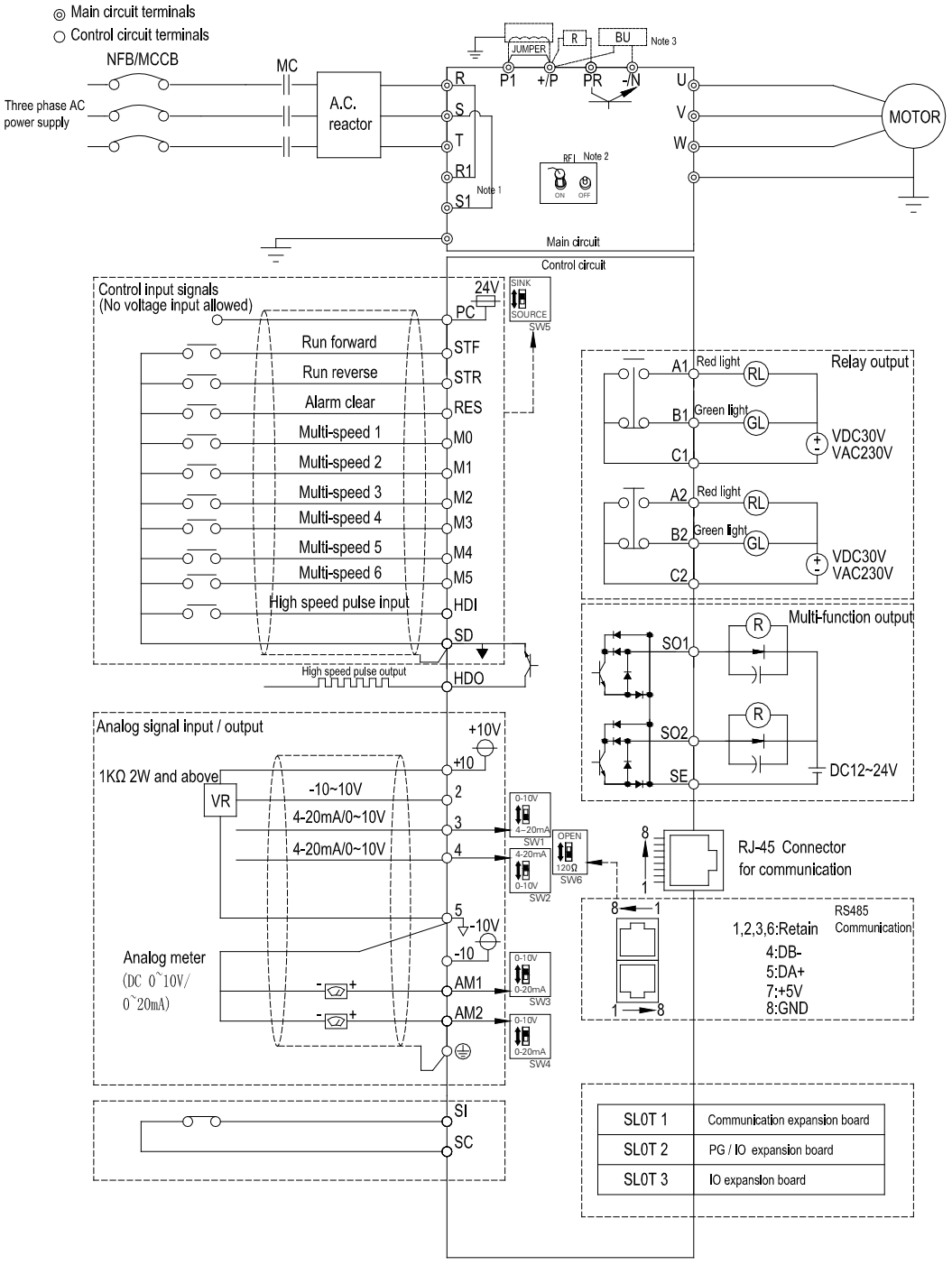
- Grounding

  The inverter must be connected to the ground safely and reliably. Grounding is not only for equipment and personal safety, but also the simplest, the most efficient and the lowest cost method to solving the EMC problem, so it should be prioritized. Please refer to the section of "3.4 Terminal wiring".

- Carrier wave

  The leakage current contains the leakage current from line to line or over the ground. It depends on the size of the distributed capacitance when wiring and the carrier frequency of the frequency. The higher the carrier frequency, the longer the motor cable, and the larger the cable cross-sectional area is, the larger the leakage current is. Reducing the carrier frequency can effectively reduce the leakage current. When the motor line is long (50m above), the output side should be installed with ac reactor or sine wave filter, when the motor line is longer, a reactor should be installed every other distance. At the same time, reducing carrier frequency can effectively reduce the conduction and radiation interference.

3.4 Terminal wire arrangement



Note: 1. R1, S1 terminal is only 4 ~ 8 framework.
2. RFI filter Settings.
3. The brake resistor connection approach between +/P and PR is for Frame 1, 2 and 3 only.
4. The DC resistor between +/P and P1 is optional. Please short +/P and P1 when AC resistor is not used.
5.When adding DC reactors, please remove the short circuit piece between P1 and +/P.
6. Please refer to the Section 5.3.9 for wiring of DOH.

3.4.1 Maincircuit Terminals

- Description

Terminal symbol	Description
R/L1-S/L2-T/L3	Connect to the commercial power supply
U/T1-V/T2-W/T3	Connect to the three-phase squirrel-cage motor
(+/P)-P1	Add to the DC reactor.
(+/P)-PR	Connect to the brake resistor. (Note 1, 2)
(+/P)-(-/N)	Connect to the brake unit. (Note 3)
⏚	Connect the enclosure of the inverter to ground. / For 440V series, special type of grounding shall be adopted. (Note 4)

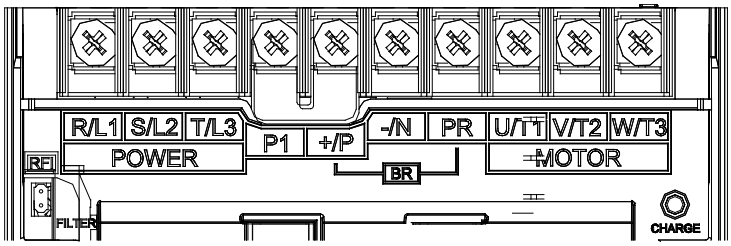
Note: 1. For DF1 series of inverters, brake resistor is not included.

2. For information related to regenerative voltage, please refer to 06-05 and 06-06 in Secdtion 5.7.3.

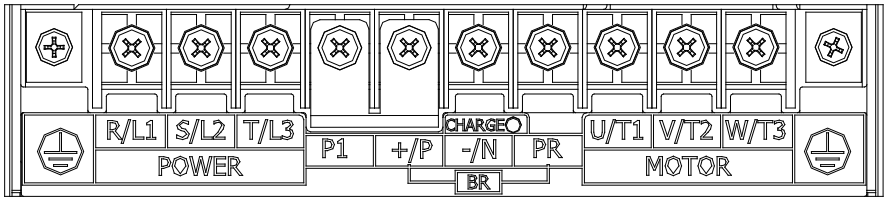
3. +/P and -/N are the positive and negative terminals of the internal DC voltage of the inverter. In order to strengthen the braking capacity during deceleration, it is suggested to purchase the optional "brake unit" which is mounted between the terminals +/P and -/N. The "brake unit" can effectively dissipate the feedback energy from the motor to the inverter when decelerating.

4. In case there is any problem on purchasing the "brake unit," please feel free to contact us.

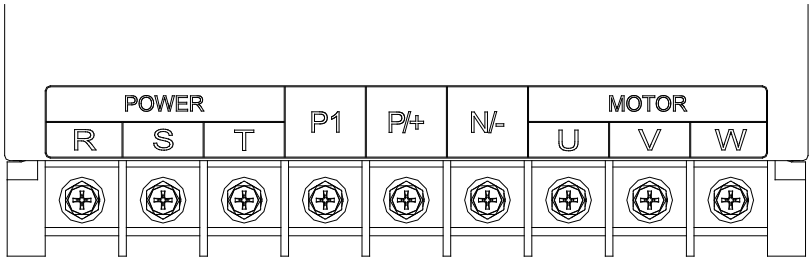
- Terminal layout of the main circuit terminals
  - Frame 1



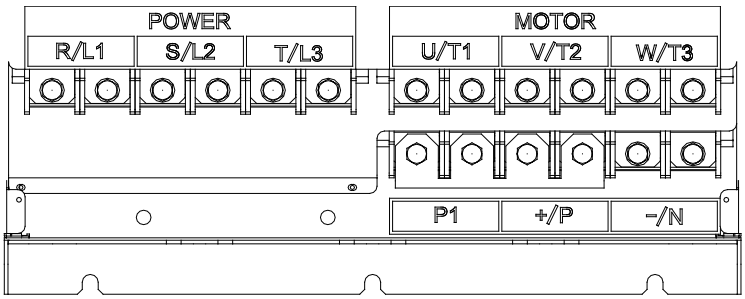
  - Frame 2/3



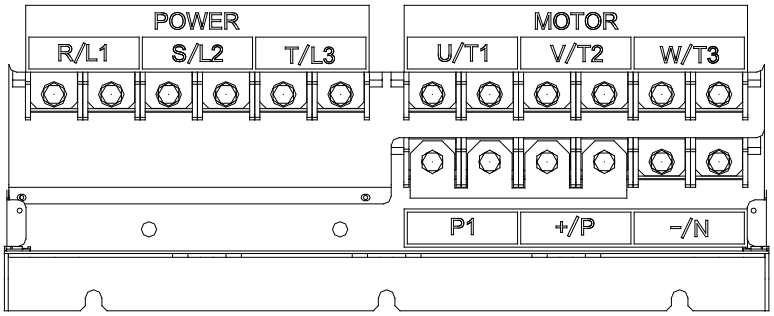
  - Frame 4/5/6



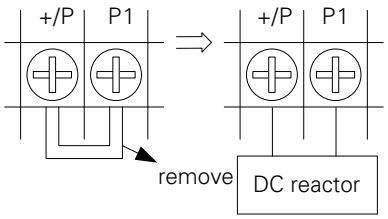
- Frame 7



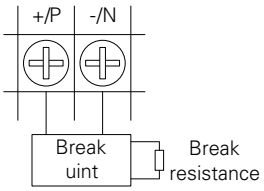
- Frame 8



- DC reactorconnection

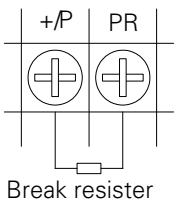


- Brake unit connection



Note: Frame 4, 5, 6, 7 and 8 corresponded inverters have no built-in brake unit. Brake units and brake resistors can be selected for use. The built-in brake unit of Frame 1,2 and 3 corresponded inverters can have brake resistors.

- Brake unit connection



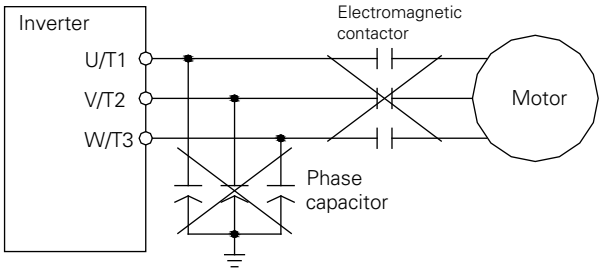
Note: It is only suitable for frame 1, 2 and 3 corresponded inverters.

3.4.2 Main circuit wiring and terminal specificatio

Inverter model	Terminal screw specifications	Tighten-ing torque (Kgf.cm)	Recommended wiring specification (mm2)				Recommended wiring specification (AWG)			
			R,S,T	U,V,W	+/P,P1	Ground-ing Cable	R,S,T	U,V,W	+/P,P1	Grounding Cable
DF1-328D0FB-C20C	M4	12~15	2.5	2.5	2.5	2.5	14	14	14	14
DF1-32011FB-C20C			4	4	4	4	12	12	12	12
DF1-32017FB-C20C			6	6	6	6	10	10	10	10
DF1-32025FB-C20C			10	10	10	10	8	8	8	8
DF1-344D2FB-C20C			2.5	2.5	2.5	2.5	14	14	14	14
DF1-346D0FB-C20C			2.5	2.5	2.5	2.5	14	14	14	14
DF1-349D0FB-C20C			2.5	2.5	2.5	2.5	14	14	14	14
DF1-34012FB-C20C			6	6	6	6	10	10	10	10
DF1-34017FB-C20CAI2			6	6	6	6	10	10	10	10
DF1-32033FB-C20CAI2	M5	20~25	10	10	10	10	8	8	8	8
DF1-32049FB-C20C			16	16	16	16	6	6	6	6
DF1-32065FB-C20C			25	25	25	16	4	4	4	4
DF1-34024FB-C20C			6	6	6	6	10	10	10	10
DF1-34032FB-C20C			10	10	10	10	8	8	8	8
DF1-34038FB-C20C			16	16	16	16	6	6	6	6
DF1-32075FB-C20C	M6	40~60	35	35	35	16	2	2	2	4
DF1-32090FB-C20C			50	50	50	25	1/0	1/0	1/0	2
DF1-34045FB-C20C			25	25	25	16	4	4	4	4
DF1-34060FB-C20C			25	25	25	16	4	4	4	4
DF1-34073FB-C20C			35	35	35	35	2	2	2	4
DF1-32120FN-C20C	M8	90~110	70	70	70	35	3/0	3/0	3/0	2
DF1-32145FN-C20C			95	95	95	50	4/0	4/0	4/0	1/0
DF1-32170FN-C20C			120	120	120	70	250	250	250	3/0
DF1-34091FN-C20C			70	70	70	35	3/0	3/0	3/0	1/0
DF1-34110FN-C20C			70	70	70	35	3/0	3/0	3/0	2
DF1-34150FN-C20CAI2			95	95	95	50	4/0	4/0	4/0	1/0
DF1-34180FN-C20C			120	120	120	70	250	250	250	3/0
DF1-32215FN-C20C	M10	180~230	120	120	120	70	250	250	250	3/0
DF1-32288FN-C20CAI2			185	185	185	95	500	500	500	4/0
DF1-34220FN-C20C			120	120	120	70	250	250	250	3/0
DF1-34260FN-C20C			185	185	185	95	500	500	500	3/0
DF1-32346FN-C20C			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
DF1-34310FN-C20C			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
DF1-34340FN-C20C	M12	320~400	240	240	240	120	4/0x2P	4/0x2P	4/0x2P	4/0
DF1-34425FN-C20C			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
DF1-32432FN-C20C			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
DF1-34480FN-C20C			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
DF1-32506FN-C20C			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
DF1-34530FN-C20C			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
DF1-34620FN-C20C			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
DF1-34683FN-C20C			95×4P	95×4P	95×4P	95×2P	4/0x4P	4/0x4P	4/0x4P	4/0

Note: 1. Don't directly connect power input line with motor terminals (U/T1) - (V/T2) - (W/T3) of the converter, otherwise will cause the damage of the inverter.

2. Don't add into the phase capacitor, surge absorber and electromagnetic contactor on the output of the inverter.



3. Do not use the power of the online "electromagnetic contactor" or "no fuse switch" to start and stop the motor.

4. Please do implement chassis grounding of the inverter and motor, avoiding electric shock.

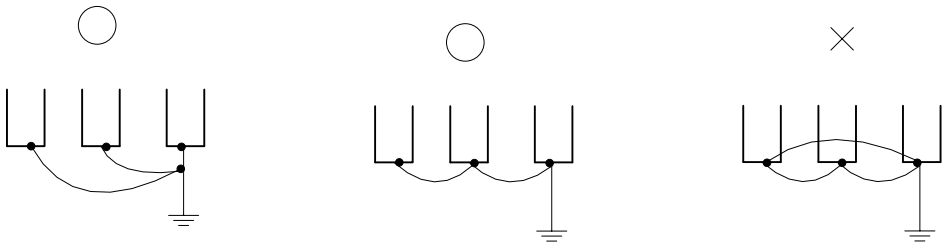
5. If the distance between the inverter and motor is longer, please use thick wires, make sure wire pressure dropping under 2V (wire length below 500 meters).

6. The connection of the power supply side and load side use "insulation sleeve crimping terminal".

7. After terminal power outage, in a short time, high voltage still exist betwwen (+/P) and (-/N). Within 10 minutes, do not touch terminals, in order to avoid electric shock.

3.4.3 Ground

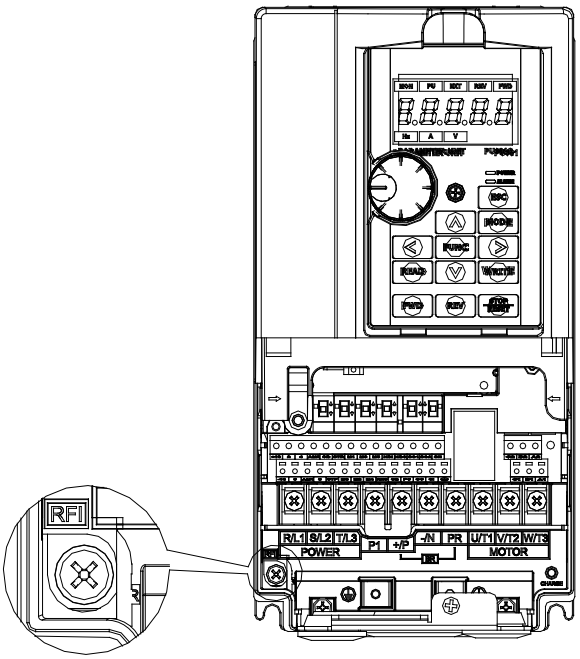
For safety and to reduce noise, the grounding terminal of the inverter must be well grounded. To avoid electric shocks and fire accident, external metal wire of electrical equipment should be short and thick, and should be connected to special grounding terminals of an inverter. If several inverters are placed together, all inverters must be connected to the common ground. Please refer to the following diagrams and ensure that no circuit is formed between grounding terminals.



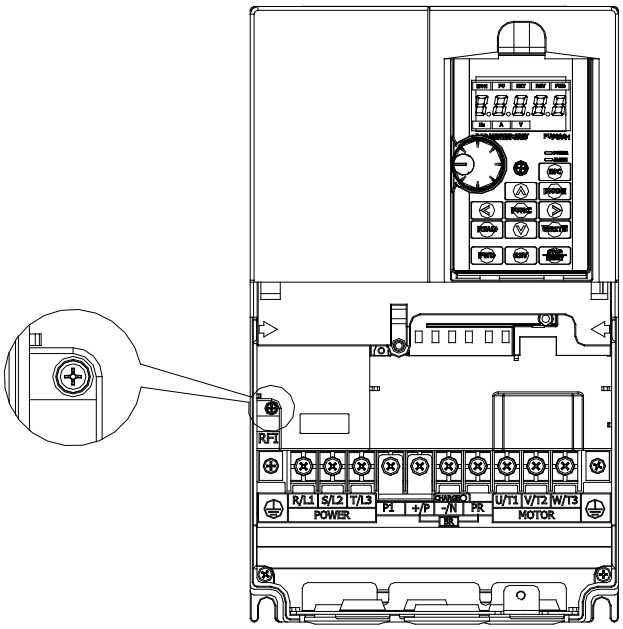
3.4.4 RFI filter

The invertersof DF1 seriesare equipped with built-in RFI filters.These filters are effective in reducing electromagnetic interference.

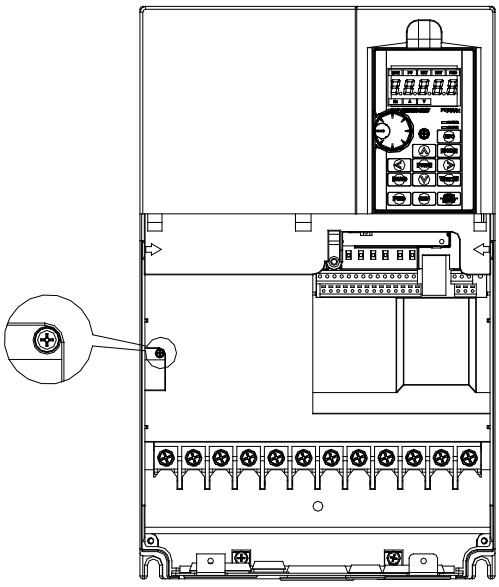
- Frame 1/2/3



Frame 1



Frame 2

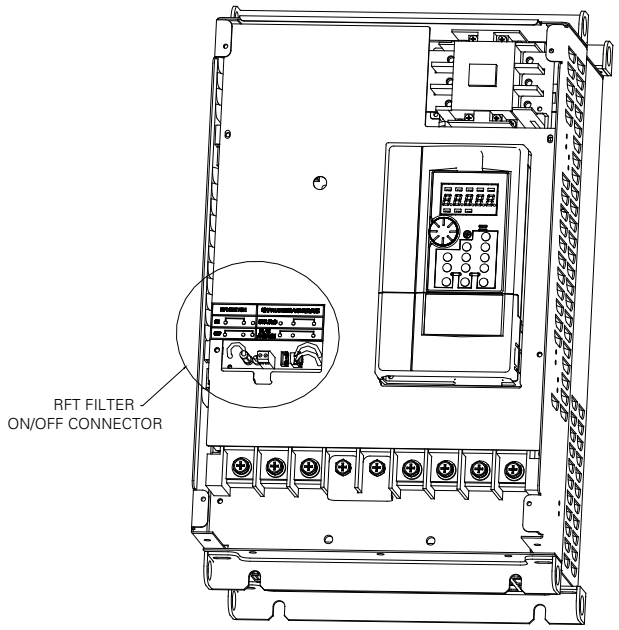


Frame 3

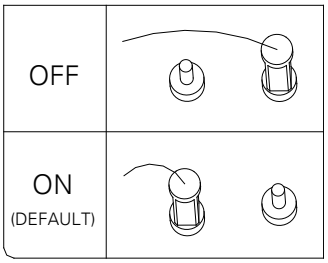
RFI filter ON: screws fastened tightly(default status)

RFI filter OFF: screws loosened

- Frame 4/5/6/7/8



RFI filter switch state



Note: 1. Do not cut off the RFI filter state after applying power to the inverter. Please make sure that the main power has been switched off before cutting of RFI filter state.

2. Electic conductivity of the capacitor will be cut off by cutting off the RFI filter. Moreover, the electromagnetic capacitance of the inverter will be reduced by cutting of the RFI filter.

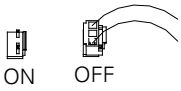
3. Do not switch off the RFI filter state when the main power is a grounded power system. To prevent machine damage, the RFI filter shall be cut off if the inverter is installed on an ungrounded power system, a high resistance-grounded (over 30 ohms) power system, or a corner grounded TN system.

4. The RFI filter cannot be cut off when performing the Hi-pot tests.

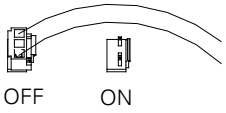
3.4.5 DC bus power supply

- Operation specification for Frame 4~8

1.The factory default state of separate power supply is OFF(as the following diagram setting),the internal AC contactor of the inverter is driven by R/L1,S/L2,T/L3 power supply.



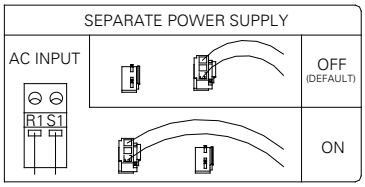
2. When the inverteris driven by DC bus power supply(+/P,-/N), the state of separate power supply should be set toON(as the following diagram setting), meanwhile, input 220Vac(220V model)/440Vac(440V model) to the terminal R1, S1. When the inverter DC is power on,[no input 220Vac(220V model)/440Vac(440V model) to terminal R1, S1], the digital parameter unit display the error code"rAE".



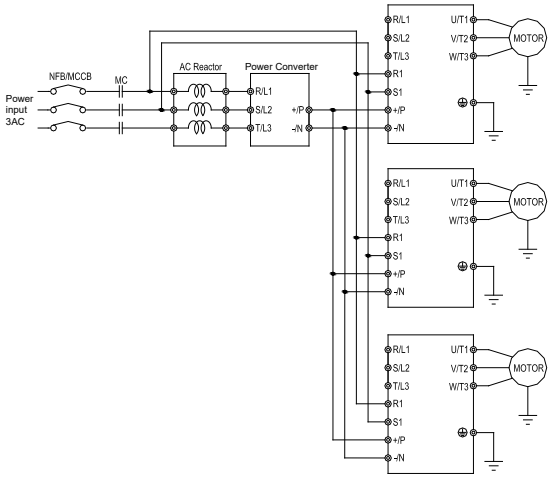
3. When as common DC bus(continuous power supply to terminal R/L1,S/L2,T/L3), separate power supply should be maintained the factory default state OFF.

- NOTE

Common DC bus application for driver power valuesare the same. If common DC bus application for different driver power valuesis demanded, please call us.



- To support a variety of dc power supply, suitable for uninterrupted power supply (UPS/EPS), dc bus power supply and other occasions.



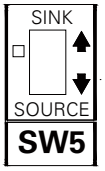
3.4.6 Control circuit

- Control terminal name

Terminal type	Terminal name	Function instructions	Terminal specifications
Switch signal input	DI1	There are totally 10 multi-function control terminals, which can switch mode of SINK/SOURCE	Input impedance: 4.7kΩ Action current: 5mA(24VDC) Voltage range: 10~28VDC Maximum frequency: 1kHz
	DI2		
	DI3		
	DI4		
	DI5		
	DI6		
	DI7		
	DI8		
	DI9		
	DIH		Maximum frequency: 100kHz
Analog signal input	10	+10.5±0.5V	Maximum current: 10mA
	-10	-10.5±0.5V	Maximum current: 10mA
	AI1	-10~10V/0~10V	Input impedance: 10kΩ
	AI2	4~20mA/0~10V	When current is input into, the input impedance is 235Ω When voltage is input into, the input impedance is 24kΩ
	AI3		
Relay output	R1O	Multi-function relay output terminals. A-C is the normally open contact, B-C is the normally closed contact, C is common terminal.	Maximum voltage: 30VDC or 250VAC Maximum current: Resistor load 5A NO/3A NC Inductance load 2A NO/1.2A NC (cosΦ=0.4)
	R1C		
	R1M		
	R2O		
	R2C		
	R2M		
Open collector output	DO1	Multi-function open collector output terminal	Maximum voltage: 48VDC Maximum current: 50mA
	DO2		
Analog signal output	AO1	0~10V/0~20mA	Output voltage: 0~10VDC Maximum current: 3mA; Output current: 0~20mA Maximum load: 500Ω
	AO2		
Pulse output	DOH	Multi-function pulse output terminal, FM and 10X are compatible.	Minimum load: 4.7kΩ Maximum current: 50mA Maximum voltage: 48VDC Maximum frequency: 100kHz
Safe terminal	SI	Factory with a short circuit	
	SC		
Communication terminal	RJ45×2	RS-485, optical isolation	Highest rate: 115200bps Longest distance: 500m
Common terminal	D-C	The public terminal of DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8 DIH, DOH (SINK)	---
	DO-	The public terminal of DO1, DO2 collector output terminal	---
	GND	The public terminal of terminal 10, -10, AI1, AI2, AI3, AO1, AO2	---
	24V	The public terminal of terminal DI1, DI2, DI3, DI4, DI5, DI6, DI7, DIH (SOURCE)	Output voltage: 24VDC±20% Maximum current: 200mA

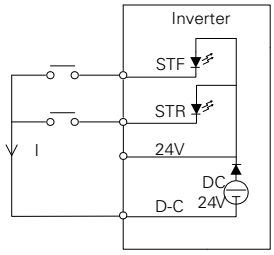
- Control logic (SINK/SOURCE) change

The multi-function control terminal of DF1 series inverter can select the sink input approach or the source input approach via the toggle switch SW5. The diagram is as follows

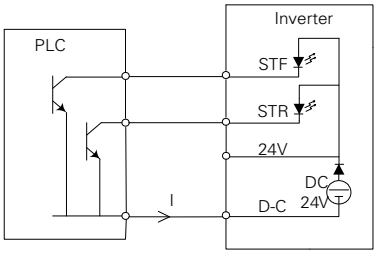


No matter what kind of multi-function control terminal is, all of its outside wire arrangement can be considered as a simple switch. If the switch is "on," the control signal will be put into the terminal. If the switch is "off," the control signal is shut off.

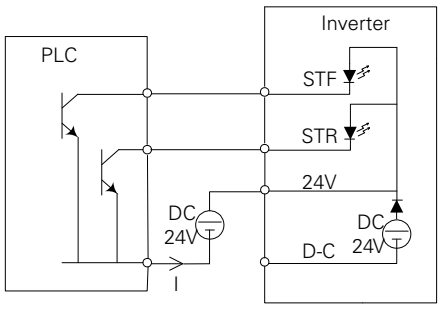
If "Sink Input" mode is selected, the function of the terminal is active when it is shorted with D-C or connected with the external PLC. In this mode, the current flows out of the corresponding terminal when it is "on". Terminal "D-C" is common to the contact input signals. When using an external power supply for output transistor, please use terminal 24V as a common to prevent misoperation caused by leakage current.



Sink Input: the multi-function control terminal is shorted directly with SD

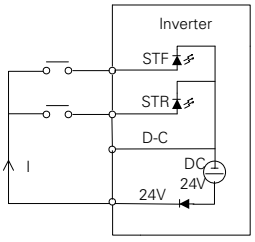


Sink Input: the multi-function control terminal is connected directly with open-collector PLC

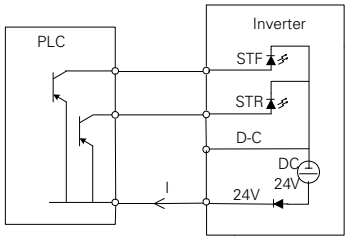


Sink Input: the multi-function control terminal is connected with open-collector PLC and external power supply

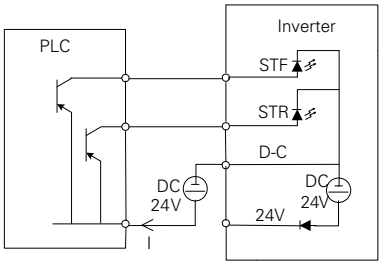
If "Source Input" mode is selected, the function of the terminal is active when it is shorted with 24V or connected with the external PLC. In this mode, the current flows into the corresponding terminal when it is "on". Terminal 24V is common to the contact input signals. When using an external power supply for transistor, please use terminal D-C as a common to prevent misoperation caused by leakage current.



Source Input: the multi-function control terminal is shorted directly with PC

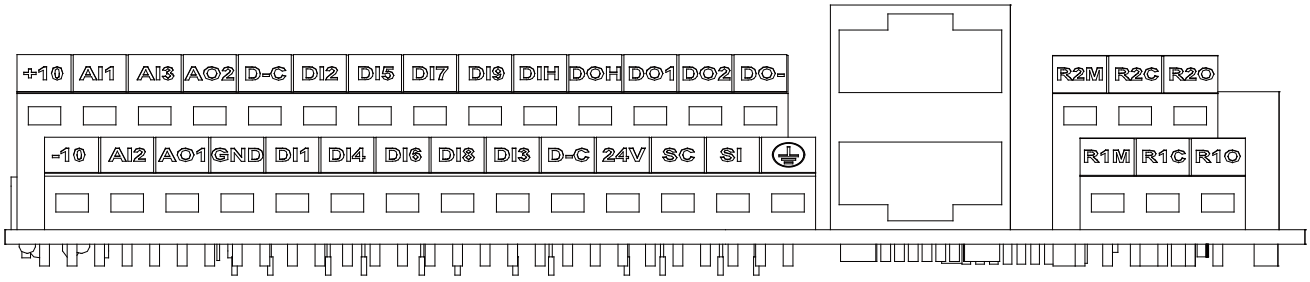


Source Input: the multi-function control terminal is connected directly with open-emitter PLC



Source Input: the multi-function control terminal is connected with open-emitter PLC and external power supply

- Arrangement of control terminal

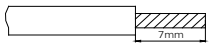


- Power supply connection

For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off thesheath of the wire and apply directly.

(1) Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off.

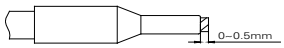
Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.



(2) Crimp the blade terminal.

Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.

Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate,or the face is damaged.



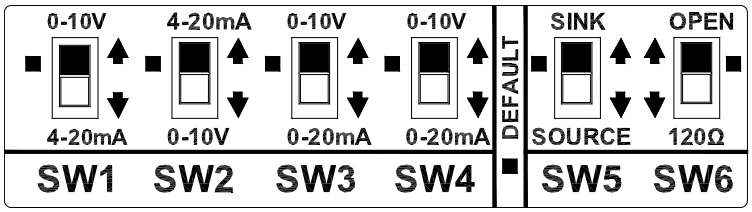
- Please do use blade terminals with insulation sleeve. Blade terminals commercially available:

Cable gauge (mm^2)	Blade terminals model	L (mm)	d1 (mm)	d2 (mm)	Manufacturer	Crimping tool product number
0.3	AI 0,25-6 WH	10.5	0.8	2	Phoenix Contact Co., Ltd.	CRIMPFOX 6
0.5	AI 0,5-6 WH	12	1.1	2.5		
0.75	AI 0,75-6 GY	12	1.3	2.8		
0.75 (for two wires)	AI-TWIN 2×0,75-6 GY	12	1.3	2.8		

Note: 1. Please Use a small flathead screwdriver (tip thickness: 0.6mm, width: 3.0mm). If a flathead screwdriver with a narrow tip is used, terminal block maybe damaged.

2. Tightening torque is2.12~3.18kgf.cm, too large tightening torque can cause screw slippage, too little tightening torque can cause a short circuit or malfunction.

- Toggle switch

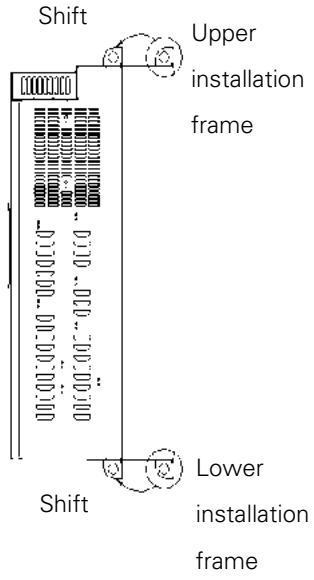


Switch number	Switch state	Explanation	Remarks
SW1	*	Input 0~10V voltage signal into terminal AI2	Cooperating with02-29, please refer to Section 5.3.7.
		Input 4~20mA current signal into terminal AI2	
SW2	*	Input 4~20mA current signal into terminal AI3	Cooperating with 02-20, please refer to Section 5.3.6.
		Input 0~10V voltage signal into terminal AI3	
SW3	*	Output 0~10V voltage from terminal AO1	Cooperating with 02-45, please refer to Section 5.3.11.
		Output 0~20mA/4~20mA current from terminal AO1	
SW4	*	Output 0~10V voltage from terminal AO2	Cooperating with 02-48, please refer to Section 5.3.12.
		Output 0~20mA/4~20mA current from terminal AO2	
SW5	*	Select the method of Sink Input	please refer to Section 3.4.6 Control logic change.
		Select the method of Source Input	
SW6	*	Communication terminal resister Open	Set the terminal resister switch SW6 on the farthest inverter at "120Ω", please refer to Section 5.8.1.
		Inserting 120Ω communicationterminal resister	

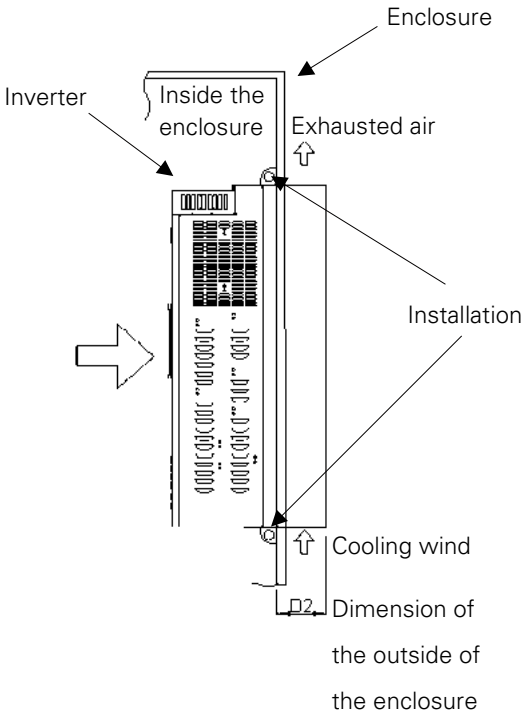
Note: 1. The state with "*" is the default state of switch.

2. The parts in black stand for switch handle.

- Installation flow chart
  - Shift and removal of a rear side installation frame, One installation frame is attached to each of the upper, and lower partsof the inverter. Change the position of, the rear side installation frameon the upper and lower, sides of the inverter to the front side as shownon the, right. When changing the installation frames, make sure, thatthe installation orientation is correct.



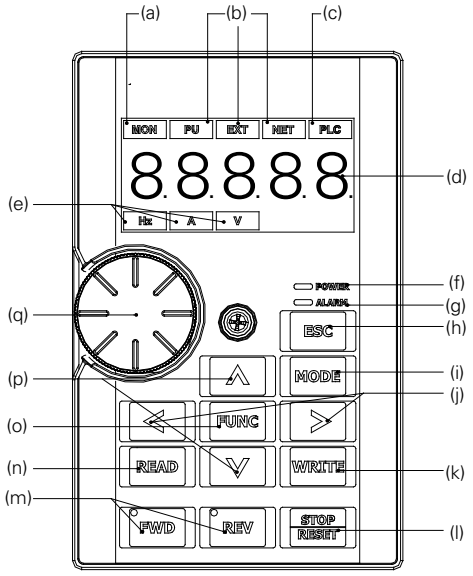
  - Installation of the inverter, As shown on the right, push the inverter heatsink portion, outside the enclosureand fix the enclosure and inverter, with upper and lower installationframe.



Model	D2(mm)
DF1-34091FN-C20C	137.5
DF1-34110FN-C20C	
DF1-34150FN-C20CAI2	
DF1-34180FN-C20C	
DF1-32120FN-C20C	
DF1-32145FN-C20C	
DF1-32170FN-C20C	
DF1-34220FN-C20C	137.5
DF1-34260FN-C20C	
DF1-32215FN-C20C	
DF1-32288FN-C20CAI2	
DF1-34310FN-C20C	145.5
DF1-32346FN-C20C	
DF1-34340FN-C20C	150.0
DF1-34425FN-C20C	
DF1-34480FN-C20C	
DF1-34530FN-C20C	
DF1-32432FN-C20C	
DF1-32506FN-C20C	
DF1-34620FN-C20C	181.5
DF1-34683FN-C20C	

4. Primary Operation

4.1 Component name of parameter unit (DXF-KEY-LED)



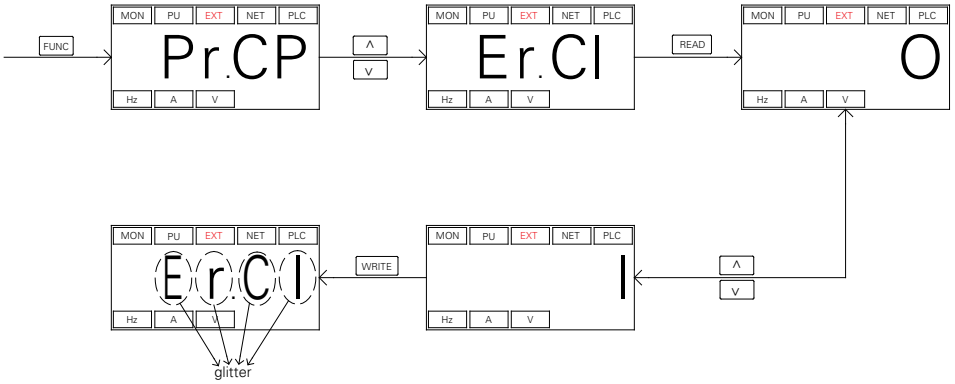
NO.	Operation parts	Name	Content
(a)	MON	Parameter unit status indicator	MON: ON to indicate the monitoring mode.
(b)	PU EXT NET	Operation mode indicator	PU: ON to indicate the PU operation mode, flickers in the H1~H5 operation mode. EXT: ON to indicate the External operation mode. NET: ON to indicate the Communication operation mode.
(c)	PLC	PLC function indicator	ON to indicate thePLC function valid.
(d)	8.8.8.8.8.	Monitor (5-digit LED)	Shows the frequency, parameter number, and parameter value, etc.
(e)	Hz A V	Unit indicator	Hz: ON to indicate the frequency. A: On indicate the output current. V: On indicate the output voltage.
(f)	POWER	Indicating lamp of power	ON to indicate the panel power on.
(g)	ALARM	Indicating lamp of alarm	ON to indicate the inverter alarm.
(h)	ESC	ESC button	Escape from the current interface.
(i)	MODE	MODE button	Switches to different modes.
(j)	< >	Left button, Right button	When setting value digit, choose the target digit.
(k)	WRITE	WRITE button	Writes parameter value, frequency, etc.
(l)	STOP RESET	STOP/RESET button	Stops the operation commands. Resets the inverter for alarm.

NO.	Operation parts	Name	Content
(m)	FWD REV	FWD button REV button	FWD: Starts forward rotation. The LED is on during forward operation. REV: Starts reverse rotation. The LED is on during reverse operation.
(n)	READ	READ button	Read the parameter. Enter into the next menu.
(o)	FUNC	FUNC button	Enter into the special operation menu. (Note)
(p)	∧ ∨	UP button DOWN button	UP: Increase the value. Switch the option. DOWN: Decrease the value. Switch the option.
(q)		M Setting dial	The function of clockwise rotation equals to UP button. The function of anticlockwise rotation equals to DOWN button.

The special operation menu by pressingFUNC button to erter into is shown as the table below:

Menu	Name	Press READ button to enter into next to realize the corresponding functioin description
Pr.CP	Parameter copy	0: No action.
		1: Copy the inverter parameter values into the parameter unit.
Pr.CA	Parameter paste	0: No action.
		1: Paste the copied parameter values in parameter unit into the inverter. (**Please first restore the inverter parameters to the factory setting, and then paste the parameter. This action is only valid in the same series and types.**)
Er.CL	Alarm clear	0: No action.
		1: Clear all alarm and alarm information.
rESr	Inverter reset	0: No action.
		1: Reset the inverter.
ALLC	Parameter restored to the factory setting	0: No action.
		1: The inverter parameters are restored to the factory setting.
Pr.Cr	Part of parameters restored to the factory setting	0: No action.
		1: Part of inverter parameters are restored to the factory setting.
PrGr	Parameter mode	0: P parameter mode
		1: Parameter group mode
PU_F	Auto write frequency selection	0: After the frequency changes, the frequency will not auto write into the inverter.
		1: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s, write into the inverter EEPROM after 10s.
		2: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s,write into the inverter EEPROM after 30s.
E.HIS	Alarm record	Display the recent four alarm codes. (Read)
Sn	Inverter version	Display the version number of the inverter. (Read)
PUSn	Parameter unit version	Display the version number of DXF-KEY-LED. (Read)

For example: From FUNC to Alarm clear E_rCL menu, the operation flow chart is as follows:



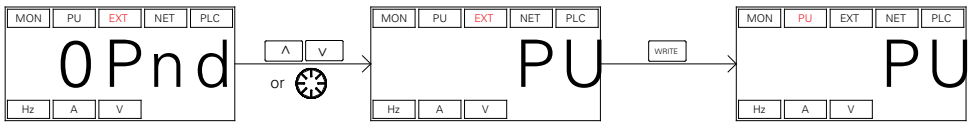
4.2 Operation modes of the inverter

- The operation modes are related to the reference source of the target frequency and the signal source of the motor starting. The Eaton DF1 inverter has a total of ten kinds of operation modes,namely, "PU mode PU", "JOG mode JOG", "external mode OPnd", "communication modeCU", "combined mode 1H1", "combined mode 2H2", "combined mode 3H3", "combined mode 4H4" and "combined mode 5H5" and the second operation mode.
- You can use parameter unit to monitor the output frequency, the output voltage and the output current, as well as to view the alarm message, the parameter setting and the frequency setting. The operator has four work modes, namely, "operation mode", "monitoring mode", "frequency setting mode" and "parameter setting mode".

Related parameters	Values	Operation mode	The reference source of target frequency	The signal source of motor starting	Remarks
Operation mode selection 00-16 (P.79)	0	PU mode (PU)	PU parameter unit	FWD or REV button for PU parameter unit	The "PU mode", "JOG mode" and "external mode" are interchangeable.
		JOG mode (JOG)	The setting value of 01-13 (P.15)	FWD or REV button for PU parameter unit	
		External mode (OPnd)	"External voltage/current signal", "combination of multi-speed stage levels" and external JOG (01-13 (P.15))	External forward and reverse terminals	
			Frequency given by (03-09 (P.550))		
			Frequency of each section in the programmed operation mode 04-19~ 04-26 /P.131~P.138	External STF terminal	
	1	PU mode (PU)	Equal to the "PU mode" when 00-16 (P.79)=0		The "PU mode" and "JOG mode" are interchangeable.
		JOG mode (JOG)	Equal to the "PU mode" when 00-16 (P.79)=0		
	2	External mode (OPnd)	Equal to the "External mode" when00-16 (P.79)=0		
	3	Communication mode (CU)	Communication	Communication	
	4	Combined mode 1 (H1)	PU parameter unit	External forward and reverse terminals	
	5	Combined mode 2 (H2)	"External voltage / current signal", "combination of multi-speed stage levels", frequency given by pulse(03-09(P.550))	FWD or REV button for PU parameter unit	
	6	Combined mode 3 (H3)	Communication, "combination of multi-speed stage levels" and External JOG(01-13(P.15))	External forward and reverse terminals	
	7	Combined mode 4 (H4)	"External voltage / current signal", "combination of multi-speed stage levels", frequency given by pulse (03-09(P.550))	Communication	
	8	Combined mode 5 (H5)	PU operation panl, "combination of multi-speed stage levels" and External JOG (01-13(P.15))	External forward and reverse terminals	
	99999	Second operation mode (rEr E)	Sets by 00-17 (P.97)	Sets by 00-18(P.109)	

- When 00-16(P.79) = 0, the external mode (OPnd) is the default mode after the inverter is turned on. Use 00-16(P.79) to switch the operation mode.

4.2.1 The flow chart for switching the operation mode



Note: 1. In "PU mode", parameter unit screen displays PU, and the indicating lamp PU will light up.

2. In "external mode", parameter unit screen displays 0Pnd, and the indicating lamp EXT will light up on the parameter unit.

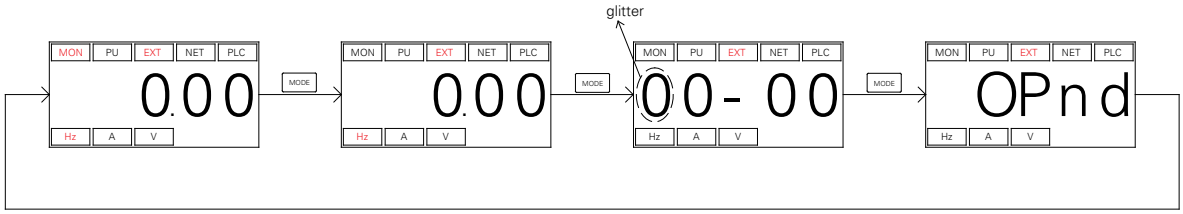
3. In "combined mode 1, 2, 3, 4, or 5", the indicating lamp PU will gilttter on the parameter unit screen.

4. In "JOG mode", the indicating lamp PU will light up.

5. When 00-16(P.79) =3, the indicating lamp NET will light up.

6. No flow chart when 00-16(P.79)=2, 3, 4, 5, 6, 7 or 8 because the operation mode will be constant.

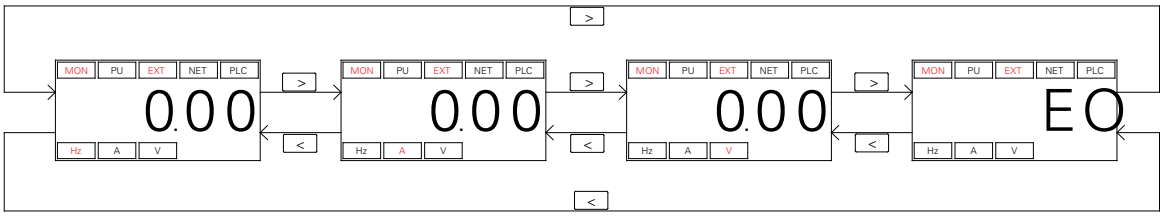
4.2.2 The flow chart for switching the working mode with DXF-KEY-LED parameter unit



Note: 1. Please refer to section 4.2.3 for the detailed operation flow under the monitoring mode.
2. Please refer to section 4.2.4 for the detailed operation flow under the frequency setting mode.
3. Please refer to section 4.2.5 for the detailed operation flow under the parameter setting mode.
4. Please refer to Section 4.2.1 for detailed operation flow under the switching operation mode.

4.2.3 The operation flow charts for monitoring mode with DXF-KEY-LED

- Take PU mode for example:



Note: 1. In the "monitoring output frequency mode", indicating lamp MON and HZ will light up, and the screen will display the current output frequency.

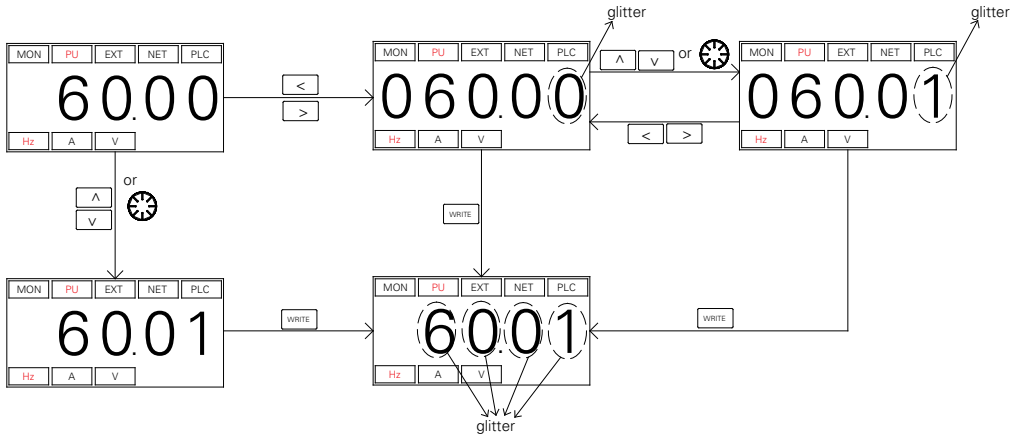
2. In the "monitoring output voltage mode", indicating lamp MON and V will light up, and the screen will display the current output voltage.

3. In the "monitoring output current mode", indicating lamp MON and A will light up, and the screen will display the current output current.

4. When in the "browsing alarm record mode," indicating lamp MON will light up, and the screen will display the current alarm code.

5. For alarm codes, please refer to Appendix 2.

4.2.4 Operation flow charts for frequency setting mode with DXF-KEY-LED

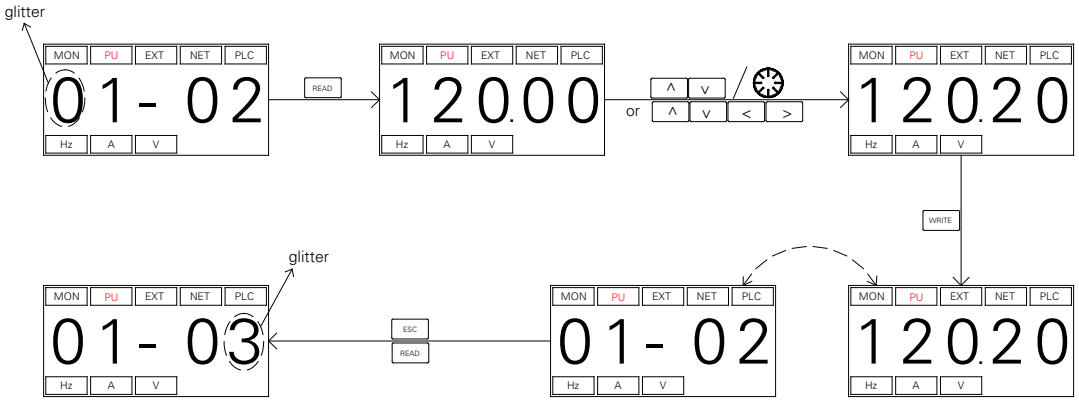


Note: 1. Use to change the frequency when the inverter is running.

2. Indicating lamp HZ will light up, but not MON under the frequency setting mode.

3. When setting the frequency under the PU mode, the set value can not exceed the upper frequency. When high frequency is needed, the upper frequency should be changed first.

4.2.5 Operation flow charts for parameter setting mode with DXF-KEY-LED



Note: Neither indicating lamp HZ nor MON will light up under the parameter setting mode. Please Use WRITE to write the parameter.

4.3 Basic operation procedures for different modes

4.3.1 Basic operation procedures for PU mode (00-16(P.79)=0 or 1)

Step	Description
1	• Change the operation mode to PU mode, and indicating lamp PU will light up. **Note:** 1. When 00-16(P.79) =0, the inverter will first go into the external mode after the power is switched on or the inverter is reset. 2. For selecting and switching the operation mode, please refer to Section 4.2.
2	• Enter into the frequency setting mode and write the target frequency into memory. **Note:** For detailed setting procedures, please refer to Section 4.2.4.
3	• Press FWD or REV to run the motor. At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. The DXF-KEY-LED parameter unit will automatically go into the monitor mode and display the current stable output frequency. **Note:** 1. For detailed operation flow for the monitoring mode, please refer to Section 4.2.3. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.
4	• Press STOP RESET and the motor will begin to decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output voltage.

4.3.2 Basic operation procedures for external mode (00-16(P.79)=0 or 2)

Step	Description
1	• Change the operation mode to external mode, the screen will display OPnd and indicating lamp EXT will light up. **Note:** 1.When00-16(P.79) =0, after the power is switched on or the inverter is reset, press MODE to switch to operation mode, the inverter willfirst go into the external mode, and then use  or ∧ ∨ to switch to PU mode. 2. When 00-16(P.79) =2, external mode will be the default for the inverter. 3. For selecting and switching the operation mode, please refer to Section 4.2.
2	• The target frequency is set by external terminals (the default priority is from high to low): • If the programmable operating mode is chosen, please refer to Section 5.4.1Function selection of digital input and 5.5.2Programmed operation mode. • If the target frequency is set by multi-speed stage levels, please refer to 04-00(P.4) in Chapter 5. • If the target frequency is set by the input signal of terminal A2/B2 on PG board, please refer to 09-07 (P.356) in Chapter 5. • If the target frequency is set by PWM input pulse, please refer to Chapter 5.4.1. • If the target frequency is set by the input signal across terminal AI1, please refer to 02-09 (P.38) in Chapter 5. • If the target frequency is set by the input signal across terminal AI3, please refer to 02-21 (P.39) in Chapter 5. • If the target frequency is set by the input signal across terminal AI2, please refer to 02-30 (P.508) in Chapter 5. • If the target frequency is set by the high-speed pulse input across terminal DIH, please refer to Chapter 5.3.8.
3	• Turn on STF or STR to run the motor. • At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. **Note:** 1. For setting up the starting terminals STF and STR, please refer to 00-15(P.78) in Chapter 5.1.8 and 5.4.1Function selection of digital input. 2. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 3. If programmed operation mode is chosen, then STF and STR will become the starting signal and the pause signal, respectively, instead of being the Run Forward or Run Reverse terminals.
4	• Turn off STF or STR to decelerate the motor until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output voltage.

4.3.3 Basic operation procedures for JOG mode (00-16(P.79)=0 or 1)

Step	Description
1	• Change the operation mode to the JOG mode and indicating lamp PU will light up. At this point, the screen will display JOG. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• Press FWD or REV to run the motor. At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. • Release FWD or REV to decelerate the motor until it comes to a full stop. Indicating lamp FWD or REV will not turn off until the inverter stops the output. **Note:** 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2. In the JOG mode, the target frequency is the value of 01-13(P.15), and the acceleration / deceleration time is the value of 01-14 (P.16). Please refer to 01-13 (P.15) in Chapter 5.

4.3.4 Basic operation procedures for communication mode (00-16(P.79)=3)

- In the communication mode, the user can set the parameters and run/stop or reset the inverters by communication. Please refer to communication function related parameters for details.

4.3.5 Basic operation procedures for combined mode 1 (00-16(P.79)=4)

Step	Description
1	• In Combined Mode 1, indicating lamp PU will light up. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• Enter into the frequency setting mode and write the target frequency into memory. **Note:** For detailed frequency setting procedures, please refer to Section 4.2.4.
3	• Set the target frequency via DXF-KEY-LED parameter unit and start the inverter by the digital input terminals. • At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. **Note:** For detailed operation flow for the monitor mode, please refer to Section 4.2.3.
4	• When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output.

4.3.6 Basic operation procedures for combined mode 2 (00-16(P.79)=5)

Step	Description
1	• In Combined Mode 2, indicating lamp PU will light up. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• The target frequency is set by the external terminals (the default priority is from high to low): • If the programmable operating mode is chosen, please refer to Section 5.4.1 Function selection of digital input and 5.5.2 Programmed operation mode. • If the target frequency is set by multi-speed stage levels, please refer to 04-00 (P.4) in Chapter 5. • If the target frequency is set by the input signal of terminal A2/B2 on PG board, please refer to 09-07 (P.356) in Chapter 5. • If the target frequency is set by PWM input pulse, please refer to Section 5.4.1. • If the target frequency is set by the input signal across terminal AI1, please refer to 02-09 (P.38) in Chapter 5. • If the target frequency is set by the input signal across terminal AI3, please refer to 02-21 (P.39) in Chapter 5. • If the target frequency is set by the input signal across terminal AI2, please refer to 02-30 (P.508) in Chapter 5. • If the target frequency is set by the high-speed pulse input across terminal DIH, please refer to Section 5.3.8.
3	• Press FWD or REV of DXF-KEY-LED parameter unit to run the motor. At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. **Note:** 1.For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2.While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.
4	• Press STOP/RESET and the motor will begin to decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output.

4.3.7 Basic operation procedures for combined mode 3(00-16(P.79)=6)

Step	Description
1	• In Combined Mode 3, indicating lamp PU will light up. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• The target frequency is determined by communication: • When RL, RM, RH and REX of multi-speed stage levels are "on", the target frequency is determined by combination of multi-speed stage levels (Please refer to 04-00~04-02 / P.4~P.6, 03-00~03-05 /P .80~P.84 / P.86, 03-06(P.126), 03-09(P.550)). • When external JOG is "on", the target frequency is determined by 01-13(P.15). Acceleration / deceleration time is set by the value of 01-14 (P.16).
3	• The inverter starting is activated by the external Run Forward or Run Reverse terminals. At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. • The functions of 00-02 (P.996 / P.998 / P.999) can be accomplished by communication. **Note:** For detailed operation flow for the monitor mode, please refer to Section 4.2.3.
4	• When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output.

4.3.8 Basic operation procedures for combined mode 4(00-16(P.79)=7)

Step	Description
1	• In Combined Mode 4, indicating lamp PU will light up. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• The target frequency of the inverter is determined by the external terminals' "external voltage signal", "external current signal", or "combination of multi-speed stage levels".
3	• The inverter starting is activated by communication (including "Reset"). At this point, indicating lamp FWD or REV will light up, indicating that the motor is running. **Note:** 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3.. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.
4	• When communication sends the stop instruction, the motor will decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output.

4.3.9 Basic operation procedures for combined mode 5(00-16(P.79)=8)

Step	Description
1	• In Combined Mode 5, indicating lamp PU will light up. **Note:** For selecting and switching the operation mode, please refer to Section 4.2.
2	• The target frequency of the inverter is set by DXF-KEY-LED parameter unit: • When RL, RM, RH and REX of multi-speed stage levels are "on", the target frequency is determined by combination of multi-speed stage levels (please refer to 04-00~04-02/P.4~P.6, 03-00~03-05/P.80~P.84 / P.86, 03-06 (P.126) / 03-09 (P.550)). • When external JOG is "on", the target frequency is determined by 01-13 (P.15). Acceleration / deceleration time is set by the value of 01-14 (P.16).
3	• The inverter starting is activated by the external forward and reverse terminals. **Note:** 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.
4	• When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. • Indicating lamp FWD or REV will not turn off until the inverter stops the output.

4.3.10 Basic operation procedures for the second operation mode(00-16(P.79)=99999)

- In the second operation mode, the target frequency is determined by 00-17(P.97), and the operation instruction is determined by 00-18 (P.109), please refer to Section 5.1.9. Operation mode selection for related description and Section 4.3.1~4.3.5 for related operation method.

4.4 Operation

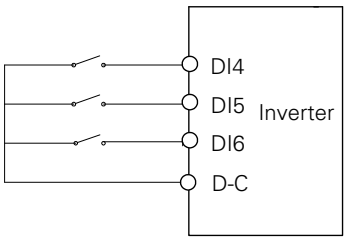
4.4.1 Pre-operation checks and preparation

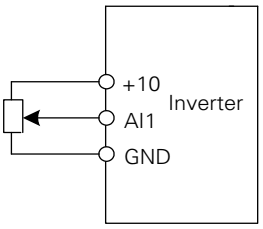
- Before starting the operation, the following shall be examined:

1. Check if the wiring is correct. Check especially the ac motor driver output terminals (U/T1, V/T2, W/T3), which can not be connected to the power. Confirm that grounding terminal (⏚) is well grounded.
2. Check if there is a short circuit at the terminals or charged exposure.
3. Verify all terminal connections, and check if plug connectors (optional) and screws are all fastened.
4. Verify that no mechanical device is connected to the motor.
5. All switches must be disconnected before power on. Make sure that the inverter will not start and there is no abnormal activity when power on.
6. Turn on the power only after the cover is well placed.
7. Do not operate the switch with a wet hand.
8. Make sure of the following after power on:
   (1). DXF-KEY-LED power indicating lamp POWER will light up but not alarm indicating lamp ALARM.
   (2). DXF-KEY-LED parameter unit, both indicating lamp HZ and EXT will light up.

4.4.2 Operation methods

For various operation methods, please refer to basic operation procedures in Chapter 4 and parameter description in Chapter 5.Select the most appropriate operation methods according to the application requirements and regulations. The most commonly used operation methods are shown below:

<table>
<tr><th>Operation method</th><th>Source of the target frequency</th><th>Source of the operating signal</th></tr>
<tr><td>parameter unit operation</td><td>∧ or ∨ or</td><td>FWD or REV</td></tr>
<tr><td rowspan="2">External terminal signal operation</td><td> 

Parameter Setting:
04-00(P.4)=40
04-01(P.5)=30
04-02(P.6)=10</td><td rowspan="2">Input by digital input terminal: DI1-D-C
DI2-D-C</td></tr>
<tr><td> 

AI1 terminal input</td></tr>
</table>

Note: RH, RM and RL mentioned in this section are function names of the "multi-function digital input terminal". Please refer to 03-00~03-05/P.80~P.84、P.86, 03-06 (P.126), 03-09、03-25~03-30/P.550~P.556, 03-33~03-38/P.559~P.564 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

4.4.3 Trial run

- Check cables and abnormalities before the trial run. After power on, the inverter is in the external mode.
  1. After power on, make sure that the indicating lamp power POWER is on.
  2. Connect a switch between DI1 and D-C or DI2 and D-C.
  3. Connect a potentiometer between AI1-GND-10 or provide 0~5V dc between AI1 and GND.
  4. Adjust potentiometer or 0~5V dc to a minimum value (under 1V).
  5. If DI1 is on, forward rotation is activated. If DI2 is on, reverse rotation is activated. Turn off DI1 or DI2 to decelerate the motor until it stops completely.
  6. Check the following:
     1). Whether the direction of motor rotation is correct.
     2). Whether the rotation is smooth (check for any abnormal noise and vibration).
     3). Whether the acceleration / deceleration is smooth.

- If there is an optional keyboard panel, do the following:
  1. Make sure that the keyboard panel is connected to the inverter properly.
  2. Change the operation mode to PU mode after power on, and the screen will display 50/60Hz.
  3. Press V button to set the target frequency at about 5Hz.
  4. Press FWD for forward rotation and REV for reverse rotation. Press STOP RESET to decelerate the motor until it stops completely.
  5. Check the following:
     1). Whether the direction of motor rotation is correct.
     2). Whether the rotation is smooth (check for any abnormal noise and vibration).
     3). Whether the acceleration / deceleration is smooth.

- If no abnormal condition is found, continue the trial run by increasing the frequency and go through the above procedure. Put the machine into operation if no abnormal condition is found.

Note: Stop working immediately if abnormalities are found when running the inverter or the motor. Check for possible causes according to "fault diagnosis". After inverter output is stopped and the power terminals (R/L1, S/L2, and T/L3) of the main circuit are disconnected, electric shock may occur if one touches the inverter's output terminals (U/T1, V/T2, and W/T3). Even if the major loop power is cut off, there is still recharging voltage in the filter capacitors. As a result, discharge takes time. Once the major loop power is disconnected, wait for the power indicating lamp to go off before testing the intermediate dc loop with a dc voltage meter. Once the voltage is confirmed to be below the safe value, it is safe to touch the circuit inside the inverter.

5. Parameter Description

5.1 System parameter group 00

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
00-00	P.90	The inverter model	Read	read	
00-01	P.188	Firmware version	Read	read	
00-02	P.996~P.999	Parameter restoration	0: Non-function	0	
			1: Alarm history clear (P.996=1)		
			2: Inverter reset (P.997=1)		
			3: Restoring all parameters to default values (P.998=1)		
			4: Restoring some parameters to default values1 (P.999=1)		
			5: Restoring some parameters to default values2 (P.999=2)		
			6: Restoring some parameters to default values3 (P.999=3)		
00-03	P.77	Selection of parameterswrite protection	0: Parameters can be written only when the motor stops	0	
			1: Parameters cannot be written		
			2: Parameters can also be written when the motor is running		
			3: Parameters cannot be written when in password protection		
00-04	P.294	Decryption parameter	0~65535	0	
00-05	P.295	Password setup	2~65535	0	
00-06	P.110	Parameter unit monitoring selection	X0: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency	1	
			X1: When the inverter starts, the screen of the parameter unit displays the target frequency		
			X2: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system		
			0X: Boot screen to monitor model output frequency		
			1X: Boot screen to set the target frequency mode		
			2X: Boot screen to monitor model of output current		
			3X: Boot screen to monitor mode of the output voltage		
00-07	P.161	Multi-function display	0: Output voltage (V)	0	
			1: Inverter voltage between (+/P) and (-/N) terminals (V)		
			2: Temperature rising accumulation rate of inverter (%)		
			3: Target pressure of the constant pressure system (%)		
			4: Feedback pressure of the constant pressure system (%)		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
00-07	P.161	Multi-function display	5: Operation frequency (Hz)	0	
			6: Electronic thermal accumulation rate (%)		
			7: Signal value (V) of AI1 simulating input terminals		
			8: Signal value (mA) of AI3 simulating input terminals (mA/V)		
			9: Output power (kW)		
			10: PG card's feedback rotation speed (Hz)		
			11: Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state		
			12: NTC temperature (°C)		
			13: Electronic thermal accumulation rate of motor (%)		
			14: Reserve		
			15: Input frequency of terminal DIH (kHz)		
			16: Real-time curling radius value (mm)		
			17: Real-time line speed (m/min)		
			18: Output torque of inverter (%) (Validonly when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6)		
			19: Digital terminal input state		
			20: Digital terminal output state		
			21: Actual working carrier frequency		
			22: Signal value (mA) of AI2 simulating input terminals (mA/V)		
			23: Synchronousmotor rotor pole position (Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective)		
			24: Current target frequency		
			25: PTC Enter the percentage		
			26: Target pressure and feedback the constant pressure system		
			27: motor speed		
00-08	P.37	Speed display	0: Display output frequency (the mechanical speed is not displayed)	0.0	
			1~50000		
			1~9999		
00-09	P.259	Speed unit selection	0: Speed display selection unit is 1	1	
			1: Speed display selection unit is 0.1		
00-10	Reserve	Reserve	Reserve	--	
00-11	P.72	Carrier frequency	Frame 1/2/3: 1~15KHz	5 kHz	
			Frame 4/5: 1~9 kHz	4 kHz	
			Frame 6/7: 1~9 kHz	2 kHz	
			Frame 8: 1~3 kHz	2 kHz	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
00-12	P.31	Soft-PWM carrier operation selection	0: None Soft-PWM operation	0	
			1: When 00-11 (P.72) < 5, Soft-PWM is valid (only apply to V/F control)		
00-13	P.71	Idling braking / DC braking	0: Idling braking	1	
			1: DC braking		
00-14	P.75	Stop function selection	0: Press STOP button and stop the operation only in the PU and H2 mode	1	
			1: Press STOP button and stop the operation in all mode		
00-15	P.78	Forward/reverse rotation prevention selection	0: Forward rotation and reverse rotation are both permitted	0	
			1: Reverse rotation is prohibited (Press the reverse reference to decelerate and stop the motor)		
			2: Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor)		
00-16	P.79	Operation mode selection	0: “PU mode”, “external mode” and “Jog mode” are interchangeable	0	
			1: “PU mode” and “JOG mode” are interchangeable		
			2: “External mode” only		
			3: “Communication mode” only		
			4: “Combined mode 1”		
			5: “Combined mode 2”		
			6: “Combined mode 3”		
			7: “Combined mode 4”		
			8: “Combined mode 5”		
			99999: The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97)		
00-17	P.97	The second target frequency selection	0: Frequency set by parameter unit	0	
			1: Frequency set by Communication RS485		
			2: Frequency set by the analog		
			3: Frequency set by communication expansion card		
			4: Frequency set by PG board A2B2		
			5: Frequency set by DIHpulse		
00-18	P.109	The second start signal selection	0: Operating signal set by parameter unit	0	
			1: Operating signal set by digital input terminal		
			2: Operating signal set by Communication RS485		
			3: Operating signal set by communication expansion card		
00-19	P.35	Communication mode instruction selection	0: Incommunication mode, operating instruction and setting frequency is set by communication.	0	
			1: Incommunication mode, operating instruction and setting frequency is set by external.		
00-20	P.400	Control mode selection	0: Speed control	0	
			1: Torque control		
			2: Position control		

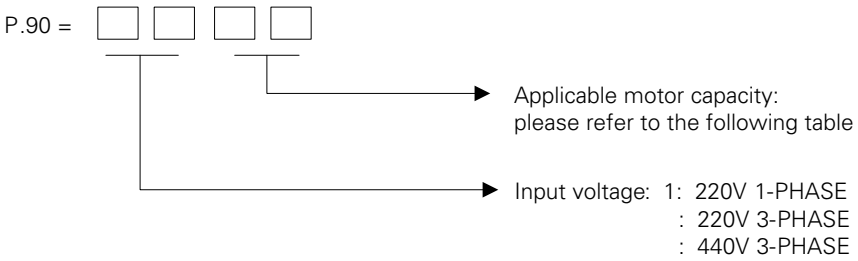
Group	Parameter Number	Name	Setting Range	Factory Value	User settings
00-21	P.300	Motor control mode selection	0: Induction motor V/F control	0	
			1: Induction motor close-loop V/F control (VF + PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motor PG vector control		
			5: Synchronous motor PG vector control		
			6: Synchronous motor without PG vector control		
00-22	P.370	The second motor control mode selection	0: Induction motor V/F control	99999	
			1: Induction motor V/F close-loop control (VF+PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motor PG vector control		
			5: Synchronous motor PG vector control		
			6: Synchronous motor without PG vector control		
			99999: The second motor control mode is not selected		
00-23	P.186	Motor types selection	0: Normal Duty (ND), apply to the fans and water pump type duty	1	
			1: Heavy Duty (HD), apply to other duties		
00-24	P.189	50Hz/60Hz switch selection	0: The frequency parameter default valueis 60Hz system	0	
			1: The frequency parameter default valueis 50Hz system	1	
00-25	P.990	Parameter mode setting	0: Parameter is displayed as “group mode”	0	
			1: Parameter is displayed as “conventional P mode”		
00-26	P.125	Expansion card type	Read	Read	

5.1.1 Inverter information

- Inquire the inverter model, control board firmware version, and the connected expansion card, etc.

Parameter	Name	Factory Value	Setting Range	Content
00-00 P.90	The inverter model	Read	Read	---
00-01 P.188	Firmware version	Read	Read	The inverter control board firmware version

- The inverter model



Read The applicable motor capacity:

Value(value of the two low-order bits of 00-00)	Capacity (kw)
3	0.75K/1.5KF
4	1.5K/2.2KF
5	2.2K/3.7KF
6	3.7K/5.5KF
7	5.5K/7.5KF
8	7.5K/11KF
9	11K/15KF
10	15K/18.5KF
11	18.5K/22KF
12	22K/30KF
13	30K/37KF
14	37K/45KF

Value (value of the two low-order bits of 00-00)	Capacity (kw)
15	45K/55KF
16	55K/75KF
17	75K/90KF
18	90K/110KF
19	110K/132KF
20	132K/160KF
21	160K/185KF
22	185K/220KF
23	220K/250KF
24	250K/280KF
25	280K/315KF
26	315K/350KF

Note: The parameters above are for reading only, not for writing.

5.1.2 Parameter restoration

- Restore the parameters to the default values.

Parameter	Name	Factory Value	Setting Range	Content
00-02 P.996 ~ P.999	Parameter restoration	0	0	No function.
			1	Alarm history clear (P.996=1)
			2	Inverter reset (P.997=1)
			3	Restoring all parameters to default values (P.998=1)
			4	Restoring some parameters to default values1 (P.999=1)
			5	Restoring some parameters to default values2 (P.999=2)
			6	Restoring some parameters to default values3 (P.999=3)

Settin Parameter restoration

1: 00-02 is set to1, and the screen will display E r.C L after writing, the abnormal record will be erased, 00-02 is restoered to 0.

2: 00-02 is set to 1, and the screen will display r E S r, the inverter will be reset.00-02 is restoered to 0.After resetting the inverter, the values of the two relays, "electronic thermal relay" and "IGBT module thermal relay"will be set to zero.

3: 00-02is set to3, and the screen will display A L L C , all the parameters will be restored to the default values except the parameters in the **table 1** below.After parameters are restored, 00-02 is restored to0.
Exception The parameters in **table 1** below will not be restored to the default values:

Group	No.	Name
00-00	P.90	The inverter model
00-01	P.188	Firmware version
00-24	P.189	50Hz/60Hz switch selection
01-08	P.21	Accelerate/Decelerate time increments
06-27	P.292	Accumulative motor operation time (minutes)
06-28	P.293	Accumulative motor operation time (days)
06-29	P.296	Accumulative motor power time (minutes)
06-30	P.297	Accumulative motor power time (days)
06-44	P.740	E1
06-45	P.741	E2
06-46	P.742	E3
06-47	P.743	E4
06-48	P.744	E5
06-49	P.745	E6
06-50	P.746	E7
06-51	P.747	E8
06-52	P.748	E9
06-53	P.749	E10
06-54	P.750	E11
06-55	P.751	E12
06-56	P.752	E1 alarm output frequency
06-57	P.753	E1 alarm output current

Group	No.	Name
06-58	P.754	E1 alarm output voltage
06-59	P.755	E1 alarm the temperature rising accumulation rate
06-60	P.756	E1 alarm PN voltage
06-61	P.757	E1 alarm the time of the inverter has run
06-62	P.758	E1 alarm the inverter operation status code
06-63	P.759	E1 alarm (years/months)
06-64	P.760	E1 alarm (days/hours)
06-65	P.761	E1 alarm (minutes/seconds)
06-70	P.766	E2 alarm output frequency
06-71	P.767	E2 alarm output current
06-72	P.768	E2 alarm output voltage
06-73	P.769	E2 alarm the temperature rising accumulation rate
06-74	P.770	E2 alarm PN voltage
06-75	P.771	E2 alarm the time of inverter has run
06-76	P.772	E2 alarm the inverter operation status code
06-77	P.773	E2 alarm (years/months)
06-78	P.774	E2 alarm (days/hours)
06-79	P.775	E2 alarm (minutes/seconds)
09-13	P.124	Expansion card version
13-02	P.285	Low frequency vibration inhibition factor
13-03	P.286	High frequency vibration inhibition factor

4: 00-02 is set to4, and the screen will display Pr.Cr after writing, all the parameters will be restored to the default values except the parameters in the **table 1** and **table 2** below.After parameters are restored, 00-02is restored to 0.

Exception The parameters in **table 2** below and **table 1**will not be restored to the default values:

Group	No.	Name
00-21	P.300	Motor control mode selection
02-12	P.192	The minimum input positive voltage of AI1
02-13	P.193	The maximum input positive voltage of AI1
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal AI1
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal AI1
02-16	P.512	The minimum input negative voltage of AI1
02-17	P.513	The maximum input negative voltage of AI1
02-18	P.510	The percentage corresponding to the minimum negative voltage of termianl AI1
02-19	P.511	The percentage corresponding to the maximum negative voltage of termianl AI1
02-25	P.198	The minimum input current/voltage of AI3
02-26	P.199	The maximum input current/voltage of AI3
02-27	P.196	The percentage corresponding to the minimum input current/voltage of AI3
02-28	P.197	The percentage corresponding to the maximum input current/voltage of AI3
02-34	P.548	The minimum input current/voltage of AI2
02-35	P.549	The maximum input current/voltage of AI2
02-36	P.546	The percentage corresponding to the minimum input current/voltage of AI2
02-37	P.547	The percentage corresponding to the maximum input current/voltage of AI2
02-39	P.524	DIH input minimum frequency
02-40	P.525	DIH input maximum frequency
02-41	P.522	The percentage corresponding to DIH input minimum frequency
02-42	P.523	The percentage corresponding to DIH input maximum frequency
02-46	P.191	AO1 output gain

Group	No.	Name
02-47	P.190	AO1 output bias
02-49	P.536	AO2 output gain
0AI10	P.535	AO2 output bias
0AI19	P.187	FM calibration parameter
05-00	P.301	Motor parameter auto-tuning function selection
05-01	P.302	Motor rated power
05-02	P.303	Motor poles
05-03	P.304	Motor rated voltage
05-04	P.305	Motor rated frequency
05-05	P.306	Motor rated current
05-06	P.307	Motor rated rotation speed
05-07	P.308	Motor excitation current
05-08	P.309	IM motor stator resistance
05-09	P.310	IM motor rotor resistance
05-10	P.311	IM motor leakage inductance
05-11	P.312	IM motor mutual inductance
05-12	P.313	PM motor stator resistance
05-13	P.314	PM motor d-axis inductance
05-14	P.315	PM motor q-axis inductance
05-15	P.316	PM motor Back-EMF coefficient
05-16	P.317	PM motor Phase Z origin pulse compensation
05-17	P.318	Rotation inertia
11-00	P.320	Speed control proportion coefficient 1
11-01	P.321	Speed control integral time 1
11-02	P.322	PI coefficient switching frequency 1
11-03	P.323	Speed control proportion coefficient 2
11-04	P.324	Speed control integral time 2
11-05	P.325	PI coefficient switching frequency 2
11-06	P.326	Current control proportion coefficient

5: User registered parameter15-00~15-19will not be restored to the default value,During 15-00~15-19, the corresponding parameter valuesof setting parameter number and the parameters in **table 1** above will not be restored to the default values.After parameters are restored, 00-02 is restored to 0.

6: User registered parameter 15-00~15-19will not be restored to the default value, During 15-00~15-19, the corresponding parameter values of setting parameter number and the parameters in **table 1** and **table 2** above will not be restored to the default values.After parameters are restored, 00-02 is restored to 0.

Note: When restoring all or some to default values, please be sure that the screen displays End, which means parameters has been restored to factory values, and then execute other operations.

5.1.3 Parameter protection

- Whether to enable the writing to various parameters or not can be selected. Use this function to prevent parameter-values from being rewritten by misoperation.

Parameter	Name	Factory Value	Setting Range	Content
00-03 P.77	Selection of parameters write protection	0	0	Parameters can be written only when the motor stops.
			1	Parameters cannot be written.
			2	Parameters can also be written when the motor is running.
			3	Parameters cannot be written when in password protection.
00-04 P.294	Decryption parameter	0	0~65535	Write the registered password to decrypt the parameter protection.
00-05 P.295	Password setup	0	0~65535	Register password for parameter protection setting.

Read Parameter writeprotection selection

- Writing parameters only during stop(00-03="0"initial value)

Exception During operation, the parameters below can be written:

Group	No.	Name
00-03	P.77	Selection ofparameters write protection
00-07	P.161	Multi-function display
02-04	P.54	Function of terminal AO1 output
02-05	P.537	Function of terminal AO2 output
02-12	P.192	The minimum input positive voltage of AI1
02-13	P.193	The maximum input positive voltage of AI1
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal AI1
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal AI1
02-16	P.512	The minimum input negative voltage of AI1
02-17	P.513	The maximum input negative voltage of AI1
02-18	P.510	The percentage corresponding to the minimum negative voltage of termianl AI1
02-19	P.511	The percentage corresponding to the maximum negative voltage of termianl AI1
02-42	P.523	The percentage corresponding to DIH input maximum frequency
02-44	P.543	FM output function selection
02-45	P.64	AO1 output signal selection
02-46	P.191	AO1 output gain
02-47	P.190	AO1 output bias
02-48	P.538	AO2 output signal selection
02-49	P.536	AO2 output gain
02-50	P.535	AO2 output bias

Group	No.	Name
02-25	P.198	The minimum input current/voltage of AI3
02-26	P.199	The maximum input current/voltage of AI3
02-27	P.196	The percentage corresponding to the minimum input current/voltage of AI3
02-28	P.197	The percentage corresponding to the maximum input current/voltage of AI3
02-34	P.548	The minimum input current/voltage of AI2
02-35	P.549	The maximum input current/voltage of AI2
02-36	P.546	The percentage corresponding to the minimum input current/voltage of AI2
02-37	P.547	The percentage corresponding to the maximum input current/voltage of AI2
02-39	P.524	DIH input minimum frequency
02-40	P.525	DIH input maximum frequency
02-41	P.522	The percentage corresponding to DIH input minimum frequency
04-20	P.132	Programmed operation mode speed 2
04-21	P.133	Programmed operation mode speed 3
04-22	P.134	Programmed operation mode speed 4
04-23	P.135	Programmed operation mode speed 5
04-24	P.136	Programmed operation mode speed 6
04-25	P.137	Programmed operation mode speed 7
04-26	P.138	Programmed operation mode speed 8
06-17	P.261	Maintenance alarm function
06-40	P.288	Alarm code query

Group	No.	Name
02-51	P.55	Frequency display reference when in the analog output
02-52	P.56	Current monitoring reference when in the analog output
02-55	P.592	PT100 voltage level 1
02-56	P.593	PT100 voltage level 2
02-59	P.187	FM calibration parameter
04-00	P.4	Speed1 (high speed)
04-01	P.5	Speed2 (mediumspeed)
04-02	P.6	Speed3 (low speed)
04-03	P.24	Speed4
04-04	P.25	Speed5
04-05	P.26	Speed6
04-06	P.27	Speed7
04-07	P.142	Speed8
04-08	P.143	Speed9
04-09	P.144	Speed10
04-10	P.145	Speed11
04-11	P.146	Speed12
04-12	P.147	Speed13
04-13	P.148	Speed14
04-14	P.149	Speed15
04-19	P.131	Programmed operation mode speed 1

Group	No.	Name
06-42	P.290	Alarm message query
08-03	P.225	PID target value panel reference
08-16	P.221	Minimum pressuresampling value
08-17	P.222	Maxmum pressure sampling value
08-18	P.223	Analog feedback bias pressure
08-19	P.224	Analog feedback gain pressure
10-19	P.230	Dwell frequency at acceleration
10-21	P.232	Dwell frequency at deceleration
10-45	P.267	Regeneration and avoidance operation selection
10-46	P.268	Regeneration and avoidance DC bus voltage level
10-47	P.269	DC bus voltage detection sensitivity at deceleration
10-48	P.270	Regeneration and avoidance frequency compensation value
10-49	P.271	Regeneration avoidance voltage gain coefficient
10-50	P.272	Regeneration avoidance frequency gain coefficient
11-12	P.401	Torque reference
14-05	P.605	Tension setting
14-45	P.657	Line speed setting

- The parameters cannot be written. (00-03="1")

Exception The parameters below can be written.

Group	No.	Name
00-03	P.77	Selection of parameters write protection

Group	No.	Name
00-16	P.79	Operation mode selection

- During operation, the parameters below can also be written.(00-03="2")

Exception During operation, the parameters below cannot be written:

Group	No.	Name
00-00	P.90	The inverter model
00-01	P.188	Firmware version
00-11	P.72	Carrier frequency
00-15	P.78	Forward / reverse rotation prevention selection
00-16	P.79	Operation mode selection
00-26	P.125	Expansion card type

Group	No.	Name
03-59	P.585	Monitor noumenon digital input terminal state
03-60	P.586	Monitor noumenon and expanded Slot 3 output terminal state
03-61	P.587	Monitor expanded Slot 2&3 digital input terminal state

Group	No.	Name
03-62	P.588	Monitor expanded Slot 2 digital output terminal state
06-01	P.22	Stall prevention operation level
06-08	P.155	Over torque detection level
06-11	P.160	Stall level when restart
06-21	P.705	Low voltage level
06-22	P.706	Regenerative brake operation level
06-23	P.707	Regenerative brake operation level
06-25	P.709	Capacitor lifetime detection level
06-27	P.292	Accumulative motor operation time (minutes)
06-28	P.293	Accumulative motor operation time (days)
06-29	P.296	Accumulative motor power time (minutes)
06-30	P.297	Accumulative motor power time (days)
06-41	P.289	Alarm code display
06-43	P.291	Alarm message display
06-44	P.740	E1
06-45	P.741	E2
06-46	P.742	E3
06-47	P.743	E4
06-48	P.744	E5
06-49	P.745	E6
06-50	P.746	E7
06-51	P.747	E8
06-52	P.748	E9
06-53	P.749	E10
06-54	P.750	E11
06-55	P.751	E12
06-56	P.752	E1 alarm output frequency
06-57	P.753	E1 alarm output current

Group	No.	Name
06-58	P.754	E1 alarm output voltage
06-59	P.755	E1 alarm the temperature rising accumulation rate
06-60	P.756	E1 alarm PN voltage
06-61	P.757	E1 alarm the time of inverter has run
06-62	P.758	E1 alarm inverter operation status code
06-63	P.759	E1 alarm (years/months)
06-64	P.760	E1 alarm (days/hours)
06-65	P.761	E1 alarm (minutes/seconds)
06-70	P.766	E2 alarm output frequency
06-71	P.767	E2 alarm output current
06-72	P.768	E2 alarm output voltage
06-73	P.769	E2 alarm the temperature rising accumulation rate
06-74	P.770	E2 alarm PN voltage
06-75	P.771	E2 alarm the time of inverter has run
06-76	P.772	E2 alarm inverter operation status code
06-77	P.773	E2 alarm (years/months)
06-78	P.774	E2 alarm (days/hours)
06-79	P.775	E2 alarm (minutes/seconds)
07-17	P.802	CANopen communication status
07-18	P.803	CANopen control status
09-13	P.124	Expansion card version
10-52	P.265	Overexcitation current level
11-13	P.402	Speed limit
11-14	P.403	Speed limit bias
14-20	P.618	Current value of curling radius
14-32	P.630	Actual line speed

- When in password protection, parameters cannot be read. (00-03="3")

Exception The parameters below can still be read:

Group	No.	Name
00-00	P.90	The inverter model
00-01	P.188	Firmware version
00-05	P.295	Password setup
00-08	P.37	Speed display
00-16	P.79	Operation mode selection
00-25	P.990	Parameter mode setting
00-26	P.125	Expansion card type
01-00	P.1	Maximum frequency
01-01	P.2	Minimum frequency
03-59	P.585	Monitor noumenon digital input terminal state

Group	No.	Name
03-60	P.586	Monitor noumenon and expanded Slot 3 output terminal state
03-61	P.587	Monitor expanded Slot 2&3 digital input terminal state
03-62	P.588	Monitor expanded Slot 2 digital output terminal state
06-25	P.709	Capacitor lifetime detection level
06-41	P.289	Alarm code display
06-43	P.291	Alarm message display
06-44	P.740	E1
06-45	P.741	E2

Group	No.	Name
06-46	P.742	E3
06-47	P.743	E4
06-48	P.744	E5
06-49	P.745	E6
06-50	P.746	E7
06-51	P.747	E8
06-52	P.748	E9
06-53	P.749	E10
06-54	P.750	E11
06-55	P.751	E12
06-56	P.752	E1 alarm output frequency
06-57	P.753	E1 alarm output current
06-58	P.754	E1 alarm output voltage
06-59	P.755	E1 alarm the temperature rising accumulation rate
06-60	P.756	E1 alarm PN voltage
06-61	P.757	E1 alarm the time of inverter has run
06-62	P.758	E1 alarm inverter operation status code
06-63	P.759	E1 alarm(years/months)

Group	No.	Name
06-64	P.760	E1 alarm (days/hours)
06-65	P.761	E1 alarm (minutes/seconds)
06-70	P.766	E2 alarm output frequency
06-71	P.767	E2 alarm output current
06-72	P.768	E2 alarm output voltage
06-73	P.769	E2 alarm the temperature rising accumulation rate
06-74	P.770	E2 alarm PN voltage
06-75	P.771	E2 alarm the time of inverter has run
06-76	P.772	E2 alarm inverter operation status code
06-77	P.773	E2 alarm (years/months)
06-78	P.774	E2 alarm (days/hours)
06-79	P.775	E2 alarm (minutes/seconds)
07-17	P.802	CAN open communication status
07-18	P.803	CAN open control status
09-13	P.124	Expansion card version
14-20	P.618	Current value of curling radius
14-32	P.630	Actual line speed

Settin Password protection

- Registering a password
  1. Write a number (2~65535) in 00-05as a password, password protection takes effect immediately;
  2. After registering a password,00-05=1;
- Unlocking password protection
  1. Write the correct password in 00-04, and then password protection will be unlocked;
  2. After unlocking the password, 00-04=0, 00-05=1;
  3. If turn the inverter power off and then turn on, it will still restore to the password protection status.
- Password all clear
  1. Write the correct password in 00-04 to unlock the password protection;
  2. Write 0 in 00-05, password will be all cleared.

Note: Please keep the password properly. Bring the inverter to the factory for decryption if the password is forgotten.

5.1.4 Monitoring function

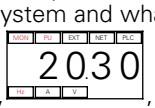
- The item to be displayed on the parameter unitcan beselected.

Parameter	Name	Factory Value	Setting Range	Content
00-06 P.110	Parameter unit monitoring selection	1	X0	When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency.
			X1	When the inverter starts, the screen of the parameter unit displays the target frequency.

Parameter	Name	Factory Value	Setting Range	Content
00-06 P.110	Parameter unit monitoring selection	1	X2	When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system
			0X	Boot screen to monitor model output frequency
			1X	Boot screen to set the target frequency mode
			2X	Boot screen to monitor model of output current
			3X	Boot screen to monitor mode of the output voltage
00-07 P.161	Multi-function display	0	0	Output voltage (V)
			1	Inverter voltage between (+/P) and (-/N) terminals (V)
			2	Temperature rising accumulation rate of inverter (%)
			3	Target pressure of the constant pressure system (%)
			4	Feedback pressure of the constant pressure system (%)
			5	Operation frequency (Hz)
			6	Electronic thermal accumulation rate (%)
			7	Signal value (V) of AI1 simulating input terminals
			8	Signal value (mA) of AI3 simulating input terminals (mA/V)
			9	Output power (kW)
			10	PG card's feedback rotation speed. (Hz)
			11	Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state
			12	NTC temperature (°C)
			13	Electronic thermal accumulation rate of motor (%)
			14	Reserve
			15	Input frequency of terminal DIH (kHz)
			16	Real-time curling radius value (mm)
			17	Real-time line speed (m/min)
			18	Output torque of inverter (%)(Validonly when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6)
			19	Digital terminal input state
			20	Digital terminal output state
			21	Actual working carrier frequency
			22	Signal value (mA) of AI2 simulating input terminals. (mA/V)
			23	Synchronousmotor rotor pole position (Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective)
			24	Current target frequency
			25	PTC enter the percentage
			26	Target pressure and feedback the constant pressure system
			27	Motor speed

Note: 1. The "output frequency" here is the value after slip compensation.
2. Set the boot screen for the target frequency mode, the "FWD" or "REV" or "STOP" button will cut images for the target frequency setting mode.
3.The multi-function display selection is realized in the monitoring voltage mode. Please refer to Section 4.2.3 for monitoring mode selection.
4. Please refer to 5.4.15 for the sort of terminal, 03-59 (P.585) for digital terminal input state, 03-60 (P.586) for digital output teriminal state.

Display Parameter unitmonitoring selection

- Display the current target pressure and feedback pressure of the constant pressure system (00-06="3").
  At this point, the screen display shows two sections. A decimal point is used to separate the boundaries. What is on the left is the target pressure of the constant pressure system and what is on the right is the feedback pressure of the constant pressure system. As is shown in this figure, 

, 20 denotes that the target pressure of the constant pressure system is 2.0kg/cm^3; 30 denotes that the feedback pressure of the constant pressure system is 3.0kg/cm^3.

Display Multi-function display

- The multi-function display selection is realized in the monitoring voltage mode. Please refer to 4.2.3. The operation flow charts for monitoring mode with DXF-KEY-LED for for monitoring mode selection.

5.1.5 Speed display

- In the mode of "monitoring output frequency", the screen displays the corresponding machine speed.

Parameter	Name	Factory Value	Setting Range	Content
00-08 P.37	Speed display	0.0	0	0: Display output frequency(the mechanical speed is not displayed)
			0.1~5000.0	When 00-09=1
			1~50000	When 00-09=0
00-09 P.259	Speed unit selection	1	0	0: Speed display selection unit is 1
			1	1: Speed display selection unit is 0.1

Settin Speed display

- The setting value of 00-08 is the machine speed of the inverter when its output frequency is 60Hz. For example:
  1. If the transmitting belt speed is 950 m/minute when the inverter output frequency is 60Hz, set 00-08 = 950.
  2. After setting, in the "output frequency monitoring mode" of parameter unit, the screen will display the speed of the transmitting belt.

Note: The machine speed on the screen is the theoretical value calculated proportionately by the inverter output frequency and the setting value of 00-08. So there's minute discrepancy between the displayed machine speed and the actual one.

5.1.6 PWMcarrier frequency

- The motor sound can be changed by adjusting PWM carrier frequency properly.

Parameter	Name	Factory Value	Setting Range	Content
00-11 P.72	Carrier frequency	5kHz	1~15 kHz	Frame 1/2/3
		4kHz	1~9 kHz	Frame 4/5
		2kHz	1~9 kHz	Frame 6/7
		2kHz	1~3 kHz	Frame 8
00-12 P.31	Soft-PWM carrier operation selection	0	0	None Soft-PWM operation
			1	When 00-11 (P.72)< 5, Soft-PWM is valid (only apply to V/F control)

Settin Carrier frequency

- The higher the carrier frequency, the lower the motor acoustic noise. Unfortunately, it will result in greater leakage current and larger noises generated by the inverter.
- The higher the carrier frequency, the more energy dissipated, and the higher the temperature of the inverter.
- In case of a mechanical resonance occurring in a system within the inverter, P.72 is helpful for improving the performance by adjusting its value.

Note: The optimum carrier frequency shall be 8 times greater than the target frequency.

Settin Carrier operation selection ***V/F***

- Soft-PWM control is a control method that changes the motor noise from a metallic sound into an inoffensive, complextone.
- Motor noise modulation control is when the inverter varies its carrier frequency from time to time during the operation. The metal noises generated by the motor are not a single frequency. This function selection is to improve the high peak single frequency noises.
- This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

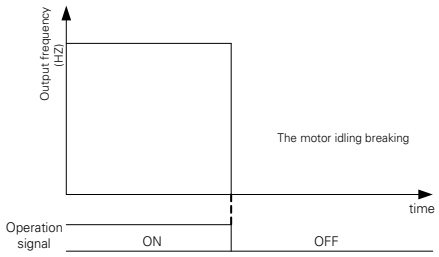
5.1.7 Stop operation selection

- Select the inverter stop operation.

Parameter	Name	Factory Value	Setting Range	Content
00-13 P.71	Idling braking / DC braking	1	0	Idling braking
			1	DC braking
00-14 P.75	STOP RESET function selection	1	0	Press STOP RESET button and stop the operation only in the PU and H2 (combined mode 2) mode
			1	Press STOP RESET button and stop the operation in all mode.

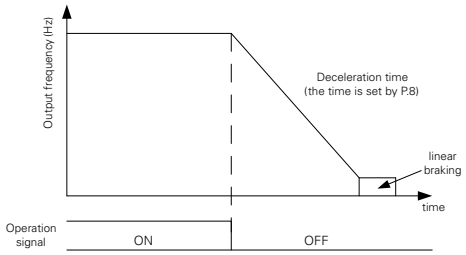
Settin Idling braking / linear braking

- Idling braking (00-13="0")
  The inverter will terminate the output immediately after the stop siganl is accepted, and the motor will be "racing"



- Linear braking(00-13="1")

  The output of the inverter will follow the acceleration / deceleration curve to decelerate until stop after the stop signal is accepted.



Settin STOP/RESET Button function selection

- STOP/RESET to stop the operation.(00-14="1")

  Noticeln any modes except the PU and the H2 mode, the motor can be stopped by pressing STOP/RESET. The inverter then displays E0 and all functions of the inverter are disabled. To unlock the state, follow the procedures below:

  1. If the start signal is the digital input terminal, it is necessary to cancel the digital input start signal given(Note1);
  2. Press STOP/RESET button for over 1.0 second to remove E0 state.

- No matter in which setting, press STOP/RESET button for over 1.0 second to reset the inverter after the alarm occurs.

Note: 1. In the programmed operation mode, it is not necessary to cancel the start signal.The inverter will run at the section where it stopped after reset.)
2.After resetting the inverter, the values of the two relays of "electronic thermal relay" and "IGBT module thermal relay" will be set to zero.

5.1.8 Forward/reverse rotation prevention selection

- Set this parameter to limit the motor rotation to only one direction, and prevent reverse rotation fault resulting from the incorrect input of the start signal.

Parameter	Name	Factory Value	Setting Range	Content
00-15 P.78	Forward/reverse rotation prevention selection	0	0	Forward rotation and reverse rotation are both permitted.
			1	Reverse rotation is prohibited (Press the reversereference to decelerate and stop the motor).
			2	Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor).

Note: It is valid to all start signals.

5.1.9 Operation mode selection

- Select the operation mode of the inverter, and determine the source of start signal and target frequency.

Parameter	Name	Factory Value	Setting Range	Content
00-16 P.79	Operation mode selection	0	0	"PU mode", "external mode" and "Jog mode" are interchangeable.
			1	"PU mode" and "JOG mode" are interchangeable.
			2	"External mode" only
			3	"Communication mode" only
			4	"Combined mode 1"
			5	"Combined mode 2"
			6	"Combined mode 3"
			7	"Combined mode 4
			8	"Combined mode 5"
			99999	The second operation mode, operating instruction is set by 00-18 (P.109), the target frequency is set by 00-17 (P.97)
00-17 P.97	The second target frequency selection	0	0	Frequency set by parameter unit
			1	Frequency set by Communication RS485
			2	Frequency set by the analog
			3	Frequency set by communication expansion card
			4	Frequency set by PG board A2B2
			5	Frequency set by DIHpulse
00-18 P.109	The second start signal selection	0	0	Operating signal set by parameter unit
			1	Operating signal set by digital input terminal
			2	Operating signal set by Communication RS485
			3	Operating signal set by communication expansion card
00-19 P.35	Communication mode instruction selection	0	0	Incommunication mode, operating instruction and setting frequency is set by communication.
			1	Incommunication mode, operating instruction and setting frequency is set by external.

Settin Operation mode selection

- Please refer to Section 4.3 for the detailed setting and usage.

Settin Communication mode instruction selection

- When 00-16=3, select communication mode:
  1. If 00-19=0, operating instruction and speed instruction is set by communication;
  2. If 00-19=1, operating instruction and speed instruction is set by external.

5.1.10 Control mode selection

- Select the control mode by setting 00-20(P.400).

Parameter	Name	Factory Value	Setting Range	Content
00-20 P.400	Control mode selection	0	0	Speed control
			1	Torque control
			2	Position control

Settin Control mode selection

- When 00-20=0, the torque control is invalid and the inverter will do the general close-loop vector speed control; when 00-20=1, the torque control is valid and the inverter will do the torque control. When the torque control is valid, the inverter need to work in the mode of close-loop vector control and the speed encoder must be installed. And if the Torque reference is larger than the load torque, the motor will accelerate until the motor speed is equal to the speed limit. Now the inverter will switch to speed control mode to avoid accelerating the motor continually.
- When 00-20control mode selection is used in concert with digital input function, please set as the following sheet.

Settin Communication mode instruction selection

- When 00-16=3, select communication mode:
  1. If 00-19=0, operating instruction and speed instruction is set by communication;
  2. If 00-19=1, operating instruction and speed instruction is set by external.

00-20	Digital input function		Control mode
	Switch of speed/torque control	Switch of position/speed control	
0	Not set	Not set	Speed control
1	Not set	Not set	Torque control
2	Not set	Not set	Position control
0	Setting, correspondent terminal ON	---	Torque control
0	Setting, correspondent terminal OFF	---	Speed control
2	---	Setting, correspondent terminal ON	Position control
2	---	Setting, correspondent terminal OFF	Speed control

5.1.11 Motor control mode selection

- Determine the control mode of the selected AC motor inverter.

Parameter	Name	Factory Value	Setting Range	Content
00-21 P.300	Motor control mode selection	0	0	Induction motor V/F control
			1	Induction motor close-loop V/F control (VF + PG)
			2	Induction motor simple vector control
			3	Induction motorsensorless vector control
			4	Induction motor PG vector control
			5	Synchronous motor PG vector control
			6	Synchronous motor without PG vector control
00-22 P.370	The second motor control mode selection	99999	0	Induction motor V/F control
			1	Induction motor V/F close-loop control (VF+PG)
			2	Induction motor simple vector control
			3	Induction motorsensorless vector control
			4	Induction motor PG vector control
			5	Synchronous motor PG vector control
			6	Synchronous motor without PG vector control
			99999	The second motor control mode is not selected.

Settin Motor control mode

- Induction motor V/F control: user can design proportion of V/F as required and can control multiple motors simultaneously.
- Induction motor close-loop V/F control (VF + PG): user can use optional PG card with encoder for the closed-loop speed control.
- Induction motor simple vector control: The frequency will be altered due to elevated voltage and increased compensatory motor load.
- Induction motor sensorless vector control: get the optimal control by the auto-tuning of motor parameters.
- Induction motor PG vector control: besides torque increases, the speed control will be more accurate.
- Synchronous motor PG vector control: besides torque increases, the speed control will be more accurate.
- Synchronous motor without PG vector control: get the optimal control by the auto-tuning of motor parameters.

Note: 1. The motor capacity has to be at the same level or one level below of the level of the capacity of the inverter.

2. Sensorless vector control: Auto-tuning function can be used to enhance the control function. Before setting 00-21= 3 or 4, first set the motor parameters or the auto-tuning function to improve the control accuracy.

3. When 00-21=1 and the mode of close-loop V/F control (VF+PG) is selected, please make sure that the motor poles 05-02 is correct.

4. When 10-03 (P.151) =1, zero-speed operation is executed under the motor closed-loop control; DC voltage brake is executed under the IM motor V/F closed-loop control.

5. When 00-22 ≠ 99999, and RTsignal is ON, the second motor parameter 05-22~05-38 is valid, please refer to Section 5.2.10 for the second function parameter.

6. RT metioned here is the function name of "multi-function digital input terminal". Please refer to 03-00~03-05/P.80~P.84, P.86, 03-06 (P.126), 03-09 (P.550) for the function selection of multi-function digital input terminal; please refer to Section 3.3 for related wiring.

5.1.12 Motor types selection

- Modify the load pattern of the inverter.

Parameter	Name	Factory Value	Setting Range	Content
00-23 P.186	Motor types selection	1	0	Normal Duty (ND), apply to the fans and water pump type duty.
			1	Heavy Duty (HD), apply to other duties.

Settin Motor types selection

- If setting Normal Duty (00-23="0"), please execute the following steps. Load pattern will be switched after the steps.
  1. Set 00-23=0;
  2. Execute 00-02 to return to the default value;
  3. Execute the reset function of 00-02.

5.1.13 50/60Hz switch selection

- According to different power frequency and the default motor frequency, frequency-related parameters which are 50Hz or 60Hz can be selected.

Parameter	Name	Factory Value	Setting Range	Content
00-24 P.189	50/60Hz switch selection	0	0	The frequency parameter default valueis 60Hz system.
		1	1	The frequency parameter default valueis 50Hz system.

Settin 50/60Hz switch selection

- If the customer would like to set frequency related parameter to 60Hz system (00-24="0"), please follow the following two steps.
  1. Set 00-24=0;
  2. Set 00-02 to the factory default value (at this point, frequency-related parameters of the inverter will be reset to 60Hz.
- The affected parameters are as follows:

Group	No.	Name
01-03	P.3	Base frequency
01-09	P.20	Accelerate/decelerate reference frequency
02-09	P.38	AI1 maximum operation frequency
02-21	P.39	The maximum operation frequency of terminal AI3
02-30	P.508	The maximum operation frequency of terminal AI2

Group	No.	Name
02-51	P.55	Frequency display reference when in the analog output
05-03	P.304	Motor rated voltage
05-04	P.305	Motor rated frequency
05-06	P.307	Motor rated rotation speed
06-03	P.66	Stall prevention operation reduction starting frequency
10-41	P.701	VF separated voltage digital

5.1.14 Parameter mode setting

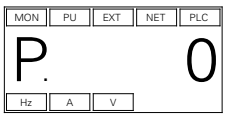
- Select "order number" or "parameter group" to display parameters.

Parameter	Name	Factory Value	Setting Range	Content
00-25 P.990	Parameter mode setting	0	0	Parameter is displayed as "group mode"
			1	Parameter is displayed as "conventional P mode"

Display Parameter mode setting

- "Parameter group" displaying

- "Order number" displaying



5.1.15 Expansion card type display

- This parameter is used to check the expansion card type, and cannot be modified.

Parameter	Name	Factory Value	Setting Range	Content
00-26 P.125	Expansion card type	Read	Read	It is used to display the current expansion card type, for read only.

Read The current expansion card type

- High level is for all no card status, i.e, all the bits are 1.
- The definition of each bit of 00-26 (P.125) is as follows:

bit

2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
SLOT3				SLTO2				SLOT1			

- The values for all kinds of expansion cards are as the following table:

Expansion card type	Model	Expansion card
Communication Expansion card	DXF-NET-DP	0 1 0 1
	DXF-NET-DN	1 0 0 1
	DXF-NET-ECAT	1 1 0 1
	DXF-NET-CAN	1 1 0 1
	DXF-NET-ET	0 0 1 1
I/OExpansion card	DXF-EXT-6DI2RO	1 0 1 0
	DXF-EXT-8RO	0 1 1 0
PGExpansion card	DXF-ENC-301C	0 0 0 0
	DXF-ENC-301L	0 0 0 1
	DXF-ENC-302L	0 0 1 0

For example: Insert DXF-NET-CAN into SLOT1, insert DXF-ENC-302L into SLOT2, and insert DXF-EXT-8RO into SLOT3, the read-out value of 00-26 (P.125) is as follows:

bit

2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	1	1	0	0	0	1	0	1	1	0	1

So 00-26 =0×211 + 1×210 + 1×29 + 0×28 + 0×27 + 0×26 + 1×25 + 0×24 + 1×23 + 0×22 + 0×21 + 0×20=1581

Note: SLOT1 is only for communication expansion card; SLOT2 is for PG and IO expansion card; SLOT3 is only for IO expansion card. It will display alarm if the expansion card is inserted into the wrong slot. Please refer to 6.1 Appendix 2: Alarm code list.

5.2 Basic parameter group 01

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
01-00	P.1	Maximum frequency	55K/75KF and types below: 0.00~01-02 (P.18) Hz	120.00Hz	
			75K/90KF and types above: 0.00~01-02 (P.18) Hz	60.00Hz	
01-01	P.2	Minimum frequency	0~120.00 Hz	0.00Hz	
01-02	P.18	High-speed maximum frequency	01-00 (P.1) ~ 650.00 Hz	120.00Hz	
01-03	P.3	Base frequency	50Hz system setting: 0~650.00 Hz	50.00Hz	
			60Hz system setting: 0~650.00 Hz	60.00Hz	
01-04	P.19	Base frequency voltage	0~1000.0 V	99999	
			99999: Change according to the input voltage		
01-05	P.29	Acceleration/deceleration curve selection	0: Linear acceleration / deceleration curve	0	
			1: S pattern acceleration / deceleration curve 1		
			2: S pattern acceleration / deceleration curve 2		
			3: S pattern acceleration / deceleration curve 3		
01-06	P.7	Acceleration time	3.7K/5.5KF and types below: 0~360.00s/0~3600.0s	5.00s	
			5.5K/7.5KF and types above: 0~360.00s/0~3600.0s	20.00s	
01-07	P.8	Deceleration time	3.7K/5.5KF and types below: 0~360.00s/0~3600.0s	5.00s	
			5.5K/7.5K~7.5K/11KF types: 0~360.00s/0~3600.0s	10.00s	
			11K/15KFand types above: 0~360.00s/0~3600.0s	30.00s	
01-08	P.21	Acceleration/deceleration time increments	0: Time increment is 0.01s	0	
			1: Time increment is 0.1s		
01-09	P.20	Acceleration/deceleration reference frequency	50Hz system setting: 1.00~650.00Hz	50.00Hz	
			60Hz system setting: 1.00~650.00Hz	60.00Hz	
01-10	P.0	Torque boost	0.75K/1.5KF types: 0~30.0%	6.0%	
			1.5K/2.2KF~3.7K/5.5KF types: 0~30.0%	4.0%	
			5.5K/7.5KF~7.5K/11KF types: 0~30.0%	3.0%	
			11K/15KF~55K/75KF types: 0~30.0%	2.0%	
			75K/90KF and types above: 0~30.0%	1.0%	
01-11	P.13	Starting frequency	0~60.00Hz	0.50Hz	
01-12	P.14	Load pattern selection	Applicable to constant torque loads (convey belt,etc.)	0	
			Applicable to variable torque loads (fans and pumps, etc.)		
			Applicable to ascending / descending loads		
			Multipoint VF curve		
			Special two-point VF curve		
			V/F complete detached mode		
			V/F semidetached mode		
01-13	P.15	JOG frequency	0~650.00Hz	5.00Hz	
01-14	P.16	JOG acceleration/ decelerationtime	0~360.00s/0~3600.0s	0.50s	
01-15	P.28	Output frequency filter time	0~1000ms	0ms	
01-16	P.91	Fequency jump 1A	0~650.00Hz	99999	
			99999: invalid		
01-17	P.92	Fequency jump 1B	0~650.00Hz	99999	
			99999: invalid		
01-18	P.93	Fequency jump 2A	0~650.00Hz	99999	
			99999: invalid		
01-19	P.94	Fequency jump 2B	0~650.00Hz	99999	
			99999: invalid		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
01-20	P.95	Fequency jump 3A	0~650.00Hz 99999: invalid	99999	
01-21	P.96	Fequency jump 3B	0~650.00Hz 99999: invalid	99999	
01-22	P.44	The second acceleration time	0~360.00s/0~3600.0s 99999: Not selected	99999	
01-23	P.45	The second decelerationtime	0~360.00s/0~3600.0s 99999: Not selected	99999	
01-24	P.46	The second torque boost	0~30.0% 99999: Not selected	99999	
01-25	P.47	The second base frequency	0~650.00Hz 99999: Not selected	99999	
01-26	P.98	Middle frequency 1	0~650.00Hz	3.00Hz	
01-27	P.99	Output voltage 1 of middle frequency	0~100.0%	10.0%	
01-28	P.162	Middle frequency 2	0~650.00Hz 99999: Not selected	99999	
01-29	P.163	Output voltage 2 of middle frequency	0~100.0%	0.0%	
01-30	P.164	Middle frequency 3	0~650.00Hz 99999: Not selected	99999	
01-31	P.165	Output voltage 3 of middle frequency	0~100.0%	0.0%	
01-32	P.166	Middle frequency 4	0~650.00Hz 99999: Not selected	99999	
01-33	P.167	Output voltage 4 of middle frequency	0~100.0%	0.0%	
01-34	P.168	Middle frequency 5	0~650.00Hz 99999: Not selected	99999	
01-35	P.169	Output voltage 5 of middle frequency	0~100.0%	0.0%	
01-36	P.255	S pattern time at the beginning of acceleration	0~25.00s/0~250.0s	0.20s	
01-37	P.256	S pattern time at the end of acceleration	0~25.00s/0~250.0s 99999: Not selected	99999	
01-38	P.257	S pattern time at the beginning of deceleration	0~25.00s/0~250.0s 99999: Not selected	99999	
01-39	P.258	S pattern time at the end of deceleration	0~25.00s/0~250.0s 99999: Not selected	99999	

5.2.1 Limiting the output frequency

- Output frequency can be limited. Clamp the output frequency at the upper and lower limits.

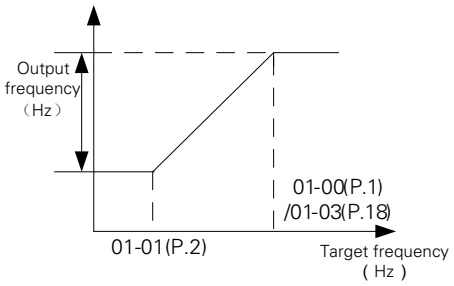
Parameter	Name	Factory Value	Setting Range	Content
01-00 P.1	Maximum frequency	120.00Hz	0.00~01-02(P.18)Hz	55K/75KF and types below
		60.00Hz		75K/90KF and types above
01-01 P.2	Minimum frequency	0.00Hz	0~120.00Hz	Output minimum frequency
01-02 P.18	High-speed maximum frequency	120.00Hz	01-00 (P.1) ~650.00Hz	Set when above 120Hz

Settin Maximum frequency, high-speed maximum frequency

- The "maximum frequency" and the "high-speed maximum frequency" are interrelated:
  1. If the target upper limit frequency is set below 01-00(P.1), use 01-00 as the maximum frequency;
  2. If the target frequency limited to between 120~650Hz, use 01-02 as the maximum frequency.
- If 01-00< 01-01, the steady output frequency will be clamped to01-00.
- When setting the target frequency in PU mode, the set frequency value cannot exceed the value of01-00.

Settin Minimum frequency

- If the target frequency≤01-01, the steady output frequency equals to = 01-01.
- If 01-01<target frequency≤01-00(01-03), the steady output frequency equals to target frequency.



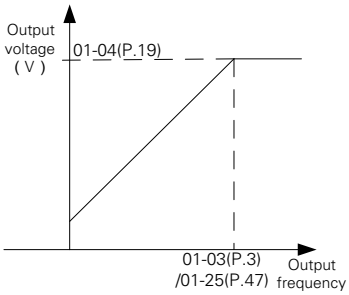
5.2.2 Base frequency, basefrequency voltage

- Use this function to adjust the inverter outputs (voltage, frequency) to match with the motor rating

Parameter	Name	Factory Value	Setting Range	Content
01-03 P.3	Base frequency	50.00Hz	0.00~650.00Hz	50Hz system (00-24=1)
		60.00Hz		60Hz system (00-24=0)
01-04 P.19	Base frequency voltage	99999	0~1000.0V	Set the base frequency voltage according to the motor rating.
			99999	The base frequency voltage is equal to the power source voltage.

Settin Base frequency

- Generally set the rated frequency of the motor in 01-03.
  When the frequency on the motor rating plate is only "50 Hz", make sure to set to "50 Hz". When it is set to "60 Hz", thevoltage will drop too much, causing insufficient torque. As a result, the inverter may trip due to overload.
- When themotor operation require switching to the commercial power supply, set the commercial power supply in 01-03.



Note: Please refer to 5.2.10 The second function for the second base frequency.

Settin Base frequency voltage

- If the output frequency is lower than the base frequency, the output voltage of the inverter will increase with output frequency. If the output frequency has reached the base frequency (01-03), the output voltage will just be equal to the base frequency voltage. If the output frequency exceeds the base frequency and increase continuously, the output voltage will be clamped to the base frequency voltage.Please refer to 5.2.10 The second function for the second base frequency.

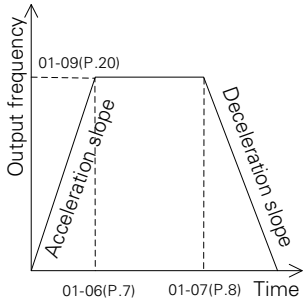
5.2.3 Acceleration/deceleration time setting

- Use this function to set motor acceleration/deceleration time

Parameter	Name	Factory Value	Setting Range	Content
01-05 P.29	Acceleration/deceleration curve selection	0	0	Linear acceleration / deceleration curve
			1	S pattern acceleration / deceleration curve 1 (Note 1)
			2	S pattern acceleration / deceleration curve 2 (Note 2)
			3	S pattern acceleration / deceleration curve 3 (Note 3)
01-06 P.7	Acceleration time	5.00s	0~360.00s 0~3600.0s	3.7K/5.5KF and types below
		20.00s		5.5K/7.5KF and types above
01-07 P.8	Deceleration time	5.00s	0~360.00s 0~3600.0s	3.7K/5.5KF and types below
		10.00s		5.5K/7.5KF~7.5K/11KF types
		30.00s		11K/15KF and types above
01-08 P.21	Acceleration/deceleration time increments	0	0	Time increment is 0.01s
			1	Time increment is 0.1s
01-09 P.20	Acceleration/deceleration reference frequency	50.00Hz	1.00~650.00Hz	50Hz system setting (00-24=1)
		60.00Hz		60Hz system setting (00-24=0)

Settin Acceleration/deceleration curve selection

- Linear acceleration /deceleration curve(01-05="0")
  An acceleration slope is constructed by the combination of 01-06 and 01-09. A deceleration slope is constructed by the combination of 01-07 and 01-09.
  When the target frequency varies, it increases with the "acceleration slope" or decreases with the "deceleration slope" linearly. See the figure below:



- S pattern acceleration /deceleration curve 1(01-05="1")

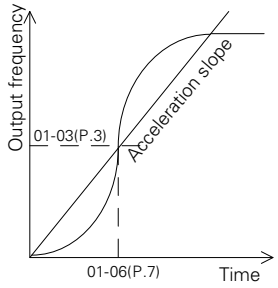
  An acceleration slope is constructed by the combination of 01-06and 01-03. A deceleration slope is constructed by the combination of 01-07 and 01-03.

  The acceleration / deceleration curve has an S-shape change according to the "acceleration / deceleration slope".

  The S-shape equation between 0 and 01-03(P.3) is: $f = [1 - \cos(\frac{90° \times t}{P.7})] \times P.3$

  The S-shape equation of 01-03(P.3) or above is: $t = \frac{4}{9} \times \frac{P.7}{(P.3)^2} \times f^2 + \frac{5}{9} \times P.7$

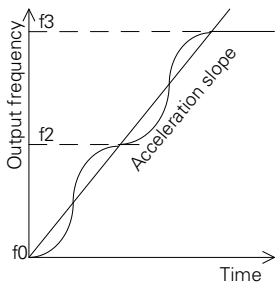
  t = time; f = output frequency



- S pattern acceleration /deceleration curve 2(01-05="2")

  An acceleration slope is formed by the combination of 01-06 and 01-09. A deceleration slope is formed by the combination of 01-07 and 01-09.

  When the target frequency varies, the acceleration curve has an S-shape ascending according to the "acceleration slope". The deceleration curve on the other hand has an S-shape deceleration according to the "deceleration slope". As shown in the figure below, when the setting value of the inverter is adjusted from f0 to f2, an S-shape acceleration is undertaken once, and the time is 01-06×(f2-f0)/01-09. Then if the frequency is set from f2 to f3, a second S-shape acceleration is experienced, and the time is 01-06×(f3-f2)/01-09.



- S pattern acceleration / deceleration curve 3(01-05="3")
  Please refer to 5.2.12 Spattern time setting.

Settin Acceleration / deceleration time increments

- When 01-08=0, minimum acceleration / deceleration time (01-06、01-07、01-14、01-22、01-23、04-35~04-42) increment is0.01s.
- When 01-08=1, minimum acceleration / deceleration time (01-06、01-07、01-14、01-22、01-23、04-35~04-42) increment is 0.1s.

Settin Acceleration / deceleration reference frequency

- When the output frequency of the inverter is accelerated from 0Hz to01-09, the required time is defined as "acceleration time".
- When the output frequency of the inverter is decelerated from 0Hz to 01-09, the required time is defined as "deceleration time".

Note: 1. S pattern acceleration /deceleration curve 1 is used when acceleration/deceleration is required for a short time until a high-speed area equal to or higher than thebase frequency, such as for the main shaft of the machine.

2. S pattern acceleration / deceleration curve 2 can effectively reduce motor vibration during the acceleration / deceleration, and thus prevent the belts and gears from broken.

3. S pattern acceleration / deceleration curve 3 is used to start the inverter gradually without impact.

4. Please refer to Section 5.2.10 The second function for the second acceleration/deceleration time.

5. When RT is "on", the second function is valid. For the operation characteristics of the motor, please refer to Section 5.2.10.RT mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

5.2.4 Torque boost *V/F*

- For an inverter controlled by V/F mode, when the motor starts up, the starting torque is usually inadequate since the output voltage of the inverter is inadequate. In this case, the output voltage can be elevated by properly setting the torque boost (01-10), and thus a better starting torque can be acquired.

Parameter	Name	Factory Value	Setting Range	Content
01-10 P.0	Torque boost	6.0%	0~30.0%	0.75K/1.5KF types
		4.0%		1.5K/2.2KF~3.7K/5.5KF types
		3.0%		5.5K/7.5KF~7.5K/11KF types
		2.0%		11K/15KF~55K/75KF types
		1.0%		75K/90KF and types above

Settin Torque boost

- If 01-10=6% and 01-04=220V, and when output frequency of the inverter is 0.2Hz, the output voltage is:

$$P.19 \times \left(\frac{100\% - P.0}{P.3} \times f + P.0 \right) = 220V \times \left(\frac{100\% - 6\%}{50Hz} \times 0.2Hz + 6\% \right) = 14.03V$$

- If RT is "on," "the second torque boost" on 01-24 is valid (Note 2).

Note: 1. If the set value of 01-10 is too high, it will activate current inverter protection or the activation will be impeded.
2. Please refer to Section 5.2.10 for the second torque boost.
3. RT mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

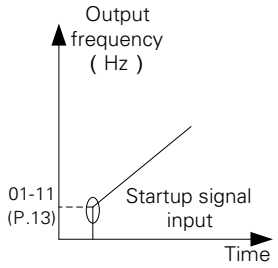
5.2.5 Starting frequency

- When the motor starts up, the instantaneous output frequency of the inverter is called "starting frequency".

Parameter	Name	Factory Value	Setting Range	Content
01-11 P.13	Starting frequency	0.50Hz	0~60.00Hz	---

Settin Starting frequency

- If the target frequency of the inverter is lower than the setting value of 01-11, the motor will not run. When the signal of the motor starts, the output frequency will go up from the value of 01-11.



5.2.6 Load pattern selection *V/F*

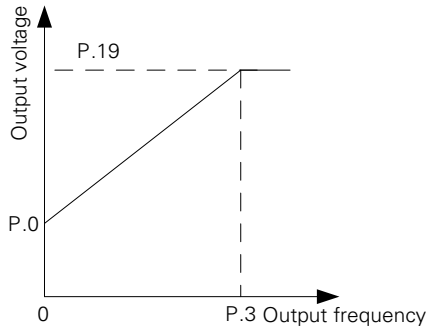
- Optimal output characteristics for application or load characteristics can be selected when in V/F control.

Parameter	Name	Factory Value	Setting Range	Content
01-12 P.14	Load pattern selection	0	0	Applicable to constant torque loads (convey belt, etc.)
			1	Applicable to variable torque loads (fans and pumps, etc.)
			2、3	Applicable to ascending / descending loads
			4	Multipoint VF curve
			5~13	Special two-point VF curve
			14	V/F complete detached mode
			15	V/F semidetached mode

Settin Load pattern selection

- When 01-12=4, suppose that 01-04=220V, 01-26=5Hz, 01-27=10%, when the inverter is running at5Hz, the output voltage equals to 01-04×01-27=220V×10%=22V.
- If RT is "on", 01-24 "the second torque boost" is valid.

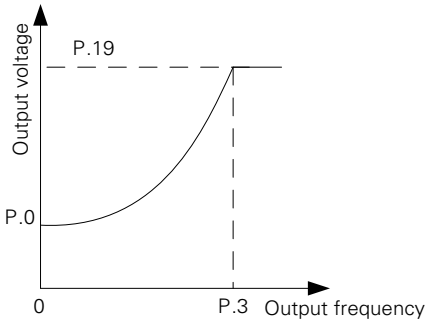
01-12 = 0



Applicable to constant torque loads

(convey belt, etc.,)

01-12 = 1



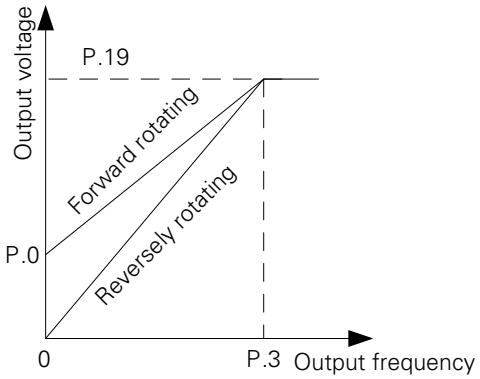
Applicable to variable torque loads

(Fans and pumps, etc.)

Curve equation of output voltage and output frequency is:

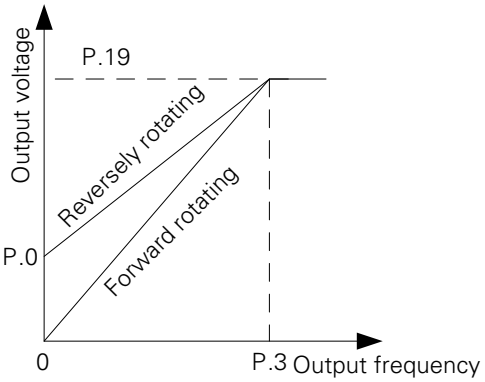
$$V = \frac{(\text{Base voltage}-\text{Base voltage}*P.0)* \text{Output frequency}^2 +}{\text{Base frequency}^2} \text{ Base voltage}* P.0$$

01-12 = 2



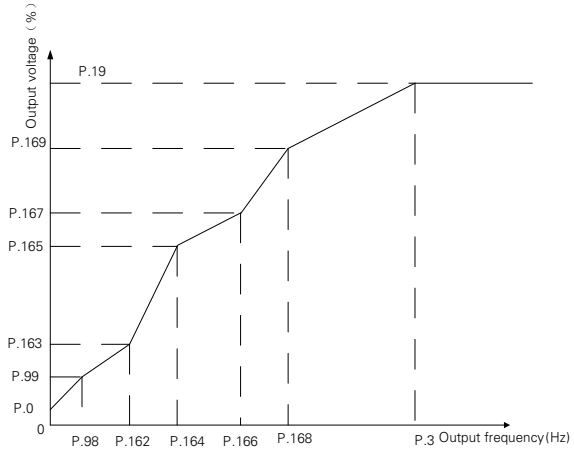
Ascending / descending loads

01-12 = 3



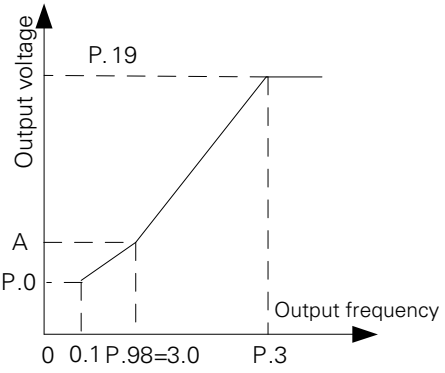
Ascending / descending loads

01-12 = 4



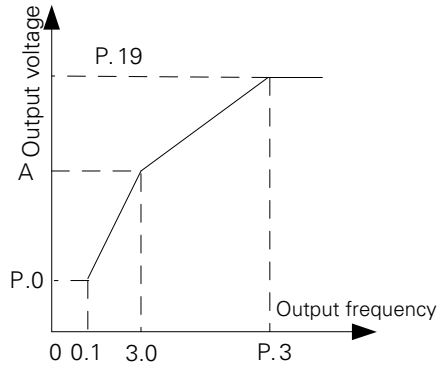
Whether it is high startup torque or descending torque, they are due to the set values (Note 1).

01-12=5



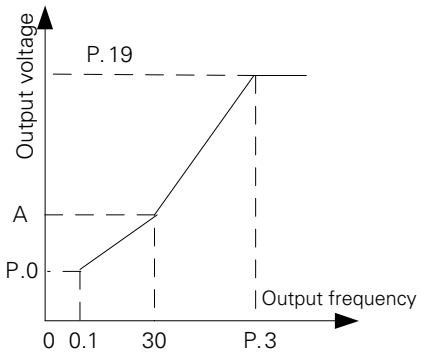
When P.14 = 5, the value of A is 7.1% (Note 2).

01-12 = 6, 7, 8



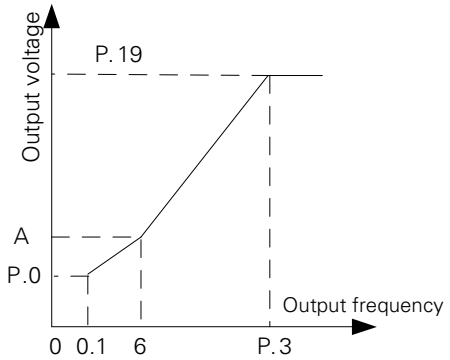
When 01-12=6, the value of A is 8.7%. When 01-12=7, the value of A is 10.4%. When01-12=8, the value of A is 12.0%.(Note 2)

01-12 = 9, 10



When P.14=9, the value of A is 20.0%. When P.14=10, the value of A is 25.0%.(Note 2)

01-12 = 11, 12, 13



When 01-12 = 11, the value of A is 9.3%. When 01-12 = 12, the value of A is 12.7%. When 01-12 = 13, the value of A is 16.1%. (Note 2)

Note: 1. Referring to the diagrams above, set 01-26 and 01-27, if one point is needed. Set 01-26, 01-27, 01-28 and 01-29 if two points are needed. 01-26, 01-27, 01-28, 01-29, 01-30 and 01-31 if three points are needed.

2. If you set 01-12 between 5 and 13, the curve will be invalid when 01-10 is larger than the point A, where point A equals to 01-10.

- VF complete separation (01-12="14")

  In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source(00-16), and the output voltage is determined by "Voltage source for V/F separation" (10-40).For the details, please refer to Section 5.11.13 V/F complete separation.

- V/F half separation (01-12="15")

  In this mode, V and F are proportional and the proportional relationship can be set by external analog terminal or DIH terminal. The relationship between V and F are also related to the rated motor voltage and rated motor frequency.

  In this mode, the relationship between V and F is: V/F=2*X*(rated motor voltage)/(rated motor frequency).

  X is set byexternal analog terminal function, and the range is 0-100%.

Note: VF curveseparation is suitable for all kinds of variable frequency power supply occasions, but the user must be careful when setting and adjusting parameters, inappropriate settings may cause damage to the machine.

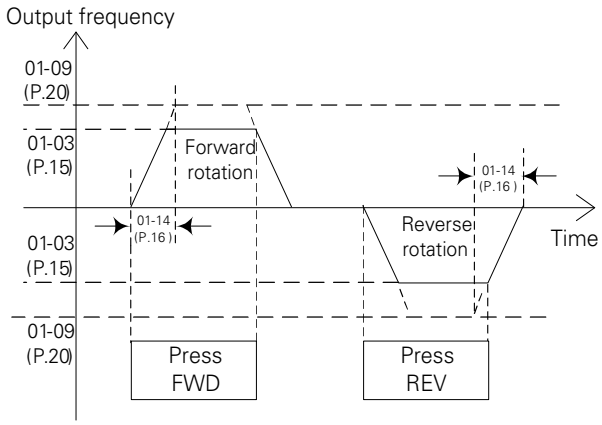
5.2.7 JOG operation

- The frequency and acceleration/deceleration time for JOG operation can be set. JOG operation can be used for conveyor positioning, test run, etc.

Parameter	Name	Factory Value	Setting Range	Content
01-13 P.15	JOG frequency	5.00Hz	0~650.00Hz	---
01-14 P.16	JOG acceleration/ decelerationtime	0.50s	0~360.00s/ 0~3600.0s	01-08=0/ 01-08=1

Settin JOG operation

- In JOG mode, the output frequency is the set value of 01-13, and the acceleration / deceleration time is the set value of 01-14.



Note: Please refer to Section 4.3.3 for how to enter the JOG mode.

5.2.8 Output frequency filter time

- When Output frequency filter time is set, the inverter can filter out the output frequency to reduce machinevibration upon high-frequency and low-frequency is switched.

Parameter	Name	Factory Value	Setting Range	Content
01-15 P.28	Output frequency filter time	0ms	0~1000ms	---

Settin Output frequency filter time

- The bigger the 01-15 is, the better the filtering effect is. But the corresponding response delay will also increase.
- If 01-15 is set to 0, the filtering function is invalid.

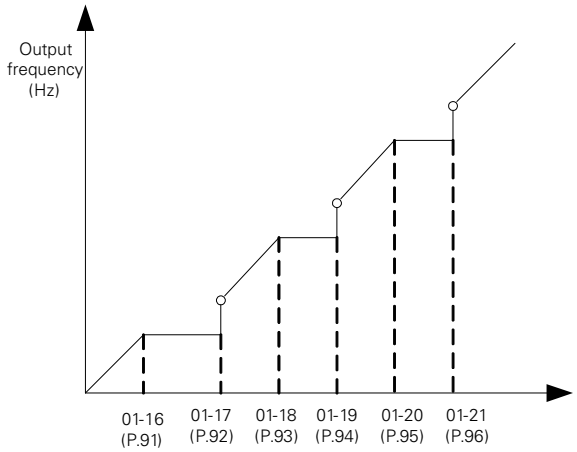
5.2.9 Fequency jump

- When it is desired to avoid resonance attributable to the natural frequency of a mechanical system, these parameter-sallow resonant frequencies to be jumped.

Parameter	Name	Factory Value	Setting Range	Content
01-16 P.91	Fequency jump 1A	99999	0~650.00Hz	---
			99999	Invalid.
01-17 P.92	Fequency jump 1B	99999	0~650.00Hz	---
			99999	Invalid.
01-18 P.93	Fequency jump 2A	99999	0~650.00Hz	---
			99999	Invalid.
01-19 P.94	Fequency jump 2B	99999	0~650.00Hz	---
			99999	Invalid.
01-20 P.95	Fequency jump 3A	99999	0~650.00Hz	---
			99999	Invalid.
01-21 P.96	Fequency jump 3B	99999	0~650.00Hz	---
			99999	Invalid.

Settin Fequency jump

- To avoid system's mechanical resonance frequency when running the motor, the inverter provides three sets of jump frequencies, namely, 01-16 and 01-17 (the first set), 01-18 and 01-19 (the second set), 01-20 and 01-21 (the third set).



- For example: assuming 01-16=45 and 01-17=50;
  If the target frequency≤45Hz, then the steady output frequency=the target frequency.
  If 45Hz≤target frequency=50Hz, then the steady output frequency=45Hz.
  If the target frequency≥50Hz, then the steady output frequency=the target frequency.

Note: 1. During the acceleration / deceleration period, the output frequency of the inverter will still pass through the jump frequency.

2. When 01-16=99999 or 01-17=99999, the first set of frequency jump is invalid.
When 01-18=99999 or 01-19=99999, the second set of frequency jump is invalid.
When 01-20=99999 or 01-21=99999, the third set of frequency jump is invalid.

5.2.10 The second function

- It is appropriate for the parameters when the RT signal is ON.

Parameter	Name	Factory Value	Setting Range	Content
01-22 P.44	The second acceleration time	99999	0~360.00s/ 0~3600.0s	01-08=0/ 01-08=1
			99999	Not selected.
01-23 P.45	The second deceleration time	99999	0~360.00s/ 0~3600.0s	01-08=0/ 01-08=1
			99999	Not selected.
01-24 P.46	The second torque boost	99999	0~30.0%	---
			99999	Not selected.
01-25 P.47	The second base frequency	99999	0~650.00Hz	---
			99999	Not selected.

Settin The second function

- When 01-08=0, minimum acceleration / deceleration time(01-22, 01-23)increment is0.01s.
- When 01-08=1, minimum acceleration / deceleration time(01-22, 01-23)increment is0.1s.
- When RT is "on", the second function is valid. For the operation characteristics of the motor, please refer to the following second function setting.
  If 01-22≠99999 and 01-23=99999, when RT is "on", the acceleration /deceleration time is the "set value of 01-22".
  If 01-22≠99999 and 01-24=99999, when RT is "on", the torque boost is the "set value of 01-10".
  If 01-22≠99999 and 01-24≠99999, when RT is "on", the torque boost is the "set value of01-24".
  If 01-22≠99999 and 01-25=99999, when RT is "on", the base frequency isthe "set value of 01-03".
  If 01-22≠99999 and 01-25≠99999, when RT is "on" the base frequency is the "set value of 01-25".

Note: RT metioned here is the function name of "multi-function digital input terminal". Please refer to 03-00~03-05/ P.80~P.84,P.86, 03-06(P.126), 03-09 (P.550) for the function selection of multi-function digital input terminal; please refer to Section 3.3 for related wiring.

5.2.11 Middle frequency, output voltage of middle frequency *V/F*

- Parameters can be set when using a special motor, especially adjusting the motor torque.

Parameter	Name	Factory Value	Setting Range	Content
01-26 P.98	Middle frequency 1	3.00Hz	0~650.00Hz	---
01-27 P.99	Output voltage 1 of middle frequency	10.0%	0~100.0%	---
01-28 P.162	Middle frequency 2	99999	0~650.00Hz	---
			99999	Not selected.
01-29 P.163	Output voltage 2 of middle frequency	0.0%	0~100.0%	---
01-30 P.164	Middle frequency 3	99999	0~650.00Hz	---
			99999	Not selected.
01-31 P.165	Output voltage 3 of middle frequency	0.0%	0~100.0%	---
01-32 P.166	Middle frequency 4	99999	0~650.00Hz	---
			99999	Not selected.
01-33 P.167	Output voltage 4 of middle frequency	0.0%	0~100.0%	---
01-34 P.168	Middle frequency 5	99999	0~650.00Hz	---
			99999	Not selected.
01-35 P.169	Output voltage 5 of middle frequency	0.0%	0~100.0%	---

Settin Middle frequency, output voltage of middle frequency

- Please refer to the description on01-12=4 in Section 5.2.6 Load pattern selection.

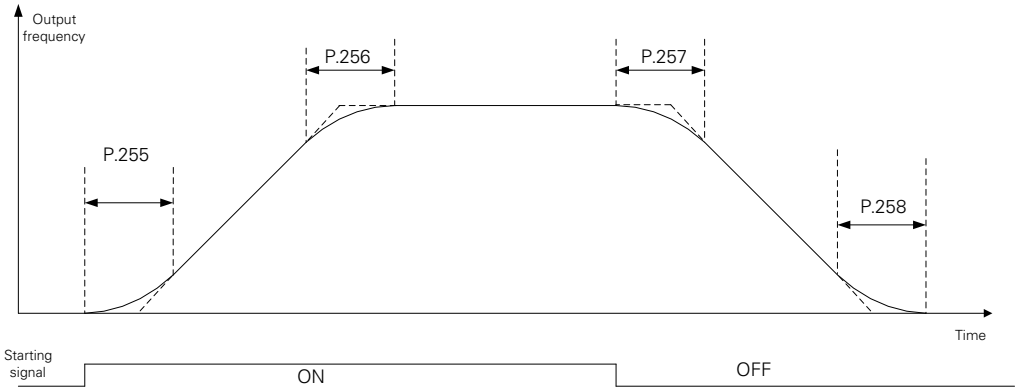
5.2.12 S pattern time

- It is used to set the acceleration time of S pattern acceleration/deceleration.

Parameter	Name	Factory Value	Setting Range	Content
01-36 P.255	S pattern time at the beginning of acceleration	0.20s	0~25.00s/ 0~250.0s	01-08=0/ 01-08=1
01-37 P.256	S pattern time at the end of acceleration	99999	0~25.00s/ 0~250.0s	01-08=0/ 01-08=1
			99999	Not selected.
01-38 P.257	S pattern time at the beginning of deceleration	99999	0~25.00s/ 0~250.0s	01-08=0/ 01-08=1
			99999	Not selected.
01-39 P.258	S pattern time at the end of deceleration	99999	0~25.00s/ 0~250.0s	01-08=0/ 01-08=1
			99999	Not selected.

Settin S pattern time

- When 01-05 = 3, "S pattern acceleration /deceleration curve 3".



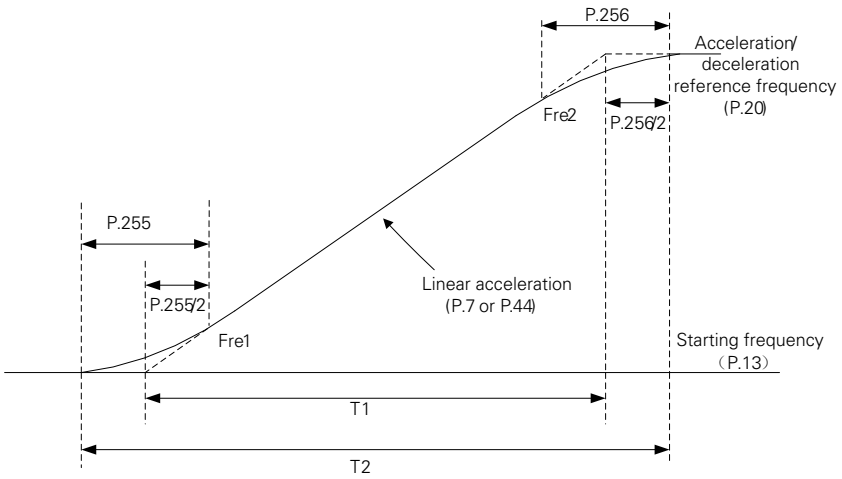
1) The parameters 01-36, 01-37, 01-38 and 01-39 are used to start the inverter gradually without impact. And varying degrees of S pattern acceleration/deceleration curve are adjusted by the values. When the S pattern acceleration/ deceleration curve is started, the inverter will accelerate/decelerate with different speed according to the primary acceleration/deceleration time.

2) When S pattern acceleration/deceleration curve 3 is selected, the acceleration/ deceleration time will be longer, as follows.

3) When the selected acceleration time (01-06 or 01-22)≥01-36 and 01-37, the actual acceleration time is as follows: The actual acceleration time = the selected acceleration time + (01-36 + 01-37) / 2.

4) When the selected deceleration time (01-07 or 01-23)≥01-38 and 01-39, the actual deceleration time is as follows: The actual deceleration time = the selected deceleration time + (01-38 + 01-39) / 2.

- Example: when the parameters are initial value (60 Hz system), the actual acceleration time from 0Hz to 60Hz in accordance with S pattern acceleration/deceleration curve 3 is as follows:



The acceleration time being setT1 = (01-09 - 01-11) * 01-06 / 01-09
The actual acceleration timeT2= T1 + (01-36 + 01-37) * (01-09 - 01-11) / 2 / 01-09
So T1 = (60 - 0.5) * 5 / 60 = 4.96s (the actual acceleration time of linear acceleration)
The actual acceleration timeT2 = 4.96 + (0.2 + 0.2) * (60 - 0.5) / 2 / 60 = 5.16s

Note: All calculations of acceleration/deceleration time are based on 01-09.

5.3 Analog input and output parameter group 02

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-00	P.500	Function selection of terminal AI1	0: Non-function 1: Frequency reference 2: Torque reference 3: PID target value 4: PID feedback signal 5: Target tension setting 6: Line speed setting 7: Feedback line speed 8: Real-time curling radius 9: Initial curling radius 10: Material thickness 11: PTC 12: PT100 13: VF detached function 14: Positive torque limit 15: Negative torque limit 16: Positive/Negative torque limit 17: Retrogradetorque limit	1	
02-01	P.501	Function of terminal AI3	Same as 02-00	1	
02-02	P.504	Function of terminal AI2	Same as 02-00	0	
02-03	P.503	Function of terminal DIH	Same as 02-00	0	
02-04	P.54	Function of terminal AO1 output	0: Output frequency, the frequency display reference 02-51 (P.55) is 100%. 1: Output current, the frequency display reference 02-52 (P.56) is 100%. 2: Output DC bus voltage, the OV level is 100%. 3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%. 4: Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%. 5: Target frequency, the frequency display reference 02-51 (P.55) is 100%. 6: Fixed level output, voltage or current output level is set by 02-54 (P.541)/02-53(P.539) 7: Output voltage, inverter rated voltage is 100% 8: Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)	0	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-04	P.54	Function of terminal AO1 output	9: Output torque, two times motor rated torque is 100%. (Valid only when 00-21 (P.300) or 00-22 (P.370) is set to 3~6)	0	
			10: Output power, two times motor rated power is 100%.		
			11: The high-speed pulse, 100.00KHz is 100%.		
			12: Motor speed, to display the level of 02-51 (P.55) is 100%		
			13: PLC analog output, details please refer to DF1 embedded PLC instructions		
02-05	P.537	Function of terminal AO2 output	6: Steady level output, voltage or current output level is set by 02-53 (P.539).	0	
			0~5, 7~13: Same as 02-04.		
02-06	P.185	Proportion linkage gain	0~100%	0%	
02-07	P.240	Auxiliary frequency	0: No auxiliary frequency function is available.	0	
			1: operation frequency = basic frequency + auxiliary-frequency (given by the AI1 terminal)		
			2: operation frequency = basic frequency + auxiliary-frequency (given by the AI3 terminal)		
			3: operation frequency = basic frequency - auxiliary frequency (given by the AI1 terminal)		
			4: operation frequency = basic frequency - auxiliary frequency (given by the AI3 terminal)		
			5: operation frequency = given by the terminal AI1 as the proportion linkage signal		
			6: operation frequency = given by the terminal AI3 as the proportion linkage signal		
			7: operation frequency = given by the terminal AI2 as the proportion linkage signal		
			8: operation frequency = basic frequency + auxiliary frequency (given by the terminal AI2)		
			9: operation frequency = basic frequency - auxiliary frequency (given by the terminal AI2)		
02-08	P.73	AI1 signal selection	0: The valid range of signal sampling is 0~5V.	1	
			1: The valid range of signal sampling is 0~10V.		
			2: The valid range of signal sampling is 0~ -5V.		
			3: The valid range of signal sampling is 0~ -10V.		
			4: The valid range of signal sampling is -5~+5V.		
			5: The valid range of signal sampling is -10~+10V.		
02-09	P.38	AI1 maximum operation frequency	50Hz system: 1.00~650.00Hz	50.00Hz	
			60Hz system: 1.00~650.00Hz	60.00Hz	
02-10	P.60	AI1 filter time	0~2000ms	30ms	
02-11	P.139	The bias rate of AI1 voltage signal	-100.0%~100.0%	0.0%	
02-12	P.192	The minimum input positive voltage of AI1	0~10.00V	0.00V	
02-13	P.193	The maximum input positive voltage of AI1	0~10.00V	10.00V	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal AI1	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal AI1	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	100.0%	
02-16	P.512	The minimum input negative voltage of AI1	0~10.00V	0.00V	
02-17	P.513	The maximum input negative voltage of AI1	0~10.00V	0.00V	
02-18	P.510	The percentage corresponding to the minimum negative voltage of termianl AI1	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	
02-19	P.511	The percentage corresponding to the maximum negative voltage of termianl AI1	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	
02-20	P.17	AI3 signal selection	0: The effective range of signal sampling is 4~20mA. 1: The effective range of signal sampling is 0~10V. 2: The effective range of signal sampling is 0~5V.	0	
02-21	P.39	The maximum operation frequency of terminal AI3	50Hz system: 1.00~650.00Hz 60Hz system: 1.00~650.00Hz	50.00Hz 60.00Hz	
02-22	P.528	AI3 filter time	0~2000ms	30ms	
02-23	P.505	The bias rate of AI3 current/ voltage signal	-100.0%~100.0%	0.0%	
02-24	P.184	AI3 disconnection selection	0: No disconnection selection is available. 1: Decelerate to 0Hz, the digital output terminal will set off the alarm 2: The inverter will stop immediately, and the panel willdisplaythe “AEr” alarm. 3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.	0	
02-25	P.198	The minimum input current/ voltage of terminal AI3	0~20.00mA	4.00mA	
02-26	P.199	The maximum input current/ voltage of terminal AI3	0~20.00mA	20.00mA	
02-27	P.196	The percentage corresponding to the minimum input current/ voltage of terminal AI3	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-28	P.197	The percentage corresponding to the maximum input current/ voltage of terminal AI3	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	100.0%	
02-29	P.531	AI2 signal selection	0: The valid range of signal sampling is 4~20mA 1: The valid range of signal sampling is 0~10V 2: The valid range of signal sampling is 0~5V	1	
02-30	P.508	The maximum operation frequency of terminal AI2	50Hz system: 1.00~650.00Hz 60Hz system: 1.00~650.00Hz	50.00Hz 60.00Hz	
02-31	P.527	AI2 filter time	0~2000ms	30ms	
02-32	P.507	The bias rate of AI2 current/ voltage signal	-100.0%~100.0%	0.0%	
02-33	P.545	AI2 disconnection selection	0: No disconnection selection. 1: Decelerate to 0Hz,the digital output terminal will set off the alarm. 2: The inverter will stop immediately, and the panel will display the “AEr” alarm. 3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.	0	
02-34	P.548	The minimum input current/ voltage of terminal AI2	0~10.00V	0.00V	
02-35	P.549	The maximum input current/ voltage of terminal AI2	0~10.00V	10.00V	
02-36	P.546	The percentage corresponding to the minimum input current/ voltage of terminal AI2	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	
02-37	P.547	The percentage corresponding to the maximum input current/ voltage of terminal AI2	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	100.0%	
02-38	P.526	DIH filter time	0~2000ms	10ms	
02-39	P.524	DIH input minimum frequency	0~100.00kHz	0.00kHz	
02-40	P.525	DIH input maximum frequency	0~100.00kHz	100.00 kHz	
02-41	P.522	The percentage corresponding toDIH input minimum frequency	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	0.0%	
02-42	P.523	The percentage corresponding to DIH input maximum frequency	-100.0%~100.0% -400.0%~400.0% (P.500= 2/14/15/16/17)	100.0%	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-43	P.74	DOH frequency multiplication coefficient	0: Select FM function as the output function of terminal DOH.	0	
			1~9000: Select the square-wave pulse which is 02-43 (P.74) times of running frequency as the output of terminal.		
02-44	P.543	FM output function selection	0: Output frequency, the frequency display reference 02-51(P.55) is 100%.	0	
			1: Output current, the current monitoringreference02-52(P.56)is 100%.		
			2: Output DC bus voltage, the OV level is 100%.		
			3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.		
			4: Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.		
			5: Target frequency, the frequency display reference02-51 (P.55) is 100%.		
			6: Fixed voltage output, voltage output level is set by 02-54 (P.541).		
			7: Output voltage, the inverter rated voltage is100%.		
			8: Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22 (P.370) is set to 3~6)		
			9: Output torque, two times motor rated torque is 100%. (Valid only when 00-21 (P.300) or 00-22 (P.370) is set to 3~6)		
			10: Output power, two times motor rated power is 100%.		
			11: The high-speed pulse, 100.00KHz is 100%.		
			12: Motor speed, to display the level of 02-51 (P.55) is 100%.		
02-45	P.64	AO1 output signal selection	0: 0~10V voltage can be output across terminal AO1-5.	0	
02-45	P.64	AO1 output signal selection	1: Reserve	0	
			2: 0~20mA current can be output across AO1-GND.		
			3: 4~20mA current can be output across AO1-GND.		
02-46	P.191	AO1 output gain	0~5000	3210	
02-47	P.190	AO1 output bias	0~5000	80	
02-48	P.538	AO2 output signal selection	Same as 02-45	0	
02-49	P.536	AO2 output gain	0~5000	3210	
02-50	P.535	AO2 output bias	0~5000	80	
02-51	P.55	Frequency display reference at the analog output	50Hz system: 1.00~650.00Hz	50.00Hz	
			60Hz system: 1.00~650.00Hz	60.00Hz	
02-52	P.56	Current monitoring reference at the analog output	0~500.00A: Types below Frame G	According to type	
			0~5000.0A: Frame G and types above		
02-53	P.539	AO2 fixed output level	0~100.0%	0.0%	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
02-54	P.541	AO1/FM fixed output level	0~100.0%	0.0%	
02-55	P.592	PT100 voltage level 1	0~10.00V	5.00V	
02-56	P.593	PT100 voltage level 2	0~10.00V	7.00V	
02-57	P.594	PT100 level 1starting frequency	0~650.00Hz	0.00Hz	
02-58	P.595	Starting PT100 level 1 delay time	0~6000s	60s	
02-59	P.187	FM calibration parameter	0~9998	450	

5.3.1 Function selection of analog terminal and DIH terminal

- Input function selection of terminal 1, 2, 3 and DIH.

Parameter	Name	Factory Value	Setting Range	Content
02-00 P.500	Function selection of terminal AI1	1	0	Non-function
			1	Frequency reference
			2	Torque reference
			3	PID target value
			4	PID feedback signal
			5	Target tension setting
			6	Line speed setting
			7	Feedback line speed
			8	Real-time curling radius
			9	Initial curling radius
			10	Material thickness
			11	PTC
			12	PT100
			13	VF detached function
			14	Positive torque limit
			15	Negative torque limit
			16	Positive/negative torque limit
			17	Retrogradetorque limit
02-01 P.501	Function of terminal AI3	1	Same as 02-00	Same as 02-00
02-02 P.504	Function of terminal AI2	0	Same as 02-00	Same as 02-00
02-03 P.503	Function of terminal DIH	0	Same as 02-00	Same as 02-00

Settin Input function selection

- When frequency reference is selected, 0~±10V/4~20mA corresponds to 0~the maximum output frequency setting.

Note: 1. The default priority level of terminal function selection is AI1 > AI3 >AI2 > DIH, so if you want toset the terminal AI2 as frequency reference, 02-00 and 02-01 should be set at 0.

2. The function selection of terminal DIH 02-03 is only valid in the mode of tension.

5.3.2 Function selection of analog output terminal AM

- Selects the data to be output via analog output terminal AM.

Parameter	Name	Factory Value	Setting Range	Content
02-04 P.54	Function of terminal AO1 output	0	0	Output frequency, the frequency display reference 02-51 (P.55) is 100%.
			1	Output frequency, the frequency display reference 02-52 (P.56) is 100%.
			2	Output DC bus voltage, the OV level is 100%.
			3	Output the temperature rising accumulation rate of inverter, the NTC level is 100%.
			4	Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.
			5	Target frequency, the frequency display reference 02-51 (P.55) is 100%.
			6	Fixed level output, voltage or current output level is set by 02-54 (P.541) /02-53 (P.539)
			7	Output voltage, the inverter rated voltage is 100%.
			8	Excitation current, the motor rated current is 100%. (Valid only when 00-21 (P.300) or 00-22 (P.370) is set to 3~6).
			9	Output torque, two times motor rated torque is100%. (Valid only when 00-21 (P.300) or 00-22 (P.370) is set to 3~6)
			10	Output power, two times motor rated power is 100%.
			11	The high-speed pulse, 100.00KHz is 100%.
			12	Motor speed, to display the level of 02-51 (P.55) is 100%.
			13	PLC analog output, details please refer to DF1 embedded PLC instructions
02-05 P.537	Function of terminal AO2 output	0	0~13	6: Steady level output, voltage or current output level is set by 02-53 (P.539).
				0~5, 7~13: Same as 02-04.

Settin Usage of analog output terminal AM

- For the voltage/current calibration of terminal AM, please refer to calibration parameter in Section 5.3.11Selection and handling of output terminal AO1.

5.3.3 Proportion linkage gain

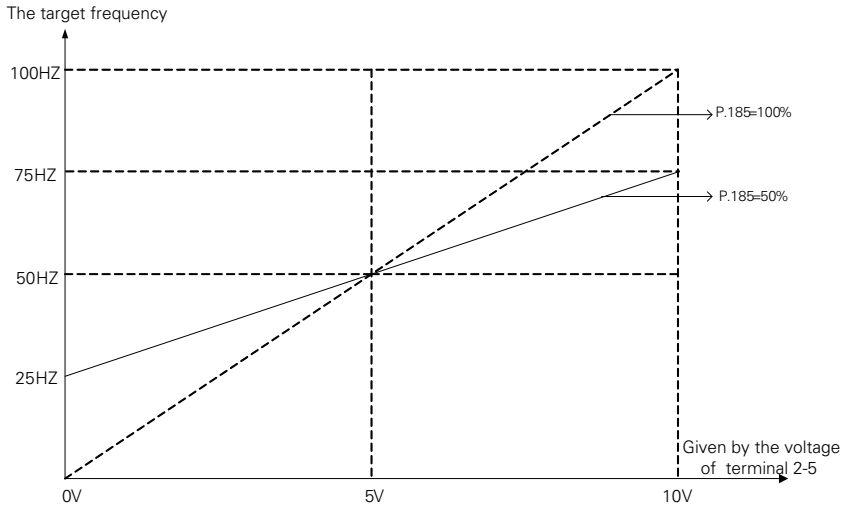
- The function is used to multiply the setting frequency by the external analog input terminal.When many inverters run proportionally, the reference frequency from the master inverter to the slave inverter can be fine tuned effectively with the function.

Parameter	Name	Factory Value	Setting Range	Content
02-06 P.185	Proportion linkage gain	0%	0~100%	---

Settin Proportion linkage gain

- When the operation frequency is smaller than 01-01, the operation frequency will be equal to the minimum limited frequency 01-01. When the operation frequency is larger than 01-00, the operation frequency will be equal to the maximum limited frequency 01-00.
- After multiplying the setting frequency by the set value of 02-06, then addition and subtraction can be performed as the following shows:

  For example: When the setting frequency is 50Hz, 02-06=50% and the external analog input signal is 0~10V.



In the above figure,when 0V is given, the target frequency is 50Hz - (50Hz × 50%) = 25Hz;
when 5V is given, the target frequency is 50Hz - (50Hz × 0%) = 50Hz;
when 10V is given, the target frequency is 50Hz + (50Hz × 50%) = 75Hz.

Note: 1. Please refer to the instruction of 02-07 (P.240) for the proportion linkage signal input.

2. When the analog current/voltage signal of external terminal AI3 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters 02-09, 02-21, 02-30, 02-20, 02-08, 02-29.

5.3.4 Auxiliary frequency

- It can flexibly implement fine tuning of frequency and frequency synthesis to meet different control requirements of different scenarios.

Parameter	Name	Factory Value	Setting Range	Content
02-07 P.240	Auxiliary frequency	0	0	No auxiliary frequency function is available.
			1	Operation frequency = basic frequency + auxiliaryfrequency (given by the AI1 terminal)
			2	Operation frequency = basic frequency + auxiliaryfrequency (given by the AI3 terminal)
			3	Operation frequency = basic frequency - auxiliary frequency (given by the AI1 terminal)
			4	Operation frequency = basic frequency - auxiliary frequency (given by the AI3 terminal)
			5	Operation frequency = given by the terminal AI1 as the proportion linkage signal
			6	Operation frequency = given by the terminal AI3 as the proportion linkage signal
			7	Operation frequency = given by the terminal AI2 as the proportion linkage signal
			8	Operation frequency = basic frequency + auxiliary frequency (given by the terminal AI2)
			9	Operation frequency = basic frequency - auxiliary frequency (given by the terminal AI2)

Settin Auxiliary frequency

- When the operation frequency is smaller than 01-01, the operation frequency will be equal to the minimum limited frequency 01-01. When the operation frequency is larger than 01-00, the operation frequency will be equal to the maximum limited frequency 01-00. After multiplying the setting frequency by the set value of 02-06, then addition and subtraction can be performed as the following shows:

Note: 1. The basic frequency is set by operation penal which is the target frequency reference source, communication or multi-speed combination.

2. Please refer to the instruction of 02-06 for the proportion linkage signal input.

3. When the analog current/voltage signal of external terminal AI3 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters 02-09, 02-21, 02-30, 02-20, 02-08, 02-29.

5.3.5 Selection and handling of input terminal AI1

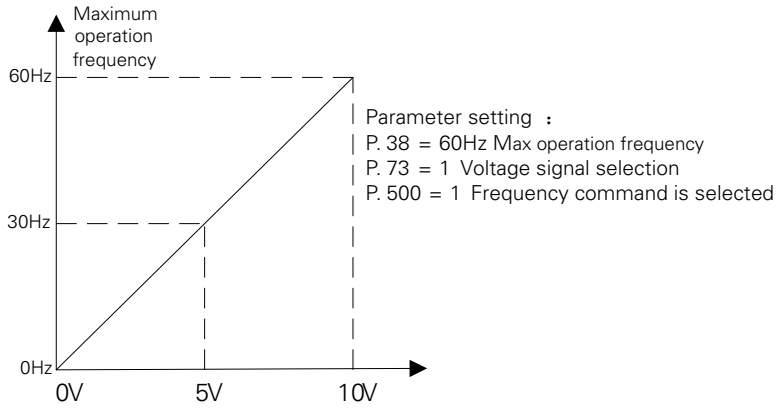
- Selects the signal specifications, frequency compensation function, and input signalpolarity, etc, viainput terminal AI1.

Parameter	Name	Factory Value	Setting Range	Content
02-08 P.73	AI1 signal selection	1	0	The valid range of signal sampling is 0~5V.
			1	The valid range of signal sampling is 0~10V.
			2	The valid range of signal sampling is 0~ -5V.
			3	The valid range of signal sampling is 0~ -10V.
			4	The valid range of signal sampling is -5~ +5V.
			5	The valid range of signal sampling is -10~ +10V.
02-09 P.38	AI1 maximumoperation frequency	50.00Hz	1.00~650.00Hz	50Hz system (00-24=1)
		60.00Hz		60Hz system (00-24=0)
02-10 P.60	AI1 filter time	30ms	0~2000ms	---
02-11 P.139	The bias rate of AI1 voltage signal	0.0%	-100.0%~ 100.0%	---
02-12 P.192	The minimum input positive voltage of AI1	0.00V	0~10.00V	---
02-13 P.193	The maximum input positive voltage of AI1	10.00V	0~10.00V	---
02-14 P.194	The percentage corresponding to the minimum positive voltage of terminal AI1	0.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.500= 2/14/15/16/17)
02-15 P.195	The percentage corresponding to the maximum positive voltage of terminal AI1	100.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.500= 2/14/15/16/17)
02-16 P.512	The minimum input negative voltage of AI1	0.00V	0~10.00V	---
02-17 P.513	The maximum input negative voltage of AI1	0.00V	0~10.00V	---
02-18 P.510	The percentage corresponding to the minimum negative voltage of termianl AI1	0.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.500= 2/14/15/16/17)
02-19 P.511	The percentage corresponding to the maximum negative voltage of termianl AI1	0.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.500= 2/14/15/16/17)

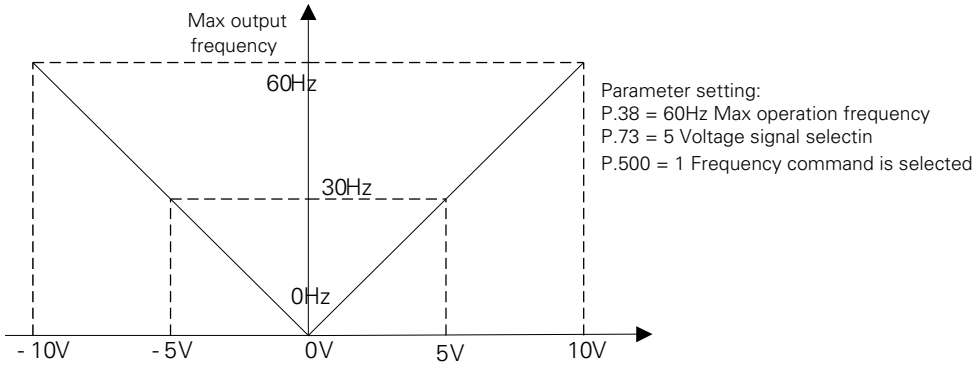
Settin AI1 signal selection, AI1 maximum operation frequency

- The setting value of 02-09 is the target frequency value of the inverter when the input signal of terminal AI1 is 5V (10V).

  Example 1: This example is the most commonly used method of adjustment.It is used when the inverter is in the "external mode", "combined mode 2"or "combined mode 4", and the frequency is set by terminal AI1.1. The basic frequency is set by operation penal which is the target frequency reference source, communication or multi-speed combination.



- The value of 02-08 needs to be changed if the terminal AI1 connects to negative voltage. The frequency arithmetic is the same as positive voltage and the rotation direction is invariant.



Note: 1. In "External mode", "combined mode 2" or "combined mode 4", the target frequency of the inverter will be determined by the signal between AI2/AI1/AI3 terminal when RH, RM, RL and REX are all "off." (the default priority is AI1>AI3>AI2, please refer to 02-00、02-01、02-02.

2. RH, RM, RL, REX, AU, RT and RUN mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

3. The selection of range of voltage signal sampling across terminal AI1 by parameter 02-08 will affect the parameters value of AI1 terminal input signal.

Settin Handling of input terminal AI1

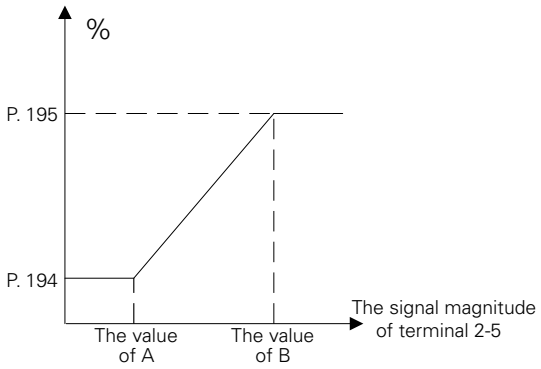
- The parameters above define the relationship between analog input voltage and the setting value what analog input represents. When the analog input voltage exceeds the maximum or minimum range of the setting value, the excess will be computed as the maximum or minimum input.

- There are two setting order when the maximum or minimum percentage is set:

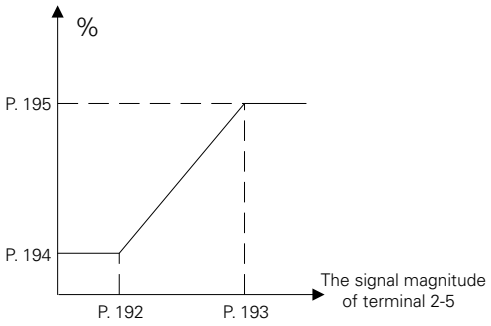
  1) If the users hope to adjust the analog input magnitude to correspond to a certain proportion relationship, the analog input need to be adjusted before setting the corresponding proportion parameters. Now the inverter will compute automatically without setting the voltage parameters. Please refer to the example 1.1.

  2) If the users skip adjusting analog input to set the proportion relationship, the proportion parameter should be set before setting the voltage parameters. Please refer to the example 1.2.

  Example 1.1: Adjust the analog input voltage to the minimum value A and set the parameter 02-14. Then adjust the input voltage to the maximum value B and set the parameter 02-15. The figure is shown as follows:



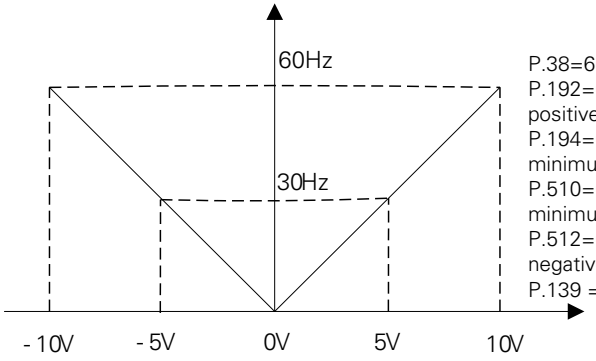
  Example 1.2: Set the value of 02-14 and 02-15, then set 02-12 and 02-13. The figure is shown as follows:



  If 02-00 is set at 1, the analog input of terminal AI1 corresponds to frequency function, that is to say the actual frequency input value is equal to the product of the proportion worked out in the above figure and 02-09 (the bias rate 02-11 is 0).

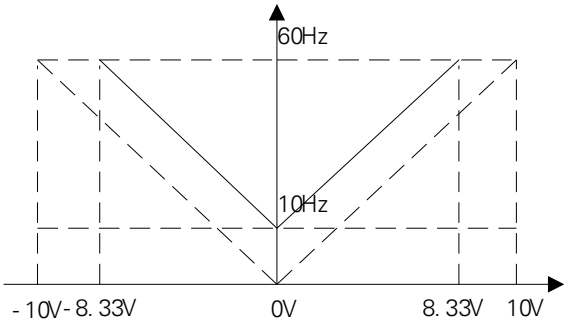
- The positive voltage setting can be referred to for the negative voltage setting, as above.

  Example 2: This example is the most commonly used method of adjustment. It is used when the inverter is in the "external mode", "combined mode 2"or "combined mode 4", and the frequency are set by terminal AI1.



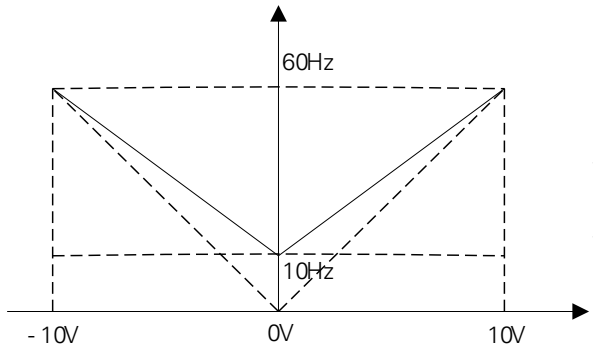
P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 3: This example is used by the industry for operating the ac motor drive. The goal is to have the set potentiometer equals to 10Hz when rotating to the far left. In other words, when activating, the lowest output of the ac motor drive has to be 10Hz. Other frequencies can be adjusted by the industry freely.



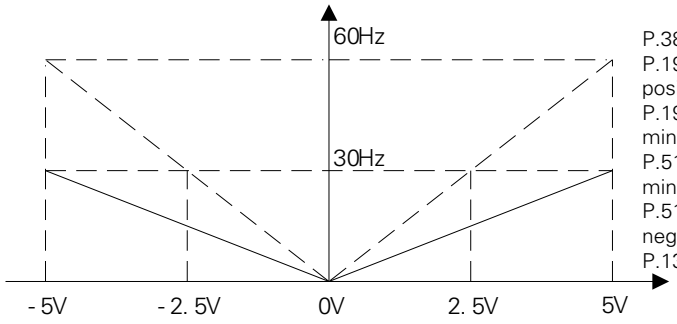
P.38=60Hz Max operation frequency
P.192=0V, P.193=8.33V The minimum/maximum input positive voltage of terminal 2-5
P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=8.33V The minimum/maximum input negative voltage of terminal 2-5
P.194 = P.510 = 10Hz / 60Hz * 100
P.193 = P.511 = 10V * (100.0 – P.194) / 100

Example 4: This example is also frequently used by the industry. The comprehensive usage for all domain of the potentiometer setup elevates the flexibility.



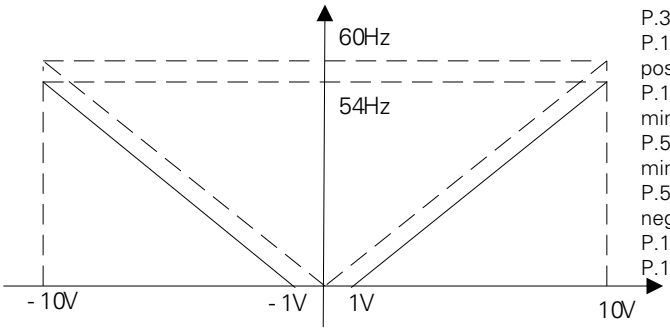
P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal
P.194 = P.510 = 10Hz / 60Hz * 100

Example 5: This example uses 0~5V to set the frequency.



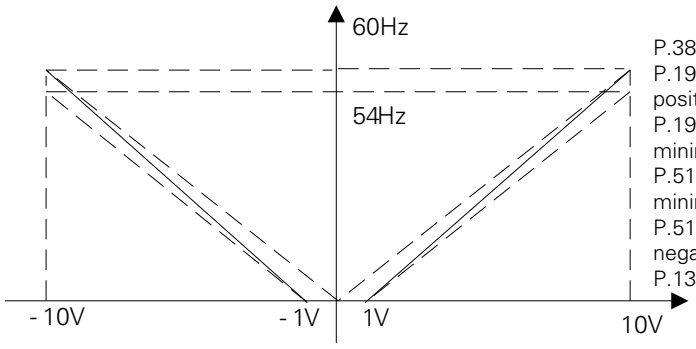
P.38=60Hz Max operation frequency
P.192=0V, P.193=5V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=50% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=50% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=5V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 6: This example is recommended to avoid using a signal that is less than 1V to set up the operation frequency of the AC motor drive under an unfavorable application environment, so that the anti-noise interference effect will be better.



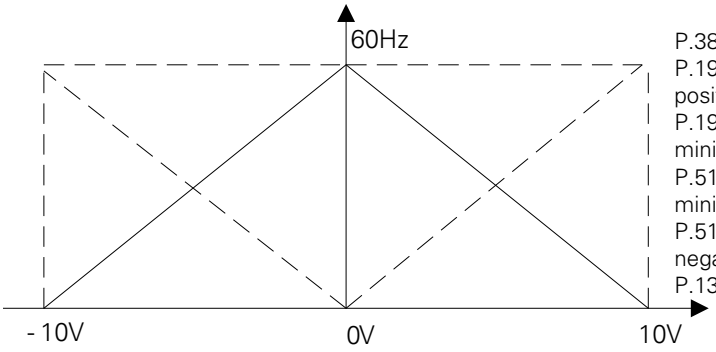
P.38=60Hz Max operation frequency
P.192=1V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=90% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=90% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=1V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal
P.195 = P.511 = 100.0 – (1V / 10V) * 100

Example 7: This example is an extension of Example 6. The wide application of this example offers the users good flexibility.



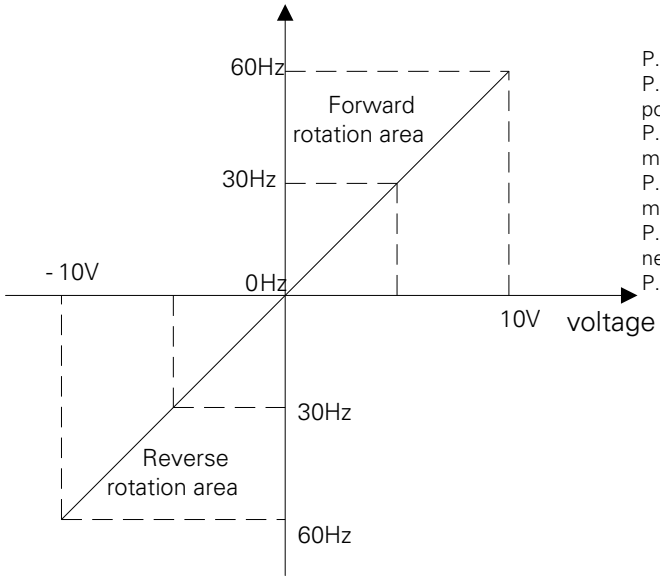
P.38=60Hz Max operation frequency
P.192=1V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=1V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 8: This example is an application of negative slop setup. The industry often uses sensors for pressure, temperature or flow control. Some of the sensors output a 10V signal at high voltage or high flow. This signal acts as a reference for the AC motor drive to decelerate or to stop. The setup presented in Example 8 can satisfy this type of application.

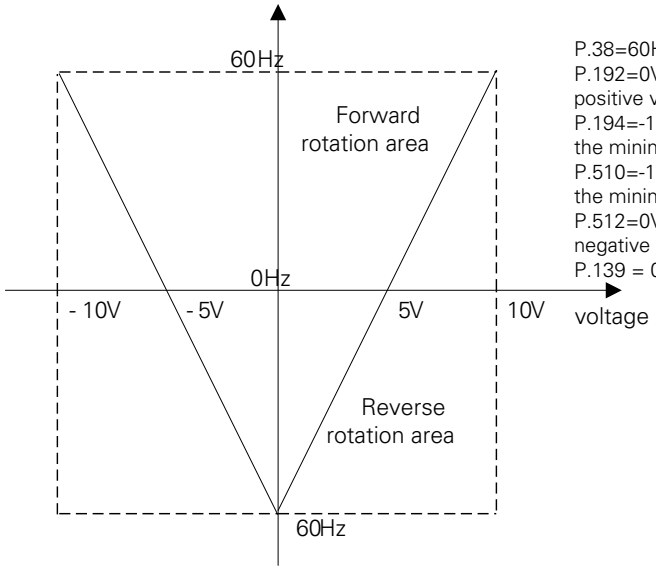


P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=100%, P.195=0% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=100%, P.511=0% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 9: This example integrates all the application of potentiometer. Together with the application of forward and reverse rotation, it fits in the system easily for assorted complicated application.

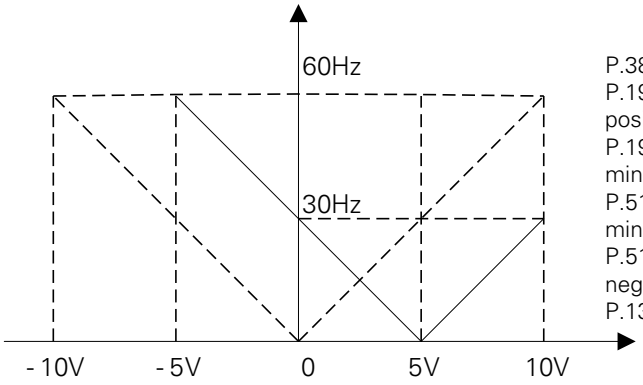


P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=-100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal



P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=-100%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=-100%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 10: This example is the application with bias voltage. The bias voltage is set by 02-11. When 02-11=0%, there is no bias voltage; When 02-11>0%, there is the positive bias voltage; When 02-11<0%, there is the negative voltage.



P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 50% The bias rate of 2-5 voltage signal

Note: 1.The examples above are in the condition that 02-00 is 1. It is also applicable when 02-00 is other non-zero value. Please refer to the definition instruction of 02-00 for details.

2. The selection of range of voltage signal sampling across terminal AI1 by parameter 02-08 will affect the parameters value of AI1 terminal input signal in this part.

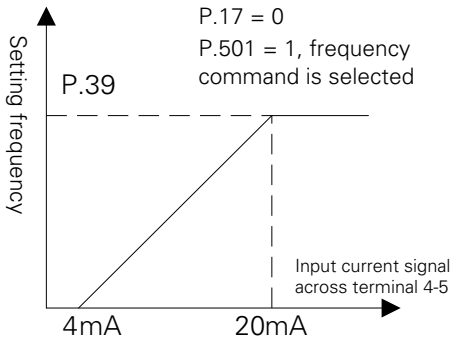
5.3.6 Selection and handling of input terminal AI3

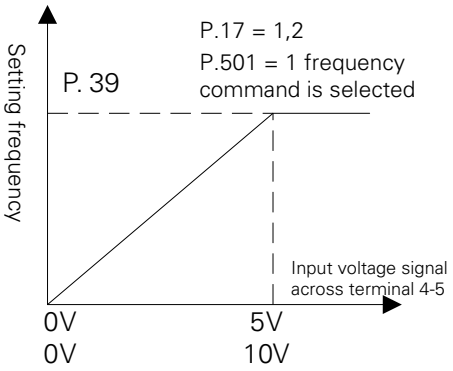
- Selects the signal specifications, frequency compensation function, etc, via input terminal AI3.

Parameter	Name	Factory Value	Setting Range	Content
02-20 P.17	AI3 signal selection	0	0	The effective range of signal sampling is 4~20mA.
			1	The effective range of signal sampling is 0~10V.
			2	The effective range of signal sampling is 0~5V.
02-21 P.39	The maximum operation frequency of terminal AI3	50.00Hz	1.00~650.00Hz	50Hz syetem (00-24=1)
		60.00Hz		60Hz syetem (00-24=0)
02-22 P.528	AI3 filter time	30ms	0~2000ms	---
02-23 P.505	The bias rate of AI3 current/voltage signal	0.0%	-100.0%~100.0%	---
02-24 P.184	AI3 disconnection selection	0	0	No disconnection selection is available.
			1	Decelerate to 0Hz, the digital output terminal will set off the alarm
			2	The inverter will stop immediately, and the panel willdisplaythe "AEr" alarm.
			3	The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.
02-25 P.198	The minimum input current/ voltage of terminal AI3	4.00mA	0~20.00mA	---
02-26 P.199	The maximum input current /voltage of terminal AI3	20.00mA	0~20.00mA	---
02-27 P.196	The percentage corresponding to the minimum input current/voltage of terminal AI3	0.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.501= 2/14/15/16/17)
02-28 P.197	The percentage corresponding to the maximum input current/voltage of terminal AI3	100.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.501= 2/14/15/16/17)

Settin Selection and handling of input terminal AI3

- AI3 signal selection and the maximum operation frequency of terminal AI3





Note: 1. In "external mode", "combined mode 2" or "combined mode 4", if AU is "on" and 02-01=1, target frequency of the inverter will be set by the input signal across terminal AI3. If AU is "off", please refer to 02-00, 02-01, 02-02.

2. In "external mode", "combined mode 2" or "combined mode 4", if AU and either one of RH, RM, RL and REX are valid concurrently, multi-speed has higher priority.

3. RH, RM, RL, REX and AU mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

- AI3 disconnection selection

1) When 02-24 = 0, the inverter will decelerate to 0Hz when disconnected. After reconnecting the inverter, the inverter will accelerate to the corresponding frequency.

2) When 02-24 =1, the inverter will decelerate to 0Hz when disconnected. Meanwhile, the multi-function digital output terminal will set off the alarm.After reconnecting the inverter, the inverter will accelerate to the corresponding frequency. Reconnection will clear the alarm.

3) When 02-24=2, the panel will display the "AEr" alarm when disconnected. The inverter will stop immediately. Reset to clear the alarm.

4) When 02-24 = 2, the inverter will run continuously according to the frequency reference before the disconnection. The multi-function digital output terminal will set off the alarm. Reconnect to clear the alarm.

Note: 1. 4 - 5 bolt function applies only to current break line, please pay attention to parameter 02-20 (P. 17) set and the location of the switch SW2.

2. The function of the multi-function digital output terminals to choose, please refer to the 03-10, 12, 03-03-13;Related wiring, please refer to section 3.3.

- Input current/voltage of terminal AI3

The setting of AI3 terminal input current/voltage is similar to the setting of AI1. And they also have the same effect except that the terminal AI3 can't give the negative voltage and the minimum input current is 4mA.

Note: Operating the AI3 terminal function mentioned above, you must flip the switch SW2 to corresponding position at first and make sure it matches the setting value of parameter 02-20.

5.3.7 Selection and handling of input terminal AI2

- Selects the signal specifications, frequency compensation function, etc, via input terminal AI2.

Parameter	Name	Factory Value	Setting Range	Content
02-29 P.531	AI2 signal selection	0	0	The valid range of signal sampling is 4~20mA.
			1	The valid range of signal sampling is 0~10V.
			2	The valid range of signal sampling is 0~5V.
02-30 P.508	The maximum operation frequency of terminal AI2	50.00Hz	1.00~650.00Hz	50Hz system (00-24=1)
		60.00Hz		60Hz system (00-24=0)
02-31 P.527	AI2 filter time	30ms	0~2000ms	---
02-32 P.507	The bias rate of AI2 current/ voltage signal	0.0%	-100.0%~100.0%	---
02-33 P.545	AI2 disconnection selection	0	0	No disconnection selection.
			1	Decelerate to 0Hz,the digital output terminal will set off the alarm.
			2	The inverter will stop immediately, and the panel will display the "AEr" alarm.
			3	The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.
02-34 P.548	The minimum input current/ voltage of terminal AI2	0.00V	0~10.00V	---
02-35 P.549	The maximum input current/ voltage of terminal AI2	10.00V	0~10.00V	---
02-36 P.546	The percentage corresponding to the minimum input current/voltage of terminal AI2	0.0%	-100.0~100.0%	---
			-400.0%~400.0%	(P.504= 2/14/15/16/17)
02-37 P.547	The percentage corresponding to the maximum input current/voltage of terminal AI2	100.0%	-100.0~100.0%	---
			-400.0%~400.0%	(P.504= 2/14/15/16/17)

Settin Selection and handling of input terminal AI2

- Please refer to terminal AI3 forselection and handling of input terminal AI2.

Note: 1. AI2 bolt function applies only to current break line, please pay attention to parameter 02-29 (P. 531) set and the location of the switch SW1.

2. The AI2 terminals function must first toggle switch SW1 to the corresponding position and ensure that match the 02-29 set value.

5.3.8 Selection and handling of input terminal DIH

- Selection and handling of input terminal DIH is for digital input DIH terminal only, other digital input terminals cannot be set to DIH function.

Parameter	Name	Factory Value	Setting Range	Content
02-38 P.526	DIH filter time	10ms	0~2000ms	---
02-39 P.524	DIH input minimum frequency	0.00kHz	0~100.00kHz	---
02-40 P.525	DIH input maximum frequency	100.00 kHz	0~100.00kHz	---
02-41 P.522	The percentage corresponding to DIH input minimum frequency	0.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.503= 2/14/15/16/17)
02-42 P.523	The percentage corresponding to DIH input maximum frequency	100.0%	-100.0%~100.0%	---
			-400.0%~400.0%	(P.503= 2/14/15/16/17)

Settin Selection and handling of input terminal DIH

- 02-38 (the DIH filter coefficient) is used to filter out the operation frequency jitter generated by component accuracy, noise or other factors. The larger the set value of 02-38 is, the better the filter ability is, and the slow response will be caused.

Note: The frequency computing method of DIH input signal is similar to AI1 analog input, the formula is 01-00 * ((the input frequency– 02-39) *(02-42 - 02-41)/ (02-40 - 02-39) +02-41).

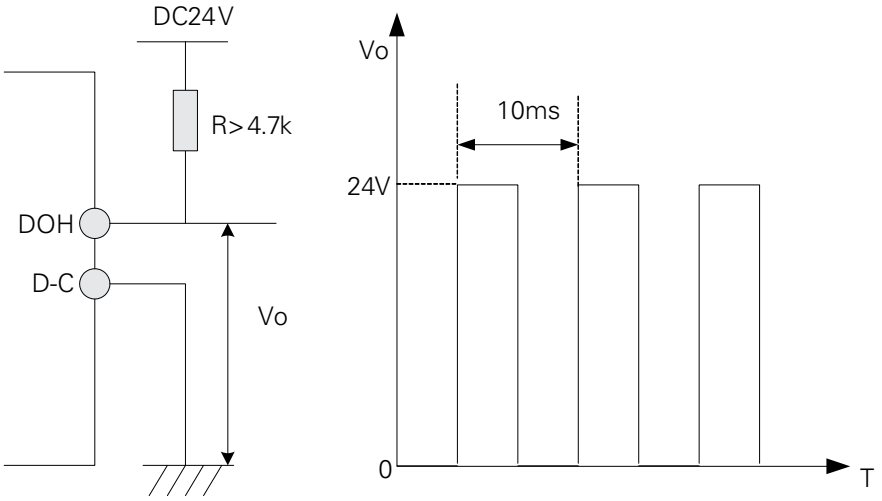
5.3.9 DOH frequency multiplication coefficient

- This parameter is used to set the output square-wave characteristic of output terminal DOH.

Parameter	Name	Factory Value	Setting Range	Content
02-43 P.74	DOH frequency multiplication coefficient	0	0	0: Select FM function as the output function of terminal DOH.
			1~9000	1~9000: Select the square-wave pulse which is 02-43 (P.74) times of running frequency as the output of terminal.

Settin DOH frequency multiplication coefficient

- When 02-43 is set to 1~9000, the external terminal DOH select the frequency multiplication output function which maximum frequency is 100 kHz.
- When 02-43 is set at 5 and the instantaneous frequency of operation is 20Hz, the output pulse wave between terminal DOH and terminal D-C is as following diagram:



Note: When 02-43=1, the output is one time of the running frequency. And the inverter can provide the output from 1~650Hz which precision is 1%. The bigger the value of 02-43 and the bigger the running frequency is, the worse the precision will be.

5.3.10 Function selection of FM output

- When the output of the terminal DOH is with FM function, sets the data to be output via analog output terminal FM.

Parameter	Name	Factory Value	Setting Range	Content
02-44 P.543	FM output function selection	0	0	Output frequency, the frequency display reference 0AI11 (P.55) is 100%.
			1	Output current, the current monitoring reference 0AI12 (P.56) is 100%.
			2	Output DC bus voltage, the OV level is 100%.
			3	Output the temperature rising accumulation rate of inverter, the NTC level is 100%.
			4	Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.
			5	Target frequency, the frequency display reference0AI11 (P.55) is 100%.
			6	Fixed voltage output, voltage output level is set by 0AI14 (P.541).
			7	Output voltage, the inverter rated voltage is100%.
			8	Fixed voltage output, voltage output level is set by 0AI14 (P.541). (Valid only when 00-21 (P.300) or 00-22 (P.370) is set to 3~6).
			9	Output torque, two times motor rated torque is 100%.
			10	Output power, two times motor rated power is 100%.
			11	The high-speed pulse, 100.00KHz is 100%.
			12	Motor speed, to display the level of 0AI11 (P.55) is 100%

Settin Usage of analog output terminal FM

- For the calibration of terminal FM, please refer to 5.3.16 FM calibration parameter.

5.3.11 Selection and handling of output terminal AO1

- It is used to adjust the analog voltage level that terminal AO1 outputs.

Parameter	Name	Factory Value	Setting Range	Content
02-45 P.64	AO1 output signal selection	0	0	0~10V voltage can be output across terminal AO1-GND.
			1	Reserve
			2	0~20mA current can be output across AO1-GND.
			3	4~20mA current can be output across AO1-GND.
02-46 P.191	AO1 output gain	3210	0~5000	---
02-47 P.190	AO1 output bias	80	0~5000	---

Settin Selection and handling of output terminal AO1

- The current/voltage output of terminal AO1 is set by both the toggle switch SW3 on control board and 02-45. When the user need to select the output type of terminal AO1, please turn the toggle switch SW3 to the corresponding type at first and then set the value of 02-45.
- The output of the terminal AO1 are shown as follows:

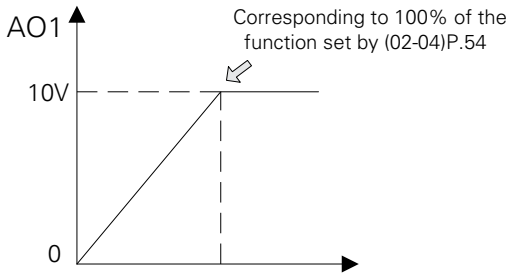


Figure 1. AO1-GND output 0~10V voltage

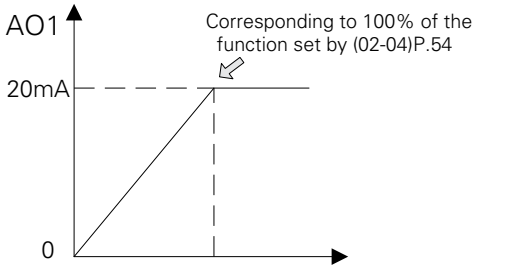


Figure 2. AO1-GND output 0~20mA current

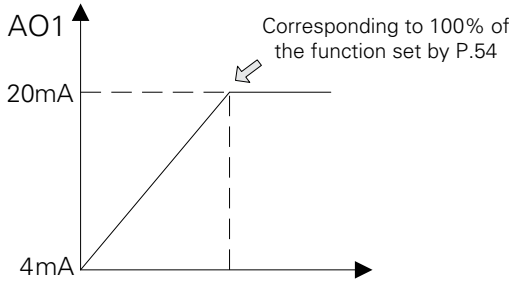


Figure 3. AO1-GND output 4~20mA current

- For the difference on the components, header needs to be calibrated, the voltage/current calibration procedures of AO1 terminal:

  1. Set the toggle switch SW3 to 0~10V/0~20mA, then set 02-45 at 0 or 2.

  2. Insert an electric meter with a full graduation of 10V/20mA across terminal AO1 and terminal 5. Set 02-04 at 0., 02-51 at 60Hz.

  3. Set 01-11 at 0. Start the motor. Fix the output frequency of the inverter to 0 Hz.

  4. Press ^ to adjust the value of 02-47. The screen will display the accumulated output bias voltage of AO1.

  Press WRITE for more than 1 second, and the pointer will move upward. Press to reduce the value of 02-47, and the screen will display the progressively decreased output bias voltage of AO1. Press v for more than 1second, and the pointer will move downward. When the pointer is adjusted to 0, the calibration of AO1 output bias voltage is completed.

  5. Adjust and fix the output frequency of the inverter at 60 Hz.

  6. Read the set value of 02-46, and the screen will display the current output gain of AO1.

  7. Press ^ or v to adjust the value of 02-46. Press WRITE for more than 1 second, and the pointer will move upward or downward. When the pointer moves to the full-scale position, the calibration is completed.

Note: When selecting the output signal of terminal AO1, please pay attention to the switch of SW3. If 4~20mA output current is selected, please switch SW3 to 0~20mA.

5.3.12 Selection and handling of output terminalAO2

- It is used to adjust the analog voltage level that terminal AO2 outputs.

Parameter	Name	Factory Value	Setting Range	Content
02-48 P.538	AO2 output signal selection	0	0	0~10V voltage can be output across terminal AOAI1.
			1	Reserve
			2	0~20mA current can be output across AOAI1.
			3	4~20mA current can be output across AOAI1.
02-49 P.536	AO2 output gain	3210	0~5000	---
0AI10 P.535	AO2 output bias	80	0~5000	---

Settin Selection and handling of output terminal AO2

- Please refer to the instruction of AO1 for this terminal function. The operation of adjusting the bias voltage and gain of AO2 is similar to AO1. 02-50 corresponds to 02-47, and 02-49 corresponds to 02-46.
- The output current/voltage of terminal AO2 is controlled by both the toggle switch SW4 on the control board and the parameter 02-48. The factory default value is 0~10V.

Note: When selecting AO2 output signal, please notice to switch SW4. If 4~20mA output current is selected, please switch SW4 to 0~20mA.

5.3.13 Display referenceat the analog output

- It is used to set the output frequency and current display reference when in the analog output of terminal AM/FM

Parameter	Name	Factory Value	Setting Range	Content
02-51 P.55	Frequency display reference at the analog output	50.00Hz	1~650.00Hz	50Hz system (when 00-24=1)
		60.00Hz		60Hz system (when 00-24=0)
02-52 P.56	Current monitoring refer-enceat the analog output	Note	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and the types above

Settin Display reference

- The setting frequency of 02-51 is 100%, which corresponds to the maximum output of AM/FM.
- The setting frequency of 02-52 is 100%, which corresponds to the maximum output of AM/FM.

Note: The factory value of 02-52 is determined by motor types.

5.3.14 AM/FM fixed output level

- Makes AM/FM output to be a steady output.

Parameter	Name	Factory Value	Setting Range	Content
02-53 P.539	AO2 fixed output level	0.0%	0~100.0%	---
02-54 P.541	AO1/FM fixed output level	0.0%	0~100.0%	---

Settin

- The voltage/current of terminal AM is controlled by 02-53 and 02-54, 02-53 is set to 0~100.0%, which corresponds to 0~10V/20mA of AO2;set 02-54 to 0~100.0%, which corresponds to0~10V/20mA of AO1;
  For example:02-54(P.541) =50%, the output of AO1 is 10V*50%=5V

5.3.15 PT100 level setting

- Sets PT100 protection level and operation frequency

Parameter	Name	Factory Value	Setting Range	Content	
02-55 P.592	PT100 voltage level 1	5.00V	0~10.00V	0	No PT100 level 1 protection.
				0.10V~ 10.00V	When PT100 is larger than level 1, after 02-58 (P.595) setting the time, the output frequency will decrease to 02-57 (P.594).
02-56 P.593	PT100 voltage level 2	7.00V	0~10.00V	0	No PT100 level 2 protection.
				0.10V~ 10.00V	When PT100 is larger than level 2, it will operate according to the setting of 06-15 (P.533)
02-57 P.594	PT100 level 1 starting frequency	0.00Hz	0~650.00Hz	When it is over PT100 level 1, the output frequency will decrease to 02-57 (P.594).	
02-58 P.595	Starting PT100 level 1 delay time	60s	0~6000s	The operation delay time for output frequency decreasing to 02-57 (P.594).	

Settin PT100 level setting

- Viaanalogvoltage input, PT100 sets the voltage input range of AI1/AI3/AI2 is0~10V(02-08=1;02-20=1;02-29=1, please pay attention to switch the voltage/current switch on control board to the position of voltage input), and sets analog voltage input to be used in PT100 function. (02-00,02-01,02-02 is set to 12).
- When the inverter is in operation state, the input voltage of PT100 is larger than the setting value of 02-55, after 02-58 setting the time, the output frequency of the inverter will decrease to the setting frequency of 02-57.
- When the input voltage of PT100 is larger than the setting value of 02-46, it will operate according to the setting of 06-15.

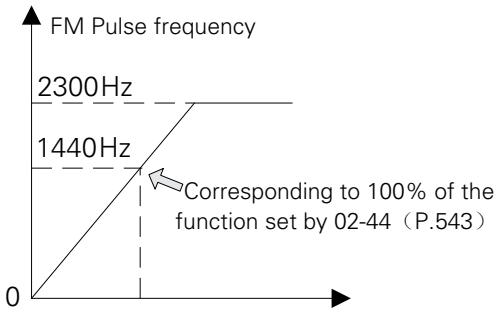
5.3.16 FM calibration parameter

- It is used to adjust the analog voltage level that terminal FM outputs.

Parameter	Name	Factory Value	Setting Range	Content
02-59 P.187	FM calibration parameter	450	0~9998	---

Settin FM calibration parameter

- The output of the terminal DOH with FM function is shown as follows:

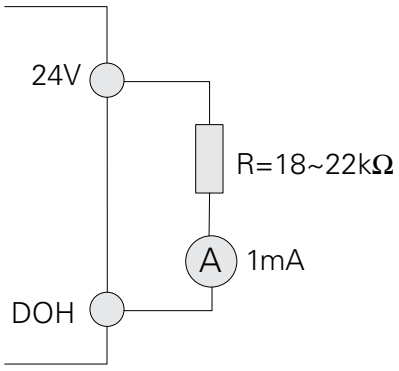


- For the difference on the components, header needs to be calibrated.DOH terminal calibration procedures:

  1. Insert an electric meter with a full graduation or a frequency counterof 1mA across terminal DOH and terminal D-C.Wiring as the following figure shown, and set 02-51 at 60Hz,02-44at 0.

  2. Start the motor and fix the output frequency of the inverter to 60Hz.

  3.When the motor runs steadily, read the set value of 02-59. At this point, the screen will display the FM correction index. Press ^ to adjust the value of 02-59. The screen will display a progressively increase of the FM correction index. Press WRITE for more than 1 second, and the pointer will move upward. Press v to adjust the value of 02-59 downward, and the screen will display a progressively decrease of the FM correction index. Press WRITE for more than 1 second and the pointer will move downward.



5.4 Digital input/ output parameter group 03

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
03-00	P.83	DI1 function selection	0: STF (the inverter runs forward)	0	
			1: STR (the inverter runs reverse)		
			2: RL (Multi-speed low speed)		
			3: RM (Multi-speed medium speed)		
			4: RH (multi-speed high speed)		
			5:AU (Analog terminal AI3 priority)		
			6: The external thermal relay operation		
			7: MRS (the instantaneous stopping of the inverter output)		
			8: RT (the inverter second function)		
			9: EXT (external JOG)		
			10: STF+EXJ		
			11: STR+EXJ		
			12: STF+RT		
			13: STR+RT		
			14: STF+RL		
			15: STR+RL		
			16: STF+RM		
			17: STR+RM		
			18: STF+RH		
			19: STR+RH		
			20: STF+RL+RM		
			21: STR+RL+RM		
			22: STF+RT+RL		
			23: STR+RT+RL		
			24: STF+RT+RM		
			25: STR+RT+RM		
			26: STF+RT+RL+RM		
			27: STR+RT+RL+RM		
			28: RUN (the inverter runs forward)		
			29: STF/STR (it is used with RUN, when STF/ STR is"on", the inverter runs reverse; when STF/STR is "off", the inverter runs forward)		
			30: RES (external reset function)		
			31: STOP (it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)		
			32: REX (multi-speed set (16 levels))		
			33: PO (in "external mode", programmed operation mode is chosen)		
			34: RES_E (external reset become valid only when the alarm goes off.)		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
03-00	P.83	DI1 function selection	35: MPO (in "external mode" the manually operation cycle mode is chosen.) 36: TRI (triangle wave function is chosen) 37: GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.) 38: CS (Manual switch to commercial power supply) 39: STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation. 40: P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input) 41: PWM setting frequency 42: Reserve 43: RUN_EN (the digital input terminal running enable) 44: PID_OFF (the digital input terminal stopping PID enable) 45: The second mode 46: Initial curling radius selection terminal 1 47: Initial curling radius selection terminal 2 48: Thickness selection terminal 1 49: Thickness selection terminal 2 50: Wind-up roll-down switching 51: Predrive reference 52: Torque memory 53: Torque memory enable 54: Turn counting signal (note1) 55: Switch speed/Torque control 56: Curling radius restore 57: High-speed pulse input function (note1) 58: Analog terminal AI1 priority 59: Analog terminal AI2 priority 60: Starting/Stopping of PLC 61: Origin retry enable function SHOM 62: Origin retry setting origin ORGP 63: Switch position/Speed control 64: External switch zero-servo 65: External accelerate/decelerate pause 66: External forced stop 67: coil diameter calculation Stop 68: Single point positioning can make 69: Multipoint positioning can make 70: entire position control pulse input command can make 71: External torque command polarity reverse 99999: Not choose in addition of terminal function	0	
03-01	P.84	DI2 function selection	Same as 03-00	1	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
03-02	P.86	DI3 function selection	Same as 03-00	30	
03-03	P.80	DI4 function selection	Same as 03-00	2	
03-04	P.81	DI5 function selection	Same as 03-00	3	
03-05	P.82	DI6 function selection	Same as 03-00	4	
03-06	P.126	DI7 function selection	Same as 03-00	5	
03-07	P.127	DI8 function selection	Same as 03-00	8	
03-08	P.128	DI9 function selection	Same as 03-00	7	
03-09	P.550	DIH terminal function	Same as 03-00	57	
03-10	P.40	DO1 - DO-DO1-DO-function	0: RUN (inverter running)	1	
			1: SU(reaching the output frequency)		
			2: FU (output frequency detection)		
			3: OL (overload detection)		
			4: OMD (zero current detection)		
			5: ALARM (alarm detection)		
			6: PO1 (programmed operation section detection)		
			7: PO2 (programmed operation periodical detection)		
			8: PO3 (programmed operation pause detection)		
			9: BP (Switch between the inverter operation and the commercial power-supply operation function, inverter output)		
			10: GP (Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)		
			11: OMD1 (zero current detection)		
			12~15: Reserve		
			16: Abnormal signal of fan		
			17: RY(the accomplishment of inverter running preparation)		
			18: Maintenance alarm detection		
			19: OL2 (Over torque alarm output)		
			20: Capacitor lifetime abnormal		
			21: Position control position attained		
			22: Tension control curl pattern detection		
			23: Power marker detection		
03-11	P.85	R1O-R1C-R1MR1O-R1C-R1M function	Same as 03-10	5	
03-12	P.129	DO2 - DO- DO2-DO-function	Same as 03-10	2	
03-13	P.130	R2O-R2C-R2M R2O-R2C-R2M function	Same as 03-10	0	
03-14	P.87	Multi-function terminal digital input negative/positive logic	0~1023	0	
03-15	P.88	Multi-function terminal digital output negative/positive logic (noumenon and slot 3)	0~4095	0	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
03-16	P.120	Output signal delay time	0~3600.0s	0.0s	
03-17	P.157	Digital input terminal filter time	0~2000ms	4ms	
03-18	P.158	Digital input terminal power enable	0: Digital input terminal power unable 1: Digital input terminal power enable	0	
03-20	P.41	Up-to-frequency sensitivity	0~100.0%	10.0%	
03-21	P.42	Output frequency detection for forward rotation	0~650.00Hz	6.00Hz	
03-22	P.43	Output frequency detection for reverse rotation	0~650.00Hz 99999: Same as the setting of 03-21(P.42)	99999	
03-23	P.62	Zero current detection level	0~200.0% 99999: Function invalid	5.0%	
03-24	P.63	Zero current detection time	0~100.00s 99999: Function invalid	0.50s	
03-25	P.551	Expanded digital input terminal M10 (Slot 3)	Same as 03-00	99999	
03-26	P.552	Expanded digital input terminal M11 (Slot 3)	Same as 03-00	99999	
03-27	P.553	Expanded digital input terminal M12 (Slot 3)	Same as 03-00	99999	
03-28	P.554	Expanded digital input terminal M13 (Slot 3)	Same as 03-00	99999	
03-29	P.555	Expanded digital input terminal M14 (Slot 3)	Same as 03-00	99999	
03-30	P.556	Expanded digital input terminal M15 (Slot 3)	Same as 03-00	99999	
03-33	P.559	Expanded digital input terminal M10 (Slot 2)	Same as 03-00	99999	
03-34	P.560	Expanded digital input terminal M11 (Slot 2)	Same as 03-00	99999	
03-35	P.561	Expanded digital input terminal M12 (Slot 2)	Same as 03-00	99999	
03-36	P.562	Expanded digital input terminal M13 (Slot 2)	Same as 03-00	99999	
03-37	P.563	Expanded digital input terminal M14 (Slot 2)	Same as 03-00	99999	
03-38	P.564	Expanded digital input terminal M15 (Slot 2)	Same as 03-00	99999	
03-41	P.567	Expanded digital input terminal negative/ positive logic (Slot 2&3)	0~65535	0	
03-42	P.568	Expanded digital output terminal A10 (Slot 3)	Same as 03-10	99999	
03-43	P.569	Expanded digital output terminal A11 (Slot 3)	Same as 03-10	99999	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
03-44	P.570	Expanded digital output terminal A12 (Slot 3)	Same as 03-10	99999	
03-45	P.571	Expanded digital output terminal A13 (Slot 3)	Same as 03-10	99999	
03-46	P.572	Expanded digital output terminal A14 (Slot 3)	Same as 03-10	99999	
03-47	P.573	Expanded digital output terminal A15 (Slot 3)	Same as 03-10	99999	
03-48	P.574	Expanded digital output terminal A16(Slot3)	Same as 03-10	99999	
03-49	P.575	Expanded digital output terminal A17 (Slot 3)	Same as 03-10	99999	
03-50	P.576	Expanded digital output terminal A10 (Slot 2)	Same as 03-10	99999	
03-51	P.577	Expanded digital output terminal A11 (Slot 2)	Same as 03-10	99999	
03-52	P.578	Expanded digital output terminal A12 (Slot 2)	Same as 03-10	99999	
03-53	P.579	Expanded digital output terminal A13 (Slot 2)	Same as 03-10	99999	
03-54	P.580	Expanded digital output terminal A14 (Slot 2)	Same as 03-10	99999	
03-55	P.581	Expanded digital output terminal A15 (Slot 2)	Same as 03-10	99999	
03-56	P.582	Expanded digital output terminal A16(Slot2)	Same as 03-10	99999	
03-57	P.583	Expanded digital output terminal A17 (Slot 2)	Same as 03-10	99999	
03-58	P.584	Expanded digital output terminal negative/ positive logic (Slot 2)	0~255	0	
03-59	P.585	Monitor noumenon digital input terminal state	Read	Read	
03-60	P.586	Monitor noumenon and expanded Slot 3 output terminal state	Read	Read	
03-61	P.587	Monitor expanded Slot 2&3 digital input terminal state	Read	Read	
03-62	P.588	Monitor expanded Slot 2 digital output terminal state	Read	Read	

5.4.1 Function selection of digital input

- Use the following parameters to select or change the digital input terminal functions.Any function from 0 to 71 can be selected by each terminal (Note 1).

Parameter	Name	Factory Value	Setting Range	Content
03-00 P.83	DI1 function selection	0	0	STF (the inverter runs forward)
			1	STR (the inverter runs reverse)
			2	RL (Multi-speed low speed)
			3	RM (Multi-speed medium speed)
			4	RH (multi-speed high speed)
			5	AU (Analog terminal AI3 priority)
			6	The external thermal relay operation
			7	MRS (the instantaneous stopping of the inverter output)
			8	RT (the inverter second function)
			9	EXT (external JOG)
			10	STF+EXJ
			11	STR+EXJ
			12	STF+RT
			13	STR+RT
			14	STF+RL
			15	STR+RL
			16	STF+RM
			17	STR+RM
			18	STF+RH
			19	STR+RH
			20	STF+RL+RM
			21	STR+RL+RM
			22	STF+RT+RL
			23	STR+RT+RL
			24	STF+RT+RM
			25	STR+RT+RM
			26	STF+RT+RL+RM
			27	STR+RT+RL+RM
			28	RUN (the inverter runs forward)
			29	STF/STR (it is used with RUN, when STF/ STR is"on", the inverter runs reverse; when STF/STR is "off", the inverter runs forward)
			30	RES (external reset function)
			31	STOP (it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)
			32	REX (multi-speed set (16 levels))
			33	PO (in "external mode", programmed operation mode is chosen)

Parameter	Name	Factory Value	Setting Range	Content
03-00 P.83	DI1 function selection	0	34	RES_E (external reset become valid only when the alarm goes off.)
			35	MPO (in "external mode" the manually operation cycle mode is chosen.)
			36	TRI (triangle wave function is chosen)
			37	GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)
			38	CS (Manual switch to commercial power supply)
			39	STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.
			40	P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input)
			41	PWM setting frequency
			42	Reserve
			43	RUN_EN (the digital input terminal running enable)
			44	PID_OFF (the digital input terminal stopping PID enable)
			45	The second mode
			46	Initial curling radius selection terminal 1
			47	Initial curling radius selection terminal 2
			48	Thickness selection terminal 1
			49	Thickness selection terminal 2
			50	Wind-up roll-down switching
			51	Predrive reference
			52	Torque memory
			53	Torque memory enable
			54	Turn counting signal (note1)
			55	Switch speed/Torque control
			56	Curling radius restore
			57	High-speed pulse input function (note1)
			58	Analog terminal AI1 priority
			59	Analog terminal AI2 priority
			60	Starting/Stopping of PLC
			61	Home moving function SHOM
			62	Origin position ORGP
			63	Position/Speed control switch
			64	External switch zero-servo
			65	External accelerate/decelerate pause
			66	External forced stop
			67	coil diameter calculation Stop
			68	Single point positioning can make
			69	Multipoint positioning can make
			70	entire position control pulse input command can make
			71	External torque command polarity reverse
			99999	Not choose in addition of terminal function

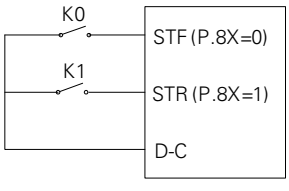
Parameter	Name	Factory Value	Setting Range	Content
03-01 P.84	DI2 function selection	1	Same as 03-00	Same as 03-00
03-02 P.86	DI3 function selection	30	Same as 03-00	Same as 03-00
03-03 P.80	DI4 function selection	2	Same as 03-00	Same as 03-00
03-04 P.81	DI5 function selection	3	Same as 03-00	Same as 03-00
03-05 P.82	DI6 function selection	4	Same as 03-00	Same as 03-00
03-06 P.126	DI7 function selection	5	Same as 03-00	Same as 03-00
03-07 P.127	DI8 function selection	8	Same as 03-00	Same as 03-00
03-08 P.128	DI9 function selection	7	Same as 03-00	Same as 03-00
03-09 P.550	DIH terminal function	57	Same as 03-00	Same as 03-00

Settin Function selection of digital input

- The default value are 03-03=2(RL), 03-04=3(RM), 03-05=4(RH), 03-00=0(STF), 03-01=1(STR), 03-02=30(RES), 03-06=5(AU), 03-09=57(DIH_FRQ).
- If the setting of 03-01~03-03, 03-06 and 03-09 are changed, the functions of the terminals are modified too. For example, when 03-03 is equal to 2, the DI4 terminal is used for RL. When 03-03 is changed to 8, than the DI4 terminal function will be changed to RT, i.e., the second function selection terminal. Take another example, if 03-00 is equal to 0, the DI1 terminal will be STF forward rotation function. When 03-00 is changed to 6, then DI1 terminal function will be changed OH, i.e., the external thermal relay terminal.
- Analog terminal AI3 priority
  When the contact is ON, the source of external frequency will force to beAI3. (If the frequency commands are set to AI3, AI1 and AI2at the same time, the priority isAI1>AI3>AI2).
- Wiring for the external thermal relay (OH): for the conventional motor wiring, the external thermal relay is often placed at the front of the motor to prevent the motor from overheating. When the external thermal relay is separated, the alarm of the inverter will be tripped off and "OHT" will be displayed on the screen.
- The operation of the inverter can be controlled by four means ("1" for terminal close, "0" for terminal open, and X = 0, 1, 2, 3, 4, 6).

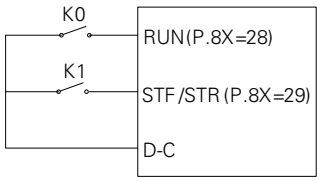
  1) Two-wire control mode 1

K0	K1	Operating Instructions
0	0	Stop
1	0	Run Forward
0	1	Run Reverse
1	1	Stop

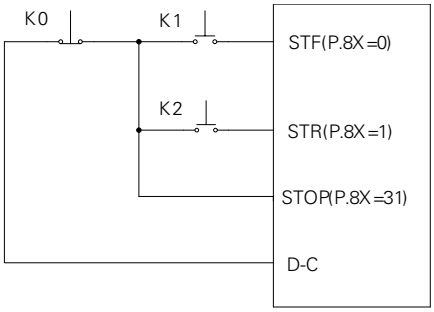


2) Two-wire control mode 2:

K0	K1	Operating Instrnctions
0	0	Stop
0	1	Stop
1	0	Run Forward
1	1	Run Reverse

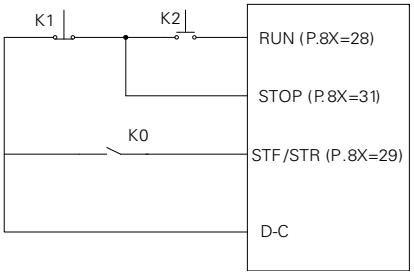


3) Three-wire control mode 1 (with self-maintenance function): K0 is for the STOP function that is normally close. When it is open, the inverter will stop. K1 and K2 is the forward and reverse signals that are normally open. They indicate that pulse signal is active, i.e., jog is valid.

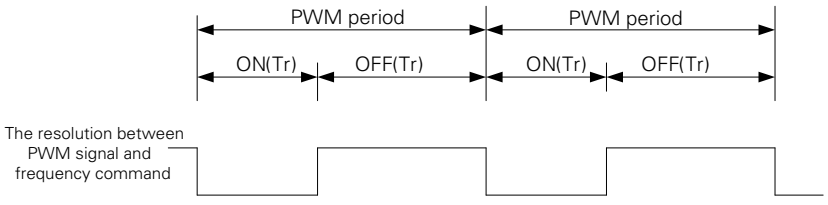


- Three-wire control mode 2 (with self-maintenance function): K1 is for the STOP function that is normally close. When it is open, the inverter will stop. K2 is the RUN signal that is normally open. It indicates that pulse signal is active, i.e., jog is valid. For the direction changing signal (STF/STR), the parameter corresponds to the digital input terminals is 39. When changing the direction, stop the inverter first, RUN the inverter before activating it.

K0	Operating Instruction
0	Run Forward
1	Run Reverse

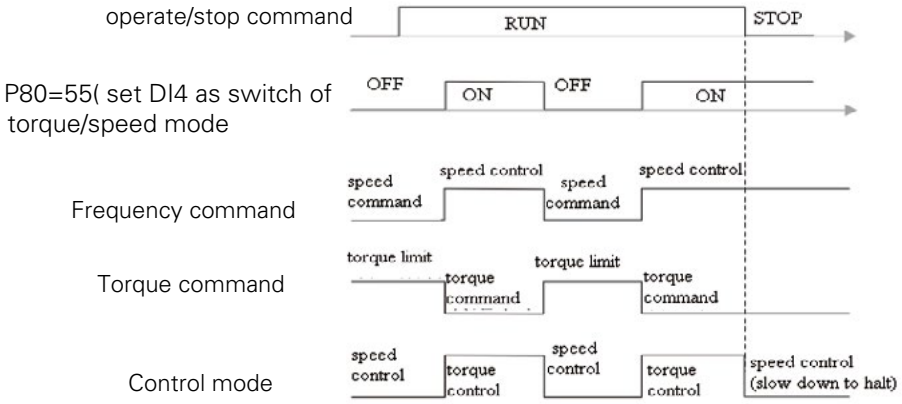


- In "external mode" and when PO is "on", select the programmed operation mode. At this stage, the STF terminal is the source of the start signal. When STF is "on", the inverter begins to run in the programmed operation mode at the first section. When STF is "off", the invert stops running, and STR becomes the pause signal source. When STR is "on", the operation will be suspended. When STR is "off", the operation sill be continued (continues from the suspended section).For details, please refer to 04-15, 04-27~04-42, 04-16~04-18 and 04-19~04-26.
- In the external mode, the manual operation cycle mode is selected when MPO is "on". For details on parameter, please refer to 04-19~04-26.
- PWM setting frequency (03-09 = 41): the inverter will measure and calculate the time of ON and OFF every PWM period as the frequency reference. (The PWM period within 0.9ms ~ 1100ms admissible)



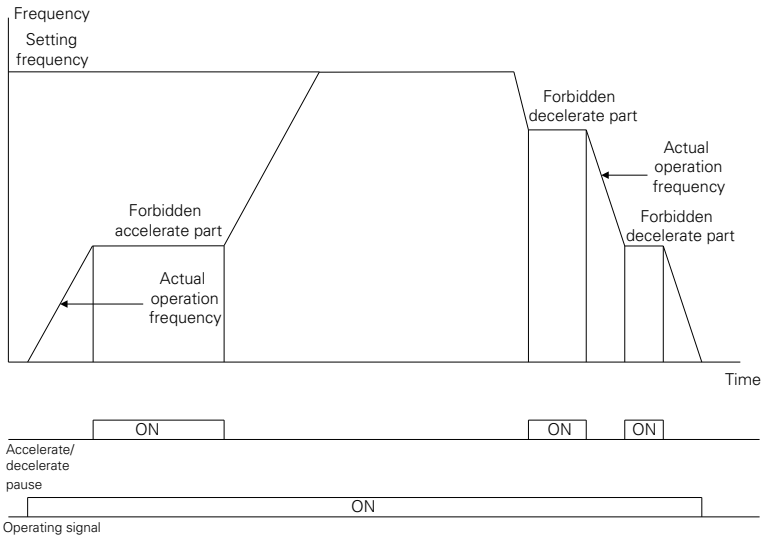
$$\text{Frequency command (Hz)} = \frac{\text{ON time}}{\text{PWM period}} \times \text{upper limit frequency P.1 (Hz)}$$

- The function is only valid for the terminal DIH. Near the minimum frequency and the maximum frequency, the precision of the output frequency will reduced relative to the input signal, please avoid using on the occasion needed rigorous frequency control.
- As the high-speed pulse input terminal, DIH is used to given the target frequency, please refer to 5.3.8.
- When 03-09 = 54, the function is under the tension control mode and it is used to calculate the turns of the winding shaft rotation when calculating the curling radius with the sickness accumulation method.
- Digital input terminals switch "speed/torque control": when switch speed-control to torque-control, torque limit turns to Torque reference, and speed reference turns to speed limit. When return torque control back to speed control, Torque reference turns to torque limit, and speed limit turns to speed reference. If you operate the switch of speed control/ torque control, please be in the mode of closed-loop vector speed control (00-21=4, 5) and set 00-20=0. If you set 00-20=1 and digital input terminals=55 at the same time, the switch function will be invalid and only torque-control operates.
- Digital input terminals switch "speed/position control", please be in the mode of closed-loop vector speed control(00-21(P.300)=4), and set00-20(P.400)=2. If you set 00-20(P.400)=0,1, and digital input terminals=63 at the same time, the position control deosn't operate and only speed control or torque control operates.
  The figure as below:



- Analog terminal AI1 priority
  When the contact is ON, the source of external frequency will force to be AI1. (If the frequency commands are set to AI3, AI1 and AI2 at the same time, the priority is AI1>AI3>AI2).
- Analog terminal AI2 priority
  When the contact is ON, the source of external frequency will force to be AI2. (If the frequency commands are set to AI3, AI1 and AI2 at the same time, the priority is AI1>AI3>AI2).
- Starting/stopping of PLC
  When the contact is ON, internal PLC starts; when it is OFF, PLC stops.
- Home moving function SHOM
  When the contact is ON, as SHOM signal is activated, home moving function would be executed.
- Origin reset set origin ORGP
  ORGP origin input. When the switch of this function operates, the inverter will execute the home moving function according to 12-00, 12-01 and 12-02.
- External switch zero-servo
  When the contact is ON, zero-servo function is valid.

- The second mode
  When the contact is ON, and function and parameter 00-16(P.79)=99999, the second mode is the same which is selected,the operation instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97).
- When excuting the external accelerate/decelerate pause function, the inverter will stop accelerating or decelerating at once.When removing the instruction, the inverter will go on accelerating/decelerating from the forbidden point.



- External forced stop
  When the contact is ON,the driver will forced stop according to the setting of 00-13(P.71).
- Single point positioning
  Details please refer to the 5.13.4 single point positioning function.
- Multipoint positioning
  Multipoint positioning is based on single point positioning, setting function for more of the external terminals can make (03-03 = 68、01-04 = 69), single point positioning movement after completion of execution, if the multipoint positioning terminal can make, the frequency converter based on multistage position terminal condition (REX, RH, RM, RL) inverter circuit within 15 paragraph positioning function, don't walk deceleration curve, the number of pulses positioning multi-segment location instructions (12-21,12-23...)., please refer to the specific parameter setting 5.13.5.
- Entire pulse position control
  In a speed control based ON embedded terminal function, when the terminals ON the inverter switch for Pt position control mode, and the position control of Pt difference only lies in this mode without setting 00-20 (P.400) = 2, other are consistent).
- External torque command polarity reverse
  Through the input terminal of the on/off switch to the direction of rotation of the torque instruction.

Note: The setting valve of "41", "54" and "57" is for DIH terminal only.

5.4.2 Function selection of digital output

- Detect the message during the inverter operation.

Parameter	Name	Factory Value	Setting Range	Content
03-10 P.40	DO1-DO- function	1	0	RUN (inverter running)
			1	SU (reaching the output frequency)
			2	FU (output frequency detection)
			3	OL (overload detection)
			4	OMD (zero current detection): when the percentage of the output current is lower than the setting value of 03-23 (P.62), and exceeds a period of time (03-24 (P.63)), OMD will output signal.
			5	ALARM (alarm detection)
			6	PO1 (programmed operation section detection)
03-10 P.40	DO1-DO- function	1	7	PO2 (programmed operation periodical detection)
			8	PO3 (programmed operation pause detection)
			9	BP (Switch between the inverter operation and the commercial power-supply operation function, inverter output)
			10	GP (Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)
			11	OMD1 (zero current detection): When the inverter output frequency reaches the target frequency, and the percentage of the output current is lower than the setting value of 03-23(P.62), and exceeds a period of time (03-24(P.63) setting), OMD1 will output signal.
			12~15	Reserve
			16	Abnormal signal of fan
			17	RY (the accomplishment of inverter running preparation)
			18	Maintenance alarm detection
			19	OL2 (Over torque alarm output)
			20	Capacitor lifetime abnormal
			21	Position control position attained
			22	Tension control curl pattern detection
			23	Power marker detection
03-11 P.85	R1O-R1C-R1M function	5	Same as 03-10 (P.40)	Same as 03-10 (P.40)
03-12 P.129	DO2-DO- function	2	Same as 03-10 (P.40)	Same as 03-10 (P.40)
03-13 P.130	R2O-R2C-R2M function	0	Same as 03-10 (P.40)	Same as 03-10 (P.40)

Settin Function selection of digital output

- For the multi-function digital output terminal DO1, the default value of 03-10 is 1 which means the "SU" function. When changing the value of 03-10, the corresponding function will change as shown in the above table.
- For the multi-function digital output terminal DO2, the default value of 03-12 is 2 which means the "FU" function. When changing the value of 03-12, the corresponding function will change as shown in the above table.
- The internal structures for multi-function digital output terminals DO1/DO2-DO- are "open collector output." Please refer to Section 3.4 and Section 3.4.6.
- For multi-function relay R1O-R1C-R1M, the default setting value of 03-11 is 5 (i.e., the alarm function). When the value of 03-11 is revised, its function will change respectively according to the function listed in the table above.
- For multi-function relay R2O-R2C-R2M, the default setting value of 03-13 is 0 (i.e., the run function). When the value of 03-13 is revised, its function will change respectively according to the function listed in the table above.

5.4.3 Terminal logic selection

- The function is bits-setting, if the bit shows 1, it means that the action of multi-function digital input terminal is negative logic; otherwise, it means that the action is positive logic.

Parameter	Name	Factory Value	Setting Range	Content
03-14 P.87	Multi-function terminal digital input negative/positive logic	0	0~1023	---
03-15 P.88	Multi-function terminal digital output negative/positive logic (noumenon and slot3)	0	0~4095	---

Settin Digital input/output logic

- The definition of each bit of 03-14(P.87) is as follows:

bit	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	DIH	DI9	DI8	DI7	DI3	DI6	DI5	DI4	DI2	DI1

For example: A three-wire control type needs the function of STOP to be kept open (negative logic). So if set 03-03(P.80)=31, take DI4 terminal as three-wire control STOP function, and 03-03(P.80)=0, 03-01(P.84)=1, and take STF and STR terminals as default positive/negative logic function, the parameter of 03-14(P.87) should be set as follows:

bit	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	0	0	0	0	0	0	0	1	0	0

So (03-14)P.87= 0×25 + 0×24 + 0×23 + 1×22 + 0×21 + 0×20 = 4

- The definiton of each 03-15(P.88) bit is as follows :

bit	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	ABC17	ABC16	ABC15	ABC14	ABC13	ABC12	ABC11	ABC10	R2	DO2	R1	DO1
	SLOT3 expanded digital output											

For example: 03-11(P.85)=0 (inverter is running and detecting), if positive logic output bit is set as 0, when inverter runs, multi-relay is on. When inverter stops, multi-relay is off; otherwise, if set negative logic bit as 1, when inverter runs, multi-relay is off,and when the inverter stops, multi-relay is on.

Note: When "STF" and "STR" terminals are set as negative logic, but signal is not connected with D-C, with power on, inverter will input and drive motor operate. So it is dangerous, you must pay attention to it.

5.4.4 Output signal delay

- It is used for digital output terminal signal delay and confirmation. The delay time is confirmation time to prevent some uncertain interference.

Parameter	Name	Factory Value	Setting Range	Content
03-16 P.120	Output signal delay time	0.0s	0~3600.0s	---

Settin Output signal delay

- When 03-16=0 and the setting requirements of 03-10(03-11, 03-12, 03-13) is met, the signal will output directly.
- When 03-16=0.1~3600 and the setting requirements of 03-10(03-11, 03-12, 03-13) is met, the signal will output after a setting delay time.

5.4.5 Digital input terminal filter

- It is used to select response time to the signal of digital input terminals.

Parameter	Name	Factory Value	Setting Range	Content
03-17 P.157	Digital input terminal filter	4ms	0~2000ms	---

Settin Digital input terminal filter

- 03-17is used to select response time to the signal of digital input terminals, and its action range including:DI1, DI2, DI3, DIH, DI4, DI5, DI6, and DI7, DI8, DI9 and expanded SLOT2/SLOT3 digital input digital except for DIH when it is input as high-speed pulse. And the actual delay time is 03-17*2ms. For example, if 03-17=100, the actual delay time is 200ms.

5.4.6 Digital input terminal power enable

- Selectspower enables on the digital input terminal, whether the inverter operates immediately.

Parameter	Name	Factory Value	Setting Range	Content
03-18 P.158	Digital input terminal power enable	0	0	Digital input terminal power unable.
			1	Digital input terminal power enable.

Settin Digital input terminal power enable

- If 03-18=1, select power enables on the digital input terminals. In this situation, if the functions of the multi-function digital input terminals before turning on the power are STF, STR, RUN and MPO, and the corresponded digital input terminals are short circuit, and then the inverter will not run immediately after turning on the power. The inverter will run only after short circuit these terminals again. When 03-18=0, make these terminal short circuit before turning on the power, and the inverter will run immediately after the power is turned on.

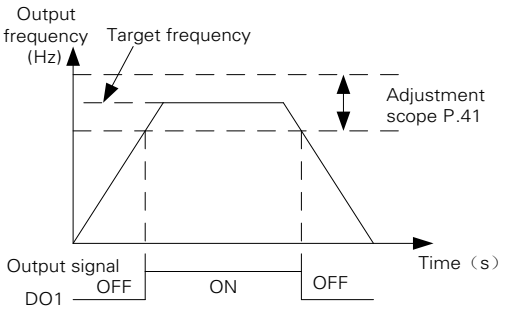
5.4.7 Output frequency detection

- Detects the inverter output frequency, and with the output signal.

Parameter	Name	Factory Value	Setting Range	Content
03-20 P.41	Up-to-frequency sensitivity	10.0%	0~100.0%	---
03-21 P.42	Output frequency detection for forward rotation	6.00Hz	0~650.00Hz	---
03-22 P.43	Output frequency detection for reverse rotation	99999	0~650.00Hz	---
			99999	Set the same as 03-21 (P.42).

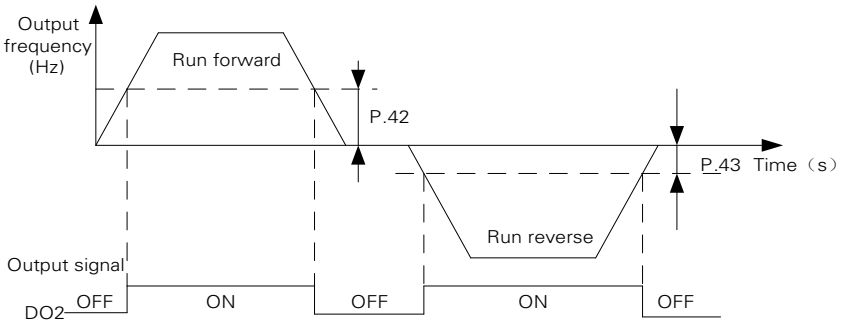
Settin Up-to-frequency sensitivity

- If 03-20=5%, when the output frequency enters the "5% region near the target frequency", it will send out SU signals.For example, when the target frequency is set to 60Hz and 03-20=5%, then if the output frequency is between 60±60×5%=57Hz and 63Hz, a SU signal will be sent out.



Settin Output frequency detection for forward / reverse rotation

- If 03-21=30 and 03-22=20, then it will send out FUsignals when the forward rotation output frequency exceeds 30Hz or when the reverse rotation output frequency exceeds 20Hz.
- If 03-21=30 and 03-22=99999 (factory default), then it will send out FU signals when the forward or reverse rotation output frequency exceeds 30Hz.



Note: In this paragraph, SU, FU is the function name for "multi-function digital output terminal"DO1, DO2. Please refer to 03-10 ~ 03-13. For wiring, please refer to Section 3.3.

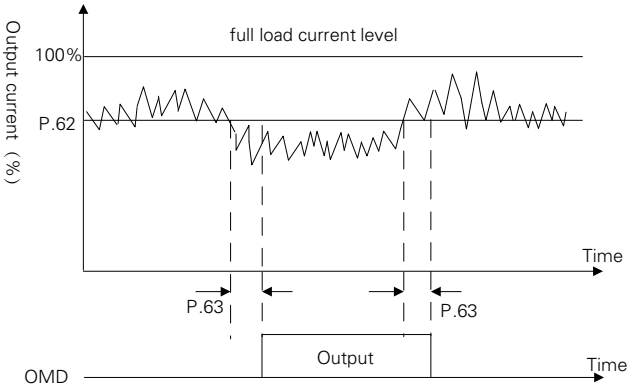
5.4.8 Zero current detection

- Detects the output current to the output terminal.

Parameter	Name	Factory Value	Setting Range	Content
03-23 P.62	Zero current detection level	5.0%	0~200.0%	---
			99999	Invalid.
03-24 P.63	Zero current detection time	0.50s	0~100.00s	---
			99999	Invalid.

Settin Zero current detection

- Assume the inverter's rated is full-loaded, the current is 20A, 03-23=5% and 03-24=0.5s, then when the output current is smaller than 20×5%=1A and exceeding 0.5s, OMD will send out signals.See the figure below:



- If the set value of 03-23 or 03-24 is 99999, the zero current detection function is disabled.

Note: In this paragraph, OMD is the function name for "multi-function digital output terminal". Please refer to 03-10, 03-10~03-13. For wiring, please refer to Section 3.3.

5.4.9 Function selection of expanded digital input terminal SLOT3

- Via parameter selection, changes the function of each expanded digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
03-25 P.551	Expanded digital input terminal M10 (SLOT 3)	99999	Same as 03-00	Same as 03-00
03-26 P.552	Expanded digital input terminal M11 (SLOT 3)	99999	Same as 03-00	Same as 03-00
03-27 P.553	Expanded digital input terminal M12 (SLOT 3)	99999	Same as 03-00	Same as 03-00
03-28 P.554	Expanded digital input terminal M13 (SLOT 3)	99999	Same as 03-00	Same as 03-00
03-29 P.555	Expanded digital input terminal M14 (SLOT 3)	99999	Same as 03-00	Same as 03-00
03-30 P.556	Expanded digital input terminal M15 (SLOT 3)	99999	Same as 03-00	Same as 03-00

Settin Expanded digital input terminal SLOT3

- The function is the same as the digital input function, please refer to Section 5.4.1.

5.4.10 Function selection of expanded digital input terminal SLOT2

- Via parameter selection, changes the function of each expanded digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
03-33 P.559	Expanded digital input terminal M10 (SLOT 2)	99999	Same as 03-00	Same as 03-00
03-34 P.560	Expanded digital input terminal M11 (SLOT 2)	99999	Same as 03-00	Same as 03-00
03-35 P.561	Expanded digital input terminal M12 (SLOT 2)	99999	Same as 03-00	Same as 03-00
03-36 P.562	Expanded digital input terminal M13 (SLOT 2)	99999	Same as 03-00	Same as 03-00
03-37 P.563	Expanded digital input terminal M14 (SLOT 2)	99999	Same as 03-00	Same as 03-00
03-38 P.564	Expanded digital input terminal M15 (SLOT 2)	99999	Same as 03-00	Same as 03-00

Settin Expanded digital input terminal SLOT2

- The function is the same as the digital input function, please refer to Section 5.4.1.

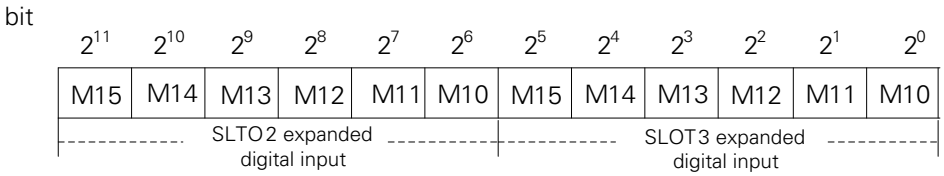
5.4.11 Expanded digital input terminal logic selection

- The function is bits-setting, if the bit shows 1, it means that the action of expanded digital input terminal is negative logic; otherwise, it means that the action is positive logic.

Parameter	Name	Factory Value	Setting Range	Content
03-41 P.567	Expanded digital input terminal negative/positive logic (Slot 2&3)	0	0~65535	---

Settin Expanded digital input terminal logic

- The definiton of each 03-41 (P.567) bit is as follows:



5.4.12 Function selection of expanded digital output terminalSLOT3

- Detect the message during the inverter operation.

Parameter	Name	Factory Value	Setting Range	Content
03-42 P.568	Expanded digital output terminal A10 (SLOT3)	99999	Same as 03-10	Same as 03-10
03-43 P.569	Expanded digital output terminal A11 (SLOT3)	99999	Same as 03-10	Same as 03-10
03-44 P.570	Expanded digital output terminal A12 (SLOT3)	99999	Same as 03-10	Same as 03-10
03-45 P.571	Expanded digital output terminal A13 (Slot3)	99999	Same as 03-10	Same as 03-10
03-46 P.572	Expanded digital output terminal A14 (Slot3)	99999	Same as 03-10	Same as 03-10
03-47 P.573	Expanded digital output terminal A15 (Slot3)	99999	Same as 03-10	Same as 03-10
03-48 P.574	Expanded digital output terminal A16 (Slot3)	99999	Same as 03-10	Same as 03-10
03-49 P.575	Expanded digital output terminal A17 (Slot3)	99999	Same as 03-10	Same as 03-10

Settin Expanded digital output terminal function SLOT3

- The function is the same as the digital output function, please refer to Section 5.4.2.

5.4.13 Function selection of expanded digital output terminal SLOT2

- Detect the message during the inverter operation.

Parameter	Name	Factory Value	Setting Range	Content
03-50 P.576	Expanded digital output terminal A10 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-51 P.577	Expanded digital output terminal A11 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-52 P.578	Expanded digital output terminal A12 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-53 P.579	Expanded digital output terminal A13 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-54 P.580	Expanded digital output terminal A14 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-55 P.581	Expanded digital output terminal A15 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-56 P.582	Expanded digital output terminal A16 (SLOT2)	99999	Same as 03-10	Same as 03-10
03-57 P.583	Expanded digital output terminal A17 (SLOT2)	99999	Same as 03-10	Same as 03-10

Settin Expanded digital output terminal functionSLOT2

- The function is the same as the digital output function, please refer to Section 5.4.2.

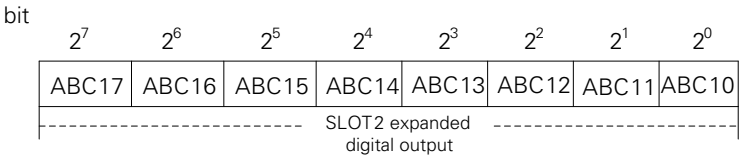
5.4.14 Expanded digital output terminal logic selection

- The function is bits-setting, if the bit shows 1, it means that the action of expanded digital output terminal is negative logic; otherwise, it means that the action is positive logic.

Parameter	Name	Factory Value	Setting Range	Content
03-58 P.584	Expanded digital output terminal negative/positive logic (Slot 2)	0	0~255	---

Settin Expanded digital output terminal logic

- The definiton of each 03-58 (P.584) bit is as follows:



5.4.15 Digital input / output terminal monitor

- Used to monitor the operation of digital input / output terminal.

Parameter	Name	Factory Value	Setting Range	Content
03-59 P.585	Monitor noumenon digital input terminal state	Read	Read	---
03-60 P.586	Monitor noumenon and expanded SLOT 3 output terminal state	Read	Read	---
03-61 P.587	Monitor expanded SLOT 2&3 digital input terminal state	Read	Read	---
03-62 P.588	Monitor expanded SLOT 2 digital output terminal state	Read	Read	---

Read Digital input / output terminal state

- For input terminal: 0 means operation, 1 means close.
- For output terminal: 0means operation, 1 means no operation.

Each bit corresponded input terminal of 03-59:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	DIH	DI9	DI8	DI7	DI3	DI6	DI5	DI4	DI2	DI1

Each bit corresponded output terminal of 03-60:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	A17	A16	A15	A14	A13	A12	A11	A10	R2	DO2	R1	DO1

SLOT3 expanded digital output

Each bit corresponded input terminal of 03-61：

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	M15	M14	M13	M12	M11	M10	M15	M14	M13	M12	M11	M10

SLTO 2 expanded digital input　　SLOT3 expanded digital input

Each bit corresponded output terminal of 03-62：

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	A17	A16	A15	A14	A13	A12	A11	A10

SLOT 2 expanded digital output

Example:

Input terminal:

Set 03-00 = 0(DI1), forward rotation signal;03-03 = 5(DI4), Analog terminal AI3priority, other terminals are default set to the factory value. After digital input terminal DI1 and DI4 close,the inverter operates in forward rotationaccording to the frequency given by AI3.Each bit state of 03-59 is as follows, indicating the operation of DI1 and DI4.

bit	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	0	0	0	0	0	0	0	1	0	1

So 03-59 = 1×22 + 0×21 + 1×20= 5

Output terminal:

03-50(A10), RUN signal detected;03-57(A17) is set set to 2(FU output frequency detected), other terminals are default value. Insert the expansion cardinto SLOT2;after the inverter operates to the target frequency,each bit state of 03-62 is as follows,indicating the output of A17 and A10.

bit	b7	b6	b5	b4	b3	b2	b1	b0
	1	0	0	0	0	0	0	1

So 03-62=1×27 + 0×26 + 0×25 + 0×24 + 0×23 + 0×22 + 0×21 + 1×20 = 129

5.5 Multi-speed parameter group 04

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
04-00	P.4	Speed 1 (high speed)	0~650.00Hz	60.00Hz	
04-01	P.5	Speed 2 (mediumspeed)	0~650.00Hz	30.00Hz	
04-02	P.6	Speed 3 (low speed)	0~650.00Hz	10.00Hz	
04-03	P.24	Speed 4	0~650.00Hz 99999: Function invalid	99999	
04-04	P.25	Speed 5	Same as 04-03	99999	
04-05	P.26	Speed 6	Same as 04-03	99999	
04-06	P.27	Speed 7	Same as 04-03	99999	
04-07	P.142	Speed 8	Same as 04-03	99999	
04-08	P.143	Speed 9	Same as 04-03	99999	
04-09	P.144	Speed 10	Same as 04-03	99999	
04-10	P.145	Speed 11	Same as 04-03	99999	
04-11	P.146	Speed 12	Same as 04-03	99999	
04-12	P.147	Speed 13	Same as 04-03	99999	
04-13	P.148	Speed 14	Same as 04-03	99999	
04-14	P.149	Speed 15	Same as 04-03	99999	
04-15	P.100	Minute/second selection	0: The minimum increment of run time is 1 minute. 1: The minimum increment of run time is 1 second.	1	
04-16	P.121	Run direction in each section	0~255	0	
04-17	P.122	Cycle selection	0: Cycle function invalid 1~8: Run circularly from the setting section.	0	
04-18	P.123	Acceleration/deceleration time setting selection	0: The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8). 1: The acceleration and deceleration time is both determined by 04-35(P.111)~04-42(P.118).	0	
04-19	P.131	Programmed operation mode speed 1	0~650.00Hz	0.00 Hz	
04-20	P.132	Programmed operation mode speed 2	0~650.00Hz	0.00 Hz	
04-21	P.133	Programmed operation mode speed 3	0~650.00Hz	0.00 Hz	
04-22	P.134	Programmed operation mode speed 4	0~650.00Hz	0.00 Hz	
04-23	P.135	Programmed operation mode speed 5	0~650.00Hz	0.00 Hz	
04-24	P.136	Programmed operation mode speed 6	0~650.00Hz	0.00 Hz	
04-25	P.137	Programmed operation mode speed 7	0~650.00Hz	0.00 Hz	
04-26	P.138	Programmed operation mode speed 8	0~650.00Hz	0.00 Hz	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
04-27	P.101	Programmed operation mode speed 1 operating time	0~6000.0s	0.0s	
04-28	P.102	Programmed operation mode speed 2 operating time	0~6000.0s	0.0s	
04-29	P.103	Programmed operation mode speed3 operating time	0~6000.0s	0.0s	
04-30	P.104	Programmed operation mode speed 4 operating time	0~6000.0s	0.0s	
04-31	P.105	Programmed operation mode speed 5 operating time	0~6000.0s	0.0s	
04-32	P.106	Programmed operation mode speed 6 operating time	0~6000.0s	0.0s	
04-33	P.107	Programmed operation mode speed 7 operating time	0~6000.0s	0.0s	
04-34	P.108	Programmed operation mode speed 8 operating time	0~6000.0s	0.0s	
04-35	P.111	Programmed operation mode speed 1 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-36	P.112	Programmed operation mode speed 2 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-37	P.113	Programmed operation mode speed 3 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-38	P.114	Programmed operation mode speed 4 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-39	P.115	Programmed operation mode speed 5 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-40	P.116	Programmed operation mode speed 6 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-41	P.117	Programmed operation mode speed 7Acc/Dec time	0~600.00s/0~6000.0s	0.00s	
04-42	P.118	Programmed operation mode speed 8 Acc/Dec time	0~600.00s/0~6000.0s	0.00s	

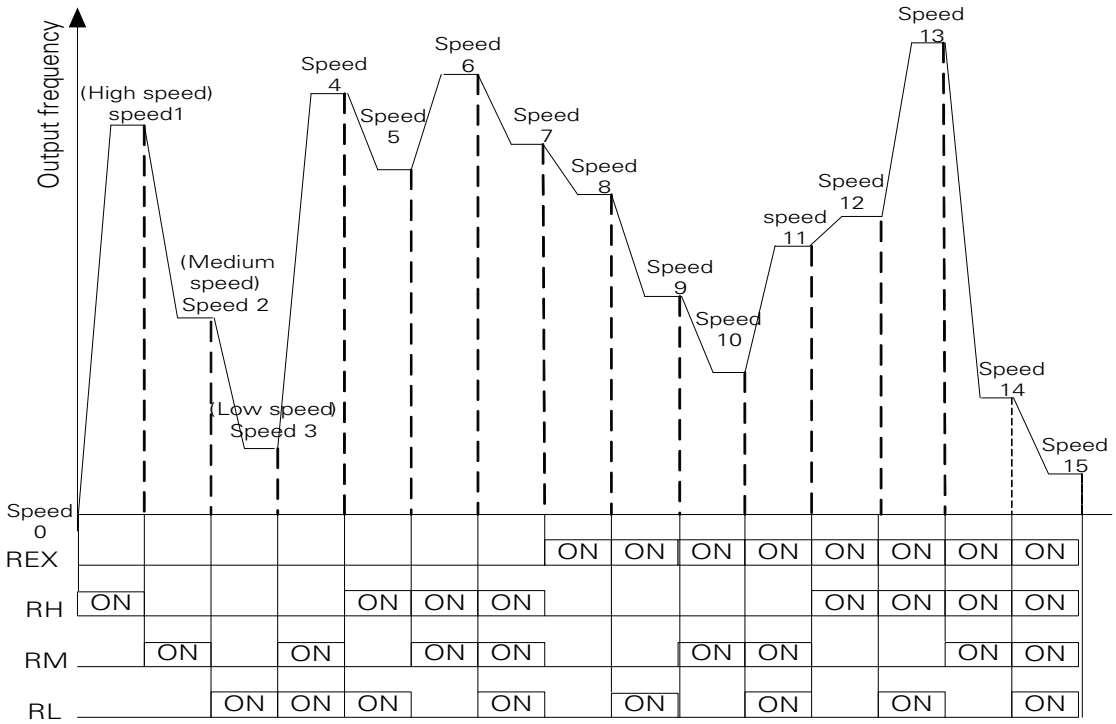
5.5.1 16 speeds

- With the combination of digital input terminal RL, RM, RH and REX, selects speed operation(the most are 16 speeds in total)

Parameter	Name	Factory Value	Setting Range	Content
04-00 P.4	Speed 1 (high speed)	60.00Hz	0~650.00Hz	---
04-01 P.5	Speed 2 (mediumspeed)	30.00Hz	0~650.00Hz	---
04-02 P.6	Speed 3 (low speed)	10.00Hz	0~650.00Hz	---
04-03 P.24	Speed 4	99999	0~650.00Hz	---
			99999	99999: Function invalid
04-04 P.25	Speed 5	99999	Same as 04-03	Same as 04-03
04-05 P.26	Speed 6	99999	Same as 04-03	Same as 04-03
04-06 P.27	Speed 7	99999	Same as 04-03	Same as 04-03
04-07 P.142	Speed 8	99999	Same as 04-03	Same as 04-03
04-08 P.143	Speed 9	99999	Same as 04-03	Same as 04-03
04-09 P.144	Speed 10	99999	Same as 04-03	Same as 04-03
04-10 P.145	Speed 11	99999	Same as 04-03	Same as 04-03
04-11 P.146	Speed 12	99999	Same as 04-03	Same as 04-03
04-12 P.147	Speed 13	99999	Same as 04-03	Same as 04-03
04-13 P.148	Speed 14	99999	Same as 04-03	Same as 04-03
04-14 P.149	Speed 15	99999	Same as 04-03	Same as 04-03

Settin 16 speeds

- If all the set values of 04-03~04-06 and 04-07~04-14 are not 99999, "16-speed operation" is active. It means that with the combination of RL, RM, RH and REX, there are 16 speeds in total. For setting up the target frequency of the inverter, please refer to the figure below:



- Provided that the parameter set values of 04-03~04-06 and 04-07~04-14 are all 99999, the target frequency will be determined by RL, RM and RH these three speeds. See the table below (the priority of the terminals is RL>RM>RH):

Parameter / Target frequency	04-03= 99999	04-04= 99999	04-05= 99999	04-06= 99999	04-07= 99999	04-08= 99999	04-09= 99999	04-10= 99999	04-11= 99999	04-12= 99999	04-13= 99999	04-14= 99999
RL (04-02)	O	O		O	O	O		O		O		O
RM (04-01)			O				O				O	
RH (04-00)									O			

For example, when 04-05=99999, the target frequency is determined by RM (the setting value of 04-01).

Note: 1. The multi-speed is only valid in the "external mode", "combination mode 2"or "combined mode 4".

2.RL, RM, RH and REX mentioned in this section are the function names of the "multi-function digital input terminal". (For example, when 03-03=2, select the DI4 terminal to perform the RL (function).Please refer to 03-00~03-06 and 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.3.

5.5.2 Programmed operation mode

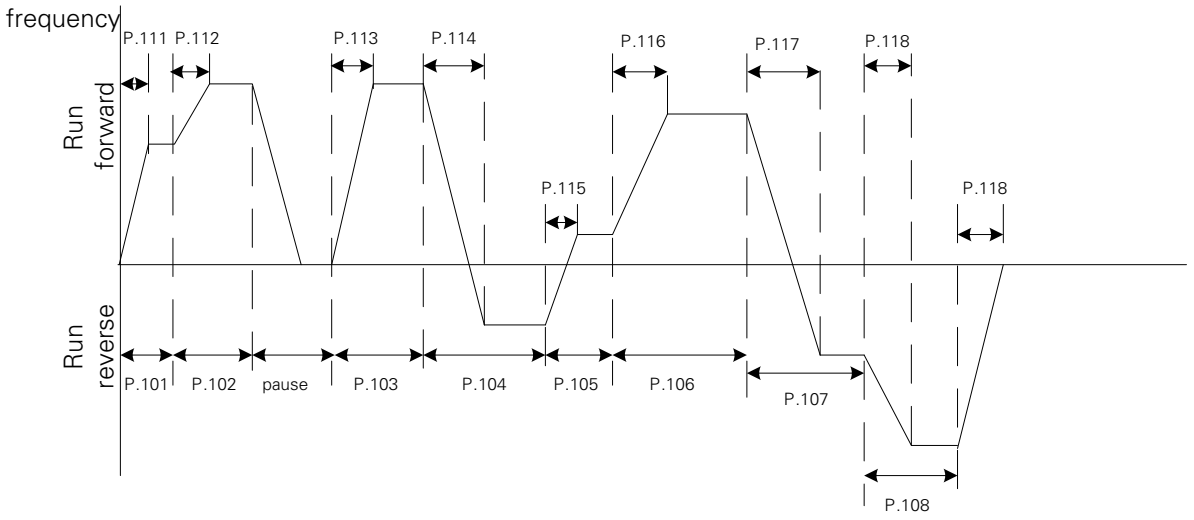
- The application of this parameter can be used as the operation process control for general small machinery, food processing machinery and washing equipment, which can replace some traditional relays, switches, timer and other control circuit, etc.

Parameter	Name	Factory Value	Setting Range	Content
04-15 P.100	Minute/second selection	1	0	The minimum increment of run time is 1 minute.
			1	The minimum increment of run time is 1 second.
04-16 P.121	Run direction in each section	0	0~255	0~255
04-17 P.122	Cycle selection	0	0	0: Cycle function invalid
			1~8	Run circularly from the setting section.
04-18 P.123	Acceleration/deceleration time setting selection	0	0	The acceleration time is set by 01-06 (P.7), the deceleration time is set by 01-07 (P.8).
			1	The acceleration and deceleration time is both determined by 04-35 (P.111)~04-42 (P.118).
04-19 P.131	Programmed operation mode speed 1	0.00Hz	0~650.00Hz	---
04-20 P.132	Programmed operation mode speed 2	0.00Hz	0~650.00Hz	---
04-21 P.133	Programmed operation mode speed 3	0.00Hz	0~650.00Hz	---
04-22 P.134	Programmed operation mode speed 4	0.00Hz	0~650.00Hz	---
04-23 P.135	Programmed operation mode speed 5	0.00Hz	0~650.00Hz	---
04-24 P.136	Programmed operation mode speed 6	0.00Hz	0~650.00Hz	---
04-25 P.137	Programmed operation mode speed 7	0.00Hz	0~650.00Hz	---
04-26 P.138	Programmed operation mode speed 8	0.00Hz	0~650.00Hz	---
04-27 P.101	Programmed operation mode speed 1 operating time	0.0s	0~6000.0s	---
04-28 P.102	Programmed operation mode speed 2 operating time	0.0s	0~6000.0s	---
04-29 P.103	Programmed operation mode speed3 operating time	0.0s	0~6000.0s	---
04-30 P.104	Programmed operation mode speed 4 operating time	0.0s	0~6000.0s	---
04-31 P.105	Programmed operation mode speed 5 operating time	0.0s	0~6000.0s	---
04-32 P.106	Programmed operation mode speed 6 operating time	0.0s	0~6000.0s	---

Parameter	Name	Factory Value	Setting Range	Content
04-33 P.107	Programmed operation mode speed 7 operating time	0.0s	0~6000.0s	---
04-34 P.108	Programmed operation mode speed 8 operating time	0.0s	0~6000.0s	---
04-35 P.111	Programmed operation mode speed 1 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-36 P.112	Programmed operation mode speed 2 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-37 P.113	Programmed operation mode speed 3 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-38 P.114	Programmed operation mode speed 4 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-39 P.115	Programmed operation mode speed 5 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-40 P.116	Programmed operation mode speed 6 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-41 P.117	Programmed operation mode speed 7 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---
04-42 P.118	Programmed operation mode speed 8 Acc/Dec time	0.00s	0~600.00s/ 0~6000.0s	---

Settin Programmed operation mode

- Programmed operation mode
  1. The calculation of runtime and acceleration/deceleration time in each section is presented in the figure below:



2. The run direction is set in binary form (8-bit), and then translated to decimal form and stored in 04-16. "1" means run forward, and "0" means run reversely. The highest bit is the run direction of section 8, while the lowest bit is the direction of the section 1.

For example: Suppose that section 1 is run forward, section 2 is run reverse, section 3 is run reverse, section 4 is run forward, section 5 is run reverse, section 6 is run forward, section 7 is run forward, section 8 is run reverse, then the value in binary form is 01101001.

04-16=0×27+1×26+1×25+0×24+1×23+0×22+0×21+1×20=105

3. When 04-16=0, it will not run in circular motion.

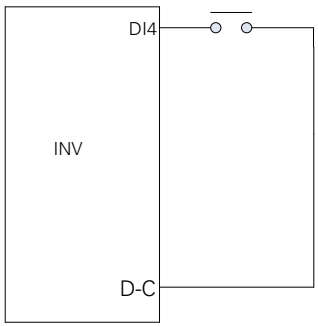
4. When 04-17 is 1~8, it is the initial sectional speed at the beginning of the cycle.

For example: When 04-17=3, the inverter will run circularly from the third section to the eighth section after it finishes its running from the first section to the eighth section.

5. When 04-18 = 0, the acceleration time is determined by 01-06, and the deceleration time is determined by 01-07.

6. When 04-18 = 1, the acceleration time and deceleration time are both determined by 04-35~04-42.

- Manual operation cycle mode

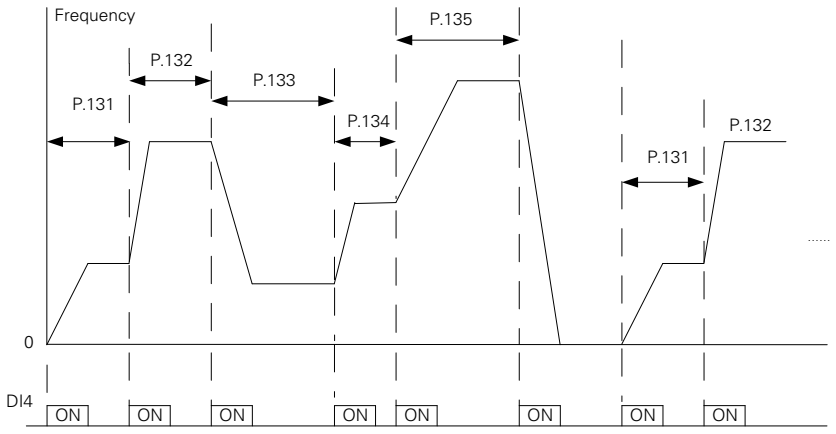


Wiring diagram for manual operation cycle mode

1. Insert an impulse type switch between DI4 and D-C.

2. After turning on the power, according to terminals wiring, set corresponding parameter 03-03 to 35.The inverter is on standby at this point.

3. The mode of operation is shown in the figure below:



Note: 1. The inverter can run eight levels of speed in the procedure, and the frequency is determined by 04-19~04-26.
2. For the setting of 04-15~04-18 and 04-27~04-42, it is valid for programmed operation mode only, not for manual operation cycle mode; For the acceleration/deceleration time of manual operation cycle mode, please refer to the usage of 01-06, 01-07, 01-22 and 01-23.
3. If there is any section set to zero, the inverter will be on standby in this section. In other word, 04-19 has to be nonzero when this mode is selected. Like the figure above, when 04-24 is 0, regardless of the value of 04-25 and 04-26, the inverter stops when the switch is pressed for the sixth time.
4. The rotation of the manual operation cycle mode is unilateralism. It has nothing to do with 04-16 or the signals of STF and STR.
5. For the setting of 04-35~04-42, please refer to 01-08 for the usage of the acceleration/deceleration time unit.

5.6 Motor parameter group 05

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
05-00	P.301	Motor parameter auto-tuning function selection	0: Parameter auto-tuning function with no motor 1: Induction motor parameter auto-tuning measuring the running motor 2: Induction motor parameter auto-tuning measuring the stopped motor 3: Induction motoronline auto-tuning function 4: Induction motorthe system inertia auto-tuning measuring in the mode of closed loop vector control 5: Induction motor parameters automatic measurement [Measurement of motor is not running] 8: Synchronous motor parameter auto-tuning function 9: Synchronous motor Phase Z position auto-tuning function 10: Synchronous motorthe rotation inertia auto-tuning-function.	0	
05-01	P.302	Motor rated power	0~650.00kW	0.00kW	
05-02	P.303	Motor poles	0~256	4	
05-03	P.304	Motor rated voltage	440 Voltage: 0~510V 220 Voltage: 0~255V	According to voltage	
05-04	P.305	Motor rated frequency	50Hz system: 0~650.00Hz 60Hz system: 0~650.00Hz	50.00Hz 60.00Hz	
05-05	P.306	Motor rated current	0~500.00A: Types below Frame G 0~5000.0A: Frame G and types above	According to type	
05-06	P.307	Motor rated rotation speed	50Hz system: 0~65000r/min 60Hzsystem: 0~65000r/min	1410r/min 1710r/min	
05-07	P.308	Motor excitation current	0~500.00A: Types below Frame G 0~5000.0A: Frame G and types above	According to type	
05-08	P.309	IM motor stator resistance	0~65000mΩ: 45K/55KF and types below 0~650.00mΩ: 55K/75KF and types above	According to type	
05-09	P.310	IM motor rotor resistance	0~65000mΩ: 45K/55KF and types below 0~650.00mΩ: 55K/75KF and types above	According to type	
05-10	P.311	IM motor leakage inductance	0~6500.0mH: 45K/55KF and types below 0~650.00mH: 55K/75KF and types above	According to type	
05-11	P.312	IM motor mutual inductance	0~6500.0mH: 45K/55KF and types below 0~650.00mH: 55K/75KF and types above	According to type	
05-12	P.313	PM motor stator resistance	0~65000mΩ: 45K/55KF and types below 0~650.00mΩ: 55K/75KF and types above	According to type	
05-13	P.314	PM motor d-axis inductance	0~650.00mH	According to type	
05-14	P.315	PM motor q-axis inductance	0~650.00mH	According to type	
05-15	P.316	PM motor Back-EMF coefficient	0~6500.0V/krpm	According to type	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
05-16	P.317	PM motor Phase Z origin pulse compensation	0~359.9°	0.0°	
05-17	P.318	Rotation inertia	0~6.5000kg.m^2: 5.5K/7.5KF and types below	According to type	
			0~65.000kg.m^2: 7.5K/11KF~ 90K/110KF types		
			0~650.00kg.m^2: 110K/132KF and types above		
05-18	P.631	Inertia self-learning setting T1	0~05-19(P.632) %	30.0%	
05-19	P.632	Inertia self-learning setting T2	05-18(P.631)~100.0%	60.0%	
05-22	P.332	The second motor rated power	0~650.00kW	99999	
			99999		
05-23	P.333	The second motor poles	0~256	99999	
			99999		
05-24	P.334	The second motor rated voltage	440Voltage: 0~510V	99999	
			220Voltage: 0~255V		
05-25	P.335	The second motor rated frequancy	0~650.00Hz	99999	
			99999		
05-26	P.336	The second motor rated current	0~500.00A: Types below Frame G	99999	
			0~5000.0A: Frame G and types above		
			99999		
05-27	P.337	The second motor rated rotation speed	0~65000r/min	99999	
			99999		
05-28	P.338	The second motor excitation current	0~500.00A: Types below Frame G	99999	
			0~5000.0A: Frame G and types above		
			99999		
05-29	P.339	The second motor (IM) stator resistance	0~65000mΩ: 45K/55KF and types below	99999	
			0~650.00mΩ: 55K/75KF and types above		
			99999		
05-30	P.340	The second motor (IM) rotor resistance	0~65000mΩ: 45K/55KF and types below	99999	
			0~650.00mΩ: 55K/75KF and types above		
			99999		
05-31	P.341	The second motor (IM) leakage inductance	0~6500.0mH: 45K/55KF and types below	99999	
			0~650.00mH: 55K/75KF and types above		
			99999		
05-32	P.342	The second motor (IM) mutual inductance	0~6500.0mH: 45K/55KF and types below	99999	
			0~650.00mH: 55K/75KF and types above		
			99999		
05-33	P.343	The second motor (PM) stator resistance	0~65000mΩ: 45K/55KF and types below	99999	
			0~650.00mΩ: 55K/75KF and types above		
			99999		
05-34	P.344	The second motor (PM) d-axis inductance	0~650.00mH	99999	
			99999		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
05-35	P.345	The second motor (PM) q-axis inductance	0~650.00mH	99999	
			99999		
05-36	P.346	The second motor (PM) Back-EMF coefficient	0~6500.0V/krpm	99999	
			99999		
05-37	P.347	The second motor (PM) Phase Z origin pulse compensation	0~359.9°	99999	
			99999		
05-38	P.348	The second motor rotation inertia	0~6.5000kg.m^2: 5.5K/7.5KF and types below	99999	
			0~65.000kg.m^2: Types from 7.5K/11KF to 90K/110KF		
			0~650.00kg.m^2: 110K/132KF and types above		
			99999		

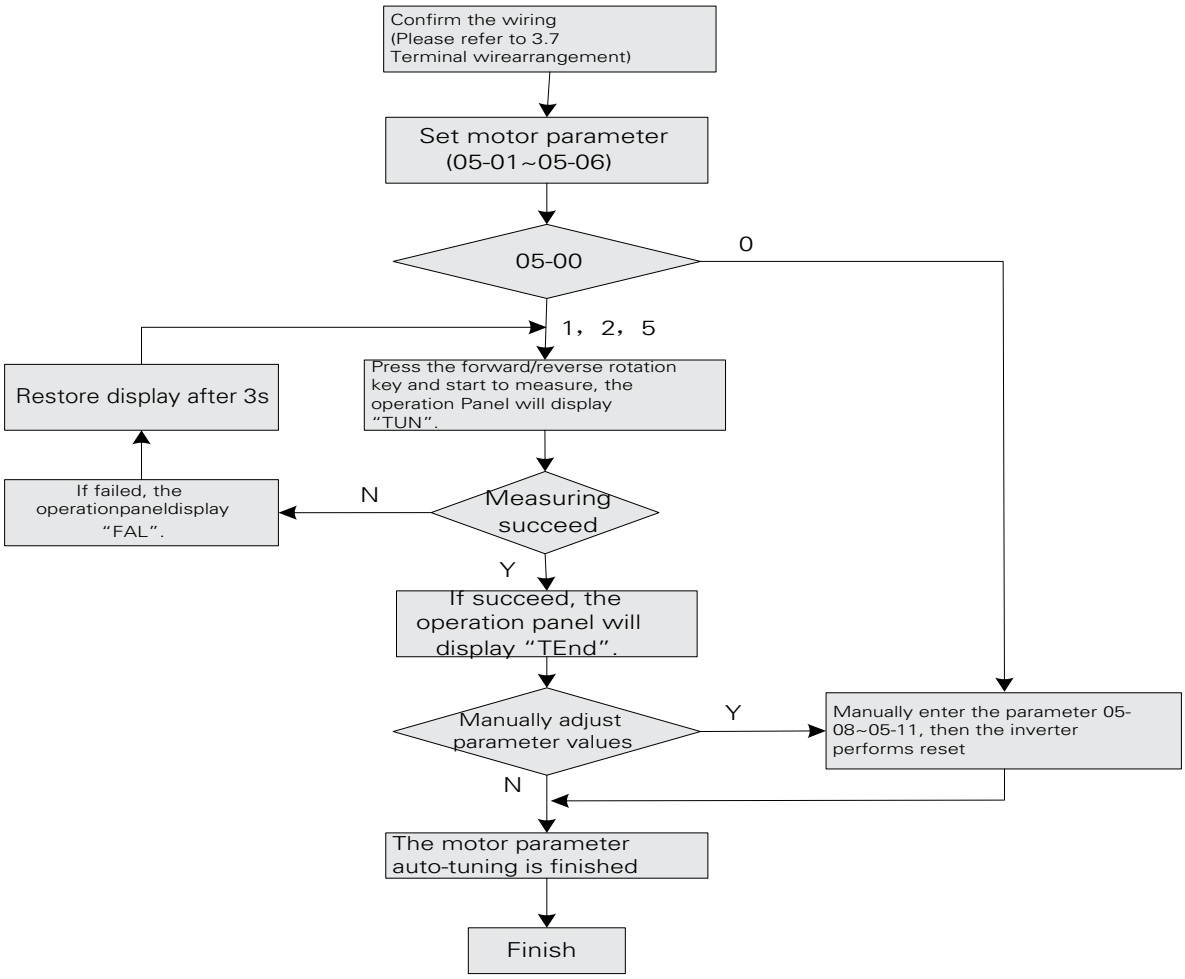
5.6.1 Motor parameter auto-tuning function selection

- Via accurate motor parameter auto-tuning function, realizes motor high-performance vector control.

Parameter	Name	Factory Value	Setting Range	Content
05-00 P.301	Motor parameter auto-tuning function selection	0	0	Parameter auto-tuning function with no motor
			1	Induction motor parameter auto-tuning measuring the running motor
			2	Induction motor parameter auto-tuning measuring the stopped motor
			3	Induction motoronline auto-tuning function
			4	Induction motorthe system inertia auto-tuning measuring in the mode of closed loop vector control
			5	Induction motor parameters automatic measurement [Measurement of motor is not running]
			8	Synchronous motor parameter auto-tuning function
			9	Synchronous motor Phase Z position auto-tuning function
			10	Synchronous motorthe rotation inertia auto-tuningfunction.

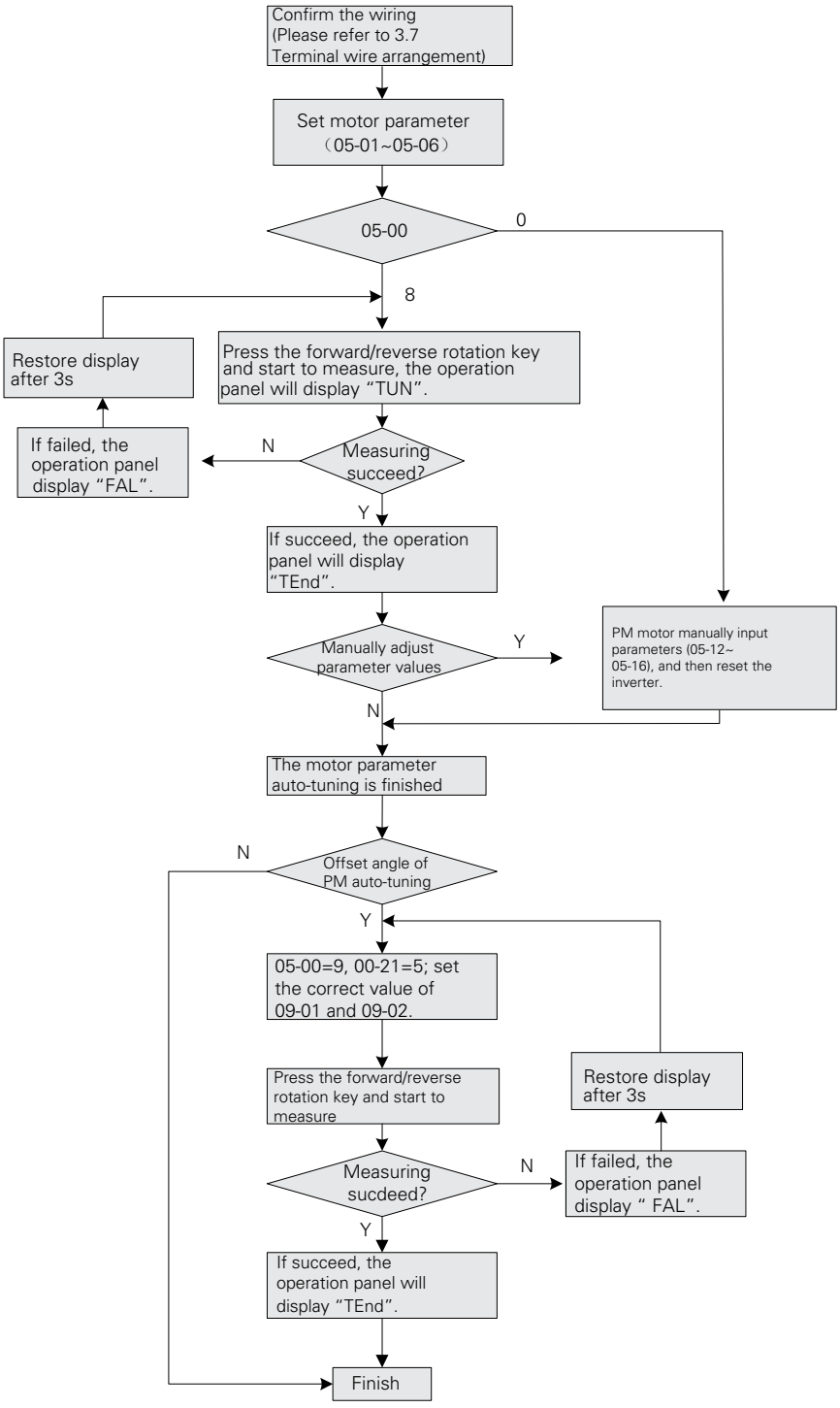
Settin Motor parameter auto-tuning function

- When 00-21=0, no motor parameter auto-tuning function is required for normal V/F curve operation.
- For IM general magnetic vector control, please set 00-21 to 2. The frequency will be altered due to elevated voltage and increased compensatory motor load.
- For executing the IM motor parameter auto-tuning function, set 05-00 to 1 or 2 or 5 and press the forward rotation or the reverse rotation key. During the measuring process, the parameter unit will flicker and display "TUN". If the measurement fails, the parameter unit will flicker "FAL" for three seconds and then return to normal display.
- For executing the system inertia auto-tuning function, set 05-00 to 4 in the mode of closed loop vector control and set the inertia self-learning torque 05-18 and 05-19 respectively, then press the forward rotation or the reverse rotation key. The measuring result will be different due to the different setting of self-learning torque. The principle of setting self-learning torque is that the difference between self-learning torque 05-18 and 05-19 can't be too small and the measuring torque can't be set too big, or the acceleration time will be too short that the measuring result will have a large error.
- Procedures for IM motor parameter auto-tuning are presented below:



- When setting 00-21 to 5 or 6, please make sure to correctly set PM motor parameterand execut the PM motor parameter auto-tuning function to ensure the stability and dynamic responsiveness of control.
- When setting 00-21 to 5, if change the encoder or the motor UVWwiting order, please make sure to set 05-00 to 9, excuting PM motor Phase Z auto-tuning function.

- Procedures for PM motor parameter auto-tuning are presented below:



- If high accuracy sensorless control is required by IM motor, set 05-00 to 3 for sensorless vector control.

Note: 1. The motor capacity has to be at the same level or one level below of the level of the capacity of the inverter.
2. For the IM motor auto-tuning function, if motor operation is permitted, set 05-00 to 1 (dynamic measurement). At this point, the load has to be separated from the motor. If the load environment does not permit auto-tuning, set 05-00 to 2 (static measurement) if motoring is running.
3. IM motor sensorless vector control: auto-tuning function can be used to enhance the control function. Before setting 05-00 to 3 or 4, first set the motor parameters or the auto-tuning function to improve the control accuracy.
4. When 05-00=1 and the mode of close-loop V/F control (VF + PG) is selected, please make sure that the motor poles 05-02 is correct.

5.6.2 Motor parameter

- The standard parameters of the adaptable motor have been configured inside the inverter. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions.

Parameter	Name	Factory Value	Setting Range	Content
05-01 P.302	Motor rated power	0.00kW	0~650.00kW	---
05-02 P.303	Motor poles	4	0~48	---
05-03 P.304	Motor rated voltage	380/440V	0~510V	440V voltage
		220V	0~255V	220Vvoltage
05-04 P.305	Motor rated frequency	50.00Hz	0~650.00Hz	50Hz system (when 00-24=1)
		60.00Hz		60Hz system (when 00-24=0)
05-05 P.306	Motor rated current	According to type	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and types above
05-06 P.307	Motor rated rotation speed	1410r/min	0~65000r/min	50Hz system (when 00-24=1)
		1710r/min		60Hz system (when 00-24=0)
05-07 P.308	Motor excitation current	According to type	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and types above
05-08 P.309	IM motor stator resistance	According to type	0~65000mΩ	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
05-09 P.310	IM motor rotor resistance	According to type	0~65000mΩ	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
05-10 P.311	IM motor leakage inductance	According to type	0~6500.0mH	45K/55KF and types below
			0~650.00mH	55K/75KF and types above
05-11 P.312	IM motor mutual inductance	According to type	0~6500.0mH	45K/55KF and types below
			0~650.00mH	55K/75KF and types above
05-12 P.313	PM motor stator resistance	According to type	0~65000mΩ	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
05-13 P.314	PM motor d-axis inductance	According to type	0~650.00mH	---
05-14 P.315	PM motor q-axis inductance	According to type	0~650.00mH	---
05-15 P.316	PM motor Back-EMF coefficient	According to type	0~6500.0V/krpm	---
05-16 P.317	PM motor Phase Z origin pulse compensation	0.0°	0~359.9°	---
05-17 P.318	Rotation inertia	According to type	0~6.5000kg.m^2	5.5K/7.5KF and types below
			0~65.000kg.m^2	7.5K/11KF~ 90K/110KF types
			0~650.00kg. m^2	110K/132KF and types above

Settin Motor parameter

- When the IM motor can be fully separated from the load, select 05-00=1. When the motor is running, the motor parameter will carry out auto-tuning. Then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter: 05-07~05-11.
- When the motor cannot be fully separated from the load, select 05-00=2. When the motor is stopped, the motor parameter will carry out auto-tuning. Then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter: 05-07~05-11.
- The users can use the motor's nameplate to calculate the two parameters. The motor nameplate parameters used in the calculation are: rated voltage U, rated current I, rated frequency f and η power factor .
- The calculation of motor idling excitation current and of motor mutual induction is presented below: is motor leakage induction.

  Idling current: $I_0 = I \times \sqrt{1-\eta^2}$

  Mutual inductance calculation: $$L_m = \frac{U}{2\sqrt{3} \cdot \pi \cdot f \cdot I_0} - L_\delta$$

  I_0 is the idling current, L_m is mutual inductance, L_s is leakage inductance.
- When executing PMmotor parameter auto-tuning function, set 05-00 to 8, then press FWD or REV on the keyboard panelfor the inverter to automatically calculate the following parameter:05-12~05-16.
- When executingPM motor Phase Zposition auto-tuning function, be sure to make the motor fully separated from the load,and set 05-00 to 9, then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter:05-16.
- When executing PM motor rotation inertia auto-tuning function, set 05-00 to 10, then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter:05-17.

Note: 1.When the inverter is used with a motor of a different level, verify the input motor's nameplate parameter 05-01~05-06.The vector control method is heavily dependent upon motor parameters. To achieve a good control performance, the controlled motor's correct parameters have to be acquired.

2. Before executing PM motor Phase Z position auto-tuning function, please first execute PM motor parameterauto-tuning function, and then correctly set the value of 09-01 and 09-02. If there is motor vibration when tuning, please decrease the setting value of 11-00.

3. When any or many values of 05-01~05-11 are manually revised, reset the inverter to reload the new values of the parameters.

5.6.3 Motor inertia auto-tuning

- It is applicable in tension control open–loop torque mode

Parameter	Name	Factory Value	Setting Range	Content
05-18 P.631	Inertia self-learning setting T1	30.0%	0~ 05-19 (P.632)%	---
05-19 P.632	Inertia self-learning setting T2	60.0%	05-18 (P.631)~100.0%	---

Settin Motor inertia auto-tuning

- When the tension control adopts the open loop torque mode, during the system acceleration/deceleration, additional torque shall be provided to overcome the rotation inertia of the whole system. Otherwise, too small tension upon wind-up acceleration and too large tension upon deceleration, or too large tension upon roll-down acceleration and too small tension upon deceleration will be caused.
- For the instruction of 05-18 and 05-19, please refer to the instruction part of 05-00=4.

5.6.4 The second motor parameter

- Via setting the second motor parameter, cooperating with the digital input terminal, starts the second motor parameter auto-tuning function.

Parameter	Name	Factory Value	Setting Range	Content
05-22 P.332	The second motor rated power	99999	0~650.00kW	---
			99999	Not selected
05-23 P.333	The second motor poles	99999	0~48	---
			99999	Not selected
05-24 P.334	The second motor rated voltage	99999	0~510V	440 Voltage
			0~255V	220 Voltage
			99999	Not selected
05-25 P.335	The second motor rated frequancy	99999	0~650.00Hz	---
			99999	Not selected
05-26 P.336	The second motor rated current	99999	0~500.00A	Types below Frame 7
			0~5000.0A	Frame 7 and types above
			99999	Not selected
05-27 P.337	The second motor rated rotation speed	99999	0~65000r/min	---
			99999	Not selected
05-28 P.338	The second motor excitation current	99999	0~500.00A	Types below Frame 7
			0~5000.0A	Frame 7 and types above
			99999	Not selected.
05-29 P.339	The second motor (IM) stator resistance	99999	0~65000mΩ	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
			99999	Not selected
05-30 P.340	The second motor (IM) rotor resistance	99999	0~65000mΩ	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
			99999	Not selected

Parameter	Name	Factory Value	Setting Range	Content
05-31 P.341	The second motor (IM) leakage inductance	99999	0~6500.0mH	45K/55KF and types below
			0~650.00mH	55K/75KF and types above
			99999	Not selected.
05-32 P.342	The second motor (IM) mutual inductance	99999	0~6500.0mH	45K/55KF and types below
			0~650.00mH	55K/75KF and types above
			99999	Not selected.
05-33 P.343	The second motor (PM) stator resistance	99999	0~65000mΩ:	45K/55KF and types below
			0~650.00mΩ	55K/75KF and types above
			99999	Not selected.
05-34 P.344	The second motor (PM) d-axis inductance	99999	0~650.00mH	According to type
			99999	Not selected.
05-35 P.345	The second motor (PM) q-axis inductance	99999	0~650.00mH	According to type
			99999	Not selected.
05-36 P.346	The second motor (PM) Back-EMF coefficient	99999	0~6500.0V/krpm	According to type
			99999	Not selected.
05-37 P.347	The second motor (PM) PhaseZ origin pulse compensation	99999	0~359.9°	---
			99999	Not selected.
05-38 P.348	The second motor rotation inertia	99999	0~6.5000kg.m^2	5.5K/7.5KF and types below
			0~65.000kg.m^2	Types from 7.5K/11KF to 90K/110KF
			0~650.00kg.m^2	110K/132KF and types above
			99999	Not selected.

Settin The second motor parameter

- When 00-22 ≠ 99999, RT signal is ON, the second motor parameters 05-22~05-38 are valid, please refer to Section 5.2.10 for the second function parameter.
- For the usage of the second motor parameter, please refer to 05-01~05-17 motor parameter setting.

5.7 Protection parameter group 06

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
06-00	P.9	Electronic thermal relay capacity	0~500.00A: Types below Frame G	According to type	
			0~5000.0A: Frame G and types above		
06-01	P.22	Stall prevention operation level	0~400.0%	150.0%	
06-02	P.23	Compensation factor at level reduction	0~150.0%	99999	
			99999: Stall prevention operation level is the setting value of 06-01 (P.22).		
06-03	P.66	Stall prevention operation reduction starting frequency	50Hz system: 0~650.00Hz	50.00Hz	
			60Hz system: 0~650.00Hz	60.00Hz	
06-04	P.220	Current stall selection of time of acceleration and deceleration	0: According to the current time of Acc/Dec	3	
			1: According to the first time of Acc/Dec		
			2: According to the second time of Acc/Dec		
			3: Automatically calculate the best time of accerelation/deceleration		
06-05	P.30	Regenerative brake function selection	0: If regenerative brake duty is fixed at 3%, parameter 06-06 (P.70) will be invalid.	0	
			1: The regenerative brake duty is the value of 06-06(P.70).		
			2: External brake unit protection function (D framework and the above models).	2	
06-06	P.70	Special regenerative brake duty	0~100.0%	0.0%	
06-07	P.263	Decrease carrier protection setting	0: Rated carrier frequency, limit load current according to the setting carrier.	0	
			1: Rated current, limit carrier according to the load current and temperature.		
06-08	P.155	Over torque detection level	0~200.0%	0.0%	
06-09	P.156	Over torque detection time	0.1~60.0s	1.0s	
06-10	P.260	Over torque detection selection	0: The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.	1	
			1: The OL2 alarm is reported after the over torque detection, and the inverter stops.		
06-11	P.160	Stall level when restart	0~150.0%	100.0%	
06-12	P.245	Cooling fan operation	0X: Fan alarm for abnormal fan	0	
			1X: No fan alarm for abnormal fan, but the output of terminal alarm.		
			X0: The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.		
			X1: Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too.		
06-12	P.245	Cooling fan operation	X2: The fan will be turned on if the temperature of the heat sink is higher than 40°C. When the power is turned off, the fan will be turned off, too.	0	
			X3: The fan will be turned on when the temperature of the heat sink is higher than 60°C. When it is lower than 40°C, the fan will be turned off.		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
06-13	P.281	Input phase failure protection	0: No Phase Failure Protection	0	
			1: Phase failure protection, the parameter unit will display the "IPF" alarm and the output stops.		
06-14	P.287	SCP Short circuit protection function	0: No the output end short-circuits protection function.	1	
			1: If outputend is short, the parameter unit will display the "SCP" alarm and the output stops.		
06-15	P.533	The process mode of PTC alarm	0: Alarm and continue to run	0	
			1: Alarm and decelerate to stop		
			2: Alarm and stop freely		
			3: No alarm		
06-16	P.534	The percentage of PTC level	0~100.0%	0.0%	
06-17	P.261	Maintenance alarm function	0: No maintenance alarm	0	
			1~9998day: Used to set time whenmaintenancealarm sends out signal		
06-18	P.280	Short circuit detection when starting	0: No short circuit detection when starting	0	
			1: Short circuit detection when starting		
06-19	P.282	Operation GF detection level	280K/315KF types below: 0~100.0%	50.0%	
			315K/355KF type: 0~100.0%	70.0%	
06-20	P.262	Output phase failure protection	0: No output phase failure protection selection	0	
			1: Output phase failure protection, the parameter unit will display the "LF" abnormal alarm and the inverter will stop the output.		
06-21	P.705	Low voltage level	155~220V: 220V inverter type	155V	
			310~440V: 440V inverter type	310V	
06-22	P.706	Regenerative brake operation level	205~400V: 220V inverter type	360V	
			410~800V: 440V inverter type	720V	
06-23	P.707	Voltage stall level	205~400V: 220V inverter type	380V	
			410~800V: 440V inverter type	760V	
06-24	P.708	Capacitor lifetime detection	0: No capacitor lifetime detection.	0	
06-24	P.708	Capacitor lifetime detection	1: When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit.	0	
06-25	P.709	Capacitor lifetime detection level	0~100.0%	100.0%	
06-26	P.710	Capacitor lifetime detection result	0: No abnormal signal.	Read	
			1: Electrolytic capacitor abnormal.		
06-27	P.292	Accumulative motor operation time (minutes)	0~1439min	0min	
06-28	P.293	Accumulative motor operation time (days)	0~9999day	0day	
06-29	P.296	Accumulative motor power time (minutes)	0~1439min	0min	
06-30	P.297	Accumulative motor power time (days)	0~9999day	0day	
06-40	P.288	Alarm code query	0~12	1	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
06-41	P.289	Alarm code display	Read	Read	
06-42	P.290	Alarm message query	0~10	0	
06-43	P.291	Alarm message display	Read	Read	
06-44	P.740	E1	Read	Read	
06-45	P.741	E2	Read	Read	
06-46	P.742	E3	Read	Read	
06-47	P.743	E4	Read	Read	
06-48	P.744	E5	Read	Read	
06-49	P.745	E6	Read	Read	
06-50	P.746	E7	Read	Read	
06-51	P.747	E8	Read	Read	
06-52	P.748	E9	Read	Read	
06-53	P.749	E10	Read	Read	
06-54	P.750	E11	Read	Read	
06-55	P.751	E12	Read	Read	
06-56	P.752	E1 alarm output frequency	Read	Read	
06-57	P.753	E1 alarm output current	Read	Read	
06-58	P.754	E1 alarm output voltage	Read	Read	
06-59	P.755	E1 alarm the temperature rising accumulation rate	Read	Read	
06-60	P.756	E1 alarm PN voltage	Read	Read	
06-61	P.757	E1 alarm the time of the inverter has run	Read	Read	
06-62	P.758	E1 alarm the inverter operation status code	Read	Read	
06-63	P.759	E1 alarm(years/months)	Read	Read	
06-64	P.760	E1 alarm (days/hours)	Read	Read	
06-65	P.761	E1 alarm(minutes/seconds)	Read	Read	
06-70	P.766	E2 alarm output frequency	Read	Read	
06-71	P.767	E2 alarm output current	Read	Read	
06-72	P.768	E2 alarm output voltage	Read	Read	
06-73	P.769	E2 alarm the temperature rising accumulation rate	Read	Read	
06-74	P.770	E2 alarm PN voltage	Read	Read	
06-75	P.771	E2 alarm the time of inverter has run	Read	Read	
06-76	P.772	E2 alarm the inverter operation status code	Read	Read	
06-77	P.773	E2 alarm (years/months)	Read	Read	
06-78	P.774	E2 alarm (days/hours)	Read	Read	
06-79	P.775	E2 alarm(minutes/seconds)	Read	Read	

5.7.1 Electronic thermal relay capacity

- The "electronic thermal relay" uses the program of the inverter to simulate a thermal relay for preventing the motor from overheating

Parameter	Name	Factory Value	Setting Range	Content
06-00 P.9	Electronic thermal relay capacity	According to type	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and types above

Settin Electronic thermal relay capacity

- Please set 06-00 as the rated current of the motor at its rated frequency. The rated frequency of a squirrel-cage inductive motor made in different countries and areas is different. Please refer to the nameplate instruction on the motor.
- If 06-00=0, the electronic thermal relay is invalid.
- In case the calculated heat by the electronic thermal relay exceeds the upper limit, an alarm will go off and the parameter unit screen will display $\Gamma H \Pi$, and the output will be stopped.

Note: 1. After the inverter is reset; the thermal accumulating record of the electronic thermal relay will be reset to zero. Please pay attention in this area.

2. When two or more motors are connected to the inverter, they cannot be protected by the electronic thermal relay. Install an external thermal relay for each motor.

3. When a special motor is employed, the electronic thermal relay is no longer valid. Install an external thermal relay for each motor.

4. About wiring for an external thermal relay, please refer to 03-00~03-06 and 03-09.

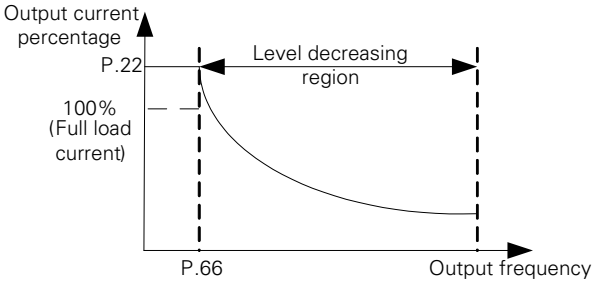
5.7.2 Current stalling protection

- This function monitors the output current and automatically changes the output frequency to prevent the inverter fromtripping due to overcurrent, overvoltage, etc. It can also limit the stall prevention and fast-response current limit-operation during acceleration/deceleration and power/regenerative driving.

Parameter	Name	Factory Value	Setting Range	Content
06-01 P.22	Stall prevention operation level	150.0%	0~400.0%	---
06-02 P.23	Compensation factor at level reduction	99999	0~150.0%	---
			99999	Stall prevention operation level is the setting value of 06-01(P.22).
06-03 P.66	Stall prevention operation reduction starting frequency	50.00Hz	0~650.00Hz	50Hz system (when 00-24=1)
		60.00Hz		60Hz system (when 00-24=0)
06-04 P.220	Current stall selection of time of acceleration and deceleration	3	0	According to the current time of Acc/Dec
			1	According to the first time of Acc/Dec
			2	According to the second time of Acc/Dec
			3	Automatically calculate the best time of accerelation/deceleration.

Settin Current stalling protection

- When the motor starts or target frequency is adjusted (increasing) under a heavy load, the motor speed is often unable to follow the output frequency closely. If the motor speed is lower than the output frequency, the output current will increase to improve the output torque. However, if the difference between the output frequency and the motor speed is too great, the motor torque will decrease, a phenomenon known as "stall".

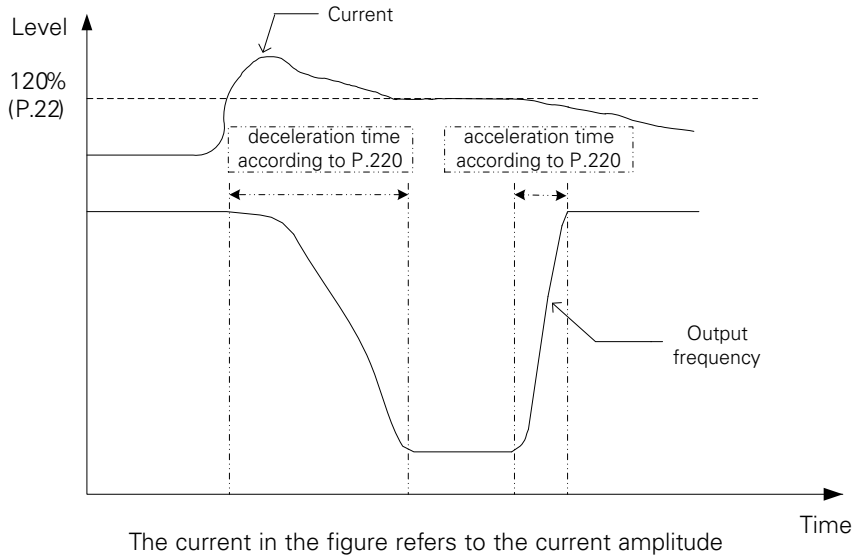


Calculation formula for stall prevention operation level:

$$\text{Level percentage}=A+B\times\frac{\text{P.22-A}}{\text{P.22-B}}\times\frac{\text{P.23-100}}{100}$$

$$A=\frac{\text{P.66}\times\text{P.22}}{\text{Output frequency}}\qquad B=\frac{\text{P.66}\times\text{P.22}}{400}$$

- During heavy load periods, the output current of the inverter will increase. Once the output current exceeds the curve in the diagram below, the inverter will decrease the output frequency according to the time of Dec of 06-04. After the motor attains the output frequency (at this moment, the output current of the inverter will decrease accordingly), and accelerates to the original output frequency according to the time of Acc of 06-04 (stall output frequency), then continue to increase the output frequency.



The current in the figure refers to the current amplitude

Note: 1.When 00-21=3 for sensorless vector control is selected from 00-21 control method, 06-01 will be used for the torque limited horizontal operation.

2. When 06-04=2, if 01-22 is not set, acceleration time is 01-07; if 01-23 is not set, deceleration time is 01-07.

5.7.3 Regenerative brake

- When performing frequent start and stop operation, usage rate of the regenerative brake can be increased by usingthe brake resistor or the brake unit.

Parameter	Name	Factory Value	Setting Range	Content
06-05 P.30	Regenerative brake function selection	0	0	If regenerative brake duty is fixed at 3%, parameter 06-06 (P.70) will be invalid.
			1	The regenerative brake duty is the value of 06-06 (P.70).
		2	2	External braking unit protection
06-06 P.70	Special regenerative brake duty	0.0%	0~100.0%	---

Settin Regenerative brake

- At the moment of the inverter output frequency switching from high to low, the rotation speed of the motor will be higher than the output frequency of the inverter due to load inertia, resulting in generator effect. This effect will cause a high voltage between the main-circuit terminals (+/P) and (-/N), which will damage the inverter. Therefore, a proper brake resistor shall be mounted between terminals +/P and PR to dissipate the feedback energy.
- There is a built-in transistor inside the inverter. The conducting time ratio of the transistor is called "regenerative brake duty". The higher the regenerative brake duty is, the more energy the brake resistor consumes, and the stronger the brake capability is.

Note: 1. In occasions where frequency starts or stops, a high capacity brake resistor is required.

5.7.4 Decrease carrier protection setting

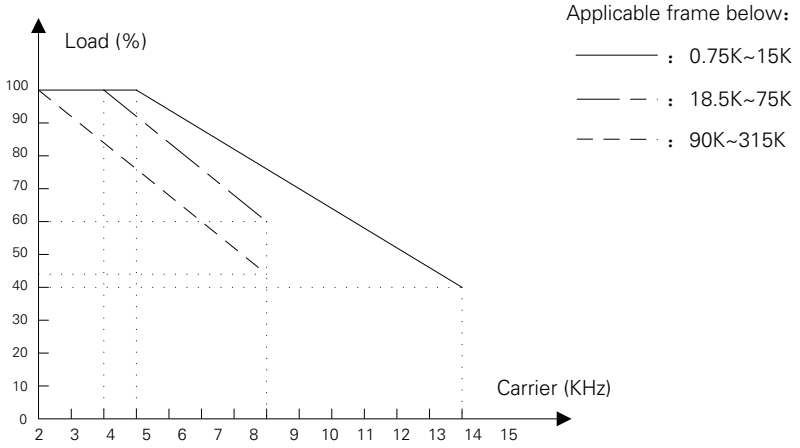
- Select decrease carrier or decrease rated current protection.

Parameter	Name	Factory Value	Setting Range	Content
06-07 P.263	Decrease carrier protection setting	0	0	Rated carrier frequency, limit load current according to the setting carrier.
			1	Rated current, limit carrier according to the load current and temperature.

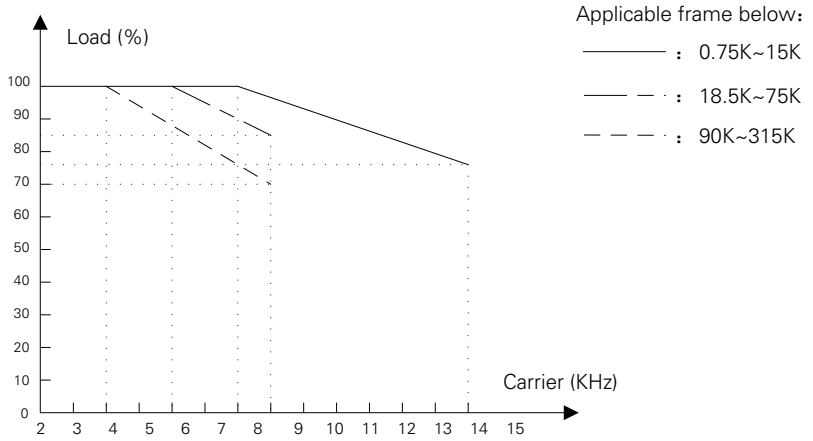
Settin Decrease carrier protection

- 06-07=0, constant carrier frequency, decrease the rated current according to the carrier frequency setting in accordance with curve, to avoid IGBT module overheated.The derating curve is as follows:

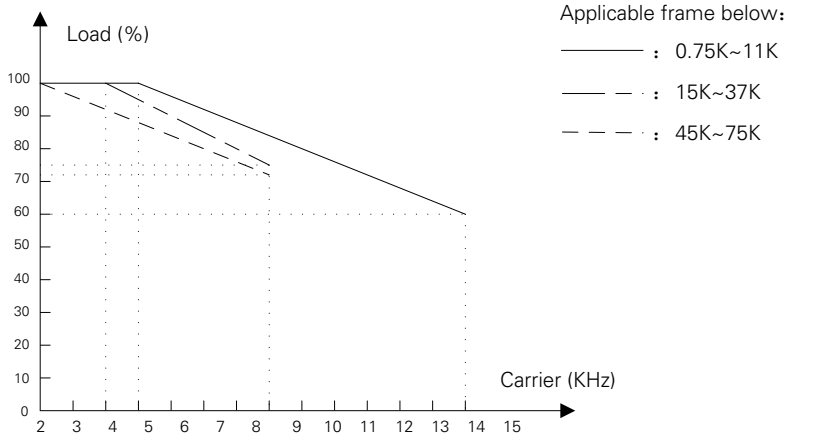
440V type heavy duty (HD)



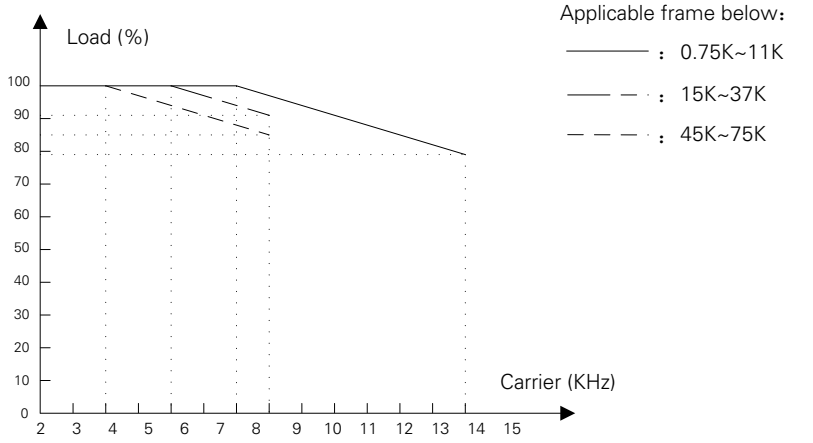
440V type normal duty (ND)



220V type heavy duty (HD)



220V type normal duty (ND)



- 06-07=1, constant rated current, auto decrease operating carrier frequency accordingto the IGBT moduletemperature to avoid IGBT module overheated.

  The rules are as follows:when the IGBT module temperature is over 80°C, auto decrease carrier frequency to the carrier value when the duty is 100% shown as the figure above; when the temperature is lower than 70°C, the operating carrier will auto increase to the setting value of 00-11.(Except special types)

  Special types:

Type	Increase to temperature (°C)	Decrease to temperature(°C)
043-110K/132KF	95	80
043-250K/280KF	91	78
023-55K/75KF	88	75

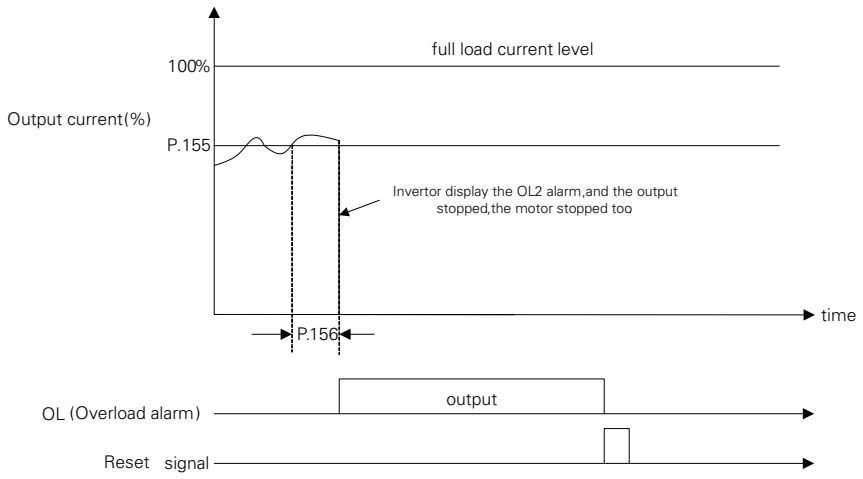
5.7.5 Over torque detection

- The output current detection function can be used for purposes suchas overtorque detection

Parameter	Name	Factory Value	Setting Range	Content
06-08 P.155	Over torque detection level	0.0%	0	No over torque detection.
			0.1~200%	Over torque detection.
06-09 P.156	Over torque detection time	1.0s	0.1~60.0s	---
06-10 P.260	Over torque detection selection	1	0	The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.
			1	The OL2 alarm is reported after the over torque detection, and the inverter stops.

Settin Over torque detection

- When the value of 06-08 is nonzero, the function of over torque detection is selected.
- When the output current exceeds the detection level of over torque (06-08) and the detection time of over torque (06-09), then inverter alarm OL2 will go off and the inverter will stop the operation. If multi-function digital outputs terminal DO1-DO-(03-10), DO2-DO-(03-12), multi-function relay R1O-R1C-R1M(03-11), and R2O-R2C-R2M(03-13) are set as over-torque alarm (set the value to 19), then the inverter will send out signals; if multi-function digital outputs terminal DO1-DO-(03-10), DO2-DO-(03-12), multi-function relay R1O-R1C-R1M(03-11), and R2O-R2C-R2M(03-13) are set as over-load alarm (set the value to 3),and 06-10(P.260)=1,then the inverter will send out signals. For details, please refer to 03-10, 03-11 and 03-12~03-13 in Chapter 5.



5.7.6 Stall level when restart

- Set the stall prevention operation level when restart via 06-11.

Parameter	Name	Factory Value	Setting Range	Content
06-11 P.160	Stall level when restart	100.0%	0~150.0%	When restarting, stall prevention operation level.

Settin Stall level when restart

- During the restarting process, when the output frequecncy is larger than the setting value of 06-11(P.160), the inverter is in current stall state.

5.7.7 Cooling fan operation

- Control the run/stop condition of the fan and the alarm output mode.

Parameter	Name	Factory Value	Setting Range	Content
06-12 P.245	Cooling fan operation	0	0X	Fan alarm for abnormal fan
			1X	No fan alarm for abnormal fan, but the output of terminal alarm.
			X0	The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.
			X1	Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too.
			X2	The fan will be turned on if the temperature of the heat sink is higher than 40ºC. When the power is turned off, the fan will be turned off, too.
			X3	The fan will be turned on when the temperature of the heat sink is higher than 60ºC. When it is lower than 40ºC, the fan will be turned off.

Settin Cooling fan operation

- Ten bits of 06-12 are used to the assigned alarm output mode.
- Each bit of 06-12 is used to the assignedrun/stop condition.

Example: If "Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too" and "No fan alarm for abnormal fan, but the output alarm of the output terminal" is needed, then 06-12 should be set to 11.

Note: Proper setting for decreasing the fan operating time according to the inverter installing condition can extend the fan lifetime.

5.7.8 Input phase failure protection

- Set input phase failure protection to be valid / invalid.

Parameter	Name	Factory Value	Setting Range	Content
06-13 P.281	Input phase failure protection	0	0	No Phase Failure Protection
			1	Phase failure protection, the parameter unit will display the "IPF" alarm and the output stops.

Settin Input phase failure protection

- When 06-13=1, input phase failure protection is valid; wheninput power is out of phase or three phases are in imbalance, the inverter will output alarm.

5.7.9 SCP Short circuit protection function

- Sets SCP short circuit protection function valid or invalid.

Parameter	Name	Factory Value	Setting Range	Content
06-14 P.287	SCP Short circuit protection function	1	0	No the output end short-circuits protection function.
			1	If outputend is short, the parameter unit will display the "SCP" alarm and the output stops.

Settin SCP Short circuit protection function

- Set 06-14 to 0 to cancel the output end short-circuits protection function.
- Set 06-14 to1, short circuit protection function is valid; the inverter will output "SCP" alarm when detecting the SCP short circuit.

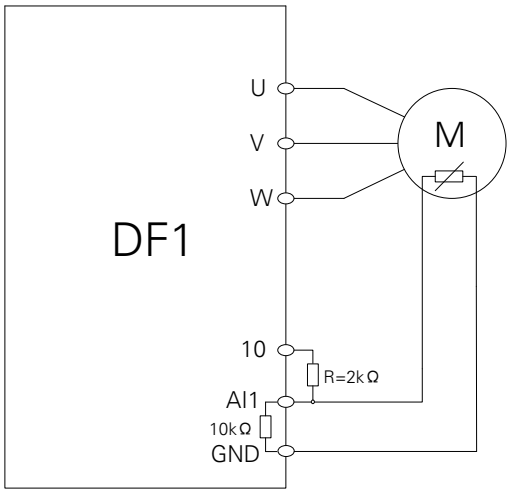
5.7.10 PTC protection selection

- The setting defines how the drive will operate after PTC detection.

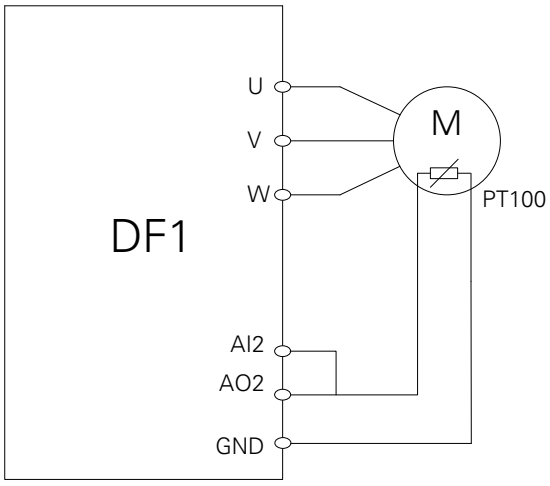
Parameter	Name	Factory Value	Setting Range	Content
06-15 P.533	The process mode of PTC alarm	0	0	Alarm and continue to run
			1	Alarm and decelerate to stop
			2	Alarm and stop freely
			3	No alarm
06-16 P.534	The percentage of PTC level	0.0%	0	NO PTC alarm
			0.1%~100.0%	The motion level of PTC function, 100% corresponds to the maximum analog input.

Settin PTC level

- It needs to set AI1/AI3/AI2 analog input function 02-00~02-02 to 11 (P.T.C. thermistor input value).It is used to set the PTC level, and the corresponding value for 100% is maxanalog input value.



PTC Electronic input wiring diagram



PT100 Electronic input wiring diagram

5.7.11 Maintenance alarm function

- The inverter cumulative operating time outputs the maintenance alarm output signal after setting the time.

Parameter	Name	Factory Value	Setting Range	Content
06-17 P.261	Maintenance alarm function	0	0	No maintenance alarm
			1~9998day	Used to set time whenmaintenancealarm sends out signal

Settin Maintenance alarm function

- When multi-function digital output terminal (03-10,03-11,03-12,03-13) equals to 18, maintenance alarm is detecting. It means that when the inverter runs for the days that reach the parameter 06-17 set value of maintenance alarm time, the multi-function digital output terminal DO - DO- or multi-function relay will send out signal.

5.7.12 Short circuit protection

- Control the startor end of the short circuit detection and set the detection level

Parameter	Name	Factory Value	Setting Range	Content
06-18 P.280	Short circuit detection when starting	0	0	No Short circuit detection when starting when starting
			1	Short circuit detection when starting
06-19 P.282	Operation GF detection level	50.0%	280K/315KF types below: 0~100.0%	---
		70.0%	315K/55KF type: 0~100.0%	

Settin Short circuit protection

- Short circuit detection when starting is only carried out when the starting signal is input into the inverter.
- 06-18 is used to set short circuit detection when starting or not, 06-19 is used to set short circuit detection when in the operation.
- If short circuit detection when starting is selected, and detects a current short to ground exceeded 50% of rated current, the inverter will stop output and display GF alarm.
- If in the operation, detecting the current short to ground which is over the setting value of 06-19, the inverter will stop output and display GF alarm.

5.7.13 Output phase failure protection

- Control the start or end of output phase failure protectionvia the parameter.

Parameter	Name	Factory Value	Setting Range	Content
06-20 P.262	Output phase failure protection	0	0	No output phase failure protection selection
			1	Output phase failure protection, the parameter unit will display the “LF” abnormal alarm and the inverter will stop the output.

Settin Output phase failure protection

- The inverter output phase failure protection: when 06-20=“1”, output phase failure, the inverter will display “LF”; when 06-20=“0”, the function will be canceled.

5.7.14 Low voltage protection

- Control the low voltage levelvia the parameter.

Parameter	Name	Factory Value	Setting Range	Content
06-21 P.705	Low voltage level	155V	155~220V	220V type
		310V	310~440V	440V type

Settin Low voltage level

- When the inverter input voltage is too low, which leads to the DC bus voltage lower than the setting value of 06-21, the inverter enters into the low voltage protection state, itwill stop output and free to stop.

5.7.15 Regenerative brake operation level

- Set regenerative brake operation levelvia the parameter.

Parameter	Name	Factory Value	Setting Range	Content
06-22 P.706	Regenerative brake operation level	360V	205~400V	220V type
		720V	410~800V	440V type

Settin Regenerative brake operation level

- 06-22 is the regenerative brake (brake resistor) operation level. WhenDC (PN) bus voltage is over the setting value of 06-22, the regenerative brake (brake resistor) operation starts.

5.7.16 Voltage stall level

- Set voltage stall operation level.

Parameter	Name	Factory Value	Setting Range	Content
06-23 P.707	Voltage stall level	380V	205~400V	220V type
		760V	410~800V	440V type

Settin Voltage stall level

- When the inverter output voltage is over the setting value of 06-23(P.707), it is in the voltage stall state.

5.7.17 Capacitor lifetime detection

- Main circuit electrolytic capacitor deterioration and capacity decreasing may occur. This function is used to detect the current capacitor lifetime which is regardedas thereplacement standard.

Parameter	Name	Factory Value	Setting Range	Content
06-24 P.708	Capacitor lifetime detection	0	0,1 (3, 7, 8, 9)	0: No capacitor lifetime detection. When it is set to 1, and the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit. When power on again and the setting value is 3, it means the detection is finished.
06-25 P.709	Detection percentage	100.0%	0~100.0%	Detect the percentage of the capacitor value and the factory decetion value.
06-26 P.710	Capacitorlifetime detection result	Read	0	No abnoamal signal.
			1	Electrolytic capacitor abnormal. (the capacitor value is less than the 85% of factory value)

Settin Capacitor lifetime detection

- The degree of deterioration of the main circuit capacitor can be diagnosed on the monitor.

06-24	Content	Remarks
0	No capacitor lifetime detection.	Initial value.
1	Start to detect.	When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit.
3	Capacitor lifetime detection is finished.	Display only, setting invalid.
7	Control mode is not correct cannot be detected (Not V/F mode)	
8	End of mandatory testing process (B, F, H)	
9	Error in the test (A, C, G, E)	

The capacitor lifetime detectionpercentage 06-25 is the value bytheoretical calculation, so the result can be only as the reference.

When the factory capacitor detection value is 100.0%, and 06-25 is less than 80%, 06-26="1", it will output capacitor lifetime abnormal signal via the digital output terminals (set 03-10, 03-11, 03-12 and03-13 to 20).

- The detection steps are as follows:

  1. Check that the motor is connected.

  2. Set 06-24 to 1 in the stop state and cut off the power.

  3. The inverter applies DC voltage to the motor to measure the capacitor capacity while theinverter is OFF.

  4. After confirming that the power lamp is OFF, turn ON the power again.

  5. Check that "3" is set in 06-24, read 06-25, and check the deterioration degree of the maincircuit capacitor.

- Under thefollowing conditions, measurement cannot beperformed correctly.

  6. Terminals P/N is connected to DC power supply.

  7. The power supply is switched ON during measurement.

  8. The motor is not connected to the inverter.

  9. The motor is running (coasting).

  10. Capacitance detection alarm

  11. The inverter output is shut off with the MRS signal.

  12. The motor capacity is smaller than the inverter capacity by two ranks or more.

  13. The start command is given while measuring.

Note: 1. The capacitor temperature will affects the capacity; please wait three hours or longer after turning OFF.
2. Capacitor lifetime detection can only be operated under V/F mode.

5.7.18 Time record function

- It is used to record the inverter accumulative operation time.

Parameter	Name	Factory Value	Setting Range	Content
06-27 P.292	Accumulative motor operation time (minutes)	0 min	0~1439min	---
06-28 P.293	Accumulative motor operation time (days)	0 day	0~9999day	---
06-29 P.296	Accumulative motor power time (minutes)	0 min	0~1439min	---
06-30 P.297	Accumulative motor power time (days)	0 day	0~9999day	---

Settin Time record function

- 06-27 is about the accumulative motor operation time in minutes. The updated value cannot be modified by executing 00-02 or power shutdown. To clear the accumulated time, make06-27=0.
- 06-28 is about the accumulative motor operation time in days. The updated value cannot be modified by executing 00-02 or power shutdown. To clear the accumulated time, make 06-28=0.

5.7.19 Alarm query function

- This function provides the users with information on the 12 alarm codes mentioned earlier.

Parameter	Name	Factory Value	Setting Range	Content	
06-40 P.288	Alarm code query	1	0~12	The value of 06-40 (P.288), 1~12, corresponds to the abnormal codes of 06-41(P.289)'s alarm E1~E12.	
06-41 P.289	Alarm code display	Read	Read		
06-42 P.290	Alarm message query	0	0~10	Alarm message of No. 06-40 (P.288)	When 06-42(P.290)=1, 06-43(P.291)corresponds to the frequency when the No.06-40(P.288)alarm goes off. When 06-42(P.290)=2, 06-43(P.291) corresponds to the current when the No.06-40(P.288)alarm goes off. When 06-42(P.290)=3, 06-43(P.291) corresponds to the output voltage when the No.06-40(P.288)alarm goes off. When 06-42(P.290)=4, 06-43(P.291) corresponds to the accumulation rate of temperature increase when the No.06-40(P.288)alarm goes off. When 06-42(P.290)=5, 06-43(P.291) corresponds to the (+/P)-(-/N) voltage when the No.06-40(P.288)alarm goes off. When 06-42(P.290) =6, 06-43(P.291) corresponds to the length of time the inverter has run before the No.06-40(P.288)alarm goes off. When 06-42(P.290)=7, 06-43(P.291) corresponds to the operation status code when the No.06-40(P.288)alarm goes off. When 06-42(P.290) = 8, 06-43(P.291) corresponds to the year and month when the No.06-40(P.288)alarm goes off. When 06-42(P.290) = 9, 06-43(P.291) corresponds to the day and hour when the No.06-40(P.288)alarm goes off. When 06-42(P.290) = 10, 06-43(P.291) corresponds to the minute and second when the No.06-40(P.288)alarm goes off.
06-43 P.291	Alarm message display	Read	Read		

Settin Alarm query function

- This paragraph provides the users with parameter-related information on alarm codes for frequency, current, voltage, as well as the 12 alarm codes mentioned earlier. If 00-02 operation is executed, the abnormal codes and the status messages for the occurred alarms recorded by this set of parameters will be all cleared.
- If both 06-40and 06-42 are 0, 06-41 and 06-43 will be displayed as 0.

Abnormal code corresponded alarm condition:

Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type
00	No alarm	32	OV1	49	THN	82	IPF	144	OHT
16	OC1	33	OV2	50	NTC	97	OLS	160	OPT
17	OC2	34	OV3	64	EEP	98	OL2	179	SCP
18	OC3	35	OV0	65	FAN	112	BE	192	CPU
19	OC0	48	THT	66	PID	129	AErr	193	CPR
209	PG1	210	PG2	211	PG3	212	bEb	213	PTC
51	NTC2	52	NTC3	53	NTC4	54	NTC5	55	NTC6
56	NTC7	57	NTC8	216	dv1	217	dv2	215	dv3
214	dv4	84	LF	85	HDC	86	ADE	113	rAE
128	GF	116	SAF	195	EbE1	196	EbE2	197	EbE3
208	PG0	161	PUE	162	CbE				

Note: Set 06-42(P.290) to 8,9,10, selecting 06-43(P.291) display alarmyear and month, day and hour, minute and second is valid only when DXF-KEY-LEDC is used as an option board. If DXF-KEY-LED is used, these thress selections are invalid.

5.7.20 Alarm code query

- This function is used to monitor the latest 12 alarm codes.

Parameter	Name	Factory Value	Setting Range	Content
06-44 P.740	The first (the latest) alarm code E1	Read	Read	---
06-45 P.741	The second alarm code E2	Read	Read	---
06-46 P.742	The third alarm code E3	Read	Read	---
06-47 P.743	The fourth alarm code E4	Read	Read	---
06-48 P.744	The fifth alarm code E5	Read	Read	---
06-49 P.745	The sixth alarm code E6	Read	Read	---
06-50 P.746	The seventh alarm code E7	Read	Read	---
06-51 P.747	The eighth alarm code E8	Read	Read	---
06-52 P.748	The nineth alarm code E9	Read	Read	---
06-53 P.749	The tenth alarm code E10	Read	Read	---
06-54 P.750	The eleventh alarm code E11	Read	Read	---
06-55 P.751	The twelve alarm code E12	Read	Read	---

Settin Alarm code

- For the alarm corresponded alarm code, please refer to Section 5.7.19.

5.7.21 The latest alarm message (E1)

- Record the details on the latesterror and analyse whether abnormal conditions happen on the inverter.

Parameter	Name	Factory Value	Setting Range	Content
06-56 P.752	E1 alarm output frequency	Read	Read	---
06-57 P.753	E1 alarm output current	Read	Read	---
06-58 P.754	E1 alarm output voltage	Read	Read	---
06-59 P.755	E1 alarm the temperature rising accumulation rate	Read	Read	---
06-60 P.756	E1 alarm PN voltage	Read	Read	---
06-61 P.757	E1 alarm the time of the inverter has run	Read	Read	---
06-62 P.758	E1 alarm the inverter operation status code	Read	Read	---
06-63 P.759	E1 alarm (years/months)	Read	Read	---
06-64 P.760	E1 alarm (days/hours)	Read	Read	---
06-65 P.761	E1 alarm (minutes/seconds)	Read	Read	---

Note: Set 06-63(P.759)~06-65(P.761) to display the alarm year and month, day and hour, minute and secondwhich is valid only when DXF-KEY-LEDC is used as an option board in alarm. If DXF-KEY-LED is used, these thress selections are invalid.

5.7.22 The second alarm message (E2)

- Record the details on the second error and analyse whether abnormal conditions happen on the inverter.

Parameter	Name	Factory Value	Setting Range	Content
06-70 P.766	E2 alarm output frequency	Read	Read	---
06-71 P.767	E2 alarm output current	Read	Read	---
06-72 P.768	E2 alarm output voltage	Read	Read	---
06-73 P.769	E2 alarm the temperature rising accumulation rate	Read	Read	---
06-74 P.770	E2 alarm PN voltage	Read	Read	---
06-75 P.771	E2 alarm the time of inverter has run	Read	Read	---
06-76 P.772	E2 alarm the inverter operation status code	Read	Read	---
06-77 P.773	E2 alarm (years/months)	Read	Read	---
06-78 P.774	E2 alarm (days/hours)	Read	Read	---
06-79 P.775	E2 alarm (minutes/seconds)	Read	Read	---

Note: Set 06-77(P.773)~06-79(P.775) to display the alarm year and month, day and hour, minute and second which is valid only when DXF-KEY-LEDC is used as an option board in alarm. If DXF-KEY-LED is used, these thress selections are invalid.

5.8 Communication parameter group 07

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
07-00	P.33	COM1 Communication protocol selection	0: Modbus protocol 1: Eaton protocol 2: PLC protocol (Effective when using the Eaton built-in PLC)	1	
07-01	P.36	COM1 Converter stations	0~254	0	
07-02	P.32	COM1 Serial communication baud rate	0: Baud rate: 4800bps 1: Baud rate: 9600bps 2: Baud rate: 19200bps 3: Baud rate: 38400bps 4: Baud rate: 57600bps 5: Baud rate: 115200bps	1	
07-03	P.48	COM1 data length	0: 8bit 1: 7bit	0	
07-04	P.49	COM1 length of the stop bit	0: 1bit 1: 2bit	0	
07-05	P.50	COM1 Parity check selection	0: No parity verification 1: Odd 2: Even	0	
07-06	P.51	COM1 CR/LFselection	1: CR only 2: Both CR and LF	1	
07-07	P.154	COM1 Modbus communication format	0: 1, 7, N, 2 (Modbus, ASCII) 1: 1, 7, E, 1 (Modbus, ASCII) 2: 1, 7, O, 1 (Modbus, ASCII) 3: 1, 8, N, 2 (Modbus, RTU) 4: 1, 8, E, 1 (Modbus, RTU) 5: 1, 8, O, 1 (Modbus, RTU)	4	
07-08	P.52	COM1 Number of communication retries	0~10	1	
07-09	P.53	COM1 Communication check time interval	0~999.8s: Use the set value for the communication overtime test. 99999: No communication overtime test.	99999	
07-10	P.153	COM1 Communication error handling	0: Warn and call to stop 1: No warning and keep running	0	
07-11	P.34	Communication EEPROM write selection	0: When parameter write is performed, write them to RAM and EEPROM 1: When parameter write is performed, write them to RAM only.	0	
07-15	P.800	CAN open slave address	0~127	0	
07-16	P.801	CAN open speed	0: 1Mbps 1: 500Kbps 2: 250K/280KFbps	0	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
07-16	P.801	CAN open speed	3: 125Kbps	0	
			4: 100Kbps		
			5: 50 Kbps		
07-17	P.802	CAN open communication status	0: Node reset state	0	
			1: Com reset state		
			2: Boot up state		
			3: Pre operation state		
			4: Operation state		
			5: Stop state		
07-18	P.803	CAN open control status	0: Not ready for use state	0	
			1: Inhibit start state		
			2: Ready to switch on state		
			3: Switched on state		
			4: Enable operation state		
			7: Quick stop active state		
			13: Err reaction activation state		
			14: Error state		
07-25	P.810	PU Communication protocol selection	0: Modbus protocol	1	
			1: Eaton protocol		
			2: PLC protocol (Effective when using the Eaton built-in PLC)		
07-26	P.811	PU converter stations	0~254	0	
07-27	P.812	PU Serial communication baud rate	0: Baud rate 4800bps	1	
			1: Baud rate 9600bps		
			2: Baud rate 19200bps		
			3: Baud rate 38400bps		
			4: Baud rate 57600bps		
			5: Baud rate 115200bps		
07-28	P.813	PU data length	0: 8bit	0	
			1: 7bit		
07-29	P.814	PU stop bit	0: 1bit	0	
			1: 2bit		
07-30	P.815	PU Parity check option	0: no odd-even check	0	
			1: odd check		
			2: even check		
07-31	P.816	PU CR/LF choose	1: only CR	1	
			2: CR, LF Both		
07-32	P.817	PU Modbus communication format	0: 1, 7, N, 2 (Modbus, ASCII)	4	
			1: 1, 7, E, 1 (Modbus, ASCII)		
			2: 1, 7, O, 1 (Modbus, ASCII)		
			3: 1, 8, N, 2 (Modbus, RTU)		
			4: 1, 8, E, 1 (Modbus, RTU)		
			5: 1, 8, O, 1 (Modbus, RTU)		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
07-33	P.818	PU Communication exception permit number	0~10	1	
07-34	P.819	PU Communication between permissible time	0~999.8s: To set data communication timeout inspection 99999: No time out inspection	99999	
07-35	P.820	PU Communication error handling	0: Alarm and stop idling 1: no alarm and keep on running	1	
07-41	P.826	Outside enlarge communication cartoon - exception permit number	0~10	1	
07-42	P.827	Outside enlarge communication cartoon - error handling	0: Alarm and stop idling 1: no alarm and keep on running	1	
07-43	P.828	Outside enlarge communication cartoon dispatch interval allowable time	0~999.8s: set data communication timeout inspection 99999: No timeout inspection	99999	
07-44	P.829	DXF-NET-ET Communication expansion card version number	read	read	
07-45	P.830	IP allocation	0: calm IP 1: move IP	0	
07-46	P.831	IP Add 1	0~255	192	
07-47	P.832	IP Add 2	0~255	168	
07-48	P.833	IP Add 3	0~255	2	
07-49	P.834	IP Add 4	0~255	102	
07-50	P.835	Subnet mask 1	0~255	255	
07-51	P.836	Subnet mask 2	0~255	255	
07-52	P.837	Subnet mask 3	0~255	255	
07-53	P.838	Subnet mask 4	0~255	0	
07-54	P.839	default gateway 1	0~255	192	
07-55	P.840	default gateway 2	0~255	168	
07-56	P.841	default gateway 3	0~255	2	
07-57	P.842	default gateway 4	0~255	100	

5.8.1 Eaton protocol and Modbus protocol

- Parameter settings and monitoring are possible by using the inverter RS-485 terminals and the host computer link communication.

Parameter	Name	Factory Value	Setting Range	Content
07-00 P.33	COM1 Communication protocol selection	1	0	Modbus protocol
			1	Eaton protocol
			2	PLC protocol (Effective when using the Eaton built-in PLC)
07-01 P.36	COM1 Inverter station number	0	0~254	The number of inverters is practically determined by the wiring method and impedance matching. If Modbus protocol is used, please set the value to a nonzero value.
07-02 P.32	COM1 Serial communication Baud rate selection	1	0	Baud rate: 4800bps
			1	Baud rate: 9600bps
			2	Baud rate:19200bps
			3	Baud rate: 38400bps
			4	Baud rate: 57600bps
			5	Baud rate: 115200bps
07-03 P.48	COM1 Data length	0	0	8bit
			1	7bit
07-04 P.49	COM1 Stop bit length	0	0	1bit
			1	2bit
07-05 P.50	COM1 Parity check selection	0	0	No parity verification
			1	Odd
			2	Even
07-06 P.51	COM1 CR/LFselection	1	1	CR only
			2	Both CR and LF
07-07 P.154	COM1 Modbus communication format	4	0	1, 7, N, 2 (Modbus, ASCII)
			1	1, 7, E, 1 (Modbus, ASCII)
			2	1, 7, O, 1 (Modbus, ASCII)
			3	1, 8, N, 2 (Modbus, RTU)
			4	1, 8, E, 1 (Modbus, RTU)
			5	1, 8, O, 1 (Modbus, RTU)
07-08 P.52	COM1 Number of communication retries	1	0~10	If the frequency of communication error exceeds the setting value of 07-08 (P.52), and 07-10 (P.153) is set to 0, the alarm will go off and display OPT.
07-09 P.53	COM1 Communication check time interval	99999	0~999.8s	Use the set value for the communication overtime test.
			99999	No communication overtime test.
07-10 P.153	COM1Communication error handling	0	0	Warn and call to stop
			1	No warning and keep running
07-25 P.810	PU Communication protocol selection	1	0	Modbus protocol
			1	Eaton protocol
			2	PLC protocol (Effective when using the Eaton built-in PLC)
07-26 P.811	PU converter stations	0	0~254	Actual implementation sets is determined by the wiring way and impedance matching.When using the Modbus protocol please its value is set to non-zero value.

Parameter	Name	Factory Value	Setting Range	Content
07-27 P.812	PUSerial communication baud rate	1	0	Baud rate 4800bps
			1	Baud rate 9600bps
			2	Baud rate 19200bps
			3	Baud rate 38400bps
			4	Baud rate 57600bps
			5	Baud rate 115200bps
07-28 P.813	PU data length	0	0	8bit
			1	7bit
07-29 P.814	PU stop bit	0	0	8bit
			1	7bit
07-30 P.815	PU Parity check option	0	0	no odd-even check
			1	odd check
			2	even check
07-31 P.816	PU CR/LFchoose	1	1	1: only CR
			2	2: CR,LF Both
07-32 P.817	PU Modbus communication format	4	0	1、7、N、2 (Modbus, ASCII)
			1	1、7、E、1 (Modbus, ASCII)
			2	1、7、O、1 (Modbus, ASCII)
			3	1、8、N、2 (Modbus, RTU)
			4	1、8、E、1 (Modbus, RTU)
			5	1、8、O、1 (Modbus, RTU)
07-33 P.818	PU Communication exception permit number	1	0~10	When communications error more than 7-33 (P. 818) value, and 07-35 (P. 820) to 0, is called different police PUE.
07-34 P.819	PU Communication between permissible time	99999	0~999.8s	To set data communication timeout inspection
			99999	No time out inspection
07-35 P.820	PU Communication error handling	1	0	Alarm and stop idling
			1	no alarm and keep on running
07-41 P.826	Outside enlarge communication cartoon - exception permit number	1	0~10	When communication error more than the setpoint of 07-41 (P. 826), and 07-42 (P. 827) to 0, is called different police CbE.
07-42 P.827	Outside enlarge communication cartoon - error handling	1	0	Alarm and stop idling
			1	no alarm and keep on running
07-43 P.828	Outside enlarge communication cartoon dispatch interval allowable time	99999	0~999.8s	set data communication timeout inspection
			99999	No timeout inspection

Settin Eaton protocol and Modbus protocol

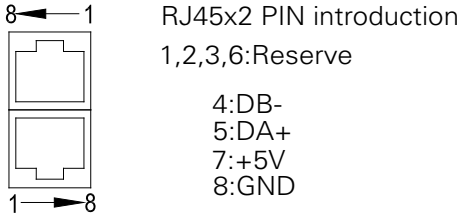
- When the communication parameters are revised, please reset the inverter.
- The DF1 inverters have two communication protocols for selection, namely, Eaton protocol and Modbus protocol. Parameter 07-02, 07-01, 07-08, 07-09 and 07-10 are suitable for both protocols. 07-03~07-06 is only suitable for the Eaton protocol, while 07-07 is only suitable for the Modbus protocol. Please refer to communication protocols for more details.

Note: 1. The number of inverters is practically determined by the wiring method and impedance matching. If Modbus protocol is used, please set the value to a nonzero value.

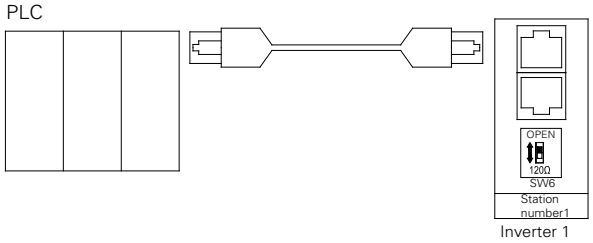
2.If the frequency of communication error exceeds the setting value of 07-08(P.52), and 07-10(P.153) is set to 0, the alarm will go off and display OPT.

3. Modbus protocol. Displayed according to the starting bit, the data bit, parity check bit, and the stop bit. N: no parity check. E: 1-bit parity check. O: 1-bit odd parity check.

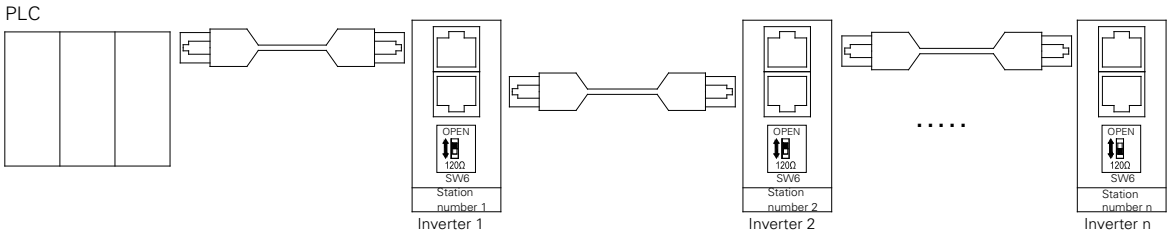
- DF1 RS-485Communication interface constituents and wiring
  1. DF1 RS-485 communication interface terminal arrangement (COM1)



2. Communication between the host computer and single inverter (take PLC as an example).



3. Communication between the host computer and multiple inverters (take PLC as an example).

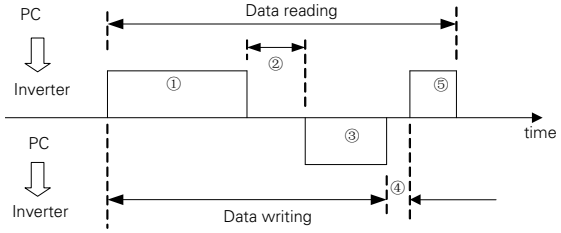


4. DF1 series inverters support Eaton communication protocol and MODBUS communication protocol.

Note: Please switch the SW6 on the inverter farthest from the computer to 120Ω.

- Eaton communication protocol
  1. Automatically switch the host computer and the inverter to ASCII codes (hexadecimal) for communication.

2.Please follow the following steps for data communication between the host computer and the inverter.



The above steps concerning communication actions and communication data format are explained below:

No.	Action content		Operation reference	Frequency write-in	Parameter write-in	Inverter reset	Monitoring	Parameters Read-out
①	Use the host computer's user procedure to send communication request to the inverter.		A	A	A	A	B	B
②	Inverter data processing time		Yes	Yes	Yes	No	Yes	Yes
③	Inverter's replay data (check data ① error)	No error(Accept the request)	C	C	C	No	E	E
		Error exists (Refuse the request)	D	D	D	No	D	D
④	host computer's processing delay time		No	No	No	No	No	No
⑤	Reply from the host computer regarding reply data ③ (Check data ③ error)	No error (No processing)	No	No	No	No	C	C
		Error exists (Output ③)	No	No	No	No	F	F

①Data of the communication request sent by the host computer to the inverter.

Format	Data number													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A (Data write-in)	ENQ *1)	Inverter station number		Reference code		Waiting time *2)	Data				Check code Sum check*7)		End symbol*3)	
B (Data read-out)	ENQ *1)	Inverter station number		Reference code		Waiting time *2)	Check code Sum check*7)		Endsymbol*3)					

③Inverter reply data

Data write-in

Format	Data number					
	1	2	3	4	5	6
C(No data error)	ACK*1)	Inverter station number		End symbol*3)		
D(With data error)	NAK*1)	Inverter station number		Error code*5)	End symbol*3)	

Data read-out

Format	Data number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
E(No data error)	STX*1)	Inverter station number		Data read-out				Unit *4)	ETX	Check code Sum check*7)		End symbol *3)	
D(With data error)	NAK*1)	Inverter station number		Error code *5)	End symbol *3)								

⑤Reply data from the host computer to the inverter during data read-out.

Format	Data number				
	1	2	3	4	5
C (No data error)	ACK*1)	Inverter station number		End symbol *3)	
F (With data error)	NAK*1)	Inverter station number		End symbol *3)	

*1) Control code

Signal	ASCIICode	Content	Signal	ASCIICode	Content
NUL	H00	NULL (Empty)	ACK	H06	Acknowledge (No data error)
STX	H02	Start of Text (Data begin)	LF	H0A	Line Feed (Change line)
ETX	H03	End of Text (Data end)	CR	H0D	Carriage Return
ENQ	H05	Enquiry (Communication request)	NAK	H15	Negative Acknowledge (Data errors)

*2) Set the waiting time from 0 to 15 with a 10ms unit. Example: 5 ---->50ms.

*3) End symbol (CR, LF codes)

When carrying out data communication from the host computer to the inverter, CR and LF codes at the end of the text are automatically set according to method of the host computer. At this time, the inverter has to be set according to the host computer, too. If only CR is selected, only one register will be occupied; if both CR and LF are selected, two registers will be occupied.

*4) Unit: 0---> Unit 1, 1---> Unit 0.1, 2---> Unit 0.01, 3---> Unit 0.001

*5) Error code:

Error code	Error item	Communication error and abnormality
H01	Error	The parity check of the data received by the inverter is different from the parity check set initially.
H02	Sum Check Error	The Sum Check calculated by the inverter according to the received data is different from the received Sum Check.
H03	Communication protocol error	The syntax of the data received by the inverter has errors. The data is not completely received during the assigned period of time. CR and LF codes are different from the initial setting.
H04	Frame error	The stop bit of the data received by the inverter does not match to the stop bit set initially.
H05	Overflow error	When the inverter is receiving data, the host computer sends the next set of data before the inverter finishes receiving the current one.
H0A	Abnormal mode	The running inverter or the operation of the inverter disqualifies the requirements of the mode setting.
H0B	Reference code error	The user assigns a reference code that cannot be processed by the inverter.
H0C	Data range error	When setting the parameters and frequencies, the set values are outside the set range of the data.

*6) When the parameter has the characteristics of 99999, the write-in or read-out of 99999 will be replaced by HFFFF.

*7) Request the sum check code

The converted ASCII codes of the data are summed up in binary digit format. The lower bits (the lower eight bits) of the result (the sum) converted into ASCII binary digits (hexadecimal) are termed as the Sum Check Code.

- Communication example:

Example 1. The host computer sends a forward rotation reference to the inverter:

Step 1: Use the host computer to send a FA reference in Format A:

ENQ	Inverter station number 0	Reference code HFA	Waiting time	Data H0002	Check code Sum Check	CR
H05	H30 H30	H46 H41	H30	H30 H30 H30 H32	H44 H39	H0D

Sum Checkcalculation is: H30+H30+H46+H41+H30+H30+H30+H30+H32=H1D9, take the lower eight bits D9 to convert to ASCII code H44 and H39.

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer in Format C:

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

Example 2. The host computer sends a stop rotation reference to the inverter:

Step 1: Use the host computer to send a FA reference in Format A:

ENQ	Inverter station number 0	Reference code HFA	Waiting time	Data H0000	Check code Sum Check	CR
H05	H30 H30	H46 H41	H30	H30 H30 H30 H30	H44 H37	H0D

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer in Format C:

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

Example 3. The read-out value of the host computer 02-15(P.195):

Step1: The host computer sends the write-in page break reference to the inverter using Format A:

ENQ	Inverter station number 0	Reference code HFF	Waiting time	Data H0001	Check code Sum Check	CR
H05	H30 H30	H46 H46	H30	H30 H30 H30 H31	H44 H44	H0D

02-15(P.195)is on page 1

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer in Format C:

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

Step 3: The host computer requests the inverter for reading the value 02-15(P.195)using Format B:

ENQ	Inverter station number 0	Reference code H5F	Waiting time	Check code Sum Check	CR
H05	H30 H30	H35 H46	H30	H30 H42	H0D

First 195 minus 100 equals to 95, then convert 95 to H5F hexadecimal digits. Next convert 5 and into H35 and H46, respectively, in ASCII code.

Step 4: Once the inverter receives and processes the data without error, the value of 02-15(P.195) will be sent tothe host computer in Format E:

STX	Inverter station number 0	Read-out data H1770(60Hz)	Unit	ETX	Check code Sum Check	CR
H02	H30 H30	H31 H37 H37 H30	H32	H03	H36 H31	H0D

Example 4. Change the content of 02-15(P.195) to 50 (the original factory setting is 60).

Step 1 to 2: Omitted (Same as Step 1 to 2 of Example 3);

Step 3: The host computer requests the inverter to write 50 in 02-15(P.195) in Format A:

ENQ	Inverter station number 0	Reference code HDF	Waiting time	Data H1388	Check code Sum Check	CR
H05	H30 H30	H44 H46	H30	H31 H33 H38 H38	H45 H45	H0D

⇩⇩

First, 195 minus 100 equals to 95; because the smallest unit of 02-15(P.195) is 0.01,
Concert 95 to H5F hexadecimal digits, 50 x 100 = 5000; then convert 5000 to hexadecimal
H5F+H80=HDF digits H13888; Then covert 1, 3, 8 and 8 to ASCII
codes for transmission.

Step 4: After receiving and processing the data without error, the inverter will send a reply to the host computer in Format C:

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

Example 5. Write 500 into 02-15(P.195) (this parameter range is set from 0 to 400)

Step 1 to 2: Omitted (same as Step 1 and 2 of Example 3);

Step 3: The host computer requests the inverter to write 500 into02-15(P.195) in Format A:

ENQ	Inverter station number 0	Reference code HDF	Waiting time	Data HC350	SUM CHECK	CR
H05	H30 H30	H44 H46	H30	H43 H33 H35 H30	H46 H35	H0D

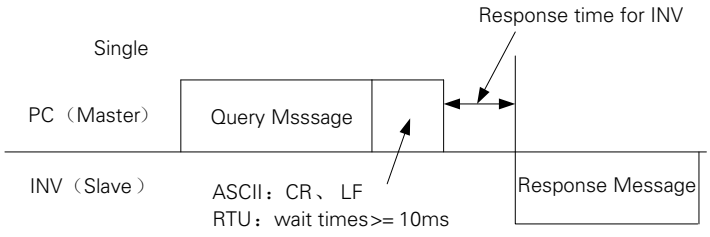
Step 4: After the inverter receives and processes the information, because the data exceed the set range of 02-15(P.195), the data range is incorrect. The inverter will reply the error to the host computer in Format D:

NAK	Inverter station number 0	Error code H0C	CR
H15	H30 H30	H43	H0D

Note: Examples above adopt P mode to read and write parameter 02-15(P.195), if Parameter group mode is needed, please notice the differences on pages and parameter number. Please refer to the list of communication references.

- MODBUS communication protocol
- Message format

  MODBUS serial transmission can be divided into two types:ASCII(American Standard Code for Information Interchange) and RTU(Remote Terminal Unit).



1. Query

   Host computer (main address) sends messages to the inverter of the assigned address (from the address).

2. Normal Response

   After receiving the query from the Master, the Slave will execute the requested function and ask the Master to send the normal response.

3. Error Response

   When receiving invalid function codes, address or data, the inverter will send the response to the Master.

4. Broadcast

   The Master will assign the address 0, and the slave will send the message to all the Slaves. Once receiving a message from the Master, all the Slaves will execute the requested function without responding to the Master.

- Communication format:

  Basically, the Master will send Query Message to the inverter, which will send the response message to the Master. The address and function codes are duplicated for regular communication. Bit 7 of functional code during abnormal communication is positioned as "1" (=H80). The data bate is set to be the error code.

- Message constituents:

Format	Start	①Address	②Function	③Data	④Error check	Stop
ASCII	H3A	8bits	8bits	n×8bits	2×8bits	0D 0A
RTU	>=10ms					>=10ms

Message	Content
①Address message set	Setting range: 0~254.0 is the broadcasting address; 1~254 are the equipment (inverter) address. The setup of 07-01 is based on the equipment address. The set up is carried out when the main equipment sends messages to the equipment and when the equipment sends reply message to the main equipment.
②Function message set	Only three functions have been done so far. The equipment carries out actions according to the request from the equipment. The main equipment sets functional codes excluded from the table below. The equipment returns error response. It is determined by the response from the equipment; regular function codes are the response for regular responses; H80 + function codes are the response for error responses.

Message	Content
②Function message set	<table><tr><td>Function name</td><td>Function code</td><td>Function description</td></tr><tr><td>Read multiple registers</td><td>H03</td><td>Read slave machine's continuous register content.</td></tr><tr><td>Write single register</td><td>H06</td><td>Write data into slave machine's single register.</td></tr><tr><td>Function diagnosis</td><td>H08</td><td>Function diagnosis (only for communication calibration)</td></tr><tr><td>Write multiple registers</td><td>H10</td><td>Write data into slave machine's multiple registers.</td></tr></table>
④Data message set	Changes, including the starting address, the number of the write-in or read-out registers, and the write-in data, are made according to the function codes.
④Error check message set	ASCII is the check method for LRC, while RTU is the check method for CRC.

ASCII mode's LRC check value calculation:

LRC check is simpler and it is used in the ASCII mode for checking the content of the message domain, excluding the colon at the beginning and the line change enter symbol at the end. It only sums up all the data to be transmitted according to the bite (not the ASCII code). If the result is greater than H100 of the hexadecimal digit, remove the exceeded part (e.g., if the result is H136 of the hexadecimal digit, then take H36 only) and add one.

RTU mode, CRC check value calculation:

1 . Add one hexadecimal digit register. All the digits are 1.

2 . Carry out XOR calculation for the higher bit of the hexadecimal digit register and the eight bits. The calculated result is entered to the hexadecimal digit register.

3 . Shift this hexadecimal digit register one bit to the right.

4 . If the right shifted bit (the marked bit) is 1, then polynomial 1010000000000001 and this register will carry out the XOR calculation. If the right shifted bit is 0, then it will return to 3.

5 . Repeat 3 and 4 until 8 bits are shifted.

6 . The other eight bits and the hexadecimal register carry out the XOR calculation.

7 . Repeat 3~6 until all the bytes of the text carry out the XOR calculation with the hexadecimal register and was shifted for eight times.

8 . The hexadecimal register content is the 2-byte CRC error checking, and it is added to the highest valid bit of the text.

When CRC is added to the message, lower bytes are added first, followed by the higher bytes.

- Communication format:

1. Data read-out (H03)

Mode	Start	Address*1)	Function*2)	Start Address*3)	Number of register*4)	Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	2byte	>=10ms

Regular response

Mode	Start	Address*1)	Function*2)	Read-out data number *5)	Read-out data*6)		Check	Stop
ASCII	H3A	2char	2char	2char	4char	…2N×8bit	2char	0D 0A
RTU	>=10ms	8bit	8bit	1byte	2byte	…N×8bit	2byte	>=10ms

Message	Content
*1) Address	Set up the address for the to-be delivered message; 0 for invalid.
*2) Function code	H03
*3) Starting address	Set up the address of the register for reading the message.
*4) Number of register	Set up the number of register for reading. Maximum number: 20.
*5) Amount of data to be read	Twice the amount of *4)
*6) Data to-be read	Set the data for *4); the data will be read according to the descending sequence

2. Data write-in (H06)

Mode	Start	Address*1)	Function*2)	Start Address*3)	Write-in data*4)	Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	2byte	>=10ms

Regular response

Mode	Start	Address*1)	Function*2)	Start Address*3)	Write-in data*4)	Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	2byte	>=10ms

Message	Content
*1) Address	Set up the address for the to-be delivered message.
*2) Function code	H06
*3) Starting address	Set up the starting address of the register to be engaged in the write-in function.
*4) Write-in data	Write the data in the assigned register. The data have to be 16bit (fixed).

Note: Regular response content and the inquired message are the same.

3. Write multiple registers (H10)

Mode	Start	Address*1)	Function*2)	Start Address*3)	Number of register *4)	Data*5)	Write-in data *6)		Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	4char	…2N×8bit	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	1byte	2byte	…N×16bit	2byte	>=10ms

Regular response

Mode	Start	Address*1)	Function*2)	Start Address*3)	Number of register *4)	Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	2byte	>=10ms

Message	Content
*1) Address	Set up the address for the to-be delivered message.
*2) Function code	H10
*3) Starting address	Set up the starting address of the register to be engaged in the write-in function.
*4) Number of register	Set up the number of register for reading. Maximum number: 20.
*5) Amount of data	The range should be 2 ~ 24. Set Twice the amount of *4).
*6) Write-in data	Set the assigned data in *4), write the data according to the sequence of the Hi byte and the Lo byte and the data of the starting address: According to the order of the data of the starting address +1, data of the starting address +2…, etc.

4. Function Diagnosis (H08)

By sending query information and getting the same query information back (the function of the subroutine code H00), it can do communication calibration.

The subroutine code H00 (for inquiring the return of data)

The query information

Mode	Start	Address*1)	Function*2)	Subroutine *3)	Data *4)	Check	End
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	1byte	1byte	2byte	2byte	2byte	>=10ms

Normal response

Mode	Start	Address*1)	Function*2)	Subroutine *3)	Data *4)	Check	End
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	1byte	1byte	2byte	2byte	2byte	>=10ms

Setting of the query information

Message	Content
*1) Address	Set the address for the information to be sent to, not able to radio communications(0 invalid)
*2) Function code	H08
*3) Subroutine code	H0000
*4) Data	If the data is 2 byte, it can be set arbitrarily. Set range from H0000 to HFFFF.

5. Error response

Carry out error response according to the error in the function, address and data of the query message received by the equipment.

There will be no errors if one or more addresses can be operated when they are accessed by the function code H03 or H10.

Mode	Start	Address*1)	Function*2) H80+function	Error code * 3)	Check	End
ASCII	H3A	2char	2char	2char	2char	0D 0A
RTU	>=10ms	8bit	8bit	8bit	2byte	>=10ms

Message	Content
*1) Address	Set up the address for the to-be delivered message.
*2) Function code	The function code set for the main equipment + H80
*3) Error code	Set the codes listed in the table below.

The list of error codes:

Source	Code	Meaning	Remarks
Slave reply	H01	Invalid function code	Set up function codes that cannot be handled by the equipment in the query message sent by the main equipment. Function codes that are not H03, H06, H08 and H10 (temporarily).
	H02	Invalid data address	Set up addresses that cannot be handled by the equipment in the query message sent by the main equipment (Asides from the addresses listed in the address table of the register; preserve the parameters, prohibit parameter reading, prohibit parameter writing).
	H03	Invalid data value	Set up data that cannot be handled by the equipment in the query message sent by the main equipment (parameters written outside the range, exist assigned mode, other errors, etc.)

Note: When performing multi-parameter reading, reading a preserved parameter is not a mistake.

Data sent to the main equipment will be tested by the inverter for the following mistakes, but the inverter will make no response for any detected error.

The list of the error test items:

Error item	Error content
Parity error	The parity test for data received by the inverter is different from the parity test set at the initial stage.
Frame error	The stop byte of the data received by the inverter mismatches the stop byte set at the initial stage.
Overflow error	When the inverter is receiving data, the host computer sends the next set of data before the inverter finishes receiving the current one.
Error test	The LRC/CRC calculated by the inverter according to the received data is different from the received LRC/CRC.

Communication example:

Example 1. The operation mode written by the communication is the CU (communication) mode.

Step 1: The host computer modifies the mode of the inverter.

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H31H30	H30 H30	H30 H30	H30 H30	H45 H39	0D 0A
RTU	>=10ms	01	06	10	00	00	00	8D 0A	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer:

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H31H30	H30 H30	H30 H30	H30 H30	H45 H39	0D 0A
RTU	>=10ms	01	06	10	00	00	00	8D 0A	>=10ms

Example 2. Read the parameter 02-15(P.195) value by the host computer

Step 1: The host computer sends message to the inverter for reading the value of 02-15(P.195).The address of 02-15(P.195) is H00C3.

Mode	Starting	Address	Function	Starting address		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30H30	H43 H33	H30 H30	H30 H31	H33 H38	0D 0A
RTU	>=10ms	01	03	00	C3	00	01	74 36	>=10ms

Step 2: Once the message is received and processed without mistake, the inverter will send the content of 02-15(P.195) to the host computer.

Mode	Starting	Address	Function	Number of data read	Read-out data		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30 H32	H31 H37	H37 H30	H37 H33	0D 0A
RTU	>=10ms	01	03	02	17	70	B6 50	>=10ms

Because the decimal form of H1770 is 6000 and the unit of 02-15(P.195) is 0.01, 02-15(P.195) is 60 (6000 x 0.01 = 60).

Example 3. Change the content of 02-15(P.195) to 50.

Step 1: The host computer sends message to the inverter for writing 50 into 02-15(P.195).

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H30H30	H43 H33	H31 H33	H38 H38	H39 H42	0D 0A
RTU	>=10ms	01	06	00	C3	13	88	74 A0	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer:

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H30H30	H43 H33	H31 H33	H38 H38	H39 H42	0D 0A
RTU	>=10ms	01	06	00	C3	13	88	74 A0	>=10ms

Example 4. Read the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6,01-06~01-07/P.7~P.8, 06-00(P.9),10-00~10-01/P.10~P.11 by the host computer.

Step 1: The host computer sends message to the inverter for reading the value of01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11. Starting address is H0000.

Mode	Starting	Address	Function	Starting address		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30H30	H30 H30	H30 H30	H30 H43	H46 H30	0D 0A
RTU	>=10ms	01	03	00	00	00	0C	45 CF	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer:

Mode	Starting	Address	Function	Number of data read	Read-out data	Check	Stop
ASCII	H3A	H30 H31	H30 H33	H31 H38	…12×4 char	2char	0D 0A
RTU	>=10ms	01	03	18	…12×2 byte	2byte	>=10ms

Example 5. Rewrite the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11 by the inverter

Step 1: The host computer sends message to the inverter for writing the value of01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9),10-00~10-01/P.10~P.11.

Mode	Starting	Address	Function	Startingaddress		Number of registers		Data volume	Write-in data	Check	Stop
ASCII	H3A	H30 H31	H31 H30	H30 H30	H30 H30	H30 H30	H30 H43	H31 H38	…N×4 char	2char	0D 0A
RTU	>=10ms	01	10	00	00	00	0C	18	…N×2byte	2byte	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the host computer:

Mode	Starting	Address	Function	Startingaddress		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H31 H30	H30H30	H30 H30	H30 H30	H30 H43	H45 H33	0D 0A
RTU	>=10ms	01	10	00	00	00	0C	00 18	>=10ms

Note: Examples above adopt P mode to read and write parameter 02-15(P.195), if Parameter Group mode is needed, please notice the differences on address. Please refer to the list of communication references.

- The list of communication references

The following references and data are set for carrying out assorted operation control and monitoring.

Item	Eaton protocol reference code	Modbus reference code	Modbusaddress	Data content and function description
Operation mode read-out	H7B	H03	H1000	H0000: communication mode; H0001: external mode; H0002: JOG Mode; H0003: combination mode 1; H0004: combination mode 2; H0005: combination mode 3; H0006: combination mode 4; H0007: combination mode 5; H0008: PUMode; b15 b14 ~ b12 b11 ~ b8 b7 ~ b0 1 | Setting value of 00-18 | Setting value of 00-17 | 00000000 : the second operation mode.
Operation mode write-in	HFB	H06/H10		
Inverter status monitoring	H7A	H03	H1001	H0000~H00FF b15: during tuning b14: during inverter resetting b13, b12: Reserve b11: inverter EO status b10: PLC operating

Item		Eaton protocol reference code	Modbus reference code	Modbusaddress	Data content and function description
Inverter status monitoring		H7A	H03	H1001	b9: inverter undervoltage b8: inverter voltage stall b7: abnormality occurred b6: frequency test b5: reserve b4: overloaded b3: reached the frequency b2: during reverse rotation b1: during forward rotation b0: during rotation
Target frequency write-in	EEPROM	HEE	H06/H10	H1009	H0000~ HFDE8: 0~650Hz
	RAM	HED		H1002	
Special monitor select codes read out		H7D	H03	H1013	H0000~H0010:monitor selected information. Special monitor select read out codes as described in the special monitoring code table (H0009 is reserved)
Special monitor select codes write in		HF3	H06/H10		
Monitor the external operation condition		H7C	H03	H1012	H0000~H000F: b15~b4: 0000 0000 0000; b3: MRS; b2: STR; b1: STF; b0: RES
Inverter reset		HFD	H06/ H10	H1101	H9696: function of 00-02=2/P.997=1. When communicating with the host computer, resetting the inverter will cause the inverter to be incapable of sending data back to the host computer.

<table>
<tr><th>Item</th><th>Eaton protocol reference code</th><th>Modbus reference code</th><th>Modbusaddress</th><th colspan="2">Data content and function description</th></tr>
<tr><td rowspan="9">Parameter delete</td><td rowspan="9">HFC</td><td rowspan="9">H06/
H10</td><td rowspan="3">H1104</td><td>H5A5A</td><td rowspan="9">For details, please refer to the parameter restoration status table.</td></tr>
<tr><td>H5566</td></tr>
<tr><td>H5959</td></tr>
<tr><td>H1103</td><td>H9966</td></tr>
<tr><td rowspan="3">H1106</td><td>H9696</td></tr>
<tr><td>H99AA</td></tr>
<tr><td>H9A9A</td></tr>
<tr><td>H1105</td><td>H55AA</td></tr>
<tr><td>H1102</td><td>HA5A5</td></tr>
<tr><td>Parameter read-out</td><td>H00~H63</td><td>H03</td><td rowspan="2">P mode:
H0000~H0513

Parameter group mode:
H2710~H2D4F</td><td colspan="2" rowspan="2">1. The data range and the position of the decimal point, please refer to the parameter table..
2. In P mode, the Modbus address of each parameter corresponds to the hexadecimal digit of the parameter number. For example, the Modbus address of 04-26(P.138) is H008A.
3. In parameter group mode, the Modbus address of each parameter corresponds tothe parameter number+ the hexadecimal digit of 10000, such as the Modbus address of04-26(P.138) is 0x28BA.</td></tr>
<tr><td>Parameter write-in</td><td>H80~HE3</td><td>H06/
H10</td></tr>
<tr><td>Line speed feedback read-out</td><td rowspan="2">---</td><td>H03</td><td rowspan="2">H100A</td><td colspan="2" rowspan="2">H0000~HFDE8</td></tr>
<tr><td>Line speed feedback write-in</td><td>H06/H10</td></tr>
<tr><td>Line speed target value read-out</td><td rowspan="2">---</td><td>H03</td><td rowspan="2">H100B</td><td colspan="2" rowspan="2">H0000~HFDE8</td></tr>
<tr><td>Line speed target value write-in</td><td>H06/H10</td></tr>
<tr><td>Tension reference read-out</td><td rowspan="2">---</td><td>H03</td><td rowspan="2">H100C</td><td colspan="2" rowspan="2">H0000~H7530</td></tr>
<tr><td>Tension reference write-in</td><td>H06/H10</td></tr>
<tr><td>Torque reference read-out</td><td rowspan="2">---</td><td>H03</td><td rowspan="2">H100D</td><td colspan="2" rowspan="2">H0000~H0FA0 (0~400.0%)
HF060~HFFFF (-400.0%~0)</td></tr>
<tr><td>Torque reference write-in</td><td>H06/H10</td></tr>
<tr><td>Loopback test for asynchronous serial communication</td><td>---</td><td>H08</td><td>H0000 (sub function code for loopback test)</td><td colspan="2">The content value is arbitrary (H0000~HFFFF)</td></tr>
<tr><td>Operation reference write-in</td><td>HFA</td><td>H06/
H10</td><td>H1001</td><td colspan="2">H0000~HFFFF
b8~b15: reserve.
b7: inverter emergency stop (MRS)
b6: the second function (RT)
b5: high speed (RH)
b4: medium speed (RM)
b3: low speed (RL)
b2: reverse rotation (STR)
b1: forward rotation (STF)
b0: reserve.</td></tr>
</table>

Item		Eaton protocol reference code	Modbus reference code	Modbusaddress	Data content and function description
Monitor the INV real-time data		---	H03	H1014~H1027	The corresponding monitoring value of each Modbus address is as follows: H1014: digital input terminal input state. H1015: digital input terminal output state. H1016: AI1 terminal input voltage H1017: AI3 terminal input current/voltage H1018: AO1-5 terminal output voltage/current H1019: DC bus voltage H101A: the electronic thermal accumulation rate of inverter H101B: inverter output power H101C: the temperature rising accumulation rate of inverter H101D: the NTC temperature accumulation of inverter H101E: the electronic thermal accumulation rate of motor H101F: target pressure when PID control H1020: feedback pressure when PID control H1021: rotating speed fed back by PG H1022: DIH terminal input frequency H1023: reserve H1024: AOAI1 terminal output voltage / current H1025: output torque of inverter H1026: AI2terminal input voltage H1027: DXF-NET-ET Communication expansion card version number
Page change for parameter reading and writing	Read	H7F	---	---	P mode: H0000: P.0~P.99; H0001: P.100~P.199; H0002: P.200~P.299; H0003: P.300~P.399; H0004: P.400~P.499; H0005: P.500~P.599; H0006: P.600~P.699 H0007: P.700~P.799 H0008: P.800~P.899 H0009: P.900~P.999 H000A: P.1000~P.1099 H000B: P.1100~P.1199 H000C: P.1200~P.1299 Parameter group mode: H0064: 00-00~00-99; H0065: 01-00~01-99; H0066: 02-00~02-99; H0067: 03-00~03-99; H0068: 04-00~04-99; H0069: 05-00~05-99; H006A: 06-00~06-99 H006B: 07-00~07-99 H006C: 08-00~08-99
	Write	HFF			

<table>
<tr><th colspan="3">Item</th><th>Eaton protocol reference code</th><th>Modbus reference code</th><th>Modbusad-dress</th><th>Data content and function description</th></tr>
<tr><td colspan="2" rowspan="2">Page change for parameter reading and writing Write</td><td>Read</td><td>H7F</td><td rowspan="2">---</td><td rowspan="2">---</td><td rowspan="2">H006D: 09-00~09-99
H006E: 10-00~10-99
H006F: 11-00~11-99
H0070: 12-00~12-99
H0071: 13-00~13-99
H0072: 14-00~14-99
H0073: 15-00~15-99</td></tr>
<tr><td>HFF</td><td></td></tr>
<tr><td rowspan="8">Monitoring</td><td rowspan="2">Frequency setup</td><td>EEPROM</td><td rowspan="2">H73
H6D</td><td rowspan="8">H03

H1008</td><td>H1009
H1002</td><td>H0000~HFDE8 (two decimal points when 00-08=0; one decimal point when non-zero)</td></tr>
<tr><td>RAM</td><td></td><td></td></tr>
<tr><td colspan="2">Output frequency</td><td>H6F</td><td>H1003</td><td>H0000~H9C40(same as above)</td></tr>
<tr><td colspan="2">Output current</td><td>H70</td><td>H1004</td><td>H0000~HFFFF (two decimal points)</td></tr>
<tr><td colspan="2">Output voltage</td><td>H71</td><td>H1005</td><td>H0000~HFFFF (two decimal points)</td></tr>
<tr><td colspan="2" rowspan="2">Abnormal content
H75</td><td>H74</td><td>H1007</td><td rowspan="2">H0000~HFFFF: Abnormal codes from the last two times
H74/H1007: Error code 1 and 2;
b15 b8 b7 b0
Error code 2 | Error code 1
H75/H1008: Error code 3 and 4;
b15 b8 b7 b0
Error code 4 | Error code 3
For abnormal codes, please refer to the abnormal code list in the abnormal record parameter06-40~06-43.</td></tr>
<tr><td></td><td></td></tr>
</table>

Data content	Parameter Poperation	Communication Parameter P (Note 1)	Table 1 (Note2)	Table 2 (Note2)	User registered parameter	Other P parameters	Error codes
H5A5A	00-02=4 (P.999=1)	o	x	x	o	o	x
H5566	00-02=5 (P.999=2)	o	x	o	x	o	x
H5959	00-02=6 (P.999=3)	o	x	x	x	o	x
H9966	00-02=3 (P.998=1)	o	x	o	o	o	x
H9696	Communication 999 1	x	x	x	o	o	x
H99AA	Communication 999 2	x	x	o	x	o	x
H9A9A	Communication 999 3	x	x	x	x	o	x
H55AA	Communication 998	x	x	o	o	o	x
HA5A5	00-02=1 (P.996=1)	x	x	x	x	x	o

Note: 1. Communication P parameters includes 07-02(P.32), 07-00(P.33), 07-01(P.36), 07-03(P.48)~ 07-09(P.53), 00-16(P.79), 07-10(P.153) and 07-07(P.154).

2. For the table 1 and table 2, please refer to Section 5.1.2.

- The table of the special monitor code

Information	Content	Unit
H0000	Monitor the digital input terminal input port state.	Note:1
H0001	Monitor the digital output terminal output port state.	Note:2
H0002	Monitor the voltage which can be input across terminal AI1.	0.01V
H0003	Monitor the voltage/current which can be input across terminal AI3.	0.01A/0.01V
H0004	Monitor the voltage which can be output across terminal AO1-5.	0.01V
H0005	Monitor the DC bus voltage value.	0.1V
H0006	Monitor the electronic thermal accumulation rate	---
H0007	The temperature rising accumulation rate of inverter	0.01
H0008	The inverter output power	0.01kW
H0009	Inverter NTC temperature accumulation	0.01
H000A	The electronic thermal accumulation rate of motor	---
H000B	Target pressure when PID control	0.1%
H000C	Feedback pressure when PID control	0.1%
H000D	The rotating speed fed back by PG	0.01Hz
H000E	The input frequency of terminal DIH	0.01kHz
H000F	Reserve	---
H0010	The output voltage of terminal AOAI1	0.01V
H0011	The inverter output torque	0.1%
H0012	The input voltage of terminal AI2	0.01V
H1013	Communication expansion card version number	---

Note: 1. Details of the digital input terminal input port state.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	DIH	DI9	DI8	DI7	DI3	DI6	DI5	DI4	DI2	DI1

Note: 2. Details of the digital output terminal output port state.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	A17	A16	A15	A14	A13	A12	A11	A10	R2	DO2	R1	DO1

SLOT3 expanded digital output

5.8.2 Communication EEPROM write selection

- Use thisfunction if parameter settings are changed frequently.

Parameter	Name	Factory Value	Setting Range	Content
07-11 P.34	Communication EEPROM write selection	0	0	Parameter values written by communication are written to the EEPROM and RAM.
			1	Parameter values written by communication are written to the RAM.

Settin Communication EEPROM write selection

- When parameter write is performed via the RS-485 terminal, the parameters storage device can be changed from EEPROM + RAM to RAM only.
- When changing the parameter values frequently, set "1" in 07-11(P.34) Communication EEPROM write selection. The life of the EEPROM will be shorter if parameter write is performed frequently with the settingunchanged from "0"(EEPROM write).

Note: Turning OFF the inverter's power supply clears the modified parameter settings when 07-11(P.34) = "1 (write only to RAM)". Therefore, theparameter values at next power-ON are the values last stored in EEPROM.

5.8.3 Canopen protocol

- The relative settings for Canopen communication expanded board

Parameter	Name	Factory Value	Setting Range	Content
07-15 P.800	CAN open slave address	0	0~127	---
07-16 P.801	CAN open speed	0	0	1Mbps
			1	500Kbps
			2	250K/280KFbps
			3	125Kbps
			4	100Kbps
			5	50Kbps
07-17 P.802	CAN open communication status	0	0	Node reset state
			1	Com reset state
			2	Boot up state
			3	Pre operation state
			4	Operation state
			5	Stop state
07-18 P.803	CAN open control status	0	0	Not ready for use state
			1	Inhibit start state
			2	Ready to switch on state
			3	Switched on state
			5	Enable operation state
			7	Quick stop active state
			13	Err reaction activation state
			14	Error state

Settin Canopen protocol

- Parameters07-17 and 07-18 are for read only, which are usedto monitor the state of Canopen communication expanded board.

5.8.4 Communication expansion card version number

- To show the current software communication expansion card program version number

Parameter	Name	Factory Value	Setting Range	Content
07-44 P.829	DXF-NET-ET Communication expansion card version number	read	read	To show the current software communication expansion card program version number,read only

5.8.5 Ethernet communication

- Using DXF-NET-ET communication expansion card related Settings

Parameter	Name	Factory Value	Setting Range	Content
07-45 P.830	IP configuration	0	0	IP state
			1	IP move
07-46 P.831	IP address 1	192	0~255	
07-47 P.832	IP address 2	168	0~255	
07-48 P.833	IPaddress 3	2	0~255	
07-49 P.834	IPaddress 4	102	0~255	
07-50 P.835	Subnet mask 1	255	0~255	
07-51 P.836	Subnet mask 2	255	0~255	
07-52 P.837	Subnet mask 3	255	0~255	
07-53 P.838	Subnet mask 4	0	0~255	
07-54 P.839	Default gateway 1	192	0~255	
07-55 P.840	Default gateway 2	168	0~255	
07-56 P.841	Default gateway 3	2	0~255	
07-57 P.842	Default gateway 4	100	0~255	

Settin Ethernet communication Settings

- At 07-45 ~ 07-57 on the number of parameters, please refer to the DXF-NET-ET EtherNet communication expansion card specifications.

5.9 PID parameter group 08

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
08-00	P.170	PID function selection	0: PID function non-selected	0	
			0X: Parameter 08-03(P.225) sets target value.		
			1X: Take the input of terminal AI1 as target source		
			2X: Take the input of terminal AI3 as target source		
			3X: Take the input of terminal AI2 as target source		
			4X: Take the input of terminal DIH as target source		
			X1: Take the input of terminal AI1 as feedback source		
			X2: Take the input of terminal AI3 as feedback source		
			X3: Take the input of terminal AI2 as feedback source		
08-01	P.171	PID feedback control method	0: Negative feedback control.	0	
			1: Positive feedback control.		
08-02	P.241	Sampling period by PID	0~60000ms	20ms	
08-03	P.225	PID target value panel reference	0~100.0%	20.0%	
08-04	P.172	Proportion gain	0.1%~1000.0%	20.0%	
08-05	P.173	Integral time	0~60.00s	1.00s	
08-06	P.174	Differential time	0~10000ms	0ms	
08-07	P.175	Abnormal deviation	0~100.0%	0.0%	
08-08	P.176	Exception duration time	0~600.0s	30.0s	
08-09	P.177	Exception handling mode	0: Free stop	0	
			1: Decelerate and stop		
			2: Continue to run when the alarm goes off		
08-10	P.178	Sleep detects deviation	0~100.0%	0.0%	
08-11	P.179	Sleep detects duration time	0~255.0s	1.0s	
08-12	P.180	Revival level	0~100.0%	90.0%	
08-13	P.181	Outage level	0~120.00Hz	40.00Hz	
08-14	P.182	Integral upper limit	0~200.0%	100.0%	
08-15	P.183	Deceleration step length with stable pressure	0~10.00Hz	0.50Hz	
08-16	P.221	Minimum pressuresampling value	0~65535	0	
08-17	P.222	Maxmum pressure sampling value	0~65535	0	
08-18	P.223	Analog feedback bias pressure	0~100.0%	0.0%	
08-19	P.224	Analog feedback gain pressure	0~100.0%	100.0%	
08-20	P.641	PID proportion Gain P2	0.1%~1000.0%	20.0%	
08-21	P.642	Integral time I2	0~60.00s	1.00s	
08-22	P.643	Differential time D2	0~10000ms	0ms	
08-23	P.644	Auto adjustment for PID parameters	0:Adjust according to the feedback deviation value	0	
			1: Adjust according to the curling radius.		
			2: Adjust according to the operation frequency		
			3: Adjust according to the line speed		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
08-24	P.711	PID target signal filter time	0~650.00s	0.00s	
08-25	P.712	PID feedback signal filter time	0~60.00s	0.00s	
08-26	P.713	PID output signal filter time	0~60.00s	0.00s	
08-27	P.714	PID deviation control limit	0~100.00%	0.00%	
08-28	P.715	Integral separated property	0: Integral not separated 1: Integral separated	0	
08-29	P.716	Integral separated point	0~100.00%	50.00%	
08-30	P.717	PID differential limit	0~100.00%	0.10%	
08-31	P.718	PID output in forward directiondeviation limit	0~100.00%	100.0%	
08-32	P.719	PID output in reverse direction deviation limit	0~100.00%	100.0%	
08-33	P.720	PID parameter switchover operation selection	0: No PID parameter switchover. 1: PID parameter switchover based ondeviation.	0	
08-34	P.721	PID parameter switchover deviation lower limit	0~100.00%	20.00%	
08-35	P.722	PID parameter switchover deviation upper limit	0~100.00%	80.00%	
08-36	P.723	PID wire-break operation selection1	0: When PID wire-break, select to no need to operate to the upper limit value. 1: When PID wire-break, select to need to operate to the upper limit value.	1	
08-39	P.726	PID operation at stop	0: No PID operation at stop. 1: PID Stop operation	0	
08-40	P.727	PID enable reverse run operation	0: PID reverse run is not allowed. 1: PID reverse run is allowed.	0	
08-41	P.728	PID in reverse direction integral limit	0~100.0%	0.0%	
08-42	P.729	PID minimum output frequency	0~10.00Hz	0.00Hz	

5.9.1 PID function selection

- Process control such as flow rate, air volume or pressure are possible on the inverter.A feedback system can be configured and PID control can be performed using the digital input signal or parametersetting value as the set point, and the digital input signal as the feedback value.

Parameter	Name	Factory Value	Setting Range	Content
08-00 P.170	PID function selection	0	0	PID function non-selected
			0x	Parameter 08-03(P.225) sets target value.
			1x	Take the input of terminal AI1 as target source
			2x	Take the input of terminal AI3 as target source
			3x	Take the input of terminal AI2 as target source
			4x	Take the input of terminal DIH as target source
			x1	Take the input of terminal AI1 as feedback source
			x2	Take the input of terminal AI3 as feedback source
			x3	Take the input of terminal AI2 as feedback source
08-01 P.171	PID feedback control method	0	0	Negative feedback control.
			1	Positive feedback control.

Settin PID function selection

- During the operation of PID control, the frequency displayed on the screen is the output frequency of the inverter.
- For input signal filtering of terminal AI1, terminal AI2 and terminal AI3, please refer to the instructions for 02-10.

Note: When selecting the target source and feedback source, please pay attention to the setting of 08-00 and 02-00~02-02, the terminals' priority are AI1 > AI3 >AI2

5.9.2 PID parameter group 1

- Auto-agjusting of process control can be easily performed by user via setting PID parameter.

Parameter	Name	Factory Value	Setting Range	Content
08-02 P.241	Sampling period by PID	20ms	0~6000ms	The parameter is the sampling period for feedback signal. The adjuster computes once every sampling period. The longer the sampling period, the slower the response.
08-03 P.225	PID target value panel reference	20%	0~100%	The target value is set by 08-03(P.225) when the ten-digit of 08-00 (P.170) value is 0, and the single-digit is not 0.
08-04 P.172	Proportion gain	20.0%	0.1%~1000.0%	This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration.
08-05 P.173	Integral time	1.00s	0~60.00s	This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable.
08-06 P.174	Differential time	0ms	0~10000ms	This gain determines deviation controller's impact on the amount of change of the deviation. Appropriate deviation time can reduce the overshooting between the proportion controller and the integral controller. Yet when the deviation time is too large, system vibration may be induced.
08-07 P.175	Abnormal deviation	0.0%	0~100.0%	---
08-08 P.176	Exception duration time	30.0s	0~600.0s	---
08-09 P.177	Exception handling mode	0	0	Free stop
			1	Decelerate and stop
			2	Continue to run when the alarm goes off
08-10 P.178	Sleep detects deviation	0.0%	0~100.0%	---
08-11 P.179	Sleep detects duration time	1.0s	0~255.0s	---
08-12 P.180	Revival level	90.0%	0~100.0%	---
08-13 P.181	Outage level	40.00Hz	0~120.00Hz	---
08-14 P.182	Integral upper limit	100.0%	0~200.0%	When the deviation value accumulated with the integral time, an upper limit for deviation accumulation should be set. For example, the upper integral limit of frequency is equal to 01-03 * 08-14.
08-15 P.183	Deceleration step length with stable pressure	0.50Hz	0~10.00Hz	When the feedback pressure satisfies the deviation value for stopping the machine and the set time (in seconds) for stopping the machine for detection is reached, the inverter will take the 08-15 (P.183) step to reduce the frequency.

Settin PID parameter group 1

Simulation of the feedback signal correction :

1.Please refer to 5.3.5 ~ 5.3.8 analog input selection and processing parts.

Example 1: The user does not answer the feedback signal

First set proportion parameter 02-14 (P. 194) = 0%, 02 to 15 (P. 195) = 100%;

02-12 set voltage parameters (P. 192) = 0, 11-13 (P. 193) = 7.

Example 2: Users choose AI3 terminals to 0 to 20 ma feedback signals

First set proportion parameter 02-27 (P. 196) = 0%, 02-28 (P. 197) = 100%;

To set the current parameter 02-25 (P. 198) = 0, 11-26 (P. 199) = 20.0

2.Users need to feedback signal correction

Example 3: User feedback range 0~10kg (3 to 5 analog input)

Adjust the feedback signal to 0 kg, write parameters 02-36 (P. 546) = 0%

Adjust the feedback signal to 10 kg, write parameters 02-37 (P. 547) = 100%

Note: 1. If the user wants to by adjusting the size of the analog input corresponding to a certain proportion relations, need to adjust good analog input first, then set the corresponding proportion parameter, this time without setting voltage parameter, frequency converter will calculate itself.If the user to skip regulating the relationship between analog input to set the proportion will be expected to set a good first proportion parameters, voltage parameter Settings again.

2. Users such as case 3 that case, must be the actual feedback signal.

3 In the process of PID correction, the correction value must be the upper and lower limits of the selected signal.

4. If you use a AI3 terminals for the target source or source of feedback, please be sure to first set 02-20 value and collocation of SW2 switch, choose AI3 terminal voltage/current signal is, to other actions.

5. If use 3 to 5 terminals for the target source or feedback, please be sure to first set SW1 switch 02-29 value and collocation, choose AI2 terminal voltage/current signal is, to other actions.

- The instruction for the target pressure given by external analog terminal:

1. When the target value is set by terminalAI1(02-00=3 and 08-00=1X)

When 02-08 = 0, the given range is 0~5V corresponding to 0~100%;

When 02-08 = 1, the given range is 0~10V corresponding to 0~100%.

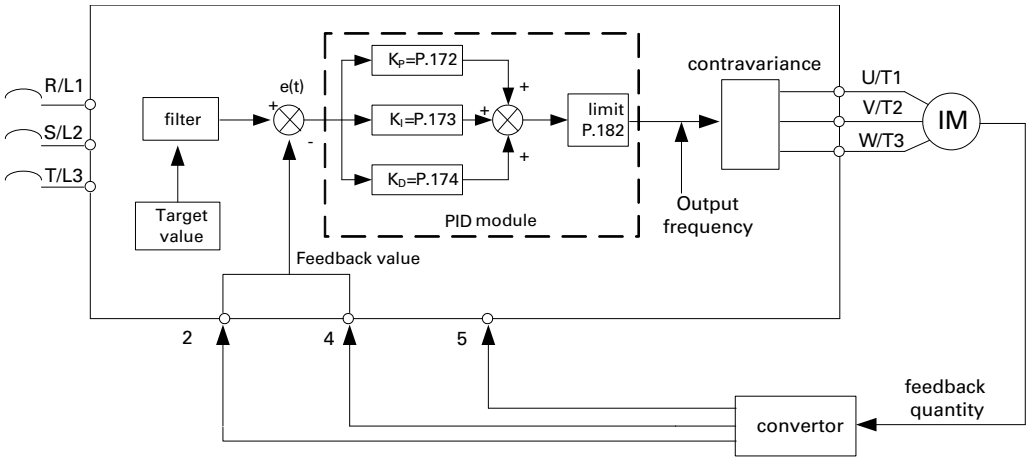
When the target value is set by terminal AI3(02-01=3 and 08-00=2X)

The given range is 4~20mA corresponding to 0~100%.

Example: Set 08-00 = 2X, 08-01 = 0.

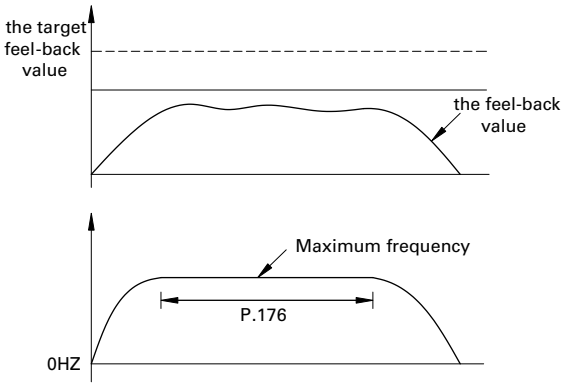
It indicates that the PID target value is given by the current of terminalAI3(4~20mA).

If 8mA is given by the user, the corresponding given proportion is (8-4)/ (20-4) * 100.0= 25.0



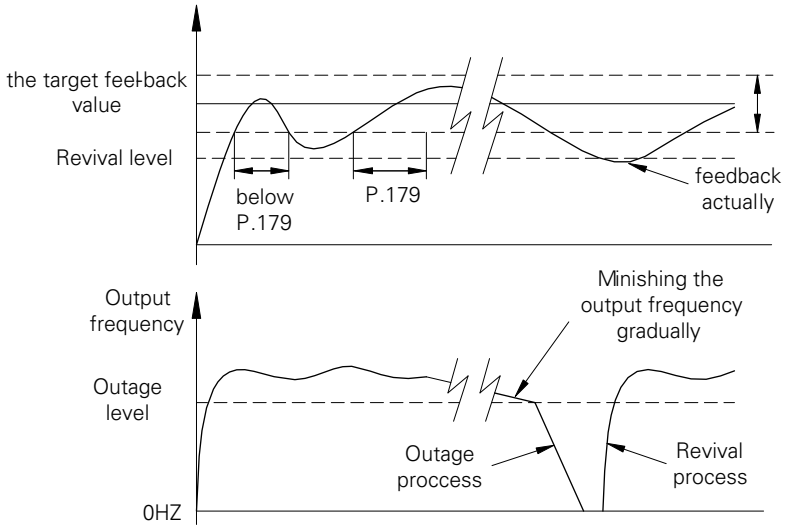
- When the output frequency reaches the value of 01-03 * 08-14, the feedback value will be less than the product of the target value multiplying 08-07. In addition, when the duration lasts more than the set value of 08-08, PID will be considered as abnormal and handled according to the set value of 08-09.

  For example, when 08-07=60%, 08-08=30s, 08-09=0,01-03=50Hz and 08-14= 100%, the output frequency reaches 50Hz, and the feedback value is lower than 60% of the target feedback value for 30 seconds continuously, alarm will be display and the inverter will be stopped freely.



- If 08-10 is set to 0, then the set values of 08-11, 08-12, 08-13 and 08-15 are invalid. If the setting value of 08-10 is nonzero, than PID's sleep function will be activated. When the absolute value of the deviation between the feedback value and the target feedback value is less than the sleep detected deviation value for the duration of 08-11's sleep detection time, the inverter will steadily reduce the output frequency. Once the output frequency of the inverter is less than the machine stop level of 08-13, the inverter will decelerate and stop. When the feedback value is lower than the wake-up level, the output frequency of the inverter will again be controlled by PID.

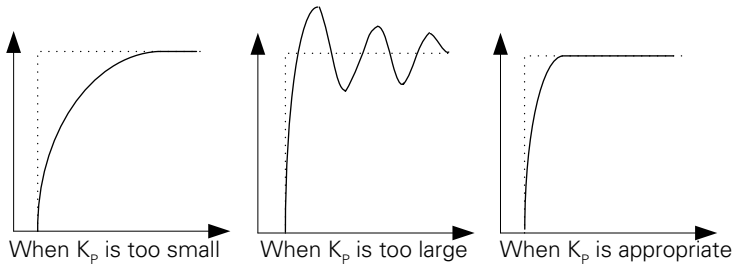
  For example, if 08-10=5%, 08-11=1.0s, 08-12=90%, 08-13=40Hz, and 08-15=0.5Hz, and when the feedback value is at a stable zone, i.e., larger than 95% of the target feedback value but less than 105% of the target feedback value, the inverter at the stable zone will reduce the output frequency by 0.5Hz/second. When the output frequency of the inverter is less than 40Hz, the inverter will directly decelerate and stop. When the feedback value lower than 90% of the target feedback value, the inverter will wake up and the output frequency will again be controlled by PID.



- PID gain simple setting:

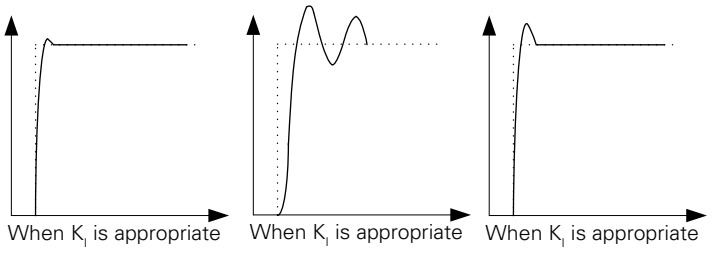
1. After changing target, response is slow ---Increase P-gain (KP =08-04)

response is quick but unstable ---Decrease P-gain (KP =08-04)



2. Target and feedback do not become equal ---Decrease Integration time (KI =08-05)

become equal after unstable vibration ---Increase Integration time (KI =08-05)



- Even after increasing KP, response is still slow ---Increase D-gain (KD =08-06)

It is still unstable ---Decrease D-gain (KD =08-06)

Note: 1. When 08-09=2, the panel has no alarm display but the multi-function output terminal has alarm detection. To turn off the alarm, reset 00-02 or turn down the power.

2. When selecting the target source and feedback source, please pay attention to the setting of 08-00 and 02-00~02-02, the terminals' priority are AI1>AI3>AI2.

5.9.3 PID parameter group 2

- This group of parameters is only related to the close loop speed mode.

Parameter	Name	Factory Value	Setting Range	Content
08-20 P.641	PID proportion Gain P2	20.0%	0.1%~1000.0%	This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration.
08-21 P.642	Integral time I2	1.00s	0~60.00s	This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable.
08-22 P.643	Differential time D2	0ms	0~10000ms	This gain determines differential controller's impact on the amount of change of the deviation. Appropriate differential time can reduce the overshooting between the proportion controller and the integral controller. Yet when thedifferential time is too large, system vibration may be induced.
08-23 P.644	Auto adjustment for PID parameters	0	0	Adjust according to the feedback deviation value
			1	Adjust according to the curling radius.
			2	Adjust according to the operation frequency.
			3	Adjust according to the line speed.

Settin PID parameter group2

- 08-23 is the auto adjustment basis for PID parameters.

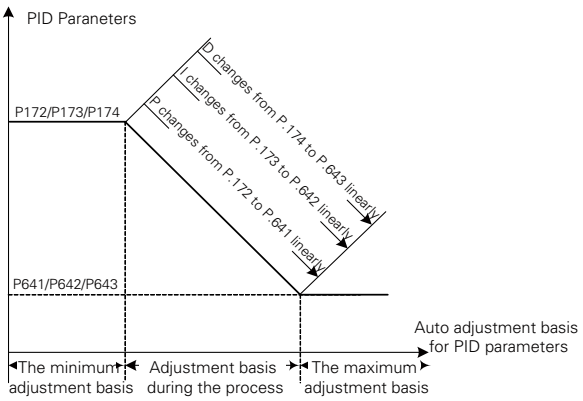
  1. When 08-23=0, he adjustment is according to the feedback deviation value.IOnly the first group of PID parameters is used, and the second group is inactive.

  2. When08-23=1, the adjustment is according to the curling radius. The first group of PID parameters is used for empty roll, while the second group of PID parameters is used for full roll. The PID parameters change continuously during the process.

  3. When 08-23=2, the adjustment is according to the operation frequency. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum frequency. The PID parameters change continuously during the process.

  4. When 08-23=3, the adjustment is according to the line speed. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum line speed. The PID parameters change continuously during the process.

- The relationship between PID auto adjustment basis and PID parameters is shown as following diagram:



5.9.4 PID filter setting

- Filter function setting can help to reduce interference on the systemyet slow the response.

Parameter	Name	Factory Value	Setting Range	Content
08-24 P.711	PID target signal filter time	0.00s	0~650.00s	Set PID targetsignal low-pass filter time constant
08-25 P.712	PID feedback signal filter time	0.00s	0~60.00s	Set PID feedbacksignal low-pass filter time constant
08-26 P.713	PIDoutput signal filter time	0.00s	0~60.00s	Set PID outputsignal low-pass filter time constant

Settin PID filter time constant

- 08-24is used to set PID target signal filter timeconstant, which can reduce the impact caused by PID target signal sudden setting change on the system.
- 08-25is used to setPID feedback signal filter timeconstant, which can reduce the impact caused byfeedback signal, but will slow the response of the process closed-loop system.
- 08-26is used to set PIDoutput signal filter timeconstant, which can help to weaken sudden change of the PID output frequency, but will slow the response of the process closed-loop system.

5.9.5 PID deviation control limit

- If the deviation between PID target and PID feedback is smaller than the value of08-27, PID output frequency keeps unchanged.

Parameter	Name	Factory Value	Setting Range	Content
08-27 P.714	PID deviation control limit	0.00%	0~100.00%	If the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops.

Settin PID deviation limit

- 08-27 is used to set PID deviation control limit, if the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops. The small deviation between PID target and PID feedback will make the output frequency stabilize, effective for some closed-loop control applications.

5.9.6 PID integral property

- PIDIntegral separated function can helpto reduce the PID overshoot effectively.

Parameter	Name	Factory Value	Setting Range	Content
08-28 P.715	Integral separated property	0	Integral not separated	Set the integral function is valid
		1	Integral separated	
08-29 P.716	Integral separated point	50.00%	0~100.00%	Set the deviationbetween target and feedback in integral separated function.

Settin PID integral separated function

- When 08-28 is set to 1, integral separated function is valid, when the deviation between PID target and PID feedback is larger than the value of 08-29, only PID proportion and differential operate, which canhelp to reduce the PID overshoot.

5.9.7 PID differential limit

- In PID control, differential may cause system oscillation, generally limit differential to a small range.

Parameter	Name	Factory Value	Setting Range	Content
08-30 P.717	PID differential limit	0.10%	0~100.00%	Set PID differential limit

Settin PID differential limit

- In PID control, the differential operation is sensitive and may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.08-27is used to set the PID differential output range.

5.9.8 PID outputdeviation limit

- PID output deviation limit setting can controlthe change of PID outputs and stabilize the running of the inverter.

Parameter	Name	Factory Value	Setting Range	Content
08-31 P.718	PID output in forward directiondeviation limit	100.00%	0~100.00%	Set the deviation limit calculated by two PID outputs
08-32 P.719	PID output in reverse direction deviation limit	100.00%	0~100.00%	

Settin PID output deviation limit

- This function is used to limit the deviation between two PID outputs to suppress the rapid change of PID output and stabilize the running of the inverter.

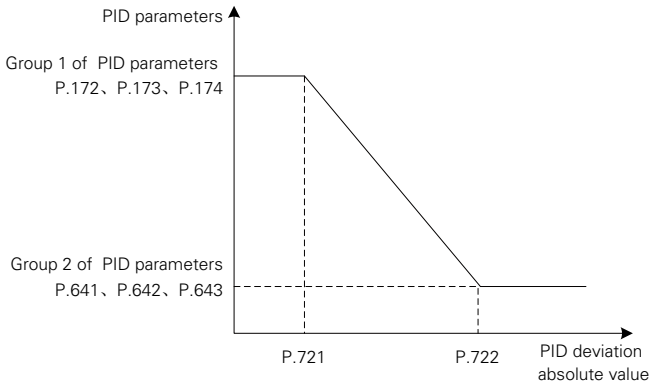
5.9.9 PID parameter switchover

- Two groups of PID parametersare required when one group of PID parameters cannot satisfy the requirement of the whole running process.

Parameter	Name	Factory Value	Setting Range	Content
08-33 P.720	PID parameter switchover operation selection	0	0: No swithcover 1: According to the deviation switch PID	When deviationis smaller than the value of 08-34, Group 1 of PID parameters operate. When deviationis larger than the value of 08-35, Group 2 of PID parameters operate. When the deviation is between 08-35 and 08-34, PID parameters linear change.
08-34 P.721	PID parameter switchover deviation lower limit	20.00%	0~100.00%	
08-35 P.722	PID parameter switchover deviation upper limit	80.00%	0~100.00%	

Settin PID parameter switchover

- In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process. Two groups of PID parameters can switch automaticaccording to deviation, as the figure shows below:



5.9.10 PID malfunction selection

- When in PIDmalfunction, 08-39 and 08-40 will show different operation to apply for different applications.

Parameter	Name	Factory Value	Setting Range	Content
08-36 P.723	PID wire-break operation selection1	1	0 ~ 1	0: When PID wire-break, select to no need to operate to the upper limit value. 1: When PID wire-break, select to need to operate to the upper limit value.
08-39 P.726	PID operation at stop	0	0: PID operation at stop 1: No PID operation at stop	It is used to select whether to operate PID in the state of stop.

Settin PID malfunction selection

- 08-36 is used to select PID wire-breakoperation. In general, once detecting PID loss, the inverter will output alarm.
- 08-39 is used to select PID operation at stop. In general, it will operate PID in the state of stop.

5.9.11 PID reverse run operation selection

- It is used to set whether reverse run is allowed when PID calculation is negative

Parameter	Name	Factory Value	Setting Range	Content
08-40 P.727	PID enable reverse run operation	1	0: PID not allow the reverse 1: PID Allow the reversal	--
08-41 P.728	PID in reverse direction integral limit	0.0%	0 ~ 100.0%	Used to set PID in reverse direction integral limit. Set it to 0 when reverse run operation is not allowed.
08-42 P.729	PID minimum output frequency	0.00Hz	0 ~ 10.00Hz	Used to set the minimum value of PID output.

Settin PID reverse run operation selection

- When PID reverse run is allowed, 08-41 should be set to a value larger than 0, generally it is set to 100.0%. When PIDreverse run is not allowed, 08-41 is set to 0.
- 08-42 is used to PIDcalculation minimum output frequency, when the output is smaller than the value, the inverter output stops.

5.10 PG feedback parameter group 09

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
09-00	P.349	PG type selection	0: ABZ 1: ABZ (Synchronous motor decicated) 2: Resolver 1x Synchronous motor standard encoder 3: ABZ/UVW Synchronous motor standard encoder	0	
09-01	P.350	Number 1 of the encoder pulses	0~20000	1024	
09-02	P.351	Encoder input mode setup 1	0: No function 1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation. 2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation. 3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation. 4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.	0	
09-03	P.352	PG abnormality detection time	0~100.0s	1.0s	
09-04	P.353	Over-speed detection frequency	0~30.00Hz	4.00Hz	
09-05	P.354	Over-speed detection time	0~100.0s	1.0s	
09-06	P.355	Number 2 of the encoder pulses	0~20000	2500	
09-07	P.356	Encoder input mode 2	0:No function 1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation. 2:Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation. 3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation. 4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.	0	
09-08	P.357	Dividing frequency output setting	1~255	1	
09-09	P.358	Dividing frequency filter coefficient	0~255	0	
09-10	P.359	Electronic gear ratio	0~300.00	1.00	
09-11	P.360	Prevent reverse rotation detection pulse number	0~65535	0	
09-12	P.361	Rse reverotation detection number	0~65535	0	
09-13	P.124	Expansion card version	Read	Read	
09-14	P.363	Phase Z adjust margin	0.0°Do not adjust 0.1°~360.0°: Phase Z impulse adjust	15.0°	
09-15	P.364	Phase Z DV1/DV2 alarm-enabled	0: Phase Z DV1/DV2 alarm is not valid 1: Phase Z DV1/DV2 alarm is valid	1	
09-16	P.386	DXF-ENC-302 Hardware break line detection	0: Break line detection is invalid 1: Break line detection is effective	1	

5.10.1 PG type selection

- PG is short for Pulse Generator.

Parameter	Name	Factory Value	Setting Range	Content
09-00 P.349	PG type selection	0	0	0: ABZ
			1	1: ABZ (Synchronous motor decicated)
			2	2: Resolver 1x Synchronous motor standard Encoder
			3	3: ABZ/UVW Synchronous motor standard Encoder

Settin PG type selection

- Please set the the value of 09-00(P.349) properly according to the type of motor and PG board.
- PM motor with ordinary ABZ photoelectric encoder, should set up the 09-00 (P. 349) = 0, frequency converter based on 11-08 (P. 328) set the choose pull in way or the high frequency pulse vibration mode for PM motor rotor initial magnetic pole position to start the PM motor.
- PM motor with province line UVW photoelectric encoder, should set up the 09-00 (P. 349) = 1, the encoder will be on electricity for the first time, a PM motor rotor magnetic pole position information, start PM motor frequency converter according to the initial magnetic pole position, if there are different P of the frequency converter, inverter electrical action again, be sure to do otherwise PM motor drive.
- PM motors with rotating transformer, should set the 09-00 (P. 349) = 2, the inverter will each time on electrical or reset, read the PM motor rotor magnetic pole position information, frequency converter according to the initial magnetic pole position to start the PM motor.

5.10.2 PG1 parameter

- It is used to select the input mode of PG1 encoder.

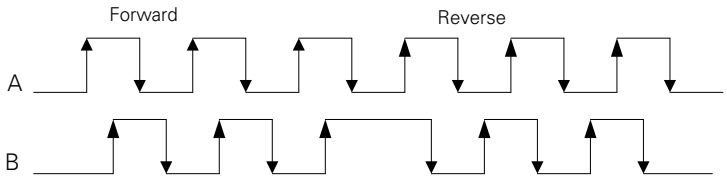
Parameter	Name	Factory Value	Setting Range	Content
09-01 P.350	Number 1 of the encoder pulses	1024	0~20000	---
09-02 P.351	Encoder input mode setup 1	0	0	No function
			1	Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.
			2	Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.
			3	Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.
			4	Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.

Settin PG1 parameter

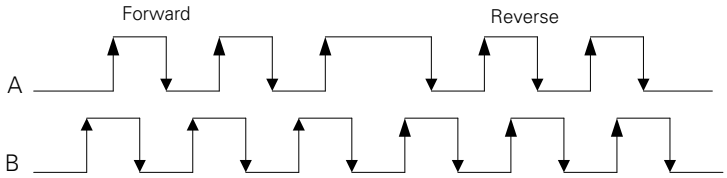
- 09-01 and 09-02 are used to set the encoder signal which connects to the A1/B1 interface on PG board. When the closed loop controls, the encoder signal for feedback can only be connected to the A1/B1 on PG board.09-01is applied for setting up the number of pulses to be generated by the encoder per revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.
- 09-02 is applied for setting up the encoder's input mode. The following encoder input modes are used as some examples:

  0: No function.

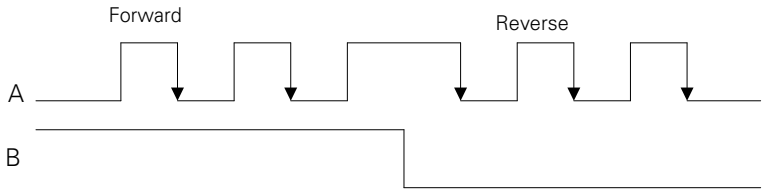
  1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.



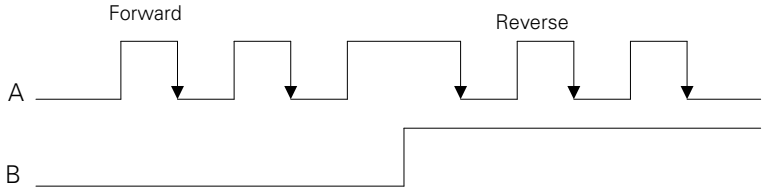
  2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.



  3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.



  4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.



Note: 1. If closed-loop control is selected but 09-02=0, then the inverter will display alarm PG1 and stop the operation.

2. PG card does not work with encoder wiring wrong or encoder, shows different p PG and stop working.

3. When 00-21=1, execute the IM motor V/F closed-loop control; when 00-21=4, execute the IM motor closed-loop vector control. When 00-21=5, execute the PM motor closed-loop vector control.

4. When 10-03=1, zero-speed operation is executed under the closed-loop control; DC voltage brake is executed under the V/F closed-loop control.

5.10.3 PG abnormality detection

- It is the detection standard when the abnormality occurrs in PG feedback control.

Parameter	Name	Factory Value	Setting Range	Content
09-03 P.352	PG abnormality detection time	1.0s	0~100.0s	PG wire-breakdetection time setting
09-04 P.353	Over-speed detection frequency	4.00Hz	0~30.00Hz	Motor over-speed detectionfrequencythreshold setting
09-05 P.354	Over-speed detection time	1.0s	0~100.0s	Motor over-speed detection time setting
09-16 P.386	DXF-ENC-302 Hard ware break line detection	1	0	Break line detection is invalid
			1	Break line detection is effective

Settin PG abnormality detection

- When carrying out PG feedback control, if the detected frequency is 0, and with duration longer than the time set by 09-03, and then the PG card's feedback signal is abnormal. The inverter will display alarm PG2 and stop the operation. If PG signal abnormal (zero speed) detection time 09-03 is set to 0, then there is no PG card feedback signal abnormal function, i.e., no alarm PG2.
- When carrying out PG feedback control, if the difference between the detected frequency and the output frequency exceeds 09-04, and with duration longer than the set time of 09-05, then the speed deviation is too big. The inverter will display alarm PG3 and stop the operation. If PG over-speed detection time 09-05 is set to 0, then alarm PG3 function is not available.

5.10.4 PG2 parameter

- It is used to select the input mode of PG2 encoder.

Parameter	Name	Factory Value	Setting Range	Content
09-06 P.355	Number 2 of the encoder pulses	2500	0~20000	It is used to set the encoder signal which connects to the A2/B2 interface on PG03.
09-07 P.356	Encoder input mode 2	0	0	No function
			1	Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.
			2	Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.
			3	Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.
			4	Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.

Settin PG2 parameter

- When using the PG card, 09-06 is applied for setting up the number of pulses to be generated by the encoder per revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.
- Parameter 09-07is applied for setting up the encoder's input mode.For the encoder's input mode, please refer to parameter 09-02.
- In speed mode, when 09-07 is not set to 0, the frequency command is the pulse input of A2/B2(target frequency(0.01Hz)=pulse frequency(Hz) /09-06*09-10); After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.
- In position mode, when 09-07 is not set to 0, the position command is the pulse input of A2/B2(target position=A2B2 pulse number*09-10);After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.

- When frequency command or position command is from the pulse input of A2/B2, the actual rotation direction of the motor is as the figure below:

Rotation command	09-07 (P.356)	A2B2 pulse train	Actual rotation direction of the motor
FWD	1\3	A2 ahead of B2	Forward
		B2 ahead of A2	Reverse
	2\4	A2 ahead of B2	Reverse
		B2 ahead of A2	Forward
REV	1\3	A2 ahead of B2	Reverse
		B2 ahead of A2	Forward
	2\4	A2 ahead of B2	Forward
		B2 ahead of A2	Reverse

5.10.5 Dividing frequency output function

- The multiple setting for PG board feedback and output.

Parameter	Name	Factory Value	Setting Range	Content
09-08 P.357	Dividing frequency output setting	1	1~255	The multiple setting for PG cardfeedback and output
09-09 P.358	Dividing frequency filter coefficient	0	0~255	The setting of PGcard dividing frequency filter coefficient

Settin Dividing frequency output function

- 09-08is the multiple setting for the feedback and output of PG card. If the feedback is 1024PPR and 09-08 is set to 2, the output of PG OUT (pulse output) on PG card is 512PPR.

5.10.6 Electronic gear ratio

- Electronic gear ratio setting for the pulse input of A2/B2 of DXF-ENC-301 card.

Parameter	Name	Factory Value	Setting Range	Content
09-10 P.359	Electronic gear ratio	1.00	0~300.00	---

Settin Electronic gear ratio

- For the usage of 09-10, please refer to 09-07.

5.10.7 Reverse rotation detection

- The relative settings for PM motor prevent reverse rotation.

Parameter	Name	Factory Value	Setting Range	Content
09-11 P.360	Prevent reverse rotation detection pulse number	0	0~65535	PM motor prevent reverse rotation detection pulse number setting.
09-12 P.361	Reverse rotation detection number	0	0~65535	PM motor reverse rotation detection number setting.

Settin Reverse rotation detection

- 09-11 is used to set prevent reverse rotation detection pulse number. When the motor rotates continuously for the pulse number of 09-11 at the opposite direction of the speed command, it will output prevent reverse rotation detection alarm dv4.Set 09-11 to 0 for applications where the direction of the load is the opposite of the speed command, which will cancel prevent reverse rotation detection alarm. It is valid only in PM motor close-loop vector control mode.
- 09-12is used to set reverse rotation detectionnumber. When detecting continuously for the number of 09-12 that the direction of acceleration is opposite to the speed command, it will output reverse rotation detection alarm dv3. When 09-12=0, it will cancel reverse rotation detection alarm.It is valid only in PM motor close-loop vector control mode.

5.10.8 Expansion card version information

- It is used to display the current firmware version or type of the inverter/expansion card.

Parameter	Name	Factory Value	Setting Range	Content
09-13 P.124	Expansion card version	Read	Read	It is used to display the current firmware version or type of the inverter/Expansion card which is readable only.

5.10.9 PG card phaseZadjust degrees

- PhaseZadjusting caneliminate the cumulative error of AB phase

Parameter	Name	Factory Value	Setting Range	Content
09-14 P.363	Phase Z adjust degrees	15.0°	0.0°	Don't adjust
			0.1°~360.0°	Phase Z pulse adjust

Settin Z phase adjust degrees

- Judge pulses deviation value of AB phase between two phasesZ. Theoretically, the deviation value is 09-01(P.350) (or 4*09-01(P.350)),Convert Angle is 360° mechanical point of view. When the deviation value decreasing the 09-01 (P. 350) (or 4 * 09-01 (P. 350) is less than 9-14 (P. 363) and the deviation value is greater than the 09-04 (P. 363), which can adjust the phase Z , or can not.
- When the signal of phase Z is destroyed by the external,please the 09-14 (P.363) set 0.

Note: It is valid,only with the VC model of PM motro and the place medel of IM motro.

5.10.10 PG card phase ZDV1/DV2 alarm-enabled

- Select phaseZ DV1,DV2 alarm is or isn't valid

Parameter	Name	Factory Value	Setting Range	Content
09-15 P.364	Phase Z DV1/DV2 alarm enable	1	0	Phase Z DV1/DV2 alarm enable is not valid
			1	Phase Z DV1/DV2 alarm enable is valid

Settin PhaseZDV1/DV2 alarm enable

- DV1 is phaseZ pulse lose alarm , DV2 is phaseZ noise detectin alarm, When 09-15 (P.364) is 0,can cancel DV1, DV2 alarm.

Note: It is valid only 00-21(P.300)=5

5.11 Application parameter group 10

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
10-00	P.10	DC injection brake operation frequency	0~120.00Hz	3.00Hz	
10-01	P.11	DC injection brake operation time	0~60.0s	0.5s	
10-02	P.12	DC injection brake operation voltage	0~30.0%: 7.5K/11KF and types below	4.0%	
			0~30.0%: 11K/15KF~55K/75KF types	2.0%	
			0~30.0%: 75K/90KF and types above	1.0%	
10-03	P.151	Zero-speed control function selection	0: There is no output at zero-speed.	0	
			1: The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.		
			2: The zero-servo running is carried out in close-loop vector mode.		
10-04	P.152	Voltage at zero-speed control	0~30.0%: 7.5K/11KF and types below	4.0%	
			0~30.0%: Types from 11K/15KF to 55K/75KF	2.0%	
			0~30.0%: 75K/90KF and types above	1.0%	
10-05	P.242	DC injection brake function before start	0: DC injection brake function is not available before starting.	0	
			1: DC brake injection function is selected before starting.		
10-06	P.243	DC injection brake time before start	0~60.0s	0.5s	
10-07	P.244	DC injection brake voltage before start	0~30.0%: 7.5K/11KF(included) and types below	4.0%	
			0~30.0%: 11K/15KF~55K/75KF types	2.0%	
			0~30.0%: 75K/90KF (included) and types above.	1.0%	
10-08	P.150	Restart mode selection	XX0: No frequency search.	0	
			XX1: Direct frequency search		
			XX2: Decrease voltage mode		
			X0X: Power on once.		
			X1X: Start each time.		
			X2X: Only instantaneous stop and restart		
			0XX: No rotationdirection detection.		
			1XX: Rotation direction detection.		
			2XX: 00-15 (P.78) =0, rotation direction detection; 00-15 (P.78) =1/2, no rotation direction detection.		
10-09	P.57	Restart coasting time	0~30.0s	99999	
			99999: No restart function.		
10-10	P.58	Restart cushion time	0~60.0s: 7.5K/11KF(included)and types below.	5.0s	
			0~60.0s: 11K/15KF~55K/75KF types	10.0s	
			0~60.0s: 75K/90KF(included)and types above.	20.0s	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
10-11	P.61	Remote setting function selection	0: No remote setting function.	0	
			1: Remote setting function, frequency setup storage is available.	0	
			2: Remote setting function, frequency setup storage is not available.		
			3: Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR "turn off".		
10-12	P.65	Retry selection	0: Retry is invalid.	0	
			1: Over-voltageoccurs, the inverter will perform the retry function.		
			2: Over-currentoccurs,the inverter will perform the retry function.		
			3: Over-voltage or over-currentoccurs, the inverter will perform the retry function.		
			4: All the alarms have the retry function.		
10-13	P.67	Number of retries at alarm occurrence	0: Retry is invalid.	0	
			1~10: The setting value of 10-13 (P.67) isexceeded, the inverter will not perform the retry function.		
10-14	P.68	Retry waiting time	0~360.0s	1.0s	
10-15	P.69	Retry accumulation time at alarm	Read	0	
10-16	P.119	The dead time of positive and reverse rotation	0~3000.0s	0.0s	
10-17	P.159	Energy-saving control function	0: Normal running mode.	0	
			1: Energy-saving running mode.		
10-18	P.229	Dwell function selection	0: None.	0	
			1: Backlash compensation function.		
			2: Acceleration and deceleration interrupt waiting function.		
10-19	P.230	Dwellfrequency at acceleration	0~650.00Hz	1.00Hz	
10-20	P.231	Dwelltime at acceleration	0~360.0s	0.5s	
10-21	P.232	Dwellfrequency at deceleration	0~650.00Hz	1.00Hz	
10-22	P.233	Dwelltime at deceleration	0~360.0s	0.5s	
10-23	P.234	Triangular wave function selection	0: None.	0	
			1: External TRIis turned on,triangular wave function will be valid.		
			2: The triangular wave function is effective at any given time.		
10-24	P.235	Maximum amplitude	0~25.0%	10.0%	
10-25	P.236	Amplitude compensation for deceleration	0~50.0%	10.0%	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
10-26	P.237	Amplitude compensation for acceleration	0~50.0%	10.0%	
10-27	P.238	Amplitude acceleration time	0~360.00s/0~3600.0s	10.00s	
10-28	P.239	Amplitude deceleration time	0~360.00s/0~3600.0s	10.00s	
10-29	P.247	MC switchover interlock time	0.1~100.0s	1.0s	
10-30	P.248	Start waiting time	0.1~100.0s	0.5s	
10-31	P.249	Switchover frequency from inverter to commercial power supply frequency	0~60.00Hz	99999	
			99999: No automatic switchover order.		
10-32	P.250	Automatic switchover frequency range	0~10.00Hz: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.	99999	
			99999: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.		
10-33	P.273	Power failure stop selection	0: Power failure time deceleration-to-stop function disabled.	0	
			1: No undervoltage avoidance (Ifan undervoltage or power failureoccurs, the motordecelerates to a stop.)		
			2: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)		
			11: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)		
			12: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)		
10-34	P.274	Subtracted frequency at deceleration start	0~20.00Hz	3.00Hz	
10-35	P.275	Subtraction starting frequency	0~120.00Hz: When output frequency≥10-35(P.275), The motor decelerates from the "output frequency - 10-34(P.274)"; When output frequency<10-35(P.275), deceleration from output frequency	50.00Hz	
			99999: The motor decelerates from the "output frequency - 10-34(P.274)"		
10-36	P.276	Power-failure deceleration time 1	0~360.00s/0~3600.00s	5.00s	
10-37	P.277	Power-failure deceleration time 2	0~360.00s/0~3600.00s: Set the Dec time starting at10-38(P.278) anddownward.	99999	
			99999: Set the Dec time to the setting frequency of 10-38(P.278).		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
10-38	P.278	Power failure deceleration time switchover frequency	0~650.00Hz	50.00Hz	
10-39	P.279	UV avoidance voltage gain	0~200.0%	100.0%	
10-40	P.700	VF separated voltage source	0: Given by digital 10-41 (P.701). 1: Given by analog or DIH pulse.	0	
10-41	P.701	VF separated voltage digital	0~440.00V/0~220.00V	According to voltage	
10-42	P.702	VF separated voltage Acc time	0~1000.0s	0.0s	
10-43	P.703	VFseparated voltage Dec time	0~1000.0s	0.0s	
10-44	P.704	VF separated Stop selection	0: Frequency/voltage independentlydecreases to 0. 1: After the voltage decreases to 0, frequency decreases.	0	
10-45	P.267	Regeneration and avoidance operation selection	0: Regeneration avoidance function is invalid. 1: Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action) 2: Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)	0	
10-45	P.267	Regeneration and avoidance operation selection	11:Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49 (P.271) and 10-50 (P.272)) 12: Regeneration and avoidance function only in constant speed(Manual mode, Acc/Dec speed of action is set by 10-49 (P.271) and 10-50 (P.272))	0	
10-46	P.268	Regeneration and avoidance DC bus voltage level	155~400V: 220V types 310~800V: 440V types	380V 760V	
10-47	P.269	DC bus voltage detection sensitivity at deceleration	0: Disables regeneration avoidance due to bus voltage change rate. 1~5: Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity.	0	
10-48	P.270	Regeneration and avoidance frequency compensation value	0~10.00Hz: Set the limit value of frequency which rises at activation of regeneration avoidance function. 99999: Frequency limit invalid.	6.00Hz	
10-49	P.271	Regeneration avoidance voltage gaincoefficient	0~400.0% / 0~40.0%	100.0%	
10-50	P.272	Regeneration avoidance frequency gain coefficient	0~400.0% / 0~40.0%	100.0%	
10-51	P.264	Overexcitation deceleration	0: Overexcitation deceleration is invalid. 1: Overexcitation deceleration is valid.	0	
10-52	P.265	Overexcitation current level	0~200.0%	150.0%	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
10-53	P.266	Overexcitation gain	1.00~1.40	1.10	
10-54	P.362	Short-circuit brake time at PM motor start	0~60.0s	0.0s	
10-55	P.780	PLC Action choice	0:PLC Function invalid 1: PLC Function effective, PLC RUN signal from the external terminal input signal or 10-56 (P.781). 2: PLC Function effective, PLC RUNsignal from the external terminal input signal	0	
10-56	P.781	PLC run	0: No effect 1: PLC RUN	0	
10-57	P.782	PLC Program erase	0: invalid 1: Erase the PLC program, after the success of the erasure parameter value is 0	0	
10-58	P.783	PLC Monitor choosing component	0~326	0	
10-59	P.784	PLC Component monitoring value	Read	Read	

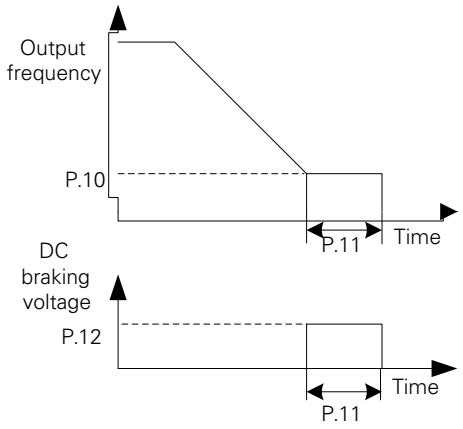
5.11.1 DC injection brake

- Timing to stop or braking torque can be adjusted by applying DC voltage to the motor to prevent the motor shaft to turn at the time of stopping motor.

Parameter	Name	Factory Value	Setting Range	Content
10-00 P.10	DC injection brake operation frequency	3.00Hz	0~120.00Hz	---
10-01 P.11	DC injection brake operation time	0.5s	0~60.0s	---
10-02 P.12	DC injection brake operation voltage	4.0%	0~30.0%	7.5K/11KF and types below
		2.0%		11K/15KF~55K/75KF types
		1.0%		75K/90KF and types above

Settin DC injection brake

- After a stop signal is put in (please refer to Chapter 4 for the primary operation of motor activation and stop), the output frequency of the inverter will decrease gradually. In case the output frequency reaches the "DC injection brake operation frequency (10-00)," the DC injection brake will be activated.
- During DC injection brake, a DC voltage will be injected into the motor windings by the inverter, which is used to lock the motor rotor. This voltage is called "DC injection brake operation voltage (10-02)". The larger the 10-02 is, the higher the DC brake voltage is, and the stronger the brake capability is.
- The DC brake operation will last a period (the set value of 10-01) to overcome the motor inertia.
- See the figure below:



Note: 1. To achieve the optimum control characteristics, 10-01 and 10-02 should be set properly.

2. If any of 10-00, 10-01 and 10-02 is set to 0, DC injection brake will not operate, i.e., the motor will coast to stop.

5.11.2 Zero-speed/zero-servo control

- Zero-speed/ zero-servo function selection

Parameter	Name	Factory Value	Setting Range	Content
10-03 P.151	Zero-speed control function selection	0	0	There is no output at zero-speed.
			1	The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.
			2	The zero-servo running is carried out in close-loop vector mode.
10-04 P.152	Voltage at zero-speed control	4.0%	0~30.0%	7.5K/11KF and types below
		2.0%		Types from 11K/15KF to 55K/75KF
		1.0%		75K/90KF and types above

Settin Zero-speed control

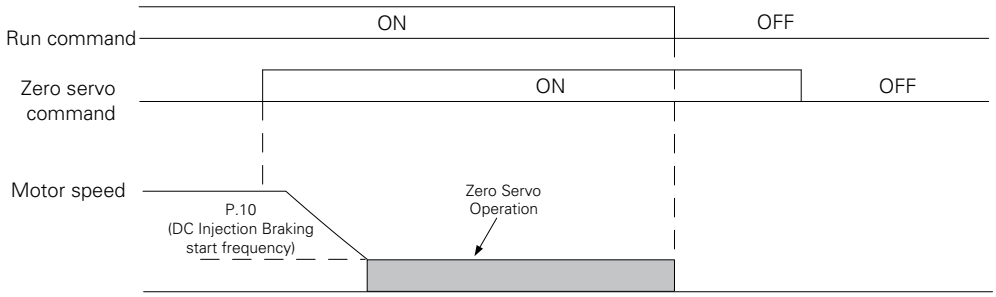
- Make sure that 01-11 (start frequency) is set to zero when using this function.

Note: 1. Suppose that 10-04 = 6%, and then the output voltage of zero speed is 6% of base frequency voltage 01-04.

2. For V/F, V/F close-loop control, and close-loop vector control mode, please refer to the motor control mode parameter 00-21, 00-22.

Settin Zeroservo

- The zero servo function is a position loop that can keep the motor to stop at any position point (origin) and lock the motor by external force at a certain position.
- When zero servo is active, once the motor speed falls below the level set in parameter 10-00, the drive goes into the zero servo mode and holds the current position. When the input assigned to trigger the Zero Servo function is released and the run command is still present, the motor reaccelerates.
- Zero servo operation:



Note: Avoid using zero servo to lock 100% load for long periods, as this can trigger a fault. If such loads need to be held in place for long periods, either make sure the current is less than 50% of the drive rated current during Zero Servo, or use a larger capacity drive.

5.11.3 DC injection brake before start

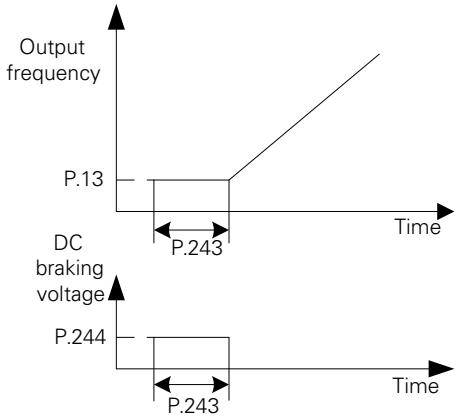
- The motor may be in the rotation status due to external force or itself inertia. If the drive is used with the motor at this moment, it may cause motor damage or drive protection due to over current.

Parameter	Name	Factory Value	Setting Range	Content
10-05 P.242	DC injection brake function before start	0	0	DC injection brake function is not available before starting
			1	DC brake injection function is selected before starting
10-06 P.243	DC injection brake time before start	0.5s	0~60.0s	---
10-07 P.244	DC injection brake voltage before start	4.0%	0~30.0%	7.5K/11KF (included) and types below
		2.0%		11K/15KF~55K/75KF types
		1.0%		75K/90KF (included) and types above

Settin DC injection brake before start

- If 10-05=0, DC injection brake function is not available before starting. If 10-05=1, DC brake injection function is selected before starting. When the output frequency reaches the starting frequency 01-11, a DC voltage (the set value of 10-07) will be injected into the motor windings by the inverter, which is used to lock the motor rotor. The DC brake operation will last a period (the set value of 10-06) before the motor starts.

  See the figure below:



Note: This function is only valid under the V/F mode; i.e., it is effective when 00-21=0

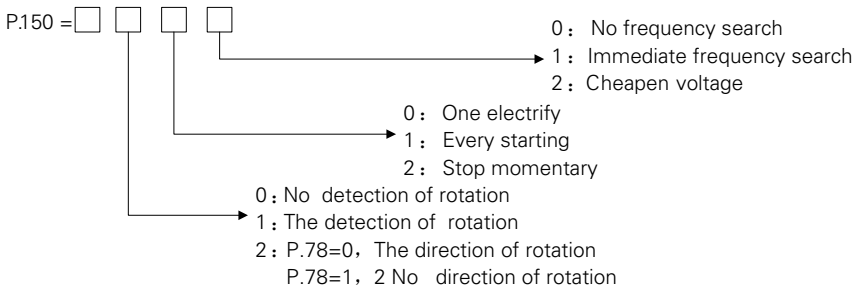
5.11.4 Restart mode selection

- Select the best start mode according to the different load.

Parameter	Name	Factory Value	Setting Range	Content
10-08 P.150	Restart mode selection	0	xx0	No frequency search.
			xx1	Direct frequency search
			xx2	Decrease voltage mode
			x0x	Power on once.
			x1x	Start each time.
			x2x	Only instantaneous stop and restart
			0xx	No rotationdirection detection.
			1xx	Rotation direction detection.
			2xx	00-15(P.78)=0, rotation direction detection.
				00-15(P.78)=1/2, no rotation direction detection.
10-09 P.57	Restart coasting time	99999	0~30.0s	---
			99999	No restart function.
10-10 P.58	Restart cushion time	5.0s	0~60.0s	7.5K/11KF (included) and types below.
		10.0s		11K/15KF~55K/75KF types
		20.0s		75K/90KF (included) and types above.

Settin Restart mode selection

- There are four digits in 10-08, and every digit has a different meaning and relevant position as following:



Note: 1. When one needs an instant restart function, 10-08 must be set.

2. When 10-08 is nonzero, linear acceleration / deceleration curve is the default.

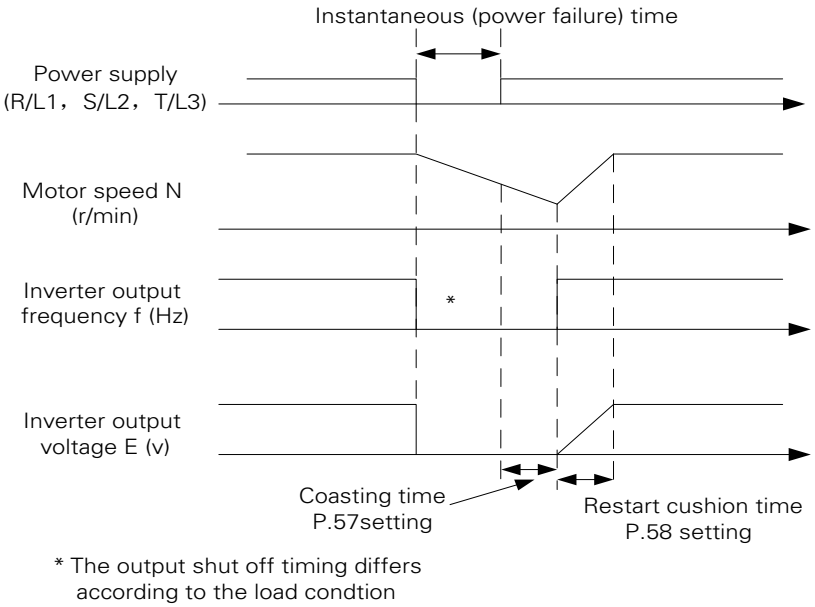
3. The direction detection position of 10-08 is only valid for direct frequency search.

4. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

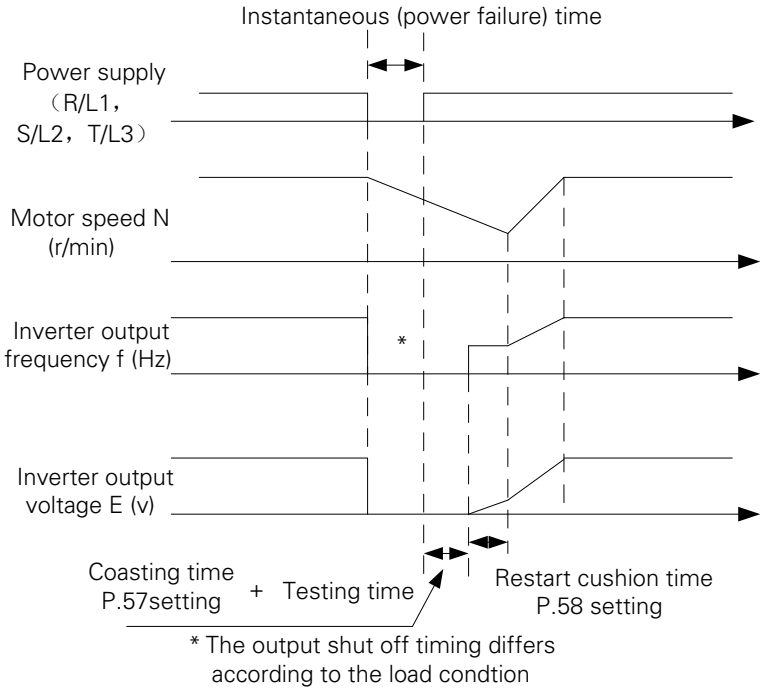
Settin Restart

- Once the driving power is interrupted while the motor is still running, voltage output will be stopped instantly. When the power is recovered and 10-09=99999, the inverter will not restart automatically. When 10-09=0.1~30, the motor will coast for a while (the set value of 10-09) before the inverter restarts the motor automatically.
- Once the motor is restarted automatically, the output frequency of the inverter will be the target frequency, but the output voltage will be zero. Then the voltage will be increased gradually to the expected voltage value. The period for voltage increase is called "Restart cushion time (10-10)".

- No frequency search again to start the action
  Restart action has nothing to do with the free running speed of the motor, but remains a moment to stop in front of the target frequency, slowly increase the voltage of the voltage reduction.



- Frequency search again to start the action
- Restart, the need for offline automatic tuning.



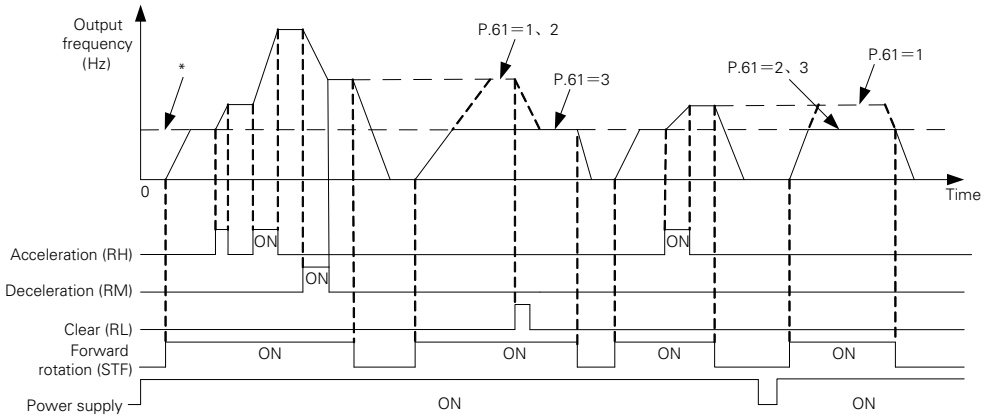
5.11.5 Remote setting function selection

- If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals

Parameter	Name	Factory Value	Setting Range	Content
10-11 P.61	Remote setting function selection	0	0	No remote setting function.
			1	Remote setting function, frequency setup storage is available.
			2	Remote setting function, frequency setup storage is not available.
			3	Remote setting function, frequency setup storage is notavailable, the remote setting frequency is cleared by STF/STR “turn off”.

Settin Remote setting function

- If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals under the external mode, combined mode 1 and combined mode 5.

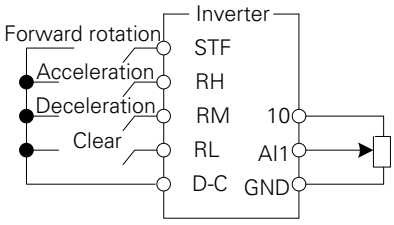


*external target frequency (except multi-speed) or PU target frequency

- Remote setting function

1. Whether the remote setting function is valid and whether the frequency setting storage function in the remote setting mode is used or not are determined by 10-11.

Set 10-11=1~3 (valid remote setting function), the function of terminal RM, RH and RL will be changed to acceleration (RH), deceleration (RM) and clear (RH).See the following figure:



2. In the remote setting, the output frequency of the inverter is: (frequency setting by RH/RM operation + external setting frequency other than multi-speeds/PU setting frequency)

- Frequency setting storage condition

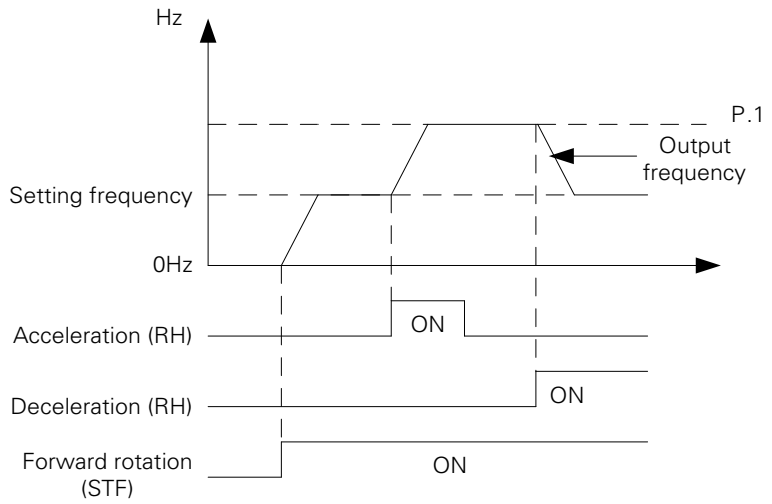
  The frequency setting storage function is to store the remote-set frequency (frequency set by RH/RM operation) in memory (EEPROM). Once the power supply is cut off and turned on again, the inverter can start running again at the remote-set frequency (10-11=1).

  <Frequency setting storage condition>

  1. It is the frequency when the start signal (STF/STR) is "off".

  2. When the signal RH (acceleration) and RM (deceleration) are both "off" and "on", the remote-set frequency is stored every minute. (Current frequency set value and the last frequency set value are compared ever minute. If they are different, then the current frequency set value is written in the memory. If RL is on, write-in will unavailable).

Note: 1. The frequency can be varied by RH (acceleration) and RM (deceleration) between 0 and (the maximum frequency – frequency set by the main speed). The output frequency is limited by 01-00.



2. When the acceleration or deceleration signal is "on", the acceleration / deceleration time will be determined by the set value of 01-06 (the first acceleration time) and 01-07 (the first deceleration time)

3. When RT signal is "on" and 01-22≠99999 (the second acceleration time), 01-23≠99999 (the second deceleration time), the acceleration / deceleration time will be determined by the set value of 01-22 and 01-23.

4. When the start signal (STF/STR) is "off" and RH (acceleration) / RM (deceleration) is "on", the target frequency will also change.

5. When the start signal (STF/STR) becomes "off", make the frequency setting storage function invalid (10-11=2, 3) if the frequency has to be changed continuously through RH/RM. If the frequency setting storage function is valid (10-11=1), the life of EEPROM will be shortened by frequent EEPROM data writing.

6. RH, RM and RL mentioned in this chapter are function names of "multi-function digital input terminal". If the functions of the terminals are changed, other functions are likely to be affected. Please verify the functions of the terminals before changing the options and functions of the multi-function digital input terminal (please refer to 03-00~03-05, 03-06 and 03-09). For wiring, please refer to Section 3.3.

5.11.6 Retry selection

- This function allows the inverter to reset itself and restart at fault indication. Theretry generating protective functions can be also selected.

Parameter	Name	Factory Value	Setting Range	Content
10-12 P.65	Retry selection	0	0	Retry is invalid.
			1	Over-voltageoccurs, the inverter will perform the retry function.
			2	Over-currentoccurs,the inverter will perform the retry function.
			3	Over-voltage or over-currentoccurs, the inverter will perform the retry function.
			4	All the alarms have the retry function.
10-13 P.67	Number of retries at alarm occurrence	0	0	Retry is invalid.
			1~10	The setting value of 10-13 (P.67) is exceeded, the inverter will not perform the retry function.
10-14 P.68	Retry waiting time	1.0s	0~360.0s	---
10-15 P.69	Retry accumulation time at alarm	0	Read	---

Settin Retry selection

- When an alarm goes off, a "retry" will take place to restore the previous setting.
- Inverter's retry is performed conditionally. When the alarm goes off and the inverter has an automatic retry, the re-occurrence of alarm going off before a set time is called a "continuous alarm". If continuous alarms happen for more than a set time, there is a significant malfunction. In this case, manual trouble shooting is necessary. The inverter at this point will perform no more the retry function. The number of Pre-defined occurrence is called "number of retries at abnormality (10-13)".
- If none of the alarm belongs to "continuous alarms", the inverter will perform retry for unlimited times.
- The period from the moment of alarm to that of retry is defined as "retry waiting time".
- For each time a retry happens, the value of 10-15 will be increased by one automatically. Therefore, the number of 10-15 read from the memory indicates the number of retries that have occurred.
- If 10-15 is rewritten with 0, the number of retry executed is cleared.

Note: The inverter will perform retry only after the retry waiting time of 10-14.Therefore when using this function, please be aware of the possible danger when operating the inverter.

5.11.7 The dead time of positive and reverse rotation

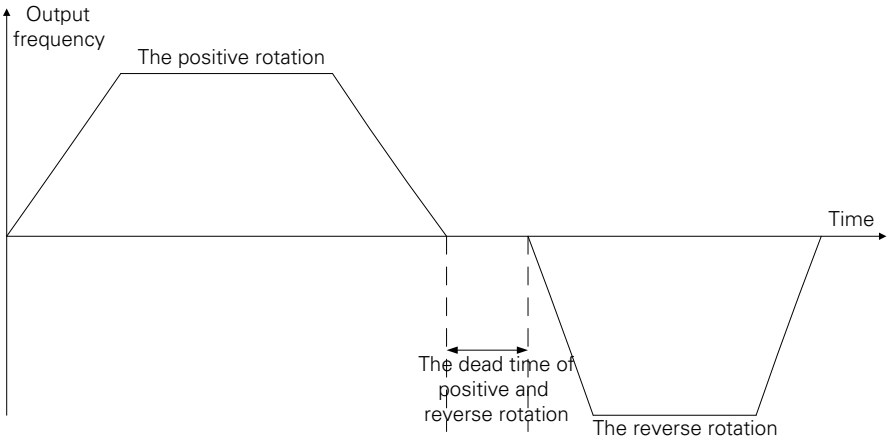
- Set the waiting or holding time after the output frequency outputs to 0Hz when the positive and reverse rotation is switching.

Parameter	Name	Factory Value	Setting Range	Content
10-16 P.119	The dead time of positive and reverse rotation	0.0s	0	Without the function.
			0.1~3000.0s	The waiting or holding time after the output frequency decreases to 0 when the positive and reverse rotation is switching.

Settin The dead time of positive and reverse rotation

- When the inverter is running and receive the reverse rotation reference, the output frequency will decrease to 0 in the process of switching from the current rotation direction to the opposite rotation direction. The dead time of positive and reverse rotation is the waiting or holding time after the output frequency decreases to 0.

  The diagram is as follows:



5.11.8 Energy-saving control functionV/F

- Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

Parameter	Name	Factory Value	Setting Range	Content
10-17 P.159	Energy-saving control function	0	0	Normal running mode.
			1	Energy-saving running mode.

Settin Energy-saving mode

- Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

Note: 1. This function is valid only in the V/F mode(00-21="0").

2. After selecting the energy-saving running mode, the deceleration time may be longer than the setting value. In addition, the properties of the regular torque load will produce abnormal voltage more easily. Please slightly prolong the deceleration time.

3.For big load purposes or machines with frequent acceleration/deceleration, the energy-saving effect may be poor.

5.11.9 Dwell function V/F

- The backlash measures that stop acceleration/deceleration by the frequency or time set with parameters ataccelera-tion/deceleration can be set.

Parameter	Name	Factory Value	Setting Range	Content
10-18 P.229	Dwell function selection	0	0	None.
			1	Backlash compensation function.
			2	Acceleration and deceleration interrupt waiting function.
10-19 P.230	Dwellfrequency at acceleration	1.00Hz	0~650.00Hz	Set the stopping frequency and time of Dwell function.
10-20 P.231	Dwelltime at acceleration	0.5s	0~360.0s	
10-21 P.232	Dwellfrequency at deceleration	1.00Hz	0~650.00Hz	Set the stopping frequency and time of Dwell function.
10-22 P.233	Dwelltime at deceleration	0.5s	0~360.0s	

Settin Dwell function

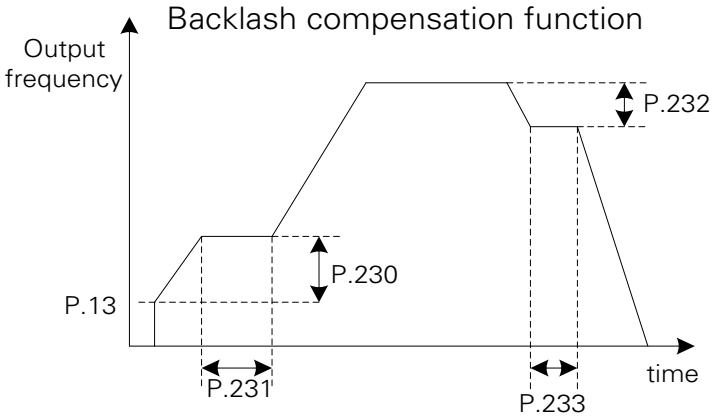
- Backlash compensation(10-18="1")

  Reduction gears have an engagement gap and a dead zone between forward and reverse rotation. This dead zone is called backlash, and the gap disables a mechanical system from following motor rotation.

  More specifically, a motor shaft develops excessive torque when the direction of rotation changes or when con-stant-speed operation shifts to deceleration, resulting in a sudden motor current increase or regenerative status.

  To avoid backlash, acceleration/deceleration is temporarily stopped. Set the acceleration/deceleration stopping fre-quency and time in 10-18 ~ 10-22.

  Shown as the figure below:

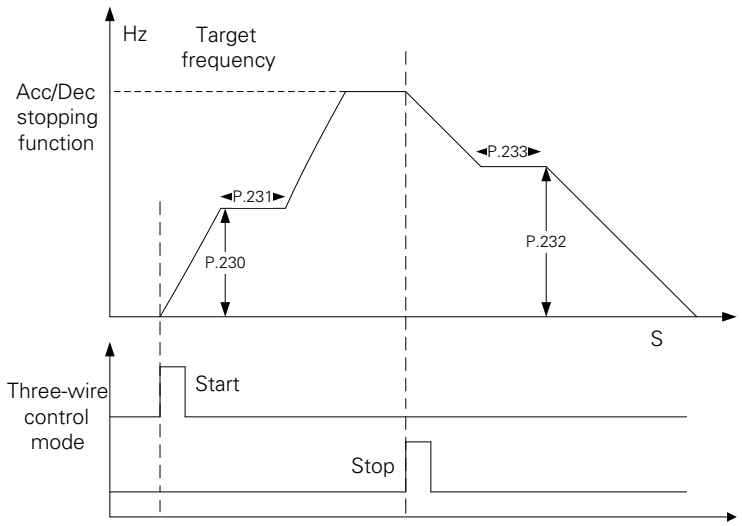


Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

- Acceleration and deceleration interrupt waiting function(10-18="2")

  When 10-18=2, start acceleration and deceleration interrupt waiting function. When accelerating to the frequency set by 10-19, wait for the time set by 10-20 and then accelerate to the target. When decelerating to the frequency set by 10-21, wait for the time set by 10-22, and then decelerate to the target.

  Shown as the figure below:



Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

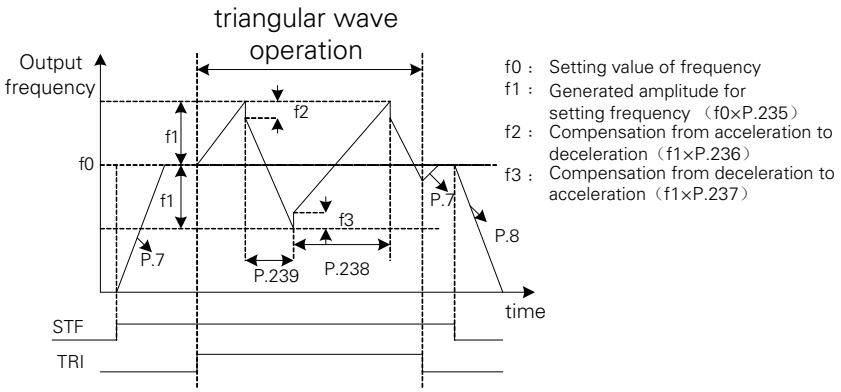
5.11.10 Triangular wave functionV/F

- The triangular wave operation, which oscillates the frequency at a constant cycle, is available.

Parameter	Name	Factory Value	Setting Range	Content
10-23 P.234	Triangular wave function selection	0	0	0: None.
			1	External TRIis turned on,triangular wave function will be valid.
			2	The triangular wave function is effective at any given time.
10-24 P.235	Maximum amplitude	10.0%	0~25.0%	---
10-25 P.236	Amplitude compensation for deceleration	10.0%	0~50.0%	---
10-26 P.237	Amplitude compensation for acceleration	10.0%	0~50.0%	---
10-27 P.238	Amplitude acceleration time	10.00s	0~360.00s/ 0~3600.0s	When 01-08=0, the unit of 10-27(P.238) and 10-28(P.239) is 0.01s.
10-28 P.239	Amplitude deceleration time	10.00s	0~360.00s/ 0~3600.0s	When 01-08=1, the unit of 10-27(P.238) and 10-28(P.239) is 0.1s.

Settin Triangular wave function

- If 10-23 "Triangular wave function selection" is "1" and triangular wave operation signal (TRI) is turned on, triangular wave function will be valid. Set any parameter in 03-00~03-06 and 03-09 "Input terminal selection function" to "36" and then assign the TRI signal for the external terminal.
- If 10-23 "triangular wave function selection" is equal to "2," the triangular wave function is effective at any given time.



Note: 1. During the movement of the triangular wave, the output frequency is limited by the maximum and the minimum frequency.

2. If the amplitude compensation, i.e., 10-25 and 10-26, is too big, over-voltage will be tripped off and the stall prevention action will be executed automatically. Consequently, the setting method will not be carried out.

3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

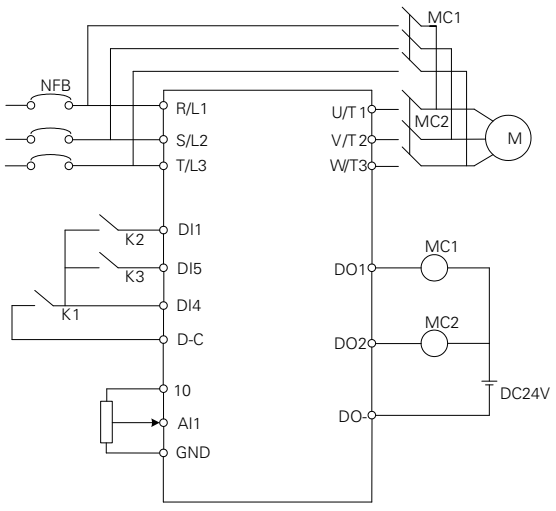
5.11.11 Commercial power supply frequency operation function

- The inverter contains control function for switching between the commercial power supply operation andinverter operation. Therefore, interlock operation of the magnetic contactor for switching can be easily performed bysimply inputting start, stop, and automatic switching selection signals.

Parameter	Name	Factory Value	Setting Range	Content
10-29 P.247	MC switchover interlock time	1.0s	0.1~100.0s	---
10-30 P.248	Start waiting time	0.5s	0.1~100.0s	---
10-31 P.249	Switchover frequency from inverter to commercial power supply frequency	99999	0~60.00Hz	---
			99999	No automatic switchover order.
10-32 P.250	Automatic switchover frequency range	99999	0~10.00Hz	When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.
			99999	When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.

Settin Commercial power supply frequency operation function

- 10-31 is used to switch the frequency from inverter operation to commercial power supply operation. Between starting and 10-31 inverter operation, an output frequency greater than 10-31 will automatically change the inverter operation to commercial power supply operation. When 10-31 is set to 99999, there is no automatic switchover.
- When 10-32≠99999, automatic switchover is valid during the operation (10-31≠99999). After the inverter operation is switched bypass operation, if the frequency reference is lower than (10-31-10-32), the operation will be switched to inverter operation and run by the frequency of the frequency reference. Inverter activation when the inverter start reference (STF/STR) is turned off, the operation is also switched to the inverter operation.
- When 10-32=99999, it is valid during automatic switchover operation (10-31≠99999). When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.
- Examples for the commercial power supply frequency switchover function:
  1. Assume that 03-03 = 37, 03-04 = 38, 03-10 = 10 and 03-12= 9. The wiring diagram is presented below:



Please be cautious of the capacity of the output terminals. The used terminals vary according to the setup of 03-10 / 03-11 / 03-12 and 03-13 (output terminal function selection).When 10 is selected for the output terminal function, connect the relay that drives the commercial power supply frequency operation. When 9 is selected for the output terminal function, connect the relay that drives the inverter operation. When 37 is selected for the digital input terminal function, commercial power-supply operation switchover function is selected. When 38 is selected for the input terminal function, commercial power supply frequency operation switchover signal CS is selected.

⚠ WARNING

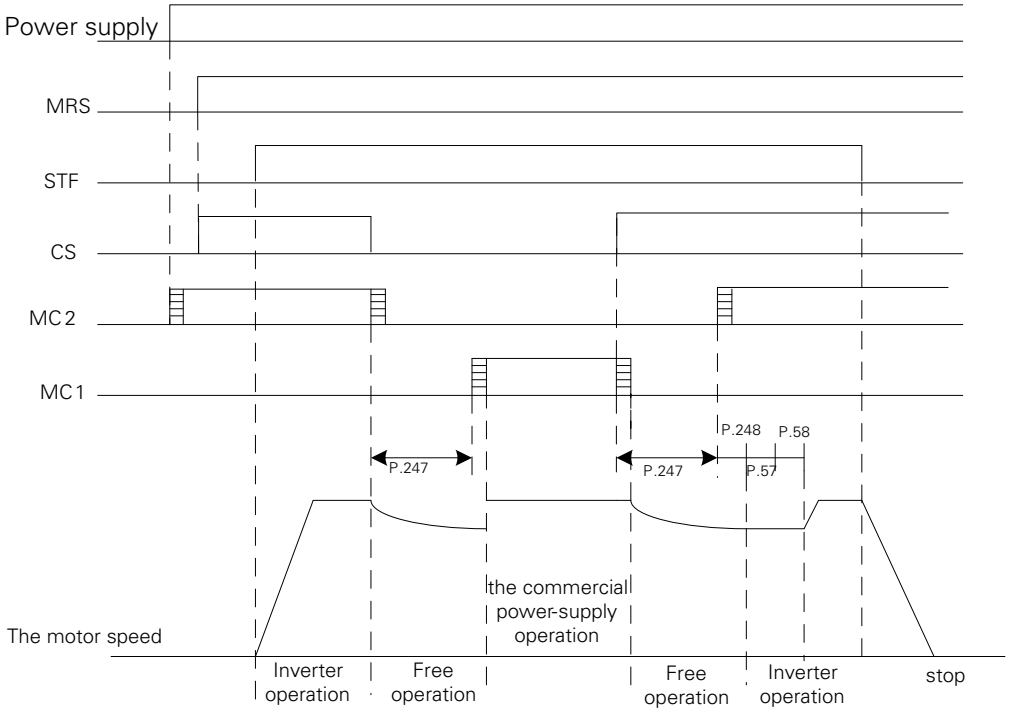
1. MC1 and MC2 must be mechanically interlocked; the running direction of the inverter operation and the commercial power supply operation should be consistent.

2. Use the commercial power operation switchover function under the external operation mode.

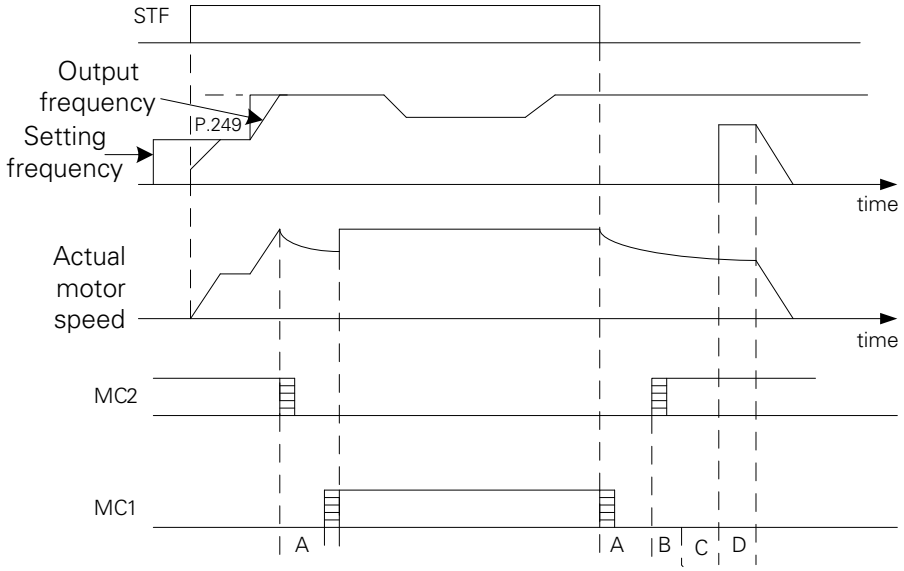
3. STF/STR is effective when the CS signal is ON.

- Here are some typical sequence diagrams for the switchover of the commercial power supply frequency:

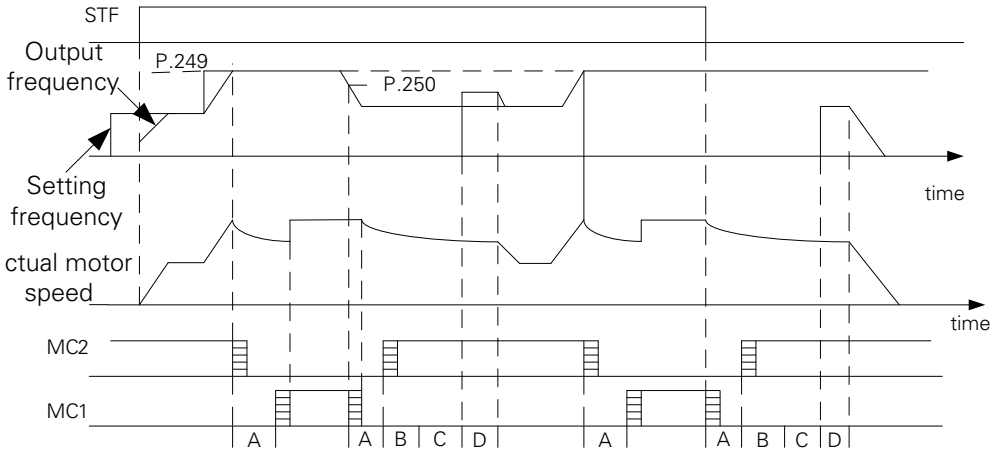
1. No action sequence for the automatic switchover sequence (10-31 = 99999).



2. With action sequence for the automatic switchover sequence(10-31 ≠ 99999, 10-32 = 99999).



3. With action sequence for the automatic switchover sequence series (10-31 ≠ 99999, 10-32 ≠ 99999)



During the automatic switchover, A: 10-29 MC switchover interlocking time; B: 10-30 starting waiting time; C: 10-09 restarting free operation time; D: 10-10 restarting elevating time.

Note: 1. When the motor runs at 50Hz (or 60Hz), the commercial power supply will offer a more efficient operation than the inverter will. Moreover, during the inverter maintenance/inspection period, the commercial power supply circuit should be installed to prevent the motor from being stopped for too long.

2. To prevent the inverter from setting off the over-current alarm when changing between the inverter operation and the commercial power supply operation, the interlock measure has to be taken. Once the motor stops, it will be activated via the inverter. Switchover and interlock can be carried out through the inverter and a complicated commercial power supply if commercial power supply switchover sequence function that can send out the signal for electromagnetic contactor actions is used.

3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

5.11.12 Power failure stopfunction

- When the inverter power comes to a sudden failure, regenerative power can maintain the inverter output to deceleration stop.

Parameter	Name	Factory Value	Setting Range	Content
10-33 P.273	Power failure stop selection	0	0	Power failure time deceleration-to-stopfunction disabled.
			1	No undervoltage avoidance (Ifan undervoltage or power failureoccurs, the motordecelerates to a stop.)
			2	No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)
			11	Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)
			12	Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motorre-accelerates if the power restores during the deceleration to stop.)
10-34 P.274	Subtracted frequency at deceleration start	3.00Hz	0~20.00Hz	Normally, the motor runs at the initial value as it is. However,adjust to suit the size of the load specification (moment of inertia, torque).
10-35 P.275	Subtraction starting frequency	50.00Hz	0~120.00Hz	When output frequency≥10-35(P.275), The motor decelerates from the "output frequency - 10-34(P.274)"; When output frequency<10-35(P.275), deceleration from output frequency
			99999	The motor decelerates from the "output frequency - 10-34 (P.274)"
10-36 P.276	Power-failure deceleration time 1	5.00s	0~360.00s/0~3600.00s	Set the time from the deceleration start to the 10-38(P.278) set frequency.
10-37 P.277	Power-failure deceleration time 2	99999	0~360.00s/0~3600.00s	Set the deceleration time for the frequency range starting at 10-38 (P.278) and downward.
			99999	Same as 10-36 (P.276)
10-38 P.278	Power failure deceleration time switchover frequency	50.00Hz	0~650.00Hz	Set the frequency at which the slope during deceleration switches from the 10-36 (P.276) setting to the 10-37 (P.277) setting.
10-39 P.279	UV avoidance voltage gain	100.0%	0~200.0%	Adjust the response level for undervoltage avoidance operation.

Settin Power failure stop function

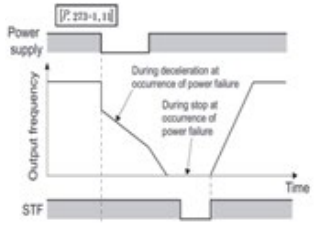
- When 10-33 is set to 1 or 11, (and 10-09=99999), the inverter decelerates to a stop at a power failure; When 10-33is set to2 or 12, the inverter decelerates to a stop at a power failure. During deceleration after power comes back ON, the inverter accelerates again.

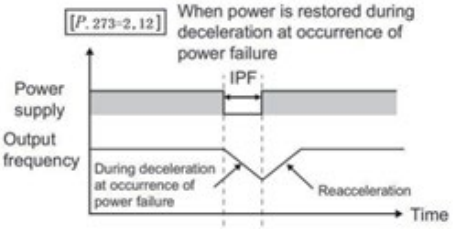
  Set 10-34 according to the value of load inertia. If load inertia is larger, then 10-34 should be set to a smaller value to produce enough regenerative power, usually 3.00Hz is enough.

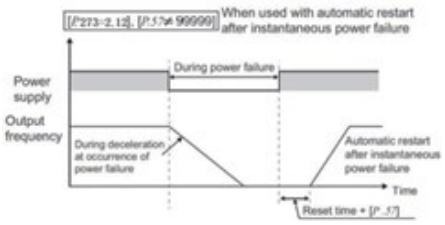
  The motor decelerates for the time set to 10-36.(The deceleration time setting is the timeit takes for the motor to stop from 01-09 Acceleration/deceleration reference frequency.)

  10-38 is the switch frequency between power-failure deceleration time 1 and power-failure deceleration time 2;If10-37 is not set, the motor still decelerates for the time set to 10-36.

10-39 is the UV avoidance voltage gain when 10-33=11 or 12; if 10-33=11 or 12, 10-39 is invalid.







- Undervoltage avoidance function(10-33=11,12):

  When setting 10-33=11 or 12, frequency is decreased to prevent an undervoltage from occurring duringdeceleration at occurrence of power failure.

  Adjust the downward frequency slope and the response level via 10-39 UV avoidance voltage gain. Setting a largevalue improves the response to the bus voltage. But when load inertia is larger, regenerative power is also larger, please set a smaller value to 10-39.

Note: Power failure time deceleration-to-stopfunction is only applicable for V/F control mode.

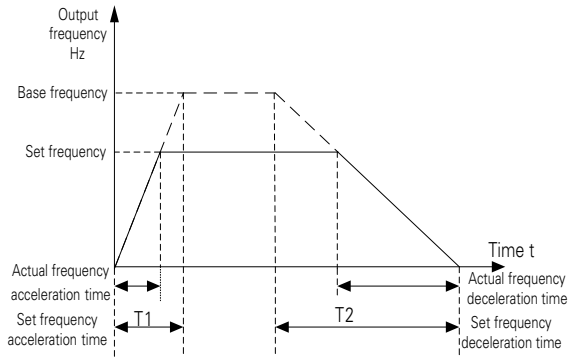
5.11.13 VF complete separation

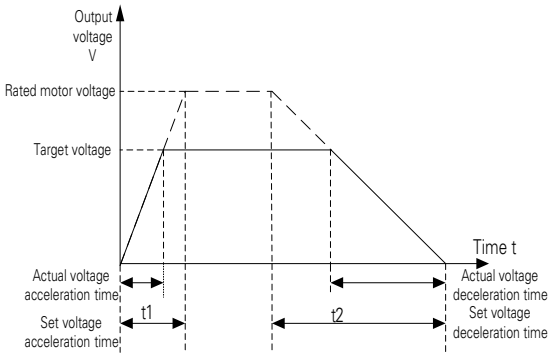
- Voltage given mode, voltage acceleration/deceleration time and voltage deceleration mode in VF complete separation.

Parameter	Name	Factory Value	Setting Range	Content	
10-40 P.700	VF separated voltage source	0	0	Given by digital 10-41(P.701).	
			1	Given by analog or DIH pulse.	
10-41 P.701	VF separated voltage digital	380/440V	0~440V	440V voltage	50Hz (when 00-24=1) / 60Hz (when 00-24=0) system setting
		220V	0~220V	220V voltage	
10-42 P.702	VF separated voltage Acc time	0.0s	0~1000.0s	Time for voltage accelerating from 0 to motor rated voltage.	
10-43 P.703	VFseparated voltage Dec time	0.0s	0~1000.0s	Time for voltage decelerating from motor rated voltage to 0.	
10-44 P.704	VF separated Stop selection	0	0	Frequency/voltage independentlydecreases to 0.	
			1	After the voltage decreases to 0, frequency decreases.	

Settin VF complete separation

- Parameter 10-40~10-44 are valid only when 01-12=14.VF complete separation is applicable to induction heating, inverse power supply and torque motor control.
- The voltage source for V/F complete separation is set in the same way as the frequency source, it can be set by digital or external analog terminal or DIH terminal.
- Frequency acceleration time of V/F complete separationindicates the time accelerates from 0 to base frequency (01-06).Frequency deceleration timeindicates the time decelerates from base frequency to0 (01-07); voltage acceleration time of VF complete separationindicates the time accelerates from 0 to the rated motor voltage. t1 (10-42). Voltage deceleration time of VF complete separation indicates the time decelerates from the rated motor voltage to0. t2 (10-43).





- Using 10-41 to set digital voltage, the setting value of voltage cannot be over the motor rated voltage.
- When the setting voltage acceleration time is less than frequency acceleration time or voltage deceleration time is more thanfrequency deceleration time, voltage stall or current stall may occur during acceleration/ deceleration, which leads to alarm. So it is suggested that 10-42 **>** 01-06 and 10-43 **<** 01-07.

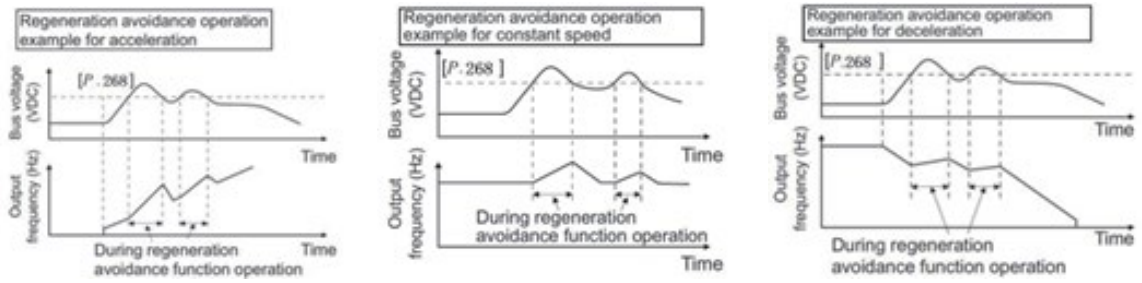
5.11.14 Regeneration and avoidance function

- When the inverter load inertia is larger, PN voltage will increase affected by regenerative power during deceleration or other process, and OV alarm occurs. This function can keep PN voltage on the fixed level and prevent PN level from increasing to OV level via adjusting the inverter output frequency and voltage.

Parameter	Name	Factory Value	Setting Range	Content
10-45 P.267	Regeneration and avoidance operation selection	0	0	Regeneration avoidance function is invalid.
			1	Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action)
			2	Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)
			11	Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))
			12	Regeneration and avoidance function only in constant speed (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))
10-46 P.268	Regeneration and avoidance DC bus voltage level	380V	155~400V	220V types
		760V	310~800V	440V types
10-47 P.269	DC bus voltage detection sensitivity at deceleration	0	0	Disables regeneration avoidance due to bus voltage change rate.
			1~5	Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity.
10-48 P.270	Regeneration and avoidance frequency compensation value	6.00Hz	0~10.00Hz	Set the limit value of frequency which rises at activation of regeneration avoidance function.
			99999	Frequency limit invalid.
10-49 P.271	Regeneration avoidance voltage gainco-efficient	100.0%	0~400.0%/ 0~40.0%	Set range and 10-45 (P. 267) set point, 10-45 (P. 267) > 10, set the range of 0 ~ 40.00%,1 0-45 (P. 267) < 10, set the range of 0 ~ 400.0%. Avoid actions should response speed adjusting regeneration.Increase the set point, will improve the response of busbar voltage change.The output frequency is likely to be unstable.Even reduce 10-49 set point (P. 271), or failing to reduce vibration, please reduce 10-50 set point (P. 272).
10-50 P.272	Regeneration avoidance frequency gain coefficient	100.0%	0~400.0%/ 0~40.0%	

Settin Regeneration and avoidance function

- Function of regeneration and avoidance: When the regenerative status is serious, the DC bus voltage rises and an overvoltage alarm OV may occur. The function is to improve the output frequency of inverter and decrease the DC bus voltage for avoiding alarm OV when overvoltage happens (as the following shows).



5.11.15 Overexcitation deceleration function

- Overexcitation decelerationincreases the flux during deceleration to increase the motor loss, so that deceleration time can be decreased without a braking resistor.

Parameter	Name	Factory Value	Setting Range	Content
10-51 P.264	Overexcitation deceleration	0	0	Overexcitation deceleration is invalid.
			1	Overexcitation deceleration is valid.
10-52 P.265	Overexcitation current level	150.0%	0~200.0%	When the output current is above the setting level in overexcitation deceleration, overexcitation gain will auto-decrease.
10-53 P.266	Overexcitation gain	1.10	1.00~1.40	---

Settin Overexcitation deceleration function

- Overexcitation deceleration(10-51=1)

  Overexcitation control can suppress the increasing of DC bus voltage. The larger overexcitation gain is, the stronger suppressing effect is.

  When the voltage stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or increase the overexcitation gain10-53.

  When the current stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or decrease the overexcitation gain 10-53.

Note: 1. As regenerative energy is mainly dissipated as heat in the motor, the motor temperature will rise if overexcitation deceleration is applied frequently.

2. When a run command is entered during overexcitation deceleration, overexcitation operation is cancelled and the drive will reaccelerate to the specified speed.

3. When PM motor is used, overexcitation deceleration function is invalid.

5.11.16 Short-circuit brakefunctionat PM motor start

- This parameter can be used in OLV/PM. For the setting of motor control mode, please refer to 00-21(P.300) and 00-22(P.370).

Parameter	Name	Factory Value	Setting Range	Content
10-54 P.362	Short-circuit brake time at PM motor start	0.0s	0.0~60.0s	---

- Parameter 10-54 sets the time for short-circuit brake operation at start. By shorting all three motor phases, it produces a braking torque in the motor and can be used to stop a coasting motor before starting it again.

Note: Short Circuit Braking cannot prevent a PM motor from being rotated by an external force. To prevent the load from rotating the motor, use DC Injection.

5.11.17 Built-in PLC

- Setting of the parameters for the built-in PLC functions

Parameter	Name	Factory Value	Setting Range	Content
10-55 P.780	PLC Action choice	0	0	PLC Function invalid
			1	PLC Function effective, PLC RUN Signals from external terminal input or 10-56 (P. 780).
			2	PLC Function invalid, PLC RUN signal from the external terminal input signal.
10-56 P.781	PLC RUN/STOP control	0	0	No effect
			1	PLC RUN
10-57 P.782	PLC Program erase	0	0	Invalid
			1	Erase the PLC program, after the success of the erasure parameter value is 0
10-58 P.783	PLC Monitor choosing component	0	0~326	PLC Component monitoring type selection
10-59 P.784	PLC Component monitoring value	Read	Read	PLC Component state monitoring

Settin Built-in PLC

- In external input terminals DI4, DI5, DI6, and DI1, DI2, DI7, DI8, DI9, DI3, DIH and external expansion board DXF-EXT-8RODXF-EXT-8RO or DXF-EXT-6DI2RODXF-EXT-6DI2RO option in the input terminal of a terminal set its corresponding function to PLC_ON_STOP corresponding parameter value is 60 which can control the RUN signal of PLC. About the external input terminal and expand the use of digital input terminals, refer to 5.4.
- P. 780 = 1 PLC running state

P.781	External PLC_ON_STOP signal	PLC state
0	0	STOP
1	0	RUN
0	1	RUN
1	1	RUN

- P.780 = 2 PLC running state

External PLC_ON_STOP signal	PLC state
0	STOP
1	RUN

- P. 783 choose monitor PLC element types, P. 784 has a value of the current state monitor PLC component, as shown in the table.

P.783	P.784	P.783	P.784
1	X0~X17 (Name of octal)	20	T0~T7 (place)
2	X20~X25 (Name of octal)	21	C0~C7 (place)
3	Y0~Y17 (Name of octal)	22	M8000~M8015
4	Y20~Y23 (Name of octal)	23	M8016~M8031
5	M0~M15	24	M8032~M8047
6	M16~M31	25	M8048~M8063
7	M32~M47	26	M8064~M8079
8	M48~M63	27~52	keep
9	M64~M79	53~60	T0~T7 Set value (word)
10	M80~M95	61~68	keep
11	M96~M111	69~76	C0~C7 Set value
12	M112~M127	77~84	keep
13	M128~M143	85~92	T0~T7 Set value (word)
14	M144~M159	93~100	keep
15	M160~M175	101~108	C0~C7 Set value (word)
16	M176~M191	109~116	keep
17	M192~M207	117~164	D0~D47
18	M208~M223	165~326	D8000~D8161
19	M224~M239		

5.12 Speed and torque control parameter group 11

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
11-00	P.320	Speed control proportion coefficient 1	0~2000.0	100	
11-01	P.321	Speed control integral time 1	0~20.00s	0.30s	
11-02	P.322	PI coefficient switching frequency 1	0~11-05 (P.325)Hz	5.00Hz	
11-03	P.323	Speed control proportion coefficient 2	0~2000.0	100	
11-04	P.324	Speed control integral time 2	0~20.00s	0.30s	
11-05	P.325	PI coefficient switching frequency 2	11-02 (P.322)~650.00Hz	10.00	
11-06	P.326	Current control proportion coefficient	0~20	0	
11-07	P.327	PM motor types	0: SPM	0	
			1: IPM		
11-08	P.328	PM initial motor position detection selection	0: Pull in.	0	
			1: High frequency pulse		
11-09	P.329	PM motor acceleration id	0~200%	80%	
11-10	P.330	PM motor constant speed id	0~200%	0%	
11-11	P.331	PM motor estimatedrotation speed filter time	0~1000ms	2ms	
11-12	P.401	Torque reference	-400.0~400.0%	0.0%	
11-13	P.402	Speed limit	-120%~120%	0%	
11-14	P.403	Speed limit bias	0~120%	10%	
11-15	P.404	Torque filter time	0~1000ms	0ms	
11-16	P.405	Torque setting source	0: Given by the 11-12 (P.401).	0	
			1: Given by the analog or pulse input.		
			2: Given by the communication mode.		
11-17	P.406	Selection of speed limit	0:The speed is limited according to 11-13 (P.402) and 11-14 (P.403)	0	
			1: Frequency reference source(it is decided according to00-16 (P.79))		
11-18	P.407	Unidirectional speed limit bias	0: Unidirectional speed limit bias is invalid.	1	
			1: Unidirectional speed limit bias is valid.		
11-19	P.408	Forward motor torque limit	0~400.0%	200.0%	
11-20	P.409	Reverse regenerative torque limit	0~400.0%	200.0%	
11-21	P.410	Reverse motor torque limit	0~400.0%	200.0%	
11-22	P.411	Forward regenerative torque limit	0~400.0%	200.0%	
11-23	P.412	Zero velocity ratio	0~2000.0	100.0	
11-24	P.413	Zero speed integration time	0~20.00s	0.30s	
11-25	P.414	Zero speed switching frequency	0~650.00Hz	5.00Hz	
11-30	P.371	The second motor speed control proportion coefficient 1	0~2000	100	
			99999		

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
11-31	P.372	The second motor Speed control integral time 1	0~20.00s 99999	0.30s	
11-32	P.373	The second motor PI coefficient switchingfrequency 1	0~11-35 (P.376)Hz 99999	5.00Hz	
11-33	P.374	The second motor speed control proportion coefficient 2	0~2000 99999	100	
11-34	P.375	The second motor Speed control integral time 2	0~20.00s 99999	0.30s	
11-35	P.376	The second motor PI coefficient switching frequency 2	11-32 (P.373)~650.00Hz 99999	10.00Hz	
11-36	P.377	The second motor current control proportion coefficient	0~20 99999	0	
11-37	P.378	The second PM motor types	0: SPM 1: IPM 99999	0	
11-38	P.379	The second PM initial motor position detection selection	0: Pull in. 1: High frequency pulse 99999	0	
11-39	P.380	The second PM motor acceleration id	0~200% 99999	80%	
11-40	P.381	The second PM motor constant speed id	0~200% 99999	0%	
11-41	P.382	The second PM motor estimated rotation speed filter time	0~1000ms 99999	2ms	
11-42	P.365	PM motor speed estimation ob-server source of PI parameters	0: manual operation 1: automatic calculation	0	
11-43	P.366	PM motor speed estimation observer Kp	0~65000	10	
11-44	P.367	PM motor speed estimation observer Ki	0~65000	376	
11-45	P.383	PM Zero speed motor current loop bandwidth coefficient	0 ~ 100	40	
11-46	P.384	PM Motor current loop bandwidth coefficient at low speed	0~100	40	
11-47	P.385	PM Motor current loop bandwidth coefficient at a high speed	0~100	40	

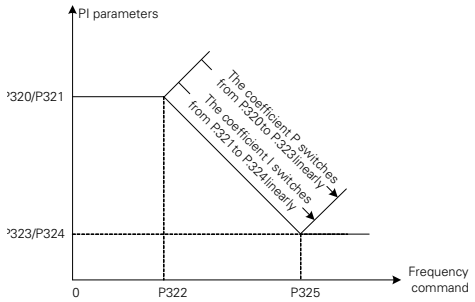
5.12.1 Control parameter

- Speed loop PI parameters vary with running frequencies of the inverter.

Parameter	Name	Factory Value	Setting Range	Content
11-00 P.320	Speed control proportion coefficient 1	100.0	0~2000.0	---
11-01 P.321	Speed control integral time 1	0.30s	0~20.00s	---
11-02 P.322	PI coefficient switching frequency 1	5.00Hz	0~11-05 (P.325)Hz	---
11-03 P.323	Speed control proportion coefficient 2	100.0	0~2000.0	---
11-04 P.324	Speed control integral time 2	0.30s	0~20.00s	---
11-05 P.325	PI coefficient switching frequency 2	5.00Hz	11-02 (P.322)~ 650.00Hz	---
11-06 P.326	Current control proportion coefficient	0	0~20	This parameter decides the response characteristics of IM motor torque control.
11-23 P.412	Zero velocity ratio	100.0	0~2000.0	---
11-24 P.413	Zero speed integration time	0.30s	0~20.00s	---
11-25 P.414	Zero speed switching frequency	5.00Hz	0~650.00Hz	---

Settin Control parameter

- 11-00 and 11-01 are the PI adjusting parameter when the running frequency is less than the switching frequency 1 (11-02). 11-03 and 11-04 are the PI adjusting parameter when the running frequency is greater than the switching frequency 2 (11-05). When the running frequency is between the switching frequency 1 and the switching frequency 2, the two PI parameters switch linearly. See the figure below:



- 11-00 or 11-03 is used to set the proportion gain of speed control.(Set the value slightly larger to better follow changes on the speed reference and to reduce speed change due to external interference.)
- 11-01 or 11-04 is used to set the integral time of speed control.(Due to external interference-generated speed change, set the value smaller to shorten the time spent on returning to the original speed.)
- When 11-06 is set to 100%, the max output torque corresponding to the vector control is the motor rated torque.

Note: 1. Use 11-00 or 11-03 to increase the set value of speed control gain can elevate the effecting time. But a set value too high can generate vibration and noises.

2. Reduce speed control integral coefficient 11-01 or 11-04 to shorten the time required to go back to the original speed. But if the value is too small, overshoot can happen.

Settin Adjuster parameter

- When the setting value of 11-06 increases, the current adjuster response level improves. But when the setting value is too large, the current loop shocks, and the electromagnetic noise becomes louder.

5.12.2 PM motor setting

- The parameters setting below can improve the VC and SVC control characteristic of PM motor.

Parameter	Name	Factory Value	Setting Range	Content
11-07 P.327	PM motor types	0	0	SPM
			1	IPM
11-08 P.328	PM initial motor position detection selection	0	0	Pull in.
			1	High frequency pulse
11-09 P.329	PM motor acceleration id	80%	0~200%	PM motor acceleration id given, valid only when 00-21=6
11-10 P.330	PM motor constant speed id	0%	0~200%	PM motor constant speed id given, valid only when 00-21=6
11-11 P.331	PM motor estimatedrotation speed filter time	2ms	0~1000ms	PM motor estimated rotation speed filter timecoefficient, valid only when 00-21=6

Settin PM motor control setting

- 11-08 is used to select how the rotor position is detected at PM motor start.In the mode of PM motor close-loop vector control, the inverter performs a magnetic pole search the first time it starts the motor. After that, rotor position is calculated from the PG encoder signal and saved until the inverter power is switched off.

  When 11-08=0, detect the initial magnetic pole position of the rotor by using the pull-in method, at this point, the motor cannot start with heavy duty, or it may fail to start.

  When 11-08=1, detect the initial magnetic pole position of the rotor by using the high frequency pulse vibration method, electromagnetic noise may be generated from the motor at start.
  11-09 is the current for pulling in the pole when PM motor starts. 05-05(the motor rated current) is set to 100%, setting the pull-in current during acceleration/deceleration, adjustments to this setting may help in the following situations:
  Increase this setting when a large amount of starting torque is required.Lower this setting if there is excessive current during acceleration.
- 11-10 is used to make the directionof pole position of PM motor during operation more effective, the current for pulling in, 05-05(the motor rated current) is set to 100%, set the d-axis current during operation at a constant speed. Please make adjustment in the following situations:

  Increase this setting when hunting occurs or the motor speed is unstable while running at a constant speed.If there is too much current when driving a normal load at a constant speed, then reduce this setting value.
- 11-11 is PM motor speed observerfilter time coefficient. Usually, it is not necessary to adjust.

5.12.3 Torque control parameter

- Used to select the inverter speed control or torque control.

Parameter	Name	Factory Value	Setting Range	Content
11-12 P.401	Torque reference	0.0%	-400.0~400.0%	-400.0~400.0%
11-13 P.402	Speed limit	0.0%	-120%~120%	0~120%
11-14 P.403	Speed limit bias	10%	0~120%	0~120%
11-15 P.404	Torque filter time	0ms	0~1000ms	0~1000ms
11-16 P.405	Torque setting source	0	0	Given by the11-12 (P.401).
			1	Given by the analog or pulse input.
			2	Given by the communication mode.
11-17 P.406	Selection of speed limit	0	0	The speed is limited according to 11-13 (P.402) and 11-14(P.403)
			1	Frequency reference source (it is decided according to 00-16 (P.79))
11-18 P.407	Unidirectional speed limit bias	1	0	Unidirectional speed limit bias is invalid.
			1	Unidirectional speed limit bias is valid.

Settin Torque control parameter

- 11-12is used to set the torque reference, the actual torque reference = 11-12*the motor rated torque;according to the

motor rated torque method: $T(N.M)=\frac{P(W)}{\omega(rad/s)}$,

P(W) is on the basis of05-01, ω(rad/s)can be worked out according to the parameter 05-06: $\frac{2\pi\times P.307}{60}(rad/s)$.

- Input value polarity
  The direction of motor output torque depends on the polarity of the Torque reference and it has nothing to do with Run command. The following sheet shows the relationship among Torque reference, Run command, motor run direction and inverter run indication lamp.

Item	Torque reference		Run command	
	+	-	FWD	REV
motor run direction	Forward	Reverse	Has nothing to do with run command	
Inverter run indication lamp	Has nothing to do with torque reference direction and motor run direction		FWD light on	REV light on

- 11-15is the torque filter coefficient. When a bigger coefficient is set, the control will be stable, but the control response will be worse. When the coefficient is too small, the response will be quick, but the control can be unstable. If the best setting value is unknown, you can adjust the setting value appropriately according to the level of unstable control and response delay.
- When 11-16=1, the torque is given by the analog or pulse input. The maximum value of analog and pulse setting correspond to the motor rated torque. When 11-16=2, the torque is given by the communication mode. There are two ways to set the torque by communication mode, one is changing the value of 11-12when 11-16 is set to 0, and another is setting by the Modbuscommunication addressH100D when 11-16 is set to 2. When the Modbus communication address H100D is set to -10000~10000, it represents -100%~100% of the motor rated torque.

- Speed limit and speed limit bias of torque control

  When 11-17=0, limit speed of torque control according to 11-13 and 11-14; When 11-17=1 , limit speed of torque control according to frequency source, which is set by 00-16.

  A bias can be added to the speed limit using parameter 11-14 and parameter 11-18 determines how the speed limit bias is applied. The following sheet shows the setting relationship, and "frequency" in sheet refers to the frequency reference set by frequency source which is set by 00-16.

	Operating condition							
Run command	Forward	Reverse	Forward	Reverse	Forward	Reverse	Forward	Reverse
Torque reference direction	+	+	-	-	+	+	-	-
Speed Limit Direction	+	-	-	+	-	+	+	-
Normal operation direction	Forward		Reverse		Forward		Reverse	
Normal speed limit (11-18=0,11-17=0)	11-13 + 11-14	11-13 + 11-14	11-13 + 11-14	11-13 + 11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=0)	11-13	11-13	11-13	11-13	11-14	11-14	11-14	11-14
Normal speed limit (11-18=0,11-17=1)	Frequency + 11-14	Frequency + 11-14	Frequency + 11-14	Frequency + 11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=1)	Frequency	Frequency	Frequency	Frequency	11-14	11-14	11-14	11-14

5.12.4 Torque limit

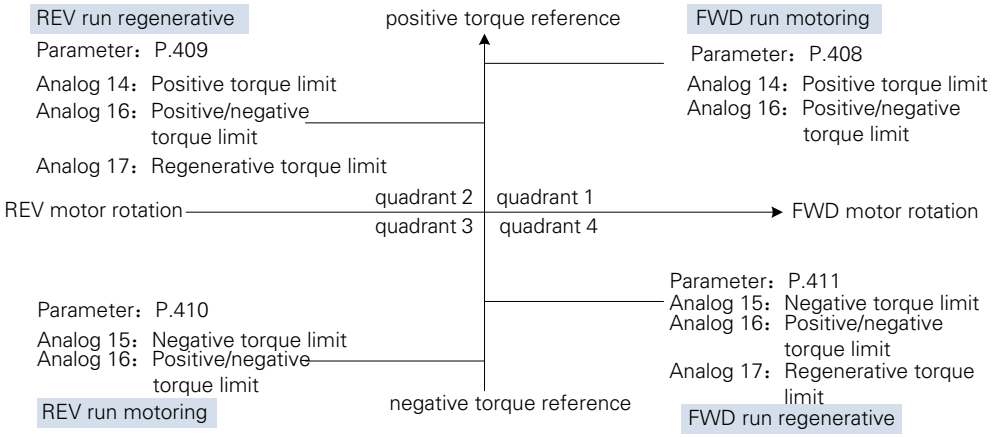
- Set the torque limit values of the four quadrants via parameters.

Parameter	Name	Factory Value	Setting Range	Content
11-19 P.408	Forward motor torque limit	200.0%	0~400.0%	Set the torque limit of the first quadrant.
11-20 P.409	Reverse regenerative torque limit	200.0%	0~400.0%	Set the torque limit of the second quadrant.
11-21 P.410	Reverse motor torque limit	200.0%	0~400.0%	Set the torque limit of the third quadrant.
11-22 P.411	Forward regenerative torque limit	200.0%	0~400.0%	Set the torque limit of the fourth quadrant.

Settin Fourquadrants torque limit function

- 11-19~11-22 are set to 100.0%, corresponding to vector control, the inverter max output torque is the motor rated torque.
- The motor rated torque calculating method: $T(N.M)=\frac{P(W)}{\omega(rad/s)}$, P(W) is on the basis of 05-01, ω(rad/s) can be worked out according to the parameter05-06 (P.307): $\frac{2\pi\times P.307}{60}(rad/s)$.

- See the figure below for four quadrants torque limit:



- Among the torque limit set by parameter, the torque limit set by analog and the inverter output current limit set by 06-01, the minimum torque limit is valid.

5.12.5 The second motor control parameter

- Realize the second motor driving function via setting the second motor control parameter with digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
11-30 P.371	The second motor speed control proportion coefficient 1	100	0~200~0 99999	---
11-31 P.372	The second motor Speed control integral time 1	0.30s	0~20.00s 99999	---
11-32 P.373	The second motor PI coefficient switchingfrequency 1	5.00Hz	0~11-35 (P.376) Hz 99999	---
11-33 P.374	The second motor speed control proportion coefficient 2	100	0~2000 99999	---
11-34 P.375	The second motor Speed control integral time 2	0.30s	0~20.00s 99999	---
11-35 P.376	The second motor PI coefficient switching frequency 2	10.00Hz	11-32 (P.373) ~650.00Hz 99999	---
11-36 P.377	The second motor current control proportion coefficient	0	0~20 99999	---

Settin The second motor control parameter

- When 00-22 ≠ 99999 and RT signal is ON, the second motor control parameter 11-30~11-36 are valid. Forthe second function parameter, please refer to Section 5.2.10.
- Please refer to 05-22~05-38 for the second motor parameter.
- For the parameter setting, please refer to 11-00~11-06 parameter function.

5.12.6 The second PM motor setting

- Realize the second PMmotor driving function via setting the second PMmotor control parameter with digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
11-37 P.378	The second PM motor types	0	0	SPM
			1	IPM
			99999	---
11-38 P.379	The second PM initial motor position detection selection	0	0	Pull in.
			1	High frequency pulse
			99999	---
11-39 P.380	The second PM motor acceleration id	80%	0~200%	0~200%
			99999	---
11-40 P.381	The second PM motor constant speed id	0%	0~200%	0~200%
			99999	---
11-41 P.382	The second PM motor estimated rotation speed filter time	2ms	0~1000ms	0~1000ms
			99999	---

Settin PM motor control parameter

- When 00-22 ≠ 99999, and RT signal is ON, second motor control parameter11-30~11-36are valid. For the second function parameter, please refer to Section 5.2.10.
- Please refer to 05-22~05-38 for the second motor parameter.
- For the parameter setting, please refer to 11-07~11-11parameter function.

5.12.7 PM motor speed estimation observer parameters

- By setting the PM motor speed estimation observer parameters, it can improve the stability of the PM motor SVC mode.

Parameter	Name	Factory Value	Setting Range	Content
11-42 P.365	PM motor speed estimation observer sourceof PI parameters	0	0: manual operation	---
			1: automatic calculation	---
11-43 P.366	PM motor speed estimation observer Kp	10	0~65000	---
11-44 P.367	PM motor speed esti mation observer Ki	376	0~65000	---

Settin PM motor SVC mode speed estimation observer parameters

- Setting a PM motor SVC model (00-21 = 6), if the motor run abnormal, you can manually adjust 11-43, 11-44 , eventually making PM motor SVC mode stable operation.

5.12.8 PM Motor current loop controller parameters

- By setting PM current loop controller parameters, adjustable current loop responsiveness

Parameter	Name	Factory Value	Setting Range	Content
11-45 P.383	PM Zero speed motor current loop bandwidth coefficient	40	0~100	---
11-46 P.384	PM Motor current loop bandwidth coefficient at low speed	40	0~100	---
11-47 P.385	PM Motor current loop bandwidth coefficient at a high speed	40	0~100	---

Settin PM Motor current loop controller parameters

- Current loop bandwidth between the zero speed and low speed, high speed switching and switching speed loop controller parameters is consistent;
- Accordance with the requirements of responsive adjustment in 11-45, 46, 11-11-47, the setting, the greater the current loop response faster, but may be volatile, low electromagnetic noise lead to the motor.

5.13 Position control parameter 12

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
12-00	P.420	Homing mode	0~2123	0	
12-01	P.421	The first high speed of Homing	0~650.00Hz	10.00Hz	
12-02	P.422	The second high speed of Homing	0~650.00Hz	2.00Hz	
12-03	P.423	The origin pulse offset	-30000~30000	0	
12-04	P.424	Position instruction source	0: External pulse. 1: Relative position. 2: Absolute position.	0	
12-05	P.425	Position control proportion gain	0~65535	10	
12-06	P.426	Position control feed forward gain	0~65535	0	
12-07	P.427	Position control feed forward low pass filter time	0~65535ms	100ms	
12-08	P.428	External pulse position control speed limit	0~650.00Hz	10.00Hz	
12-09	P.429	Position reaching margin	0~65535	10	
12-10	P.430	Zero servo gain	0~100	5	
12-11	P.431	Single point positioning location	0~65535	0	
12-12	P.432	Frequency of single point locating	0~650.00Hz	0.00Hz	
12-13	P.433	Zero velocity threshold	0~650.00Hz	0.50Hz	
12-14	P.434	Position command response options	0~2	0	
12-20	P.450	Number of turns position command1	-30000~30000	0	
12-21	P.451	Number of pulses position command 1	-30000~30000	0	
12-22	P.452	Number of turns position command 2	-30000~30000	0	
12-23	P.453	Number of pulses position command 2	-30000~30000	0	
12-24	P.454	Number of turns position command 3	-30000~30000	0	
12-25	P.455	Number of pulses position command 3	-30000~30000	0	
12-26	P.456	Number of turns position command 4	-30000~30000	0	
12-27	P.457	Number of pulses position command 4	-30000~30000	0	
12-28	P.458	Number of turns position command 5	-30000~30000	0	
12-29	P.459	Number of pulses position command 5	-30000~30000	0	
12-30	P.460	Number of turns position command 6	-30000~30000	0	
12-31	P.461	Number of pulses position command 6	-30000~30000	0	
12-32	P.462	Number of turns position command 7	-30000~30000	0	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
12-33	P.463	Number of pulses position command 7	-30000~30000	0	
12-34	P.464	Number of turns position command 8	-30000~30000	0	
12-35	P.465	Number of pulses position command 8	-30000~30000	0	
12-36	P.466	Number of turns position command 9	-30000~30000	0	
12-37	P.467	Number of pulses position command 9	-30000~30000	0	
12-38	P.468	Number of turns position command 10	-30000~30000	0	
12-39	P.469	Number of pulses position command 10	-30000~30000	0	
12-40	P.470	Number of turns position command 11	-30000~30000	0	
12-41	P.471	Number of pulses position command 11	-30000~30000	0	
12-42	P.472	Number of turns position command 12	-30000~30000	0	
12-43	P.473	Number of pulses position command 12	-30000~30000	0	
12-44	P.474	Number of turns position command 13	-30000~30000	0	
12-45	P.475	Number of pulses position command 13	-30000~30000	0	
12-46	P.476	Number of turns position command 14	-30000~30000	0	
12-47	P.477	Number of pulses position command 14	-30000~30000	0	
12-48	P.478	Number of turns position command 15	-30000~30000	0	
12-49	P.479	Number of pulses position command 15	-30000~30000	0	

5.13.1 Homing mode

- Set the Homing position of position control via Homing mode.

<table>
<tr><th>Parameter</th><th>Name</th><th>Factory Value</th><th>Setting Range</th><th>Content</th></tr>
<tr><td>12-00
P.420</td><td>Homing mode</td><td>0</td><td>0~2123</td><td>Homing mode setting:
u | x | y | z
u: 0: Close Homing mode.
1: When the power is ON, Homing mode operates automatically.
2: Set the terminal to SHOM function, homing function starts.
x: 0: After checking point, the motor decelerates to point.
1: After checking point, the motor decelerates to stop at the forwarding direction.
y: 0: When in Homing mode, return to search for Z-pulse.
1: No return when in Homing mode, forward run and search for Z-pulse.
2: When in Homing mode, locate in searcher point or Z-pulse.
z: 0: Forward run to home. Set ORGPas check point.
1: Reverse run to home. Set ORGPas check point.
2: Forward run and search for Z-pulse as check point.
3: Reverse run and search for Z-pulse as check point.</td></tr>
<tr><td>12-01
P.421</td><td>The first high speed of Homing</td><td>10.00Hz</td><td>0~650.00Hz</td><td>---</td></tr>
<tr><td>12-02
P.422</td><td>The second high speed of Homing</td><td>2.00Hz</td><td>0~650.00Hz</td><td>---</td></tr>
<tr><td>12-03
P.423</td><td>Home position shift pulse</td><td>0</td><td>-30000~30000</td><td>---</td></tr>
</table>

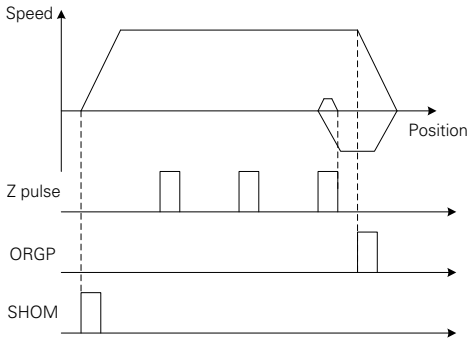
Settin Homing mode

- Homing mode setting table(√represents setting is available,×represents setting is unavailable)

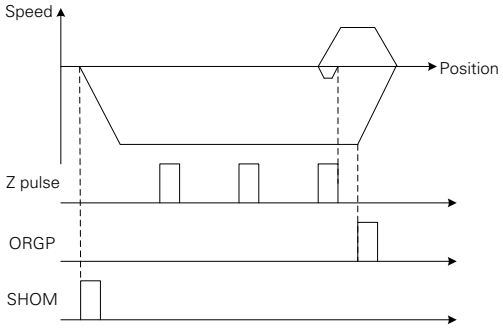
y \ z	0	1	2	3
0	√	√	×	×
1	√	√	×	×
2	√	√	√	√

- Take u=2, x=0 as example, speed of Homing corresponded position sequence Diagram:

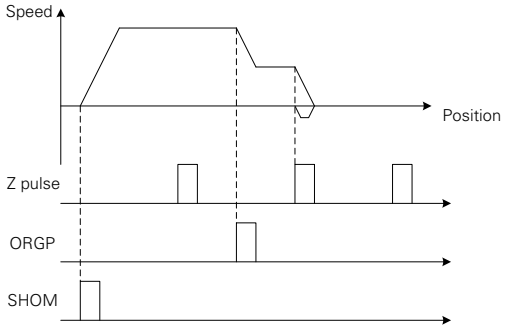
1. y=0、z=0



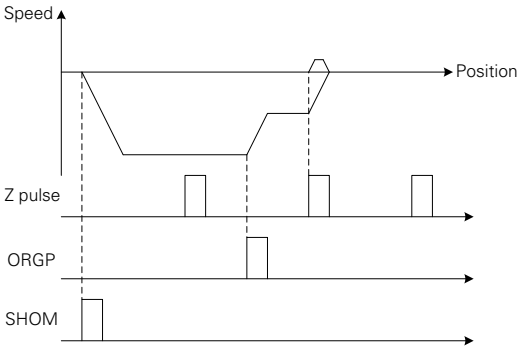
2. y=0、z=1



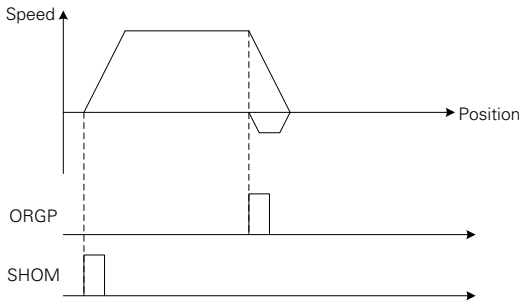
3. y=1、z=0



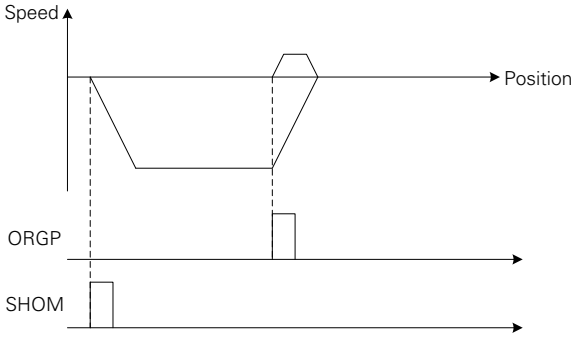
4. y=1、z=1



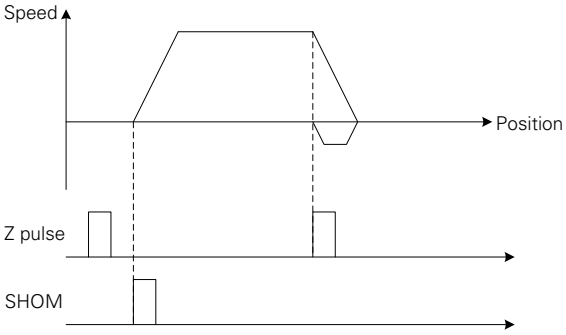
5. y=2、z=0



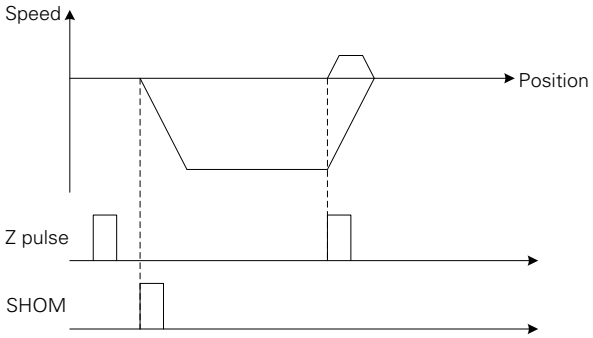
6. y=2、z=1



7. y=2、z=2



8. y=2、z=3



- Origin of pulse offset: according to the motor forward direction set origin pulse offset pulse number.

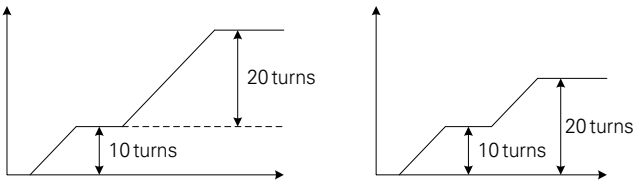
5.13.2 Position control parameter

- Realize high accuracy position control function via setting with PG vector control mode.

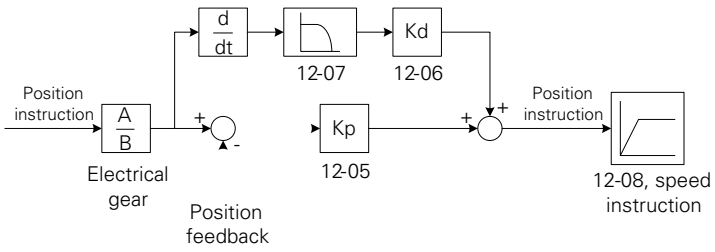
Parameter	Name	Factory Value	Setting Range	Content
12-04 P.424	Position instruction source	0	0	Position instruction source comes from external pulse.
			1	Position instruction source comes from the parameter (relative position).
			2	Position instruction source comes from the parameter (absolute position).
12-05 P.425	Position control proportion gain	10	0~65535	Increase setting can improve the response of position control, but may cause overshoot.
12-06 P.426	Position control feed forward gain	0	0~65535	Increase setting can improve the response of position control, but may cause overshoot.
12-07 P.427	Position control feed forward low pass filter time	100ms	0~65535ms	---
12-08 P.428	External pulse position control speed limit	10.00Hz	0~650.00Hz	---
12-09 P.429	Position reaching margin	40	0~65535	---
12-13 P.433	Zero velocity threshold	0.50Hz	0~650.00Hz	
12-14 P.434	Position command response options	0	0~2	

Settin Position control function

- When 12-04=0, position instruction is given by the pulse of A2/B2.(For the pulse given, please refer to 09-07 Encoder input mode 2)
- When 12-04=1, 2, position instruction is given by 12-20~12-49, 1 stands for relative position, 2 stands for absolute position. See the figure below:

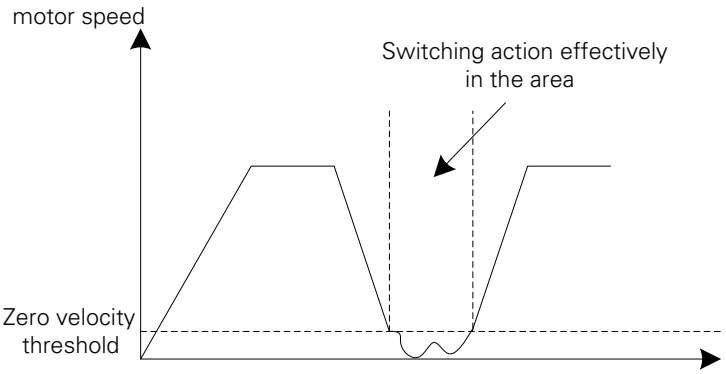


- Position control diagram



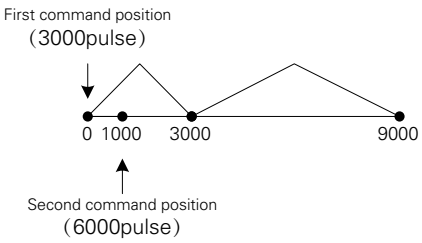
- When position instruction source comes from the parameter, the position control speed limit is decided by multi-speed instruction.
- The difference between the motor actual position and position command is smaller than the setting value of the position attained margin12-09(P.429), which is regarded as position attained. If the function setting of multi-function digital output terminal is 21, the multi-function digits will output signals.

- Zero velocity threshold: when the motor speed is less than 12-13 (P. 433), multi-function input terminal state (position/speed switching action) is effective.

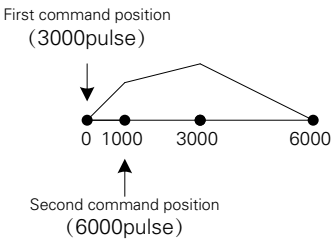


- Position command response
  Pr position mode, the position command response
  The relative position 12-04 (P. 424) = 1:

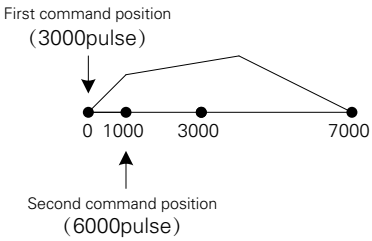
12-14(P.434)=0：



12-14(P.434)=1：

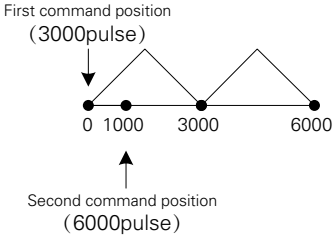


12-14(P.434)=2

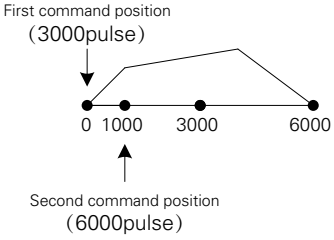


Absolute position 12-04 (P. 424) = 2:

12-14(P.434)=0：



12-14(P.434)=1：



Note: Please refer to 03-10~03-13 for function selection and purposes of the multi-function digital output terminal. For related wiring, please refer to Section 3.3.

5.13.3 Zero servo

- Adjusts the responsiveness of the zero servo position loop via setting zero servo gain.

Parameter	Name	Factory Value	Setting Range	Content
12-10 P.430	Zero servo gain	5	0~100	---

Settin Zero servo

- Parameter 12-10 adjusts the responsiveness of the zero servo position loop. Increase the value if the response is too slow and the deviation from the zero position rises too high when load is applied. Decrease the value if vibrations occur during zero servo operation.

5.13.4 Single point positioning function

- Single point positioning belongs to the category of position control, but with the application of existing Pt, completely independent Pr position mode.

Parameter	Name	Factory Value	Setting Range	Content
12-11 P.431	Single point positioning location	0	0~65535	---
12-12 P.432	Frequency of single point locating	0.00Hz	0~650.00Hz	---

Settin Single point positioning

- Single point positioning is in speed control mode, through external terminal function embedded in a motor rotor finally stopped to control the amount of the Angle of the position control function, function as shown in the figure below:

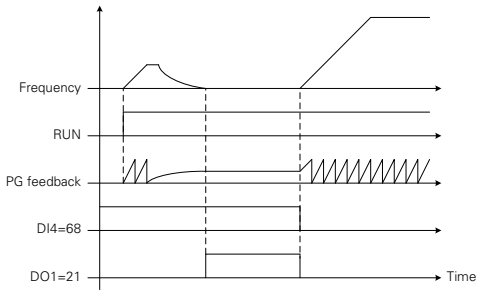


Figure 1.1 single point positioning can make before operation

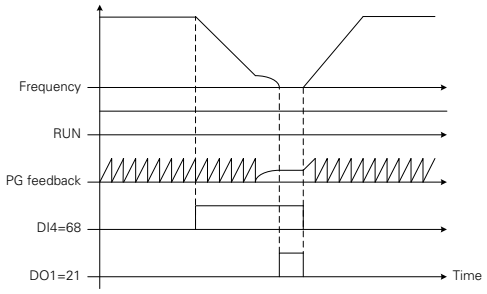


Figure 1.2 single point positioning can make during operation

As shown in the above, the single point positioning function can be described as follows:

In closed loop speed mode, set the external terminals can function as the single point positioning make (example 03-03 (P. 80) = 68), when DI4 terminal OFF, is pure speed mode, when DI4 terminal ON inverter from the current operating frequency curve acceleration and deceleration, run to locate frequency parameters (12-12 set), located in the frequency of operation, until the Z phase was detected, will switch to the value is set to 12-11 position control of the target location (position control process not deceleration curve), the position control gain (12-05 (P. 425)), arriving position output terminal and position allowance (12-09 (P. 429)) and Pt, Pr position mode share.

5.13.5 Position command

- Set the position command value in position control mode via parameter with the digital input terminal state.

<table>
<tr><th>Parameter</th><th>Name</th><th>Factory Value</th><th>Setting Range</th><th>Content</th></tr>
<tr><td>12-20
P.450</td><td>Number of turns position command 1</td><td>0</td><td>-30000~30000</td><td rowspan="17">
<table>
<tr><td colspan="4">Terminal state</td><td colspan="3">Target position</td><td>upper limit of frequency</td></tr>
<tr><td>REX</td><td>RH</td><td>RM</td><td>RL</td><td colspan="3">Rotation turns+ number of pulses</td><td></td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td colspan="3">0</td><td></td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>Position1</td><td>12-20</td><td>12-21</td><td>Speed 1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Position2</td><td>12-22</td><td>12-23</td><td>Speed 2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>Position3</td><td>12-24</td><td>12-25</td><td>Speed 3</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Position4</td><td>12-26</td><td>12-27</td><td>Speed 4</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>Position5</td><td>12-28</td><td>12-29</td><td>Speed 5</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>Position6</td><td>12-30</td><td>12-31</td><td>Speed 6</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>Position7</td><td>12-32</td><td>12-33</td><td>Speed 7</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>Position8</td><td>12-34</td><td>12-35</td><td>Speed 8</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>Position9</td><td>12-36</td><td>12-37</td><td>Speed 9</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td><td>Position10</td><td>12-38</td><td>12-39</td><td>Speed 10</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>Position11</td><td>12-40</td><td>12-41</td><td>Speed 11</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td><td>Position12</td><td>12-42</td><td>12-43</td><td>Speed 12</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>Position13</td><td>12-44</td><td>12-45</td><td>Speed 13</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>Position14</td><td>12-46</td><td>12-47</td><td>Speed 14</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>Position15</td><td>12-48</td><td>12-49</td><td>Speed 15</td></tr>
</table>
</td></tr>
<tr><td>12-21
P.451</td><td>Number of pulses position command 1</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-22
P.452</td><td>Number of turns position command 2</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-23
P.453</td><td>Number of pulses position command 2</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-24
P.454</td><td>Number of turns position command 3</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-25
P.455</td><td>Number of pulses position command 3</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-26
P.456</td><td>Number of turns position command 4</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-27
P.457</td><td>Number of pulses position command 4</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-28
P.458</td><td>Number of turns position command 5</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-29
P.459</td><td>Number of pulses position command 5</td><td>0</td><td>-30000~30000</td></tr>
<tr><td>12-30
P.460</td><td>Number of turns position command 6</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-31
P.461</td><td>Number of pulses position command 6</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-32
P.462</td><td>Number of turns position command 7</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-33
P.463</td><td>Number of pulses position command 7</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-34
P.464</td><td>Number of turns position command 8</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-35
P.465</td><td>Number of pulses position command 8</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-36
P.466</td><td>Number of turns position command 9</td><td>0</td><td>-30000~30000</td><td></td></tr>
<tr><td>12-37
P.467</td><td>Number of pulses position command 9</td><td>0</td><td>-30000~30000</td><td></td></tr>
</table>

Parameter	Name	Factory Value	Setting Range	Content
12-38 P.468	Number of turns position command 10	0	-30000~30000	
12-39 P.469	Number of pulses position command 10	0	-30000~30000	
12-40 P.470	Number of turns position command 11	0	-30000~30000	---
12-41 P.471	Number of pulses position command 11	0	-30000~30000	---
12-42 P.472	Number of turns position command 12	0	-30000~30000	---
12-43 P.473	Number of pulses position command 12	0	-30000~30000	---
12-44 P.474	Number of turns position command 13	0	-30000~30000	---
12-45 P.475	Number of pulses position command 13	0	-30000~30000	---
12-46 P.476	Number of turns position command 14	0	-30000~30000	---
12-47 P.477	Number of pulses position command 14	0	-30000~30000	---
12-48 P.478	Number of turns position command 15	0	-30000~30000	---
12-49 P.479	Number of pulses position command 15	0	-30000~30000	---

Settin Position command

- When 12-04=1, 2, set terminal function to REX, RH, RM and RL, and the position command is decided by parameter and digital input terminal state.
- The position control acceleration/deceleration time is set by 01-06 and 01-07.
- The position command comes from the parameter position control, and the motor operation direction is decided by position command and forward/reverse rotation command. The target position is related to parameter 09-02 Encoder input type1.

  For example: set 09-01 to 1024, the encoder number of pulses 1 is 1024; Set 12-20 to 1,number of turns position command1 is 1 turn; Set 12-21 to 1024, number of pulses position command1 is 1024,

  If 09-02=1 or 2, encoder input type 1 is Phase A/B pulse input, the position command is: 1 turn + 1/4 turn.

  If 09-02=3 or 4, encoder input type 1 is Phase A pulse input, Phase B is a direction input, position command is: 1 turn+1 turn.

Note: RL, RM, RH and REX here are the function names of "Multi-function digital input terminal". Please refer to 03-00~03-06 and 03-09 for function selection and purposes of the multi-function digital input terminal.For related wiring, please refer to Section 3.3.

5.14 Special adjustment parameter group 13

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
13-00	P.89	Slip compensation coefficient	0~10	0	
13-01	P.246	Modulation coefficient	0.90~1.20	1.00	
13-02	P.285	Low frequency vibration inhibition factor	0~8	5	
13-03	P.286	High frequency vibration inhibition factor	XX00~XX15	509	
			00XX ~15XX		

5.14.1 Slip compensationV/F

- This parameter can be used to set compensation frequency and reduce the slip to close the setting speed when the motor runs in the rated current to raise the speed control accuracy.

Parameter	Name	Factory Value	Setting Range	Content
13-00 P.89	Slip compensation coefficient	0	0~10	0: Slip compensation is forbidden.
				10: The compensation value is 3% of the target frequency.

Note: 1.This function is only valid under the V/F mode(00-21="0").
2. During slip compensation, the output frequency may be larger than the setting frequency.

5.14.2 Modulation coefficient

- It is used to determine the ratio between the maximum output voltage and the input voltage.

Parameter	Name	Factory Value	Setting Range	Content
13-01 P.246	Modulation coefficient	1.00	0.90~1.20	The maximum output voltage ="13-01"× the input voltage

Settin Modulation coefficient

- The users can use this parameter to obtain an output voltage that is higher than the input voltage.
- But the output voltage waveform at this point will generate distortion and contain assorted harmonics. It may also increase the motor torque harmonics and noises.

5.14.3 Vibration inhibition

- Inhibit the great vibration of inverter output current and motor rotation speed and the motor vibration.

Parameter	Name	Factory Value	Setting Range	Content
13-02 P.285	Low frequency vibration inhibition factor	5	0~8	If motor vibration is generated at lower frequency, adjust the set value of 13-02.
13-03 P.286	High frequency vibration inhibition factor	509	XX00~XX15 00XX~15XX	If motor vibration is generated at higher frequency, adjust the set value of 13-03. Gradually increase the set value by the unit of 1. 13-03 two high and low two set the range of 0 ~ 15

Settin Vibration inhibition factor

- For the actual application, use the vibration-generating frequency that is lower or higher than half of the motor rated frequency to determine whether the occurred vibration is a low-frequency vibration or a high-frequency vibration.
  i.e:
  If the rated frequency on the name plate of the motor is 50Hz,
  And the vibration-generating frequency is lower than 25Hz, then this is a low-frequency vibration.
  On the other hand, if the vibration-generating frequency is higher than 25Hz, then this is a high-frequency vibration.

Note: When the motor load is light, current flow may happen at certain specific operation frequency. This situation may cause the motor to vibrate slightly. The user can neglect it if this trivial vibration has no impact on the application.

5.15 Tension control parameter group 14

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
14-00	P.600	The tension control selection	0: The tension control is invalid 1: Open-loop torque control mode(in the mode of close-loop vector control) 2: Close-loop speed control mode 3: Close-loop torque control mode (in the mode of close-loop vector control) 4: Constant line speed control mode.	0	
14-01	P.601	The curling mode	0: Wind-up 1: Roll-down	0	
14-02	P.602	Selection of inverse take-up during roll-down	0: Active inverse material take-up is not allowed during startup. 1: Active inverse material take-up is allowed.	0	
14-03	P.603	Mechanical transmission ratio	0~300.00	1.00	
14-04	P.604	Tension setting source	0: The parameter 14-05 (P.605) setting. 1: The analog value or PULSE input setting. 2: Communication setting.	0	
14-05	P.605	Tension setting	0~30000N	0N	
14-06	P.606	Maximum tension	0~30000N	0N	
14-07	P.607	Zero-speed tension increase	0~50.0%	0.0%	
14-08	P.608	Zero-speed threshold	0~30.00Hz	0.00Hz	
14-09	P.609	Tension taper	0~100.0%	0%	
14-10	P.654	Taper compensation correction	0~10000mm	0mm	
14-11	P.610	Curling radius calculation method selection	0: Calculation through line speed. 1: Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card. 2: Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal DIH. 3: Analog value or pulse input.	0	
14-12	P.650	Curling radius memory control when calculation through thickness accumulation	0: It does not memorize the curling radius when turning off the power or stopping calculating the curling radius. 1: It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate.	0	
14-13	P.611	Maximum curling radius	0~10000mm	500mm	
14-14	P.612	Winding shaftdiameter	0~10000mm	100mm	
14-15	P.613	Initial curling radius source	0: Initial curling radius is set by the parameter 14-16 (P.614)~14-18 (P.616). 1: Initial curling radius is set by the analog value.	0	
14-16	P.614	Initial curling radius 1	1~10000mm	100mm	
14-17	P.615	Initial curling radius 2	1~10000mm	100mm	
14-18	P.616	Initial curling radius 3	1~10000mm	100mm	

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
14-19	P.617	Curling radius filtering time	0~1000ms	0ms	
14-20	P.618	Current value of curling radius	0~10000mm	0mm	
14-21	P.619	Number of pulses each turn	1~60000	1	
14-22	P.620	Number of turns each layer	1~10000	1	
14-23	P.621	Material thickness setting source	0: The material thickness is set by the parameter 14-24 (P.622)~14-27 (P.625).	0	
			1: The material thickness is set by the analog value.		
14-24	P.622	Material thickness 0	0.01~100.00mm	0.01mm	
14-25	P.623	Material thickness 1	0.01~100.00mm	0.01mm	
14-26	P.624	Material thickness 2	0.01~100.00mm	0.01mm	
14-27	P.625	Material thickness 3	0.01~100.00mm	0.01mm	
14-28	P.626	Maximum thickness	0.01~100.00mm	1.00mm	
14-29	P.627	Line speed inputsource	0: No line speed input.	0	
			1: The analog value or pulse input		
			2: The communication setting.		
14-30	P.628	Maximum line speed	0.1~6500.0m/min	1000.0m/ min	
14-31	P.629	Minimum line speed for calculation R	0.1~6500.0m/min	200.0m/ min	
14-32	P.630	Actual line speed	0~6500.0m/min	0.0m/min	
14-33	P.633	Mechanical inertia compensation coefficient	0~65535	0	
14-34	P.634	Material density	0~60000kg/ m^3	0kg/ m^3	
14-35	P.635	Material width	0~60000mm	0mm	
14-36	P.636	Fiction compensation coef-ficient	0~50.0%	0.0%	
14-37	P.637	Material supplyinterrupt auto detection function	0: Material supply interrupt auto detection is inactive.	0	
			1: Material supply interrupt auto detection function 1		
			2: Material supply interrupt auto detection function 2		
			3: Material supply interrupt auto detection function 3		
14-38	P.638	Auto detection minimum line speed	0.1~6500.0m/min	200.0m/ mn	
14-39	P.639	Auto detection error range	0.1~100.0%	10.0%	
14-40	P.640	Auto detection judgment delay	0.1~60.0s	2.0s	
14-41	P.645	Pre-drive speed gain	-50.0%~50.0%	0.0%	
14-42	P.646	Pre-drive torque increase	-50.0%~50.0%	0.0%	
14-43	P.647	Pre-drive torque delay time	0~65535ms	0ms	
14-44	P.656	Line speed setting source	0: The line speed setting is invalid.	0	
			1: The line speed is obtained by analog value or pulse input.		
			2: The line speed is obtained by communication mode.		
14-45	P.657	Line speed setting	0~6500.0m/min	0.0m/min	
14-46	P.658	Tension closed-loop limite amplitude of benchmark	0: amplitude limitingis based on the motor rated power	0	
			1: amplitude limitingis based on system real-time line speed		
14-47	P.659	Tension in closed-loop limite amplitude of the bias	0.0%~100.0%	0.0%	

5.15.1 Tension control mode selection

- Select the control method for tension control.

Parameter	Name	Factory Value	Setting Range	Content
14-00 P.600	The tension control selection	0	0	The tension control is invalid
			1	Open-loop torque control mode(in the mode of close-loop vector control)
			2	Close-loop speed control mode
			3	Close-loop torque control mode (in the mode of close-loop vector control)
			4	Constant line speed control mode
14-01 P.601	The curling mode	0	0	Wind-up
			1	Roll-down
14-02 P.602	Selection of inverse take-up during roll-down	0	0	Active inverse material take-up is not allowed during startup
			1	Active inverse material take-up is allowed
14-03 P.603	Mechanical transmission ratio	1.00	0~300.00	Mechanical transmission ratio

Settin Tension control mode

- When 14-00=0, the tension control is inactive, and the inverter is used as general inverter.
- When 14-00=1, the open-loop torque control mode is active. The inverter controls the constant tension through controlling the motor output torque. No tension feedback is required. The speed encoder must be installed when the inverter works in the mode of close-loop vector control.
- When 14-00=2, the close-loop speed control mode is active. The controlling result is to make the tension (position) feedback signal stable at the value given by PID.

  Close loop means that the tension (position) detection feedback forms a close loop for adjustment. Speed control mode means that the inverter realizes the control by adjusting the output frequency according to the feedback signal. This mode can work in any motor control mode, that is to say00-21 can be set to 0~4.
- When 14-00=3, the close-loop torque control mode is active. The tension feedback close-loop adjustment is added on the basis of open-loop tension control. The tension signal fed back by the tension detection device and the tension setting value constitute the PID close-loop adjustment which is used to adjust the inverter output Torque reference. The control method of it works in the mode of close-loop vector control method, and the speed encoder must be installed.
- When 14-00=4, the constant line speed control method is active. It is a special application to realize constant line speed control without PID adjustment, which is more stable than general close-loop control and applicable to the filed requiring smooth operation rather than fast line speed adjustment. This mode can work in any motor control mode, that is to say 00-21 can be set to 0~4.
- 14-01 is used to select the curling mode which can be combined with the switching terminal of wind-up and roll-down. If the switching terminal of wind-up and roll-down is inactive, the set of actual curling mode is the same with the function mode. If it is valid, the set of the actual curling mode is the same with the switching terminal of wind-up and roll-down.
- 14-02 is used to select whether support active take-up of material through inverse running of motor. If "not allowed" is selected, during the roll-down control, the inverter can only output torque when material is running forward. During the roll-down, the frequency for inverse take-up can be limited by setting the upper limit frequency.
- 14-03 is the mechanical transmission ratio. Mechanical transmission ratio=motor rotation speed/winding shaft rotation speed, the mechanical transmission ratio must be correctly set during the tension control.

5.15.2 Tension setting

- The parameters in this part are only applicable in open–loop torque mode. Close–loop speed mode is set by PID setting source.

Parameter	Name	Factory Value	Setting Range	Content
14-04 P.604	Tension setting source	0	0	The parameter 14-05 (P.605) setting
			1	The analog value or PULSE input setting
			2	Communication setting
14-05 P.605	Tension setting	0N	0~30000N	---
14-06 P.606	Maximum tension	0N	0~30000N	---
14-07 P.607	Zero-speed tension increase	0.0%	0~50.0%	---
14-08 P.608	Zero-speed threshold	0.00Hz	0~30.00Hz	---
14-09 P.609	Tension taper	0.0%	0~100.0%	---
14-10 P.654	Taper compensation correction	0mm	0~10000mm	---

Settin Tension setting

- The parameters in this part are only applicable in open–loop torque mode.
- When 14-04=0, the tension is set by the parameter14-05.
- When 14-04=1, the tension is set by the analog value or pulse input terminal. If set the tension through this mode, the maximum tension 14-06 must be set. In general, the maximum value set by analog value and set in maximum pulse both correspond to the maximum tension. The pulse can be set by terminal DIH.
- When 14-04=2, the tension is set by communication. If perform the control with upstream equipment, the tension can be set by communication. There are two ways to realize communication setting of tension: 1) Change value of 14-05, then 14-04 shall be set to 0; 2) Set the tension through Modbuscommunication address H100C, 14-04 shall be set to 2 and the Modbuscommunication address H100Cshall be set from 0 to 30000.
- 14-07is the zero-speed tension increase. It is used to set the tension of the system when it is at zero-speed. It is mainly for overcoming static friction when startup or keep certain tension when the system is at zero-speed. If the control tension is small and it is hard to start, it is allowed to properly increase the setting value of the parameter.
- 14-08is the zero-speed threshold. When the running speed of the inverter is below the set speed of the parameter, it is considered that the inverter is under zero-speed operation status.
- 14-09is the tension taper. The parameter is only used for wind-up control. For the wind-up control, sometimes, it is needed to reduce the tension while increasing the curling radius to ensure a good curling of the material.

  Formula of tension taper: $F=F0*\left\{1-K*\left[1-\left(D0+D1\right)/\left(D+D1\right)\right]\right\}$

  Wherein, F is the actual tension, F0 is the setting tension, D0 is the diameter of winding shaft, D is the actual curling radius, D1 is the taper compensation correction of 14-10 set tension, and K is the tension taper.
- 14-10is the taper compensation correction of tension which can relay the reduction curvature of tension.

5.15.3 Curling radius calculation

- The output torque is controlled by curling radius in open–loop torque mode.The output frequency corresponded to line speed is gained by curling radius in close–loop speed mode.

Parameter	Name	Factory Value	Setting Range	Content
14-11 P.610	Curling radius calculation method selection	0	0	Calculation through line speed.
			1	Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.
			2	Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal DIH.
			3	Analog value or pulse input.
14-12 P.650	Curling radius memory control when calculation through thickness accumulation	0	0	It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.
14-12 P.650	Curling radius memory control when calculation through thickness accumulation	0	1	It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate.
14-13 P.611	Maximum curling radius	500mm	1~10000mm	---
14-14 P.612	Winding shaft diameter	100mm	1~10000mm	---
14-15 P.613	Initial curling radius sourcelnitial curling radius source	0	0	Initial curling radius is set by the parameter 14-16 (P.614)~14-18 (P.616)
			1	Initial curling radius is set by the analog value.
14-16 P.614	Initial curling radius1	100mm	1~10000mm	---
14-17 P.615	Initial curling radius 2	100mm	1~10000mm	---
14-18 P.616	Initial curling radius 3	100mm	1~10000mm	---
14-19 P.617	Curling radius filtering time	0ms	0~1000ms	---
14-20 P.618	Current value of curling radius	0mm	0~10000mm	---
14-21 P.619	Number of pulses each turn	1	1~60000	---
14-22 P.620	Number of turns each layer	1	1~10000	---
14-23 P.621	Material thickness setting source	0	0	The material thickness is set by the parameter 14-24 (P.622)~14-27 (P.625)
			1	The material thickness is set by the analog value.
14-24 P.622	Material thickness0	0.01mm	0.01~100.00mm	---
14-25 P.623	Material thickness1	0.01mm	0.01~100.00mm	---
14-26 P.624	Material thickness2	0.01mm	0.01~100.00mm	---
14-27 P.625	Material thickness3	0.01mm	0.01~100.00mm	---
14-28 P.626	Maximum thickness	1.00mm	0.01~100.00mm	---

Settin Curling radius calculation

- In every tension control method, the curling radius is needed to be calculated. The curling radius can be acquired through the curling radius calculation module built in the inverter or through the external curling radius sensor.
- 14-11=0, the calculation through line speed: the curling radius is calculated by the system current line speed and the inverter output frequency. The equation is as follows: $D = (i \times V) / (\pi \times n)$

  Wherein D is the curling radius, iis the mechanical transmission ratio, V is the line speed, n is the motor speed.

  When the system operation speed is slow, the line speed of material and the output frequency of the inverter will be low. Then a little detection error will cause a big error in the curling radius calculation, so that a lowest line speed 14-31 must be set. When the line speed of material is lower than 14-31, the curling radius is stopped to calculate and the current value of curling radius remains unchanged. The value should be set below the normal working line speed.
- 14-11=1, the calculation of thickness accumulation: the curling radius is worked out through the encoder on the motor side and the gear feedback. In this condition, connect the pulse signal to A1/B1 on PG card and set the encoder input mode setup (09-02), the mechanical transmission ratio (14-03), the number of pulses per revolution of the encoder (09-01), the number of turns each layer (14-22) and the material thickness (14-24).
- 14-11=2, the calculation through thickness accumulation: the curling radius is worked out through the encoder on the winding shaft. In this condition, connect the pulse signal to the terminal DIH of the inverter and calculate the curling radius through the number of pulses each turn (14-21), the number of turns each layer (14-22) and the material thickness 0 (14-24).
- 14-11=3, when testing the curling radius with curling radius test sensor, the input channel of curling radius sensor can be the analog value or the pulse input.
- 14-13 is used to set the maximum curling radius. When 14-11=3, the parameter must be set and the maximum of the analog value or pulse signal corresponds to the set value of the parameter 14-13.
- 14-14 is used to set the winding shaft diameter. The curling radius calculated by the curling radius calculation module of the inverter is limited by 14-13 and 14-14.
- 14-15 is used to select the input channel of initial curling radius.

  1. When 14-15=0, the initial curling radius is set by the parameter 14-16~14-18. The initial value of curling radius can be determined through two multi-function digital input terminals, the selection of initial curling radius is as follows:

Digital input terminal 1	Digital input terminal 2	Initial curling radius source
0	0	14-14
0	1	14-16
1	0	14-17
1	1	14-18

  2. When 14-15=1, the initial curling radius is determined by the analog value. When the initial curling radius does not count from the hollow curling radius, the initial curling radius can be selected by the digital input terminal. For wind-up control, the system default initial curling radius is the diameter of winding shaft (14-14). For roll-down control, the system default initial curling radius is the maximum curling radius (14-13).
- 14-19 is used to set the curling radius filtering coefficient to avoid fast change of curling radius calculation (or input) result.
- 14-20is used to display the current curling radius in real time. It is able to know the current actual curling radius through the parameter.
- Only when 14-11=1 or 14-11=2, the parameters 14-21~14-28 are related to the parameter.

  1. 14-21represents pulse number when winding shaft turns a round. It needs to be set when 14-11=2.

  2. 14-22shows the rounds of winding shaft turning after the material wraps one layer. It is used for wire.

  3. When the material thickness is analog input (14-23=1), the maximum analog input corresponds to the set value of 14-28.

  4. When 14-23 =0, the system default material thickness is determined by the parameter 14-24. The different material thickness source can also be selected by the combination of digital input terminals and 14-24~14-27, the selection relationship is as follows:

Digital input terminal 1	Digital input terminal 2	Initial thickness source
0	0	14-24
0	1	14-25
1	0	14-26
1	1	14-27

5.15.4 Line speed input

- If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal.

Parameter	Name	Factory Value	Setting Range	Content
14-29 P.627	Line speed inputsource	0	0	No line speed input.
			1	The analog value or pulse input
			2	The communication setting.
14-30 P.628	Maximum line speed	1000.0 m/min	0.1~6500.0m/min	Maximum line speed
14-31 P.629	Minimum line speed for calculation R.	200.0 m/min	0.1~6500.0m/min	Minimum line speed for calculation R
14-32 P.630	Actual line speed	0.0 m/min	0~6500.0m/min	Actual line speed

Settin Line speed input

- If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal. In general, the convenient way for obtaining line speed is through analog output of operation frequency of traction (constant speed) inverter. The operation frequency of traction inverter corresponds with the line speed in linear. It only needs to set the maximum line speed (14-30) to the corresponding line speed of maximum frequency of operation frequency of traction (constant speed) inverter.
- 14-29is used to select the way or channel for obtaining line speed.

  1. When 14-29=0, no line speed is input.

  2. When the line speed is obtained through the analog value or pulse input (14-29=1), the maximum line speed 14-30 must be correctly set. The maximum value of analog or pulse input corresponds with the maximum line speed.

  3. When the line speed is obtained through the communication method (14-29=2), it is set by the Modbuscommunication address H100A and the setting range is 0.1~6500.0m/min.
- 14-31is used to set the minimum speed for starting calculation of curling radius. When the inverter detects that the line speed is lower than the value, inverter will stop curling radius calculation. Correct setting of the value will effectively avoid great deviation of curling radius calculation when the speed is reduced. In general, the value shall be set to over 20% of maximum line speed.
- 14-32is used to display the actual line speed in real time. The current actual line speed can be known by the parameter.

5.15.5 Tension compensation

- It is only relevant to the open-loop torque mode.

Parameter	Name	Factory Value	Setting Range	Content
14-33 P.633	Mechanical inertia compensation coefficient	0	0~65535	Mechanical inertia compensation coefficient
14-34 P.634	Material density	0kg/m^3	0~60000kg/m^3	Material density
14-35 P.635	Material width	0mm	0~60000mm	Material width
14-36 P.636	Fiction compensation coefficient	0.0%	0~50.0%	Fiction compensation coefficient

Settin Tension compensation

- When the tension control adopts the open loop torque mode, during the system acceleration/deceleration, additional torque shall be provided to overcome the rotation inertia of the whole system. Otherwise, too small tension upon wind-up acceleration and too large tension upon deceleration, or too large tension upon roll-down acceleration and too small tension upon deceleration will be caused.
- 14-33 is used to set the mechanical inertia compensation coefficient. It is used to compensate the rotation inertia of the system, including inertia of the motor, rotation system and the shaft. Such inertias are fixed and independent of the curling radius. This parameter can be obtained automatically by the system inertia self learning or manually set based on the actual working situation.
- 14-34 and 14-35 are relevant to the material inertia compensation. The inverter will automatically calculate the material inertia compensation value according to the parameter and the curling radius.
- 14-36is used to set the friction compensation coefficient. Take wind-up as an example. Because of the frictional resistance, the material tension reduces, which is more obvious upon small roll, and the tension will be nonlinear. This situation can be improved by setting the parameter.

5.15.6 Material supply interrupt detection

- It is an auxiliary function, and not in all situations can the material supply interrupt be detected effectively.

Parameter	Name	Factory Value	Setting Range	Content
14-37 P.637	Material supply interrupt auto detection function	0	0	Material supply interrupt auto detection is inactive.
			1	Material supply interrupt auto detection function 1
			2	Material supply interrupt auto detection function 2
			3	Material supply interrupt auto detection function 3
14-38 P.638	Auto detection minimum line speed	200.0 m/min	0.1~6500.0m/min	Material supply interrupt auto detection minimum line speed
14-39 P.639	Auto detection error range	10.0%	0.1~100.0%	Material supply interrupt auto detection error range
14-40 P.640	Auto detection judgment delay	2.0s	0.1~60.0s	Material supply interrupt auto detection judgment delay

Settin Material supply interrupt detection

- The group of parameters is used for the inverter to automatically detect the material supply interrupt. It is an auxiliary function. Only when line speed is use for curling radius calculation can the inverter have the material supply interrupt detection basis. And not in all situations can the material supply interrupt be detected effectively. If good result can not be achieved after proper effort, set 14-37 to 0.

- If the system line speed is higher than 14-38, and the abnormal change of the curling radius (the variation range of the curling radius calculated in the current corresponding to the last one is too large) exceeds the setting range of 14-39, and the lasting time of the abnormal change of the curling radius exceeds the delay time set by 14-40, the inverter reports material supply interrupt failure (bEb).

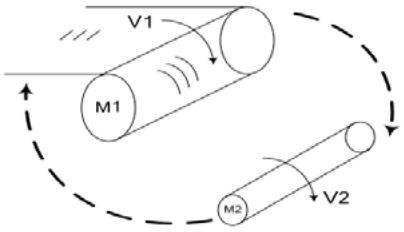
5.15.7 Pre-drive control

- Roll alternationduring operation can avoid causing too large shock.

Parameter	Name	Factory Value	Setting Range	Content
14-41 P.645	Pre-drive speed gain	0.0%	-50.0%~50.0%	Pre-drive speed gain
14-42 P.646	Pre-drive torque increase	0.0%	-50.0%~50.0%	Pre-drive torque increase proportion
14-43 P.647	Pre-drive torque delay time	0ms	0~65535ms	Pre-drive torque increase delay time

Settin Pre-drive control

- The diagram of auto roll alternation is as follows, there are two inverters to control the replacing upper roll and replacing lower roll.



M1 is “replacing lower roll”, M2 is “replacing upper roll” or “pre-drive roll”

- To enhance productivity, generally, the winding shaft will be switched without stopping the machine (auto winding up and rolling down the material). To realize the smooth and well-off auto roll alternation and avoid causing too large shock, it is necessary to rotate the wind-up roll (roll-down roll) in advance and the rotating line speed shall be consistent with the line speed of the materials in operation (V1≈V2). This is the pre-drive function.
- Auto roll alternation control logic

  On the occasion of continuous working, the auto roll alternation control logic is used to alternate the roll smoothly to enhance productivity. The auto roll alternation function is realized with the cooperation of the control signal provided by external controller. Wherein, the motion of B, C and D is only active when the replacing lower roll inverter works in the close loop vector control mode (00-21=4).

  1. Pre-drive process

  When the replacing upper roll inverter receives the pre-drive reference, no matter what value 14-00 is set, it will operate according to the matching frequency calculated by the given line speed and the initial curling radius until the line speed of replacing upper roll is consistent with the system line speed. When the pre-drive signal disappears, the control mode switches to the setting tension control mode.

  2. Torque memory signal

  Before replacing the roll, the torque memory signal makes the replacing lower roll inverter remember the current output torque for the use of later process.

3. Torque memory enable

When the replacing upper roll has contacted with the material and the replacing lower roll hasn't been replaced, no matter which torque control mode is adopted, the replacing lower roll inverter will be switched to the torque control mode by the torque memory enable signal. The given Torque reference is the torque remembered by the previous inverter.

4. Torque increase function

When the torque memory enable signal is valid, the inverter will control the torque according to the memory torque. After the setting torque increase delay time, the output torque will increase according to the setting torque increase proportion to keep a large line tension at the moment for easy cutting off.

At the end of roll alternation, the pre-drive signal of the replaced upper roll inverter is revoked. Then the replaced upper roll inverter operates in the setting tension control mode. The process of roll alternation is end after the replacing lower roll inverter stops.

- The pre-drive reference, torque memory signal and torque memory enable signal mentioned above in the point 3 are realized all by setting the corresponding function of digital input terminals.
- 14-41is use to set the pre-drive speed gain. For meeting the technological requirements and revising the line speed error, it can be adjusted on the basis of synchronous matching frequency. The adjustment formula:

  V2 = V1 * (1 + 14-41).

  When 14-41<0, the line speed of pre-drive roll will be lower than the material line speed.
- In the process of auto roll alternation, when the torque memory enable signal is valid, the replacing lower roll inverter will control the torque according to the memory torque at first. And then after the delay time set by 14-43, the output torque will be increased according to the torque increase proportion set by 14-42.

5.15.8 Constant line speed mode

- In constant line speed control mode(14-00="4"), it is used to select the method for acquiring the target speed of constant line speed.

Parameter	Name	Factory Value	Setting Range	Content
14-44 P.656	Line speed setting source	0	0	Parameter 14-45 (P.657) setting
			1	The line speed is obtained by analog value or pulse input
			2	The line speed is obtained by communication mode
14-45 P.657	Line speed setting	0.0 m/min	0~6500.0m/min	Line speed setting value

Settin Line speed setting source

- When 14-44=0, line speed is set by parameter 14-45.
- The line speed is obtained by analog value or pulse input.(14-44="1")

  The maximum line speed 14-30(P.628) must be set correctly now. The maximum of analog value or pulse input corresponds to the maximum line speed.
- The line speed is obtained by communication mode.(14-44="2")

  It is set by the Modbuscommunication address H100B which setting range is0~6500.0m/min.

5.15.9 Tension closed-loop limiter

- The closed-loop speed control mode (14-00 = "2"), is used to select the PID regulator output limit benchmark and limiting bias.

Group	Parameter Number	Name	Setting Range	Content
14-46 P.658	Tension closed-loop limite amplitude of benchmark	0	0: amplitude limitingis based on the motor rated power	---
			1: amplitude limitingis based on system real-time line speed	---
14-47 P.659	Tension in closed-loop limite amplitude of the bias	0.0%	0.0%~100.0%	---

- Under the closed-loop speed control mode, PID regulator limiter bias is set by the 14-47. If this parameter is set to 0, when the system is zero velocity, the controller will not work. So setting bias is appropriate, which can avoid this problem.

5.16 User parameter group 15

Group	Parameter Number	Name	Setting Range	Factory Value	User settings
15-00	P.900	User registered parameter1	P mode: 0~1299 Parameter group mode: 00-00~15-99	99999	
15-01	P.901	User registered parameter2		99999	
15-02	P.902	User registered parameter3		99999	
15-03	P.903	User registered parameter4		99999	
15-04	P.904	User registered parameter5		99999	
15-05	P.905	User registered parameter6		99999	
15-06	P.906	User registered parameter7		99999	
15-07	P.907	User registered parameter8		99999	
15-08	P.908	User registered parameter9		99999	
15-09	P.909	User registered parameter10		99999	
15-10	P.910	User registered parameter11		99999	
15-11	P.911	User registered parameter12		99999	
15-12	P.912	User registered parameter13		99999	
15-13	P.913	User registered parameter14		99999	
15-14	P.914	User registered parameter15		99999	
15-15	P.915	User registered parameter16		99999	
15-16	P.916	User registered parameter17		99999	
15-17	P.917	User registered parameter18		99999	
15-18	P.918	User registered parameter19		99999	
15-19	P.919	User registered parameter20		99999	

5.16.1 User registered parameter

- The user parameter group is used to register the parameter numbers for the parameters which do not need to be restoredto the factory value.

Parameter	Name	Factory Value	Setting Range	Content
15-00 P.900	User registered parameter 1	99999	P mode: 0~1299 Parameter group mode: 00-00~15-99	---
15-01 P.901	User registered parameter 2	99999		---
15-02 P.902	User registered parameter 3	99999		---
15-03 P.903	User registered parameter 4	99999		---
15-04 P.904	User registered parameter 5	99999		---
15-05 P.905	User registered parameter 6	99999		---
15-06 P.906	User registered parameter 7	99999		---
15-07 P.907	User registered parameter 8	99999		---
15-08 P.908	User registered parameter 9	99999		---
15-09 P.909	User registered parameter 10	99999		---
15-10 P.910	User registered parameter 11	99999		---
15-11 P.911	User registered parameter 12	99999		---
15-12 P.912	User registered parameter 13	99999		---
15-13 P.913	User registered parameter 14	99999		---
15-14 P.914	User registered parameter 15	99999		---
15-15 P.915	User registered parameter 16	99999		---
15-16 P.916	User registered parameter 17	99999		---
15-17 P.917	User registered parameter 18	99999		---
15-18 P.918	User registered parameter 19	99999		---

Parameter	Name	Factory Value	Setting Range	Content
15-19 P.919	User registered parameter 20	99999	P mode: 0~1299 Parameter group mode: 00-00~15-99	---

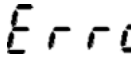
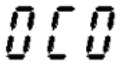
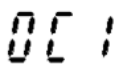
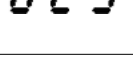
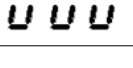
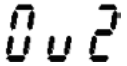
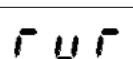
Settin User registered parameter

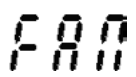
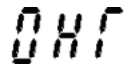
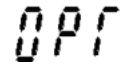
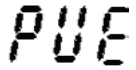
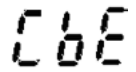
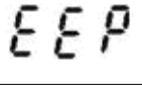
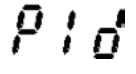
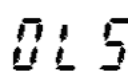
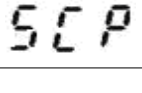
- The parameters in this group will not be restored to the factory value when executing 00-02=5/6.
- The parameter values set in this group are the parameter numbers that user need to register. The parameter values with registered number will not be restored to the factory value when 00-02=5/6.
- For the setting of restoring the factory value, please refer to Section 5.1.2 for the parameter management part.

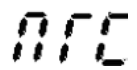
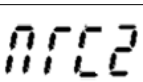
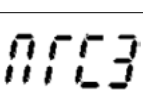
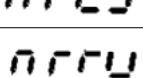
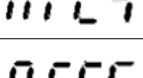
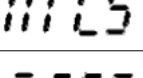
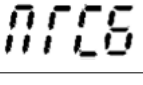
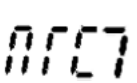
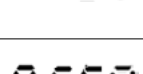
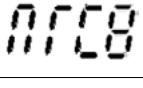
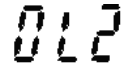
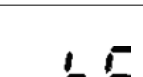
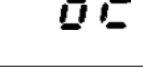
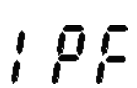
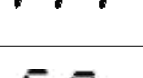
Note: Please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between. Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7;In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106.Note: please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between. Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7;In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106.

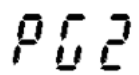
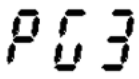
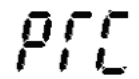
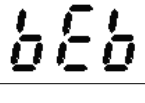
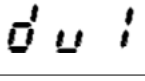
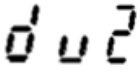
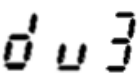
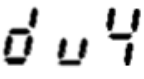
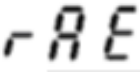
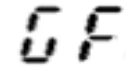
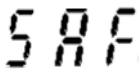
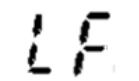
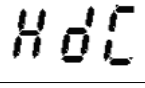
6. Appendix

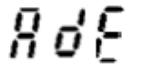
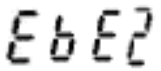
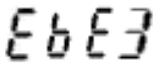
6.1 Appendix 1 Alarm code list

Code	Screen display	Cause	Troubleshooting
ERROR		1. Under-voltage for power supply 2. The reset function "RES" is on 3. Bad connection between the parameter unit and main machine 4. Internal circuit malfunction 5. Wrong CPU operation	1. Provide a normal power supply 2. Shut off "RES" 3. Ensure firm connection between the parameter unit and the main machine 4. Replace the inverter. 5. Restart the inverter
OC0 Over-current when stop		The output current is two times larger than the rated current of the inverter.	Please restart the inverter. If the alarm repeated, please send the inverter back to the factory.
OC1 Over-current during acceleration			1. In case the time for acceleration or deceleration is too short, extend it as necessary. 2. Avoid abrupt increase of load. 3. Check Terminals U/T1, V/T2 and W/T3 for short circuit.
OC2 Over-current at constant speed			
OC3 Over-current during deceleration			
OV0 Over-voltage when stop		Over-voltage between Terminals P and N.	Check whether the power supply is normal or abnormal.
OV1 Over-voltage during acceleration			1. In case the time for acceleration or deceleration is too short, extend it as necessary. 2. Check the brake resistor between Terminals +/P and PR for loose connection. 3. Check whether the values of 06-05(P.30) and 06-06(P.70)are correct or not.
OV2 Over-voltage at constant speed			
OV3 Over-voltage during deceleration			
THT Overheated IGBT module		IGBT module thermal accumulation relay operation	Avoid prolonged inverter operation when overloaded.
THN Overheated motor		Electronic thermal relay operation	1. Check whether the set value of 06-00(P.9) is correct or not (according to the externally connected motor). 2. Reduce load.

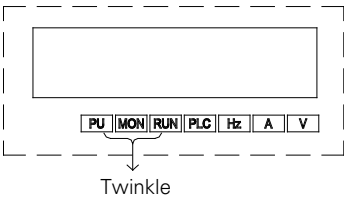
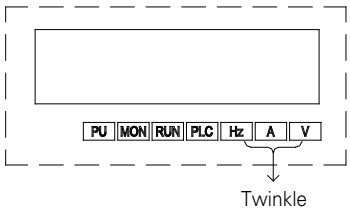
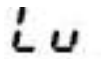
Code	Screen display	Cause	Troubleshooting
FAN Cooling fan alarm		Cooling fan failure	1. The cooling fan is damaged. Please replace it with a new fan. 2. Please clean the fan if it is blocked by foreign substances. 3. Check if fans wiring is broken/loose, or replace it with a new fan.
OHT External thermal relay operation		External thermal relay operation	1. Check whether the capacity of the external thermal relay and of the motor coordinates well. 2. Reduce the load.
OPT Abnormal peripheral devices		1. Abnormal communication; Exceeding the number of communication retries 2. Interrupted communication; Exceeding the permitted communication time interval	Correctly set the communication parameters.
PUE PUCommunication mouth peripheral anomalies			
CbE Outside enlarge communication mouth peripheral anomalies			
EEP Abnormal memory		ROM malfunction	Send the inverter back to the factory if this type of alarm happens frequently.
PID Abnormal PID		1. Insufficient inverter and motor capacity 2. PID target value or feedback value set unreasonably 3. Peripheral devices malfunction	1. Enlarge the inverter and motor capacity. 2. Check the feedback gain setup. Reset the target value according to the feedback. 3. Check the system's peripheral feedback devices (e.g., sensors, potentiometer) and whether the wiring is correct.
CPU Abnormal CPU		Serious peripheral electromagnetic interference	Reduce peripheral interference.
OLS Stall prevention and protection		Over-loaded motor	1. Reduce motor load. 2. Increase 06-01(P.22) value.
SCP Short circuit over-current		Output-end short circuit	Check whether the inverter output has short circuit (e.g., the motor wiring).

Code	Screen display	Cause	Troubleshooting
NTC Overheated module		The temperature of the inverter IGBT module is too high.	1. Reduce the environment temperature and improve the air condition. 2. Check whether the fan of the inverter is running normally.
NTC2 Overheated module2			
NTC3 Overheated module3			
NTC4 Overheated module4		The temperature of the converter IGBT module is too high.	
NTC5 Overheated module5			
NTC6 Overheated module6		The temperature of the converter IGBT module is too high.	1. Reduce the environment temperature and improve the air condition. 2. Check whether the fan of the inverter is running normally.
NTC7 Overheated electrolytic capacitor		The environment temperature of electrolytic capacitor is too high.	
NTC8 Overheated start resistor		Rectifier side of the relay is not pull-in, which leads to the overheat of the start resistor.	Confirm whether the rectifier side of the relay is pull-in.
OL2 Abnormal over-torque		1. Over-loaded motor 2. 06-08 (P.155), 06-09 (P.156) set unreasonably.	1. Reduce motor load. 2. Adjust the set value of 06-08 (P.155), 06-09(P.156) properly.
BE Abnormal brake-resistor (Abnormal relay)		Abnormal brake-resistor (Abnormal relay)	Return it to the factory for repair.
IPF Abnormal power supply input		Abnormal power supply input	Check whether power supply input is normal.
CPR Abnormal CPU		Abnormal CPU procedures	1. Check the wiring. 2. Check the parameter setup. 3. Reduce peripheral interference.
AEr Abnormal AI3/AI2 terminal		Abnormal disconnection of AI3/AI2 terminal's analog output	Please refer to the description for 02-24(P.184)/02-33 (P.545).
PG0 PG cartoon - error		PG Abnormal communication	1. Check the PG card connection with encoder 2. Confirm whether the encoder can work normally
PG1 Abnormal encoder model		Abnormal encoder model	Check the set value of 09-02 (P.351).

Code	Screen display	Cause	Troubleshooting
PG2 Abnormal PG card feedback signals		Abnormal PG card feedback signals	Please refer to the feedback control parameter description for 09-01~09-05 / P.350~P.354.
PG3 Too large speed deviation under closed-loop control		Too large speed deviation under closed-loop control	Please refer to the feedback control parameter description for 09-01~09-05/P.350~P.354.
PTC Overheated motor		Overheated motor	1. Reduce motor load 2. Amend 06-16(P.534)
BEB Material line breaking		Material line breaking	Detect whether the material feedback signal line is broken.
DV1 Z pulse fault		1. PG encoder is notconnected, not wired properly 2. Encoder is damaged	Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV2 Z pulse noise detection		1. PG cable is not wired properly. Noise interference along the PG cable. 2. PG option card or encoder is damaged	1. Separate the PG cable lines from the source of the noise. 2. Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV3 Inversion detection		1. Z pulse position default. 2. 09-02(P.351) setting dufault 3. PG cable is not wired properly. Noise interference along the PG cable.	1. Start auto-tuning on Z pulse. 2. Set 09-02(P.351) correctly. 3. Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV4 Inversion prevention detection			
rAE Relay operation abnormal		Relay on the main circuit is abnormal.	Return it to the factory for repair.
GF		Output ground fault	Please check whether motor ground short circuit is normal or not.
SAF Safety circuit abnormal		Safety circuit is disconnected.	1. Please check whether the short circuit jump piece between S1-SC is firmly connected; 2. When using the safety stop function, please check safety ralay unit and the wire connection.
LF		Three- phase output abnormal	Please check whether UVWthree-phase output normal or not.
HDC Hardware detection error		Error in hardware detection	Return it to the factory for repair.

Code	Screen display	Cause	Troubleshooting
ADE Three-phase current sampling abnormal		Error in three-phase current sampling circuit.	Return it to the factory for repair.
EbE1 Expansion cardSLOT1 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.
EbE2 Expansion cardSLOT2 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.
EbE3 Expansion cardSLOT3 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.

6.2 Appendix 2 Warning Code list

Code	Screen Display	Cause	Troubleshooting
Current stall		When the output current is larger than Stall prevention operation level, the three lights on the left side of the screen flicker, indicating that the inverter is in current stall mode. In this case the motor may not run smoothly.	1. Check if the values of P.22, P.23, and P.66 are proper. 2. Check if the values of P.7 and P.8 are too small. 3. If there is rapid acceleration or deceleration, please extend the acceleration and deceleration time. 4. Avoid sharp increase of load 5. Check whether there is a short circuit in the motor terminal U/ t1-v/t2-w /T3.
Voltage stall		When the voltage between +/P and -/N is too high, the three lights on the right side of the screen flicker, indicating that the inverter is in voltage stall mode. Then the motor may not run smoothly.	1 . Add a brake resistor between +/P and PR. 2 . Check if the values of P.7 and P.8 are too small
LV Low voltage		Input voltage is low.	Supply with the normal voltage

6.3 Appendix 3 Troubles and solutions 0

Troubles	Check points	
Motionless motor	Main circuit	• Check whether the power supply voltage between Terminals R/L1, S/L2 and T/L3 is normal. • Check whether the Power light is on. • Check whether the wiring between the inverter and the motor is correct.
	Load	• Check whether the load is too heavy. • Check whether the motor rotor is locked.
	Parameters Setting	• Check whether the starting frequency (01-11(P.13)) is set too big. • Check whether the operation mode (00-16(P.79)) is correct. • Check whether the maximum frequency (01-00(P.1)) is zero. • Check whether the reverse rotation prevention (00-15(P.78))is restricted. • Check whether the bias and gain (02-12~02-15, 02-25~02-28 / P.192~P.199) setting is correct. • Check that the frequency jump (01-16~01-21 / P.91~P.96) setting is correct.
	Control circuit	• Check whether the output stop signal "MRS" is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86, 03-06(P.126) / 03-09(P.550)) • Check whether the "RES" function is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09 (P.550)) • Check whether the external thermal relay is operating or not. • Check whether the reset has been performed or not after the set-off of the alarm (the ALARM light in on). • Check whether the voltage/current signals are correctly wired. • Check whether the functions of STF and STR are correct. (Related parameter03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09 (P.550)) • Check whether the wiring for the control circuit is disconnected or has a poor contact.
Reversed motor rotation	• Check whether the phase sequence of output terminals U/T1, V/T2 and W/T3 is correct. • Check whether the start signal (STF and STR) are connected correctly.	
Failure to increase the rotation speed of the motor	• Check whether the load is too heavy. • Check whether the stall prevention level (06-01(P.22)) is correct. • Check whether the torque boost (01-10(P.0)) is set too high. • Check whether the maximum frequency (01-00(P.1)) is effective.	
Unsmoothed acceleration / deceleration	• Check whether the acceleration / deceleration time (01-06(P.7), 01-07(P.8)) is correct. • Check whether the acceleration / deceleration curve selection (01-05(P.29)) is correct. • Check whether the voltage / current input signals are affected by noises.	
Overlarge motor current	• Check whether the load is too heavy. • Check whether the capacity of the inverter and of the motor are well matched. • Check whether the torque boost (01-10(P.0)) is set too high.	
Speed variation during the operation	• Check whether the voltage / current input signals are affected by noises. • Check whether the load varies. • Check whether the wiring length of the main circuit is too long.	

6.4 Appendix 4 Optional equipment

6.4.1 Communication card

- DXF-NET-DP: Profibuscommunication card

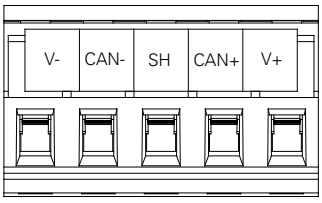
Terminal form	Terminal name	Function name	Description
DB9	1	---	---
	2	---	---
	3	Rxd/Txd-P	Receive/transmit data-P
	4	CNTR-P 2)	Control-P
	5	DGND	Data ground
	6	VP 1)	Positive voltage
	7	---	---
	8	Rxd/Txd-N	Receive/transmit data-N
	9	---	---
1) The signal is only needed in bus cable endpoint station.			
2) The signal is alternative.			

- Ordering code:

NO.	Type
1	DXF-NET-DP

- DXF-NET-DN: Devicenet communication card
  - Devicenet ports definition

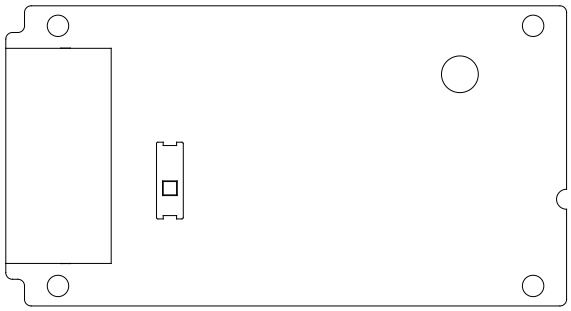
Terminal	Signal	Description
V+	V+	DC24V
CAN+	CAN+	Positive Signal wire
SH	SHIELD	Ground wire
CAN-	CAN-	Complex signal wire
V-	V-	0V



- Ordering code:

NO.	Type
1	DXF-NET-DN

- DXF-NET-CAN: Canopencommunication card



- RJ-45Pin Definition

Pin	Symbol	Description
1	CAN_H	CAN_Hbus line (dominant high)
2	CAN_L	CAN_L bus line (dominant low)
3	CAN_GND	Ground /0V/V-
7	CAN_GND	Ground /0V/V-

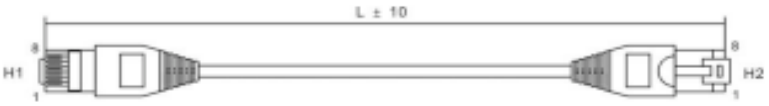
Socket

- Function and specification

Connector	RJ-45
Port	2 Port
Transmission mode	CAN
Transmission cable	Using CAN standard line
Transmission rate	1M 500k 250K/280KF 125k 100k 50k
Protocol	CAN open Protocol

- CANopen communication wiring

  Type: SNKCBLxxGTN2 (xxstands for1R5,3,5,10)

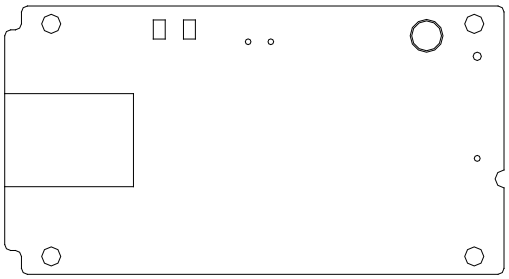


Item No.	Part No.	L(mm)
1	SNKCBL1R5GTN2	1500
2	SNKCBL3GTN2	3000
3	SNKCBL5GTN2	5000
4	SNKCBL10GTN2	10000

- Ordering code:

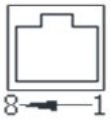
NO.	Type
1	DXF-NET-CAN

- DXF-NET-ET：Ethernet communication card



- Electric specification

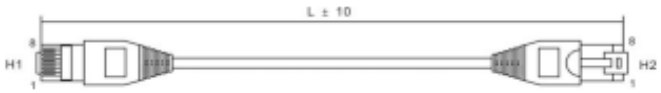
Terminal form	Terminal name	Function name	Description
RJ45	1	Tx+	Transmit data +
	2	Tx-	Transmit data -
	3	RX+	Receive data +
	4	---	---
	5	---	---
	6	RX-	Receive data -
	7	---	---
	8	---	---



Socket

- CANopen communication wiring

  Type：SNKCBLxxGTN2 (xx stands 1R5,3,5,10)



Item No.	Part No.	L(mm)
1	SNKCBL1R5GTN2	1500
2	SNKCBL3GTN2	3000
3	SNKCBL5GTN2	5000
4	SNKCBL10GTN2	10000

- Ordering code:

NO.	Type
1	DXF-NET-ET

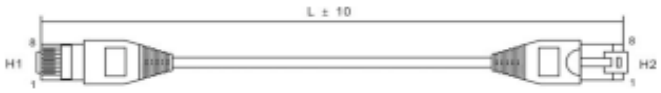
- DXF-NET-ECAT：EtherCAT communication card

- Electric specification

Terminal form	Terminal name	Function name	Description
RJ45	1	Tx+	transmit data +
	2	Tx-	transmit data -
	3	RX+	Receive data +
	4	---	---
	5	---	---
	6	RX-	Receive data -
	7	---	---
	8	---	---

- CANopen communication wiring

  Type：SNKCBLxxGTN2 (xx stands 1R5,3,5,10)



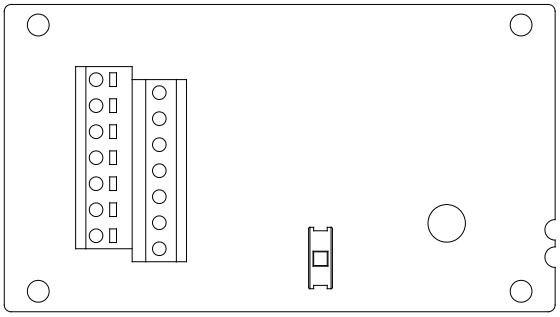
Item No.	Part No.	L(mm)
1	SNKCBL1R5GTN2	1500
2	SNKCBL3GTN2	3000
3	SNKCBL5GTN2	5000
4	SNKCBL10GTN2	10000

- Ordering code:

NO.	Type
1	DXF-NET-ECAT

6.4.2 I/O card

- DXF-EXT-6DI2RO

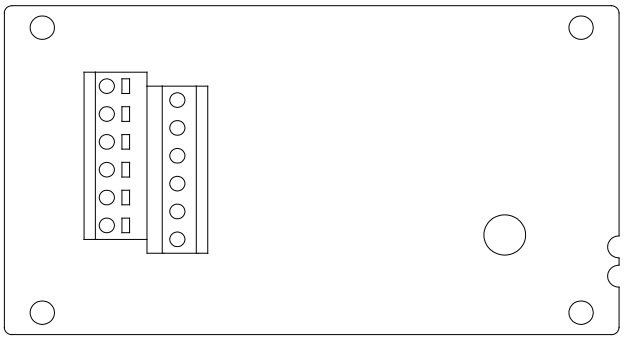


Terminal form	Terminal name	Function instructions	Terminal specification
Switch signal input	M10	There are totally 6 multi-function expanded control terminals. (Sink/Source can be switched)	Input impedance: 4.7 kΩ Action current: 5mA Voltage range: 10~28VDC Maximum frequency: 1kHz
	M11		
	M12		
	M13		
	M14		
	M15		
Relay output	A10, C10	Multi-function relay outputs 2 groups; A-C is the normally open contact	Maximum voltage: 30VDC or 250VAC Maximum current: Resistive load: 5A NO Inductive load: 2A NO (cosΦ=0.4)
	A11, C11		
Public terminal	SD	The common terminal of Terminal M10~M15 (SINK).	----
	PC	The common terminal of Terminal M10~M15 (SOURCE).	Output voltage: 24VDC±20% Maximum current: 200mA(share with control board)

- Ordering code:

NO.	Type
1	DXF-EXT-6DI2RO

- DXF-EXT-8RO



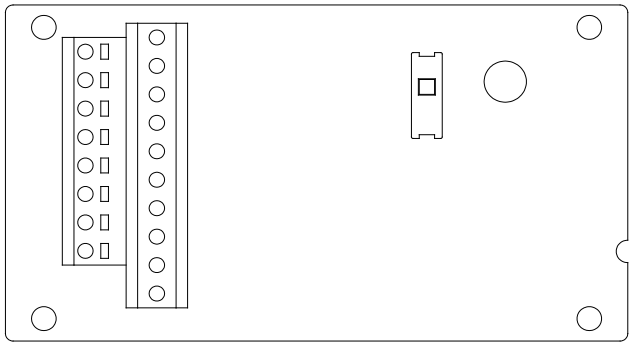
Terminal form	Terminal name	Function instructions	Terminal specification
Relay outputs	A10, C1	Multi-function relay outputs 8 groups; A-C is the normally open contact.	Maximum voltage: 30VDC or 250VAC Maximum current: Resistive load:5A NO Inductive load: 2A NO (cosΦ=0.4)
	A11, C1		
	A12, C2		
	A13, C2		
	A14, C3		
	A15, C3		
	A16, C4		
	A17, C4		

- Ordering code:

NO.	Type
1	DXF-EXT-8RO

6.4.3 PG card

- DXF-ENC-301C

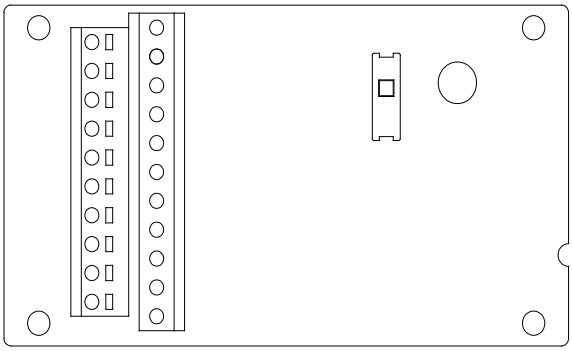


Terminal	Terminal Symbols	Function instruction	Terminal specification
Input	A1 / B1 / Z1	The input of the encoder signal supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	A1 / B1 / Z1		
	A2 / B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	A2 / B2		
Output	A1O	The open collector dividing frequency output is 1~255 times dividing frequency. The maximum output current is 50mA.	Maximum frequency: 500KP/Sec Maximum current: 50mA It can switch pull-up resistors under different voltages.
	B1O		
	Z1O		
	DCM		
Power	12V	12V Power	Voltage: ±5% Current: 200mA MAX
	5V	5V Power	
	DCM	Power grounding	

- Ordering code:

NO.	Type
1	DXF-ENC-301C

- DXF-ENC-301L

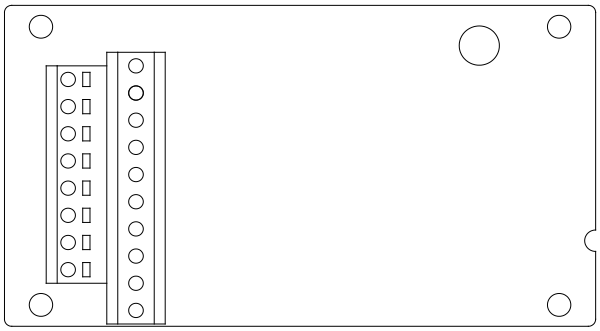


Terminal	Terminal Symbols	Function instruction	Terminal specification
Input	A1 / B1 / Z1	The input of the encoder signal supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	A1 / B1 / Z1		
	A2 / B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	A2 / B2		
Output	A0 / B0 / Z0	The line-drive dividing frequency output is 1~255 times dividing frequency.	Maximum output voltage: 5V Maximum current: 50mA Maximum frequency: 500KP/Sec
	A0 / B0 / Z0		
Power	12V	12V Power	Voltage: ±5% Current: 200mA MAX
	5V	5V Power	
	DCM	Power grounding	

- Ordering code:

NO.	Type
1	DXF-ENC-301L

- DXF-ENC-302L



Terminal	Name	Function instruction	Terminal specification
Input	S1 / S2	Resolver signal input	3.5±0.175Vrms, 10kHz
	S3 / S4		
	A2 /B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type, the maximum is 500K.	Maximum frequency: 500KP/Sec
	A2 /B2		
Output	A0 /B0 /Z0	The line-drive dividing frequency output is 1~255 times dividing frequency.	Maximum output voltage: 5V Maximum current: 50mA Maximum frequency: 500KP/Sec
	A0 /B0 /Z0		
Power	R1-R2	Resolver power output	7Vrms, 10KHz

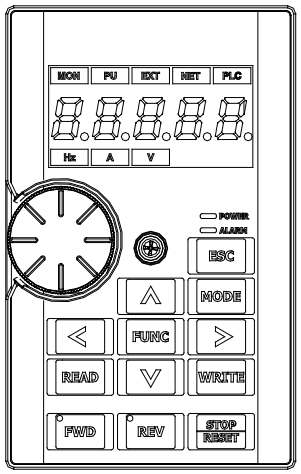
- Ordering code:

NO.	Type
1	DXF-ENC-302L

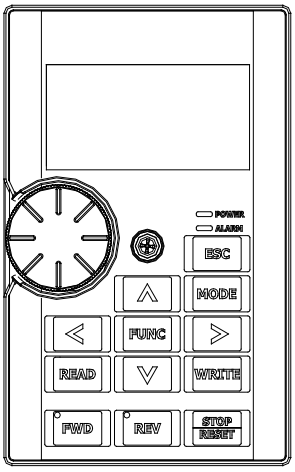
6.4.4 Parameter unit

- DXF-KEY-LED, DXF-KEY-LCD appearance

DXF-KEY-LED



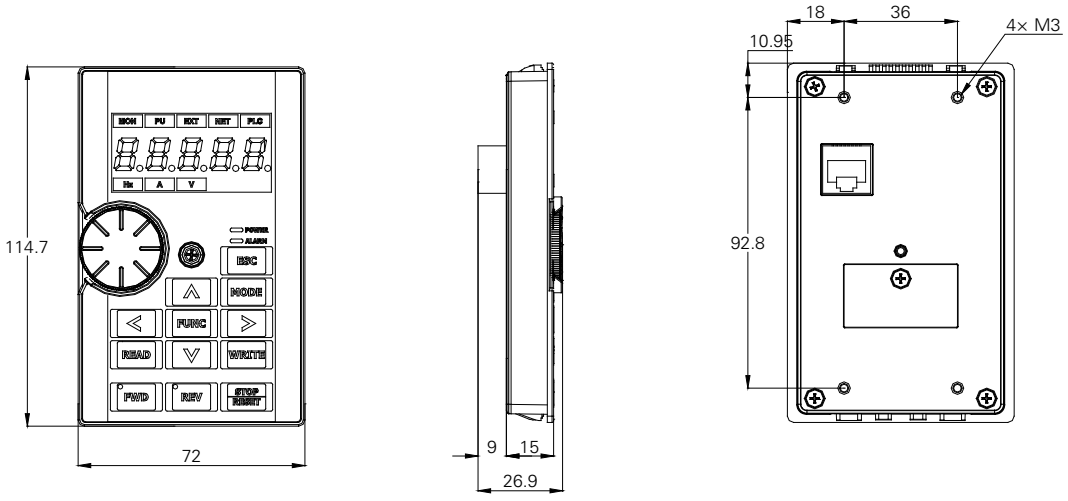
DXF-KEY-LCD



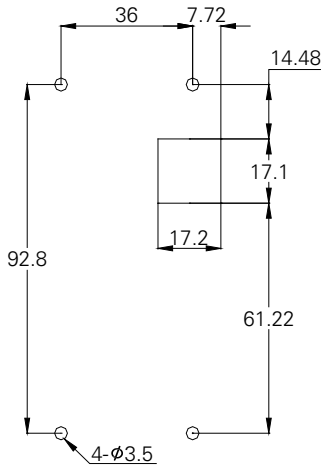
- Ordering code:

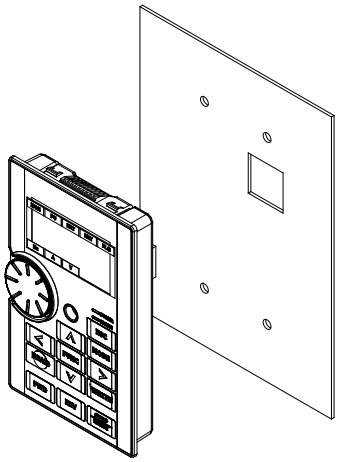
NO.	Type
1	DXF-KEY-LED
2	DXF-KEY-LCD

- Appearance and dimensions



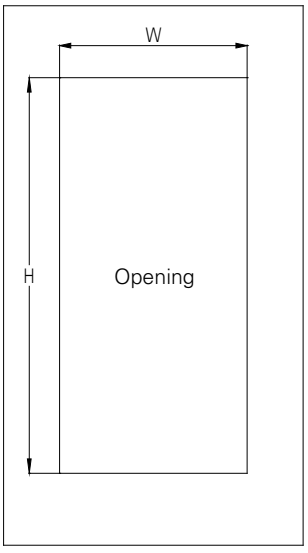
- Panel Mounting cutout dimension

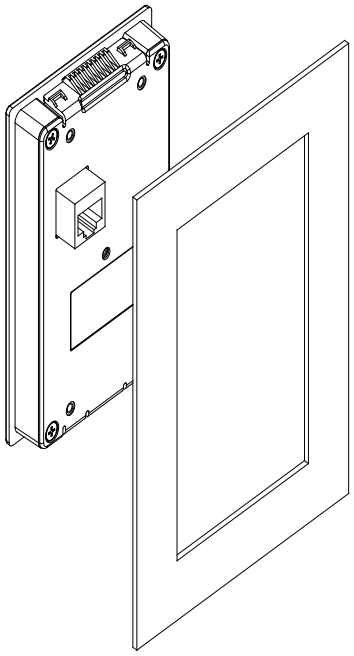




- Snap mounting cutout dimension

Dimensional drawing of opening of fastener mounting panel



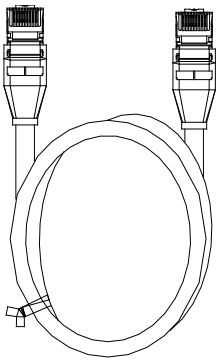


Panel thickness	1.2mm	1.6mm	2.0mm
W		66.4	
H	110.2	111.3	112.5

* Allowable error: ±0.15mm.

* If customer cutout accuracy cannot meet the allowable error, please purchase DXF-KEY-SPR (Snap Mounting Kit) for installation.

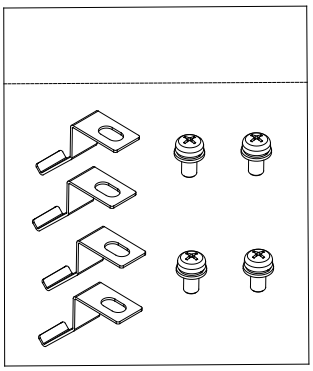
6..4.5 Data transmission line



- Ordering code:

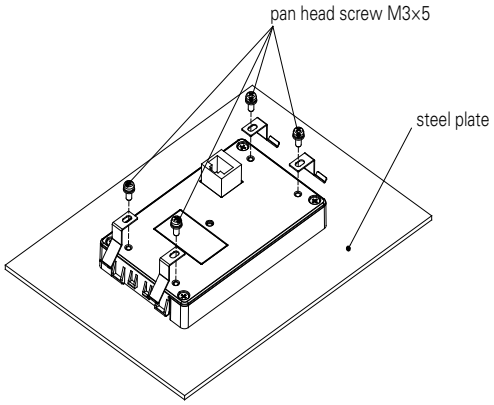
NO.	Type	Name
1	DXV-CBL3M	The data transmission line (3 m)
2	DXV-CBL5M	The data transmission line (5 m)

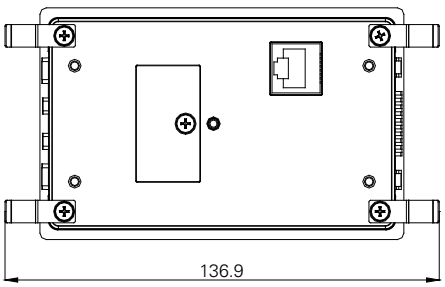
6.4.6 Snap mounting kit



- Ordering code:

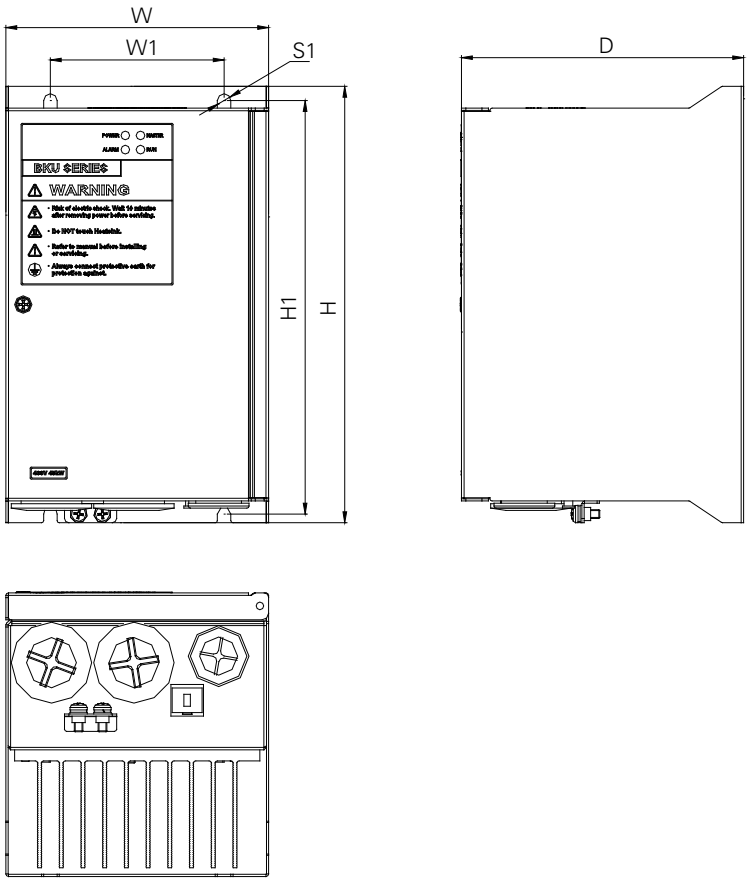
NO.	Type
1	DXF-KEY-SPR





6.4.7 BKU Brake unit

- BKU



Unit: mm

Frame	Type	W	W1	H	H1	D	S1
A	DXF-BKU32-37K	121	80	200	189.5	130	6.4
	DXF-BKU34-45K						
B	DXF-BKU32-110K	233.5	193.5	343	329	190	6.4
	DXF-BKU34-160K						

- Ordering code:

NO.	Type	Name
1	DXF-BKU32-37K	200V 37KW Brake unit
2	DXF-BKU32-110K	200V 110KW Brake unit
3	DXF-BKU34-45K	400V 45KW Brake unit
4	DXF-BKU34-160K	400V 160KW Brake unit

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