

# **D5M series inverter Manual**

[www.finglai.com](http://www.finglai.com)

Thank you for choosing D5M series ,D6B series multi-function and high-performance inverter

Faulty operation of inverter during installation, wiring and operation may cause an accident, please read the Instruction Manual carefully before using so as to master correct using method, thus avoiding personal injury and property loss due to improper operation. After reading, please keep the Instruction Manual well for future maintenance, protection and application in other situations.

For your safety, please ask professional electrical engineering personnel to install and debug the inverter and adjust the parameters.

Signs like  危險 **DANGER** and  注意 **WARNING** in the Manual remind you of precautions when carrying, installing, operating and checking the inverter, please strictly follow the labeled warnings to realize the safety in use.

Refer to the Manual in case of any doubts; for the problems unsolved, please contact the Company directly or our distributors, we will assign professionals to serve you sincerely.

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**Date: February 10, 2012**

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Safety level in the Manual refers to "danger" and "warning" with the signs respectively as below:

 危險 **DANGER:** Casualties may be caused if failing to use as required.

 注意 **WARNING:** Personal injury or damage to the inverter or mechanical system may be caused if failing to use as required.

Make sure the contents with safety signs are observed. For different situations, "Warning" may also cause serious results, so it is necessary to abide by the precautions in Instruction Manual.

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- Turn the power off before wiring.
  - After cutting off AC power, high voltage still exists in the inverter before the charging indicator goes out, so it is dangerous to touch internal circuit and components.
  - Don't check the components and signal on circuit board during operation.
  - Don't dismantle or change the internal connection, wiring or components of inverter at will.
  - Don't control buttons with wet hands to avoid electric shock.
  - Earthing terminal of the inverter shall be grounded properly.
  - It is prohibited to change and replace the control panel and components at will so as to prevent electric shock, explosion and other dangers.
- 



- Since semiconductor parts inside the inverter are easily damaged by high voltage, it is prohibited to perform voltage withstand test to them.
  - It is prohibited to connect the output terminal U.V.W of inverter to AC power.
  - Don't touch the inverter and brake resistor when the power is turned on or disconnected before long in high temperature, so as to avoid scalding.
  - Voltage applied to each terminal only can be that required in the Instruction Manual to prevent bursting, damage and so on.
  - Don't touch the main circuit boards CMOS and IC of the inverter since they are easily influenced and damaged by static electricity.
  - Only qualified professionals can install, debug and maintain the inverter.
  - Scrapped inverter shall be disposed as industrial wastes, and burning is prohibited.
  - After long-term storage, the inverter must undergo checking and commissioning before being used.
  - The inverter can be easily set for high-speed operation, before the setting, please check whether the characteristics of motor and machine are suitable for such high-speed operation.
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## No.1 Safety Cautions

### 1.1 Unpacking inspection

D5M series ,D6B series multi-function and high-performance inverter has passed test and quality inspection before delivery. After purchasing it and prior to unpacking, please check whether the package is damaged due to improper transportation, and whether the specification and model are in conformity with the ordered machine, in case of any problem, please contact the supplier.

#### 1. Inspection after unpacking

- (1) There is a D5M inverter, an instruction manual, a warranty card and a certificate of approval inside.
- (2) Check the nameplate at side of the inverter to make sure the product in hand is the right one.

#### 2. Introduction of D5M series nameplate

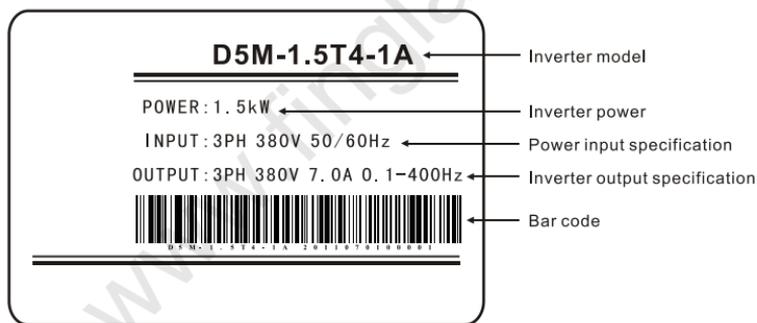


Figure 1-1 Introduction of D5M series ,D6B Series Nameplate

#### 3. Model specification

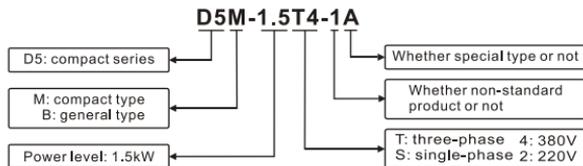


Figure 1-2 Inverter Model Specification

## 1.2 Installation

- Ambient temperature ranges from  $-5^{\circ}\text{C}$  to  $40^{\circ}\text{C}$ , high temperature and moist shall be prevented with the humidity less than 90% (non-condensation).
- Electromagnetic interference shall be prevented and interference source shall be kept away.
- Water drop, steam, dust, cotton dust, and metal powder, as well as oil, salt and corrosive gas shall be prevented entering.
- It is prohibited to install the inverter in environment with inflammable and explosive gas, as well as liquid and solid.
- It is unallowable to install air switch, contactor, capacitor or piezoresistor concerned and other devices at output side, so as to avoid inverter fault and damage to tripping protection or components.
- The inverter shall adopt independent power supply rather than sharing power supply with electric welder, so as to prevent the damage to inverter protection.
- To facilitate cooling and maintenance, the inverter shall be installed vertically with enough space around to ensure ventilation.
- Installation wall shall be made of non-combustible materials like iron plate which shall be prevented from vibration to cause damage to the inverter.
- If several inverters are installed up and down in one cabinet, certain spacing shall be kept and baffle plate shall be set there between.

## 1.3 Use

### 1. Before energizing

- Voltage of the power supply selected must have the same specification with the input voltage of inverter.
- PE refers to earthing terminal, please make sure the motor and inverter are grounded properly to ensure safety.
- Do not set contactor between power supply and inverter to control startup or stop of inverter, otherwise life time of the inverted will be impacted.
- Wiring of main circuit terminal shall be correct, L1.L2.L3 refer to power input terminals which are prohibited to be mixed with U.V.W., otherwise, damage to the inverter may be caused during energizing.

### 2. Energizing

- It is prohibited to plug and unplug the connector on inverter to prevent surge entering the control panel and causing damage to the inverter.
- It is necessary to put the cover in place to prevent electric shock causing personal injury.

### 3. Running

- It is prohibited to enable or disconnect motor unit during the running of inverter, so as to prevent overcurrent tripping even burning the main circuit.
- It is prohibited to remove the front cover of inverter during energizing to prevent electric shock causing personal injury.
- When the failure restart function is started, the motor will restart automatically after the running stops; please keep away from the machine at this time to avoid accident.
- Stop switch will not be enabled until being set, which is different from the emergency switch in use, please pay attention to it.

## 1.4 Storage

- Temperature of the storage environment shall range from  $-20^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$ ;
- Relative humidity of the storage environment shall range from 0% to 95% in dry place without condensation or dust;
- There shall be no corrosive gas and liquid in the storage environment, it shall be put on shelter preferably with proper package;
- Long-term storage of inverter may cause deterioration of electrolytic capacitor, so it is necessary to switch it on over 5h once a year at least, and the voltage must rise to rated voltage value via a voltage regulator when inputting.

## No.2 Product Introduction

### 2.1 Specification of D5M series

Model	Input voltage	Power (KW)	Capacity of driver (KVA)	Output current (A)	Applicable motor (KW)
D5M-0.4S2-1A	Single-phase 220V 50Hz	0.4	1.0	2.5	0.4
D5M-0.75S2-1A	Single-phase 220V 50Hz	0.75	2.0	5.0	0.75
D5M-1.5S2-1A	Single-phase 220V 50Hz	1.5	2.8	7.0	1.5
D5M-2.2S2-1A	Single-phase 220V 50Hz	2.2	4.4	11	2.2
D5M-3.7S2-1A	Single-phase 220V 50Hz	3.7	6.8	17	3.7
D5M-5.5S2-1A	Single-phase 220V 50Hz	5.5	10	25	5.5
D5M-0.4T4-1A	Three-phase 380V 50Hz	0.4	1.2	1.2	0.4
D5M-0.75T4-1A	Three-phase 380V 50Hz	0.75	2.2	2.7	0.75
D5M-1.5T4-1A	Three-phase 380V 50Hz	1.5	3.2	4.0	1.5
D5M-2.2T4-1A	Three-phase 380V 50Hz	2.2	4.0	5.0	2.2
D5M-3.7T4-1A	Three-phase 380V 50Hz	3.7	6.8	8.5	3.7
D5M-5.5T4-1A	Three-phase 380V 50Hz	5.5	10	12.5	5.5
D5M-7.5T4-1A	Three-phase 380V 50Hz	7.5	14	17.5	7.5
D5M-11T4-1A	Three-phase 380V 50Hz	11	19	24	11
D5M-15T4-1A	Three-phase 380V 50Hz	15	26	33	15
D5M-18.5T4-1A	Three-phase 380V 50Hz	18.5	32	40	18.5

### 2.2 General specification of the product

Name	D5M series		
Control mode	V/F curve control		
Input power	380V power: 380±15%	220V	power: 220±15%
Four digital display and status indicator	Display frequency, current, rotating speed, voltage, counter, temperature, forward/reverse		

## NO.2 Product Introduction

		status, fault, etc.
	Communication control	RS-485
	Operating temperature	-10~40℃
	Humidity	Relative humidity ranging from 0 to 95% (without condensation)
	Vibration	Below 0.5G
Frequency control	Range	0.10-400.00Hz
	Accuracy	Digital type: 0.01% (-10-40℃); analog type: 0.1% (25±10℃)
	Setting resolution	Digital type: 0.01Hz; analog type: 1% of the maximum operating frequency
	Output resolution	0.01Hz
	Keyboard setting mode	Set as    directly
	Analog setting mode	External voltage 0-5V, 0-10V, 4-20mA, 0-20mA.
	Other functions	Three hopping frequencies (lower-frequency limit, startup frequency and stop frequency) can be set respectively
General control	Acceleration/deceleration control	4 optional acceleration/deceleration time (0.1-6500 seconds)
	V/F curve	V/F curve can be set optionally
	Torque control	Torque can be set rising with the maximum of 10.0%, and it can reach 150% when starting at 1.0Hz
	Multi-function input terminal	6-way programmable input; realize the functions like 8-segment speed control, program running, 4-segment acceleration/deceleration switching, UP, DOWN function, counter, external emergency stop, etc.
	Multi-function output terminal	1-way programmable output; realize running, zero speed, counter, external exception, program running and other indications as well as alarm.
	Other functions	Automatic voltage regulation (AVR), deceleration stop or free stop, DC brake, automatic reset and restart, frequency tracking, PLC program control, transverse control, draft control, automatic energy-saving running, carrier regulation (up to 20KHz), etc.

## NO.2 Product Introduction

Protection Function	Overload protection	Electric relay protection motor driver (constant torque: 150% per minute, fans: 120% per minute).
	FUSE protection	In case of fuse, the motor stops running
	Over voltage	220V: DC voltage>390V      380V: DC voltage>800V
	Low voltage	220V: DC voltage<200V      380V: DC voltage<400V
	Restart after transient stop	Restart after transient stop through frequency tracking mode
	Stall prevention	Stall prevention during acceleration/deceleration
	Short circuit of output terminal	Electronic circuit protection
	Other functions	Overheating protection of radiating fin, reverse limit, direct startup after operating, fault reset, parameter locking, etc.

## No.3 Wiring

### 3.1 Arrangement of main circuit terminals

L1	L2	L3	DC+	DB	U	V	W
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[Note] Screws on main control board serve as PE terminals for that of 0.4-1.5kW.

### 3.2 Arrangement of control terminals

FA	FB	FC	X6	X5	X4	X3	X2	X1	GND	AI1	AI2	12V	A0
----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	----

### 3.3 Description of main circuit terminals

Symbol of terminal	Name of terminal	Description
L1.L2.L3	Input power terminal	Connected to three-phase 380V power (single-phase 220V grade machine is connected via terminals L1 and L2)
U.V.W	Inverter output terminal	Connected to three-phase motor.
DC+	DC output + terminal	DC bus output terminal is used for connecting external brake unit or common DC bus system. (DC- is not provided for partial models)
DC-	DC output - terminal	
DB	Brake output terminal	Connecting brake resistor between DB and DC+.
PE	Earthing terminal	Inverter housing earthing terminal <b>must be earthed.</b>

### 3.4 Description of control terminals

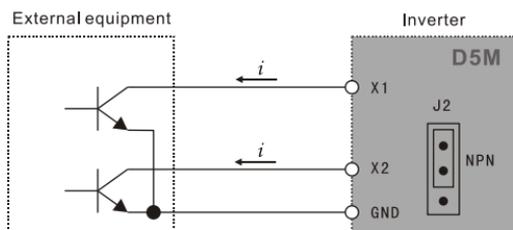
Symbol of terminal	Function of terminal	Description
X1	Multi-function digital input terminals 1-6	Set as forward during delivery
X2		Set as reverse during delivery
X3		Set as reset during delivery
X4		Set as high speed during delivery
X5		Set as medium speed during delivery
X6		Set as low speed during delivery
GND	Digital/analog/communication and power earthing terminals	Isolation of GND inside from PE
12V	+12V power supply	Maximum output current: 150mA
A11	Analog voltage input	Input voltage range: 0-+10V
A12	Analog current/voltage input, selecting via jumper1, default to current input	Input current range: 0-+20mA Input voltage range: 0-+10V
A0	Analog voltage output	Output voltage range: 0-+10V
FA, FB, FC	Multi-function relay output	FA-FC: normally open, FB-FC: normally closed Contact specification: 250VAC/3A, 30VDC/3A
RS+ RS-	RS485 communication interface	Available connection of 1-32 RS485 sites

### 3.5 Description of jumper function

No.	Function	Ex-factory setting
J1	Selection of A12 input type V: Voltage mode mA: Current mode	mA
J2	Selection of X1-X6 wiring mode NPN type or PNP type	NPN

Wiring mode of multi-function digital input terminals X1-X6:

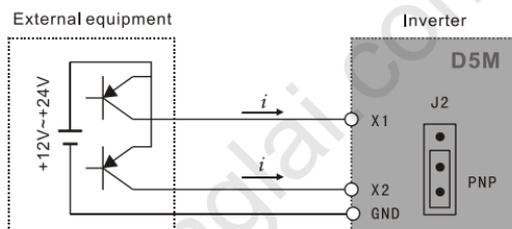
(1) When NPN type wiring mode is adopted for external equipment, leakage type logic is induced and the current flows out from input terminal (sourcing current) as shown in Figure 3-1, at the same time parameter P067=0 is required.



[Note] NPN type wiring mode shall be adopted in case of P067=0.

Figure 3-1 NPN Type Wiring Mode

(2) When PNP type wiring mode is adopted for external equipment, source-type logic is induced, and the current flows into from input terminal (sinking current) as shown in Figure 3-2, at the same time parameter P067=1 is required.



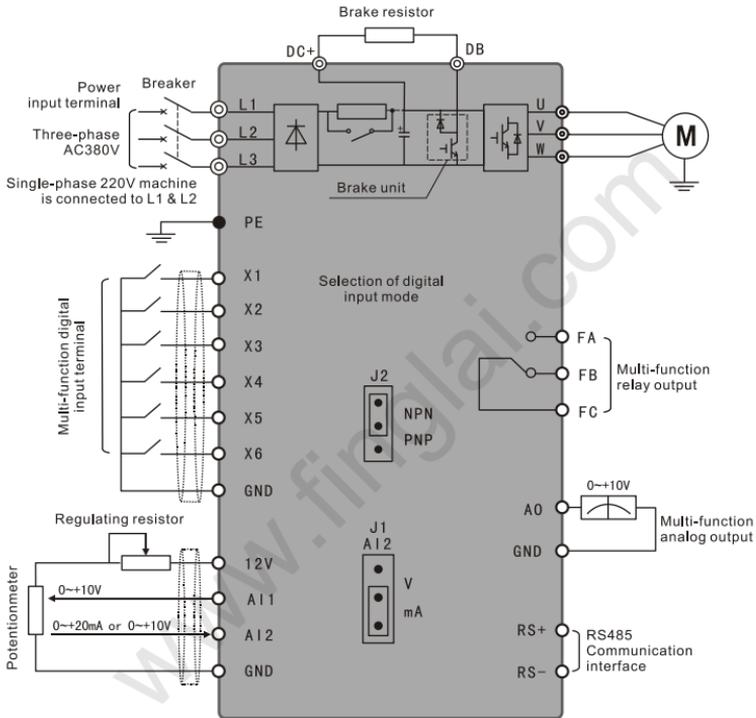
[Note] PNP type wiring mode shall be adopted in case of P067=1, at this time 9v above at input terminal is high level.

Figure 3-2 PNP Type Wiring Mode

### 3.6 Basic wiring diagram

Inverter wiring involves main circuit and control circuit. The user can raise the cover of housing, at this time main circuit terminal and control circuit terminal shall be viewed, and the user must conduct correct connection as per wiring circuit below.

Figure 3-3 below refers to standard wiring diagram of ex-factory D5M series.



- [note] 1)  indicates that shielded wire is adopted for wiring  
 2) ,  and  respectively refer to main circuit terminal, control terminal and earthing screw  
 3) All GNDs are connected inside the drive

Figure 3-3 Standard Wiring of D5M series ,D6B series Inverter

## 1. Main circuit wiring

- During wiring, please select wire diameter specification and conduct wiring as per those specified by electrical engineering laws so as to ensure the safety.
- For power supply wiring, prefer shielded wire or spool, and earth isolating layer or both ends of spool.
- Be sure to install air circuit breaker NFB between the power and input terminal (L1.L2.L3).  
(In case of applying leakage switch, please use the breaker with high frequency solution)
- Do not connect AC power to inverter output terminal (U.V.W).
- Prevent output wire touching metallic part of inverter housing; otherwise, earth short-circuit may be induced.
- Do not apply phase-shifting capacitor, LC, RC noise filter or other elements to output end of inverter.
- Indispensably make main circuit wiring of inverter away from other control equipment.
- When the wire between inverter and motor exceeds 15m (220V grade) or 30m (380V grade), extremely high dV/dT shall emerge inside motor coil and it shall produce damage to layer insulation of the motor, so it is necessary to use AC motor dedicated to inverter or install reactor onto inverter side.
- In case of long distance between inverter and motor, reduce carrier frequency, for the larger the carrier frequency is, the larger the higher harmonic leakage current becomes, which shall produce adverse effect on the inverter and other equipment.

## 2. Control circuit wiring

- It is not allowed to place signal wire and main circuit wire inside the same slot.
- Supply cord of signal wire should be shielded wire with the size of 0.5-2.0mm.
- Control terminal on control board should be correctly used as required.

## 3. Earth wire

- Please properly earth terminal PE of earth wire.

220V grade: The third type earthing (earthing resistance is below 100)

380V grade: Particularly the third type earthing (earthing resistance is below 10)

- Use earth wire as per fundamental length and size specified by electrical equipment technology.
- Absolutely avoid sharing earth electrode with welding machine, power generating machine and other large-scale power equipment and make earth wire away from power line of large-scale equipment as much as possible.
- Earth wire must be short to the utmost extent.

## No.4 Manipulator Description

### 4.1 Description of operation panel appearance and key function

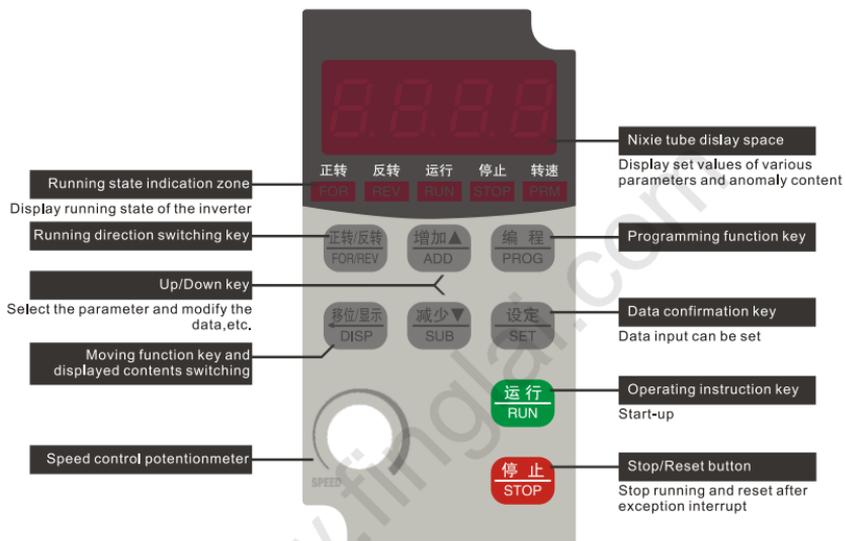


Figure 4-1 D5M Series Digital Manipulator

[Note] Two switching modes of forward and reverse rotation are provided for D5M:

- 1) Press and hold down the key FOR/REV;
- 2) Press the key Program (PROG), then use the keys ▲ and ▼ to select; enter parameter setting interface if pressing the key Program (PROG) again.

### 4.2 Description of indicator functions

Indicator	Function description
FOR	Motor forward
REV	Motor reverse
RUN	Motor is running
STOP	Motor is stopped
PRM	Display motor speed

## 4.3 Description of displayed items

Displayed content	Description
$f 50.0$	Output frequency is 50.0Hz at this time
$F 50.0$	Set frequency is 50.0Hz
$A 03.0$	Output current is 3.0A at this time
$1440$	Output speed is 1440r/min and speed light turns on at this time
$\bar{u} 510$	DC voltage is 510V at this time
$\bar{u} 380$	AC voltage is 380V at this time
$t 35.0$	Inverter temperature is 35.0°C at this time
$0 105$	Counter value is 105 at this time
$\bar{n} 50.0$	PID target value is 50.0%
$\bar{n} 48.0$	PID feedback value is 48.0%

## No.5 Function List

Description of special symbols:

\* indicates that this parameter content has various set values or it shall be specifically set based on actual situation.

Ex-factory value refers to parameter value set during delivery of inverter or parameter value refreshed while the user restores ex-factory operation.

Alteration refers to alternative attribute of the parameter. ○ indicates that the alteration is available during shutdown and operating, × indicates that the alteration is unavailable during operating, and Δ refers to read-only parameter which cannot be altered by the user.

### 5.1 Basic function parameters

Function code	Name of function	Setting range and data content	Ex-factory value	Alteration
P000	Parameter locking	0: Invalid 1: Valid	0	×
P001	Control mode	0: Manipulator 1: External terminal 2: Communication port	0	×
P002	Frequency setting selection	0: Manipulator 1: External terminal 2: Communication port 3: Manipulator potentiometer	0	×
P003	Main frequency	0.00-400.00 Hz	*	○
P004	Reference frequency	0.01-400.00 Hz	50.00	×
P005	Maximum operating frequency	10.00-400.00 Hz	50.00	×
P006	Intermediate frequency	0.01-400.00 Hz	2.5/3.0	×
P007	Minimum frequency	0.01-20.00 Hz	0.50	×
P008	Maximum voltage	0.1V-*	220/380	×
P009	Intermediate voltage	0.1V-*	*	×
P010	Low-frequency torque boost voltage	0.1V-50.0V	*	×
P011	Lower frequency	0.00-400.00 Hz	0	○

	limit			
P012	Reserve			
P013	Parameter resetting	8 restore ex-factory value	00	×
P014	Acceleration time I	0.1-6500.0s	*	○
P015	Deceleration time I	0.1-6500.0s	*	○
P016	Acceleration time II	0.1-6500.0s	*	○
P017	Deceleration time II	0.1-6500.0s	*	○
P018	Acceleration time III	0.1-6500.0s	*	○
P019	Deceleration time III	0.1-6500.0s	*	○
P020	Acceleration time IV	0.1-6500.0s	*	○
P021	Deceleration time IV	0.1-6500.0s	*	○
P022	Reserve			

## 5.2 Application function parameters

Function code	Name of function	Setting range and data content	Ex-factory value	Alteration
P023	Reverse prohibit	0: Reverse prohibit 1: Reverse allow	1	×
P024	Stop key is valid or not	0: STOP invalid 1: STOP valid	1	×
P025	Start mode	0: Start from starting frequency 1: Frequency tracking start	0	×
P026	Stop mode	0: Decelerate stop 1: Free running stop	0	×
P027	Starting frequency	0.10-30.0 Hz	0.5	×
P028	Stop frequency	0.10-30.0 Hz	0.5	×
P029	Start braking time	0.0-25.0s	0.0	×
P030	Stop braking time	0.0-25.0s	0.0	×
P031	DC braking level	0.0-20.0%	2.0	×
P032	Frequency tracking time	0.1-20.0s	5.0	×
P033	Current tracking frequency level	0-200%	150	×
P034	Voltage rise time during frequency tracking	0.1-10.0s	0.5	○
P035-P040		Reserve		
P041	Carrier frequency	0-15	*	×

P042	Jogging frequency	0.00-400.00 Hz	5.00	○
P043	S curve time	0.0-6500.0s	0.0	○

### 5.3 Functional parameters of input/output terminals

Function code	Function name	Setting range and data content	Ex-factory value	Alteration
P044	FOR(X1) function	0: Invalid 1: Run 2: Forward	02	×
P045	REV(X2) function	3: Reverse 4: Stop	03	×
P046	RST(X3) function	5: Forward/reverse	14	×
P047	SPH(X4) function	6: Inching 7: Inching forward	22	×
P048	SPM(X5) function	8: Inching reverse	23	×
P049	SPL(X6) function	9: External control timer I 10: External control timer II 11: Setting frequency is forced to P003 12: Radiator or motor overheating 13: Emergency stop 14: Reset 15-16: Reserve 17: Acceleration/deceleration time selection I 18: Acceleration/deceleration time selection II 19: Multi-segment speed I 20: Multi-segment speed II 21: Multi-segment speed III 22: High speed 23: Medium speed 24: Low speed 25: PID allowed 26: Multi-segment speed IV 27: UP 28: DOWN 29: Draft allowed 30: Reserve 31: Pulse counter 32: Pulse counter resets	24	×
P050	Y1 output function	0: Invalid	01	○
P051	Y2 output function	1: Indication during running	05	○
P052	Output function (KA and KC are terminals)	2: Zero-speed indication 3: Fault indication	00	○

P053	Output function (FA, FB and FC terminals)	4: DC braking indication 5: Setting frequency arrival indication 6: Accelerating indication 7: Decelerating indication 8: Frequency consistency arrival I indication 9: Frequency consistency arrival II indication 10: Motor overload indication 11: Over-torque indication 12: Inverter overload indication 13: Pulse setting counter arrival indication 14: Pulse middle counter arrival indication 15: External control timer I arrival indication 16: External control timer II arrival indication 17: Low-voltage indication 18: Internal control multi-segment speed stage completion indication 19: Internal control multi-segment speed process completion indication 20: 4-20mA wire breakage indication 25: Actuation indication of auxiliary pump 1 26: Actuation indication of auxiliary pump 2 27: Draft completion indication 28: PID lower limit alarm indication 29: PID upper limit alarm indication 30: Actuation indication of brake resistor	03	○
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## NO.5 Function List

		31: Actuation indication of electromagnetic relay 32: Fan actuation indication		
P054	AO output function	Analog voltage output 0-3	0	○
P055	AO analog output gain	0-100%	100	○
P056	Hopping frequency 1	0.00-400.00Hz	0.00	○
P057	Hopping frequency 2	0.00-400.00Hz	0.00	○
P058	Hopping frequency 3	0.00-400.00Hz	0.00	○
P059	Range of hopping frequency	0.10-10.00 Hz	0.50	○
P060	Frequency consistency I	0.00-400.00 Hz	0.00	○
P061	Frequency consistency II	0.00-400.00 Hz	0.00	○
P062	Frequency consistency range setting	0.10-10.00 Hz	0.50	○
P063	Timer I	0.1-10.0s	0.1	×
P064	Timer II	1-100s	1	×
P065	Count value	0-65500	0	○
P066	Value of middle counter	0-65500	0	○
P067	Digital input terminal Positive and negative logic	0: Positive logic, wiring mode NPN 1: Negative logic, wiring mode PNP	01	×
P068-P069		Reserve		

## 5.4 Functional parameters of analog quantity

Function code	Function name	Setting range and data content	Ex-factory value	Alteration
P070	Input channel selection for analog quantity	0: 0-10V 1: 0-5V 2: 0-20mA 3: 4-20mA 4: Overlaying of 0-10V/4-20mA	0	×
P071	Filtering constant of analog quantity	0-50	20	×
P072	High-end frequency of analog frequency	0.00-400.00 Hz	50.00	×
P073	Low-end frequency of analog quantity	0.00-400.00 Hz	0	×
P074	Bias direction of high-end frequency	0: Positive 1: Negative	0	×

P075	Bias direction of low-end frequency	0: Positive 1: Negative	0	×
P076	Selectable negative bias reverse of analog quantity	0: Irreversible 1: Reversible	0	×
P077	UP.DOWN memory function selection	0: Not memorized 1: Memorized	0	×
P078	UP.DOWN increment selection	0: 0.01Hz 1: 0.1Hz	1	×
P079	UP.DOWN increment multiple	1-250	1	×

### 5.5 Functional parameters of multi-segment speed

Function code	Function description	Setting range and data content	Ex-factory value	Alteration
P080	Selection of operating mode	0: Normal operation 1: Internally controlled 16-segment speed 2: Externally controlled 4-segment speed 3: Externally controlled 16-segment speed 4: Draft 5: Disturbance	0	×
P081	Internally controlled multi-segment speed Selection of operation mode	0: Stop after operating for one cycle 1: Circulating operation 2: Stop after automatically operating for one cycle (STOP interval) 3: Automatically circular operating (STOP interval)	0	×
P082	Speed operation directions of first internally controlled 8 segments	0-255 (0: Forward 1: Reverse)	0	×

## NO.5 Function List

P083	Speed operation directions of last internally controlled 8 segments	0-255 (0: Forward 1: Reverse)	0	×
P084	Acceleration/deceleration time of the first internally controlled 8 segments	0-65535s	0	×
P085	Acceleration/deceleration time of the last internally controlled 8 segments	0-65535s	0	×
P086	Frequency II setting	0.00-400.00 Hz	15.00	○
P087	Frequency III setting	0.00-400.00 Hz	20.00	
P088	Frequency IV setting	0.00-400.00 Hz	25.00	
P089	Frequency V setting	0.00-400.00 Hz	30.00	
P090	Frequency VI setting	0.00-400.00 Hz	35.00	
P091	Frequency VII setting	0.00-400.00 Hz	40.00	
P092	Frequency VIII setting	0.00-400.00 Hz	0.50	
P093	Frequency IX setting	0.00-400.00 Hz	10.00	
P094	Frequency X setting	0.00-400.00 Hz	15.00	
P095	Frequency XI setting	0.00-400.00 Hz	20.00	
P096	Frequency XII setting	0.00-400.00 Hz	25.00	
P097	Frequency XIII setting	0.00-400.00 Hz	30.00	
P098	Frequency XIV setting	0.00-400.00 Hz	35.00	
P099	Frequency XV setting	0.00-400.00 Hz	40.00	
P100	Frequency XVI setting	0.00-400.00 Hz	45.00	
P101	Internally controlled multi-segment speed timer I	0.0-6500.0s	10.0	○
P102	Internally controlled multi-segment speed timer II	0.0—6500.0s	10.0	
P103	Internally controlled multi-segment speed timer III	0.0-6500.0s	0.0	
P104	Internally controlled multi-segment speed timer IV	0.0-6500.0s	0.0	
P105	Internally controlled multi-segment speed timer V	0.0-6500.0s	0.0	
P106	Internally controlled multi-segment speed timer VI	0.0-6500.0s	0.0	
P107	Internally controlled multi-segment speed timer VII	0.0-6500.0s	0.0	
P108	Internally controlled multi-segment speed timer VIII	0.0-6500.0s	0.0	
P109	Internally controlled multi-segment speed timer IX	0.0-6500.0s	0.0	
P110	Internally controlled multi-segment speed timer X	0.0-6500.0s	0.0	
P111	Internally controlled multi-segment speed timer XI	0.0-6500.0s	0.0	
P112	Internally controlled multi-segment speed timer XII	0.0-6500.0s	0.0	
P113	Internally controlled multi-segment speed timer XIII	0.0-6500.0s	0.0	
P114	Internally controlled multi-segment speed timer XIV	0.0-6500.0s	0.0	

P115	Internally controlled multi-segment speed timer XV	0.0-6500.0s	0.0	
P116	Internally controlled multi-segment speed timer XVI	0.0-6500.0s	0.0	
P117	Internally controlled multi-segment speed memory function	0-1	0	×

## 5.6 Protection function parameters

Function code	Function	Setting range and function description	Ex-factory value	Alteration
P118	Selection of over-voltage stall	0-1	1	×
P119	Stalling level during accelerating	0-200%	150	×
P120	Stalling level during constant speed	0-200%	0	×
P121	Stalling deceleration time during constant speed	0.1-25.5s	5	○
P122	Stalling level during decelerating	0-200%	150	×
P123	Selection of over-torque detection mode	0-3	0	×
P124	Over-torque detection level	0-200%	0	×
P125	Over-torque detection time	0.1-20.0s	1.0	×
P126	Pulse counter memory	0-1	0	×
P127-P129		Reserve		

## 5.7 Function parameters of constant-pressure water supply

Function node	Function description	Setting range and function description	Ex-factory value	Alteration
P130	Quantity of auxiliary pumps	0-2	0	×
P131	Continuous time of auxiliary pump	1-9000min	60	×
P132	Interlocking time of auxiliary	1-250s	5	○

## NO.5 Function List

	pump			
P133	High-speed operating time	1-250s	60	○
P134	Low-speed operating time	1-250s	60	○
P135	Stop pressure level	1-150%	95	○
P136	Stop level continuous time	1-250s	30	○
P137	Wake-up level	1-150%	80	○
P138	Sleep frequency	0.00-400.0Hz	20.00	○
P139	Continuous time of sleep frequency	1-250s	20	○
P140	Reserve			

## 5.8 Motor function parameters

Function code	Function description	Setting range and function description	Ex-factory value	Alteration
P141	Rated voltage of motor	Set as per motor nameplate	*	
P142	Rated current of motor	Set as per motor nameplate	*	
P143	Number of motor poles			×
P144	Rated rotating speed of motor	02-22 00-9999	04 1440	
P145	Automatic torque compensation	0.0-10.0%	2.0	×
P146	Motor no-load current	0-100%	40	×
P147	Motor slip compensation	0-1.0	0.000	×
P148-P149		Reserve		
P150	AVR function	0-1	1	×
P151	Automatic energy-saving function	0.0-20.0%	0.0	×
P152	Fault restart time	0.2-25.0s	1.0	○
P153	Selection of transient stop restart	0: Invalid 1: Frequency tracking	0	
P154	Allowed power fault time	0.1-5.0s	0.5	×
P155	Times of fault restart	0-10	00	

## 5.9 PID function parameters

Function code	Function name	Setting range and content description	Ex-factory value	Alteration
P156	Proportional constant P	0.0-1000.0%	100.0	○

P157	Integration time I	0.1-3600.0s	5.0	
P158	Derivation time D	0.01-10.00s	0	
P159	Target value	0.0-100.0%	0	
P160	Selection of target value	0: Set by manipulator 1: Set by external terminals (0-10V)	0	×
P161	PID upper limit	0-100%	100	○
P162	PID lower limit	0-100%	0	

### 5.10 Communication function parameters

Function code	Function name	Setting range and content description	Ex-factory value	Alteration
P163	Communication address	0-250	1	
P164	Communication transmission speed	0-3	2	×
P165	Communication data mode	0-5	3	
P166-P168		Reserve		
P169	Selection of communication protocol	0: Standard Modbus Agreement 1: D5M communication protocol	1	×

### 5.11 Monitoring function parameters

Function code	Function	Setting range and content description	Ex-factory value	Alteration
P170	Selection of display content	0-7	2	○
P171	Start of display content	0-7	3	
P172	Fault clearing	00-10 (01 refers to fault clearing)	***00	△
P173	Rated voltage of inverter	Set as per machine model		
P174	Rated current of inverter	Set as per machine model		
P175	Type of inverter	0: Constant torque 1: Fan model		
P176	Frequency standard of inverter	0: 50Hz 1: 60Hz		
P177	Unexpected error 1	Note: — means no fault record	—	△
P178	Unexpected error 2		—	
P179	Unexpected error 3		—	

## NO.5 Function List

P180	Unexpected error 4		—	
P181	Software version No.	00-02	00	Δ
P182-P250		Reserve		

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## No.6 Detailed Function Descriptions

### 6.1 Basic function parameters

P000	Setting range	Unit	Ex-factory value	Change
Parameter locking	0-1	1	0	×

0: Invalid

1: Valid i.e. parameter locking, meaning other parameters are unchangeable except this parameter.

This parameter can avoid mistake operation of non-operators which may cause unnecessary danger and mistake. But after locking parameters, the current frequency can be changed through keys ▲ and ▼.

P001	Setting range	Unit	Ex-factory value	Alteration
Selection of control mode	0-2	1	0	×

0: Keyboard setting Operating command is set by keyboard.

1: External terminals setting Operating command is set by 6-way programmable input terminals.

2: Communication interface setting Operating command is set by transmission of communication interface

P002	Setting range	Unit	Ex-factory value	Alteration
Frequency setting selection	0-3	1	0	×

0: Keyboard setting P003 of former operating frequency is set by keyboard.

1: Analog quantity setting Former operating frequency is controlled by input analog signals and signal type is decided by P070.

Refer to P070-P076 for relevant parameters.

2: Communication interface setting Current operating frequency is set by serial port communication.

3: Potentiometer of manipulator Current operating frequency is set by potentiometer knob on manipulator.

P003	Setting range	Unit	Ex-factory value	Alteration
Main frequency	0.00-400.00 Hz	0.01 Hz	*	×

## NO.6 Detailed Function Description

In case that frequency option is set by keyboard, the frequency operates with set value of P003. During operating, the current operating frequency can be changed with keys ▲ and ▼. In multi-segment operation, main frequency is taken as frequency 1. If P002 is set as 1, i.e. the external analog quantity is set, the frequency 1 is set by analog quantity of external terminals. Main frequency setting is limited by maximum operating frequency.

Relevant parameters: P002 and P080. These parameters are adjustable during operating.

P004	Setting range	Unit	Ex-factory value	Alteration
Reference frequency	0.01-400.00Hz	0.01 Hz	50.00	×

This setting must be conducted as per the motor's rated running voltage frequency on motor nameplate. Generally, the frequency setting value shall not be changed at will. In case of being equipped with special motor, please set properly as per the motor parameter characteristics, otherwise, the equipment will be damaged.

P005	Setting range	Unit	Ex-factory value	Alteration
Maximum operating frequency	10.00-400.00 Hz	0.01 Hz	50.00	×

This parameter decides the maximum operating frequency of the inverter.

P006	Setting range	Unit	Ex-factory value	Alteration
Intermediate frequency	0.01-400.00 Hz	0.01 Hz	2.50	×

This parameter can set the intermediate frequency value in any V/F curve. Improper setting will cause insufficient startup torque of inverter or motor overcurrent and even tripping of inverter. The setting value of intermediate frequency is limited by that of reference frequency.

P007	Setting range	Unit	Ex-factory value	Alteration
Minimum frequency	0.01-20.00 Hz	0.01 Hz	0.50	×

This parameter decides the minimum startup frequency value in V/F curve.

P008	Setting range	Unit	Ex-factory value	Alteration
Maximum voltage	0.1-*	0.1V	220/380	×

This value shall be set as per rated value on motor's nameplate. The ex-factory value of 380V grade is 380V while that of 220V grade is 220V. This parameter setting range is limited by voltage grade of inverter. And at the sites where motor is relatively far away from inverter, this value can be appropriately increased.

P009	Setting range	Unit	Ex-factory value	Alteration
Intermediate voltage	0.1-510.0V	0.1V	15/27.5	×

**[Note] The ex-factory value of 220V grade inverter is 15 while that of 380V grade is 28.**

This parameter can set intermediate voltage values in any V/F curve. Improper setting may cause motor overcurrent or insufficient torque and even inverter tripping. Augmenting intermediate voltage may augment the output torque and the output current will increase at the same time. When modifying this parameter, please monitor the output current so as to avoid overcurrent and tripping of inverter.

Intermediate voltage setting value is limited by maximum voltage setting value. When intermediate voltage increases to a certain value, the torque compensation may lose its utility. When adjusting this parameter, slowly increase the output current of inverter from small to large as per the mechanical load until it meets the startup requirements and do not improve the current with large amplitude, otherwise inverter tripping or equipment damage may occur.

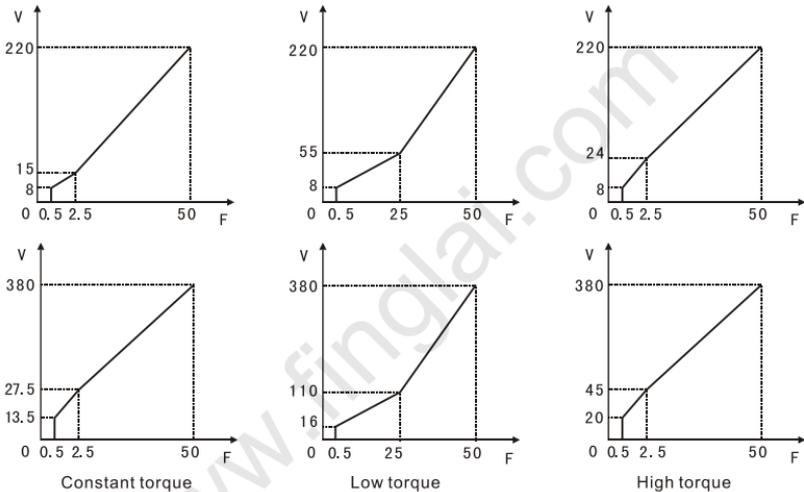


Figure 6-1 Common Curves and Setting Values

P010	Setting value	Unit	Ex-factory value	Alteration
Booster voltage of low-frequency torque	0.1-380.0V	0.1V	*	×

**[Note] The ex-factory value of 220V grade inverter is 7.5 while that of 380V grade is 14.**

This parameter sets the lowest startup voltage value in V/F curve. P010 setting value is limited by voltage of maximum operating frequency. This parameter can compensate the insufficient torque at low frequency, but the torque compensation shall not be too large and shall be set from small to large slowly according to actual situations. Insufficient compensation may cause insufficient torque when motor is at low frequency, while excessive compensation may cause excessive torque and generate impact to machinery and even may cause inverter tripping if severe.

V/F curves are determined by P006-P010. This manual supplies several common V/F curves for reference, such as Figure 6-1. Specific curves shall be set as per mechanical load

## NO.6 Detailed Function Description

characteristics.

P011	Setting range	Unit	Ex-factory value	Alteration
Lower limit of frequency	0.00-400.00	0.01 Hz	0.00	○

The purpose of lower limit of frequency is to prevent misoperation of site personnel and avoid overheat or other mechanical fault due to too low running frequency of motor. The setting of lower limit of frequency must be smaller than the setting value of upper limit of frequency.

P012	Reserve
------	---------

P013	Setting range	Unit	Ex-factory value	Alteration
Parameter reset	00-10	1	00	×

If the setting of parameter values is improper or abnormal, set them as 08 and reset it after the ex-factory value is recovered. After being locked (when P000=1), the parameters can not be reset unless they are unlocked. Relevant parameter: P000.

P014	Setting range	Unit	Ex-factory value	Alteration
Acceleration time I	0.1-6500.0s	0.1s	*	○
P015				
Deceleration time I				
P016				
Acceleration time II				
P017				
Deceleration time II				
P018				
Acceleration time III				
P019				
Deceleration time III				
P020				
Acceleration time IV				
P021				
Deceleration time IV				

Acceleration time refers to the time required by the inverter to accelerate from 0Hz to maximum operating frequency. Refer to  $t_1$  in Figure 6-2 for details; deceleration time refers to the time required by the inverter to decelerate from maximum operating frequency to 0Hz. Refer to  $t_2$  in Figure 6-2 for details.

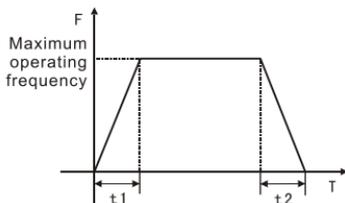


Figure 6-2 Acceleration/deceleration Time Curves

D5M series ,D6B series of inverters define four kinds of acceleration/deceleration time in all from acceleration/deceleration I to IV. Users can select different acceleration/deceleration time through the corresponding function switching of acceleration/deceleration time at external switch terminals as required; and select different acceleration/deceleration time through relevant parameters of internally controlled multi-segment speed during internally controlled multi-segment speed operation.

Generally, the inverter defaults acceleration/deceleration time I. The ex-factory value of acceleration/deceleration time I is set as per model and acceleration/deceleration time IV refers to jog acceleration/deceleration time.

Relevant parameters: P044-P049, P084 and P085.

P022	Reserve
------	---------

## 6.2 Application function parameters

P023	Setting range	Unit	Ex-factory value	Alteration
Reverse prohibit	0-1	1	1	×

0: Reverse prohibit      1: Reverse valid

This parameter setting is applied to sites where motor is irreversible so as to avoid misoperation of operators. When reverse is prohibited, motor can only rotate in a forward way rather than in a reverse way.

P024	Setting range	Unit	Ex-factory value	Alteration
Is stop key valid?	0-1	1	1	×

0: STOP key is invalid      1: STOP key is valid

When control mode refers to external terminal control or communication control, the stop key on the panel can select whether to be valid. If selecting valid, the panel will stop the inverter. If it is necessary to restart, remove the running signal firstly and then restart the inverter.

This parameter is only valid when P001 is set as 1 or 2.

P025	Setting range	Unit	Ex-factory value	Alteration
Startup mode	0-1	1	1	×

Two kinds of startup modes can be set as required by different equipment.

0: Start from startup frequency. When P029 is set as zero, the DC braking at the time of startup is invalid and the startup shall be conducted from start-up frequency. When P029 is not zero, the DC braking at the time of startup is valid; when starting, firstly start the DC braking and then start from start-up frequency.

1: Frequency tracking startup: this parameter can be used to restart of high-inertia load. When restarting, operating command can be executed without fully stopping of equipment and tracking startup also can be made to save time. Refer to Figure 6-3 for details.

Refer to P027, P029 and 031P for relevant parameters.

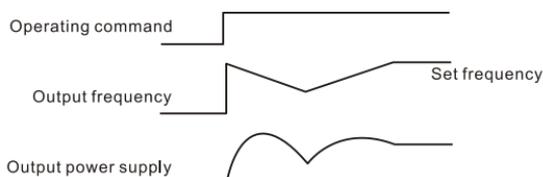


Figure 6-3 Frequency Tracking Startup

**[Note]** During frequency tracking startup, the frequency set by inverter will make

frequency tracking downward and carry out tracking at the maximum speed. During starting, the current may be relatively large and overcurrent or stalling phenomenon may occur. It is necessary to pay attention to the adjustment of tracking current level. P033 is generally set at about 100 and shall be specifically set as per the mechanical inertia.

P026	Setting range	Unit	Ex-factory value	Alteration
Stop mode	0-1	1	0	×

0: For deceleration stop, when P030 is 0, DC braking is invalid. When DC braking is invalid, the inverter will decelerate to stop frequency and stop output, and motor will stop in self-running manner. When P030 is not 0, DC braking is valid, after inverter decelerates to stop frequency, it will stop in DC braking manner. When stopping, DC braking is usually used for high-position stop or positioning control. Note: frequently using DC braking may cause overheat of motor. Relevant parameters are P028, P030 and P031.

1: After free running stop inverter receives stop command, inverter will immediately stop output and motor will stop in free running manner. Under such manner, DC braking is invalid.

P027	Setting range	Unit	Ex-factory value	Alteration
Startup frequency	0.1-30.0 Hz	0.1Hz	0.5	×

Startup frequency refers to initial starting frequency of inverter, for instance, when the startup frequency is set as 5.0 Hz, inverter will run between 5.0Hz to maximum operation frequency after it is started at 5.0Hz.

Relevant parameters: P025, P029 and P031.

P028	Setting range	Unit	Ex-factory value	Alteration
Stop frequency	0.1-30.0 Hz	0.1Hz	0.5	×

When inverter is under deceleration stop and frequency decreases to stop frequency, the inverter will stop output or start DC braking stop.

When P030 is 0, the DC braking when stopping is invalid and inverter will stop output when it decreases to P028. When P030 is set as valid, inverter will stop in DC braking manner when it decreases to P028.

Relevant parameters: P028, P030 and P031.

P029	Setting range	Unit	Ex-factory value	Alteration
DC braking time when starting	0.0-25.0s	0.1s	0.0	×

This parameter will enter DC braking status when it is set as startup and will be input into duration time of motor DC braking current. When it is set as zero, it means the DC braking is invalid. Refer to Figure 6-4 for details.

DC braking startup is usually used when load can move under ventilation status for motor will be in free running status with uncertain direction before inverter outputs voltage. Therefore, we can execute DC braking before startup and then start the motor to avoid the tripping of motor.

Parameters will be valid when P025 is set as zero. Refer to P028, P029 and P031 for relevant parameters.

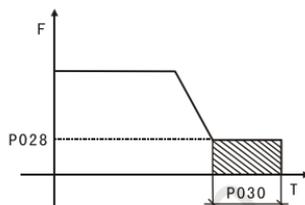
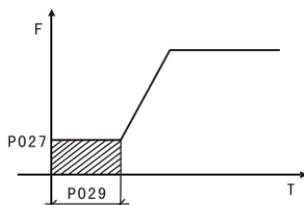


Figure 6-4 DC Braking Time when Starting      Figure 6-5 DC Braking Time when Stopping

P030	Setting range	Unit	Ex-factory value	Alteration
DC braking time when stopping	0.0-25.0s	0.1s	0.0	×

When this parameter is set as non-zero, the DC braking when stopping is valid and it will enter the motor DC braking time. When stopping, DC braking is usually used for high-position stop or positioning control. When this parameter is zero, DC braking is invalid. Refer to Figure 6-5 for details.

This parameter is valid when P026 is set as zero. Refer to P026, P028 and P031 for related descriptions.

P031	Setting range	Unit	Ex-factory value	Alteration
DC braking level	0.0-20.0%	0.1%	2.0	×

This parameter can be used to set the input motor DC braking voltage when starting and stopping and adjusted to obtain different braking voltages. The parameter must be adjusted from small to large slowly until sufficient braking torque is reached, otherwise the motor will be damaged.

100% voltage shall be used for maximum operation frequency.

P032	Setting range	Unit	Ex-factory value	Alteration
Frequency tracking time	0.1-20.0s	0.1s	5.0	×

In case of external exception or temporary power failure, this parameter will be set as frequency tracking time when inverter is executing frequency tracking. In some large inertia load starting and stopping, restarting after machinery fully stops will waste much time for load inertia is large. After frequency tracking is enabled, the starting can be executed without complete stop of machinery. And inverter will conduct frequency tracking from top to down with set frequency and then continue to accelerate to set frequency after tracking.

P033	Setting range	Unit	Ex-factory value	Alteration
Frequency tracking current level	0-200%	1%	150	×

When inverter is executing frequency tracking, output current shall take this set value as level. When output current is larger than this level, the frequency will drop and make current below current level, and then re-execute the frequency tracking.

P034	Setting range	Unit	Ex-factory value	Alteration
Voltage rising time during frequency tracking	0.1-10.0s	0.1s	0.5	○

When startup mode of inverter is set as frequency tracking, there is a voltage rising process. When the voltage rising is too fast, the current will be very large and the tracking process will be fast. If the voltage rising is slow, the current will be small and tracking will also be slow. The general setting mode is that for machinery with small power, P034 shall be set as a small value while for machinery with large power, P034 as a slightly larger value.

P035-P040	Reserve

P041	Setting range	Unit	Ex-factory value	Alteration
Carrier frequency	0-15	1	*	×

[Note] 0-15 is corresponding to 0-20K Hz

Carrier frequency is related to electromagnetic noise of motor as well as to inverter's heat productivity and disturbance to environment. Refer to the following table:

Carrier frequency	Electromagnetic noise	Heat productivity	Disturbance to environment
Small ↓ Large	Large ↓ Small	Small ↓ Large	Small ↓ Large

Carrier Mapping Table

Setting value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Carrier frequency KHz	0.7	1	1.5	2	3	4	5	7	8	9	10	11	13	15	17	20

The higher the carrier frequency is, the smaller the motor's electromagnetic noise will be, but the disturbance to other systems will be stronger and the heat productivity of inverter will be larger. When the ambient temperature is relatively high and the motor load is relatively heavy, we can appropriately reduce the carrier frequency to improve the heat characteristics of inverter. The ex-factory value of carrier frequency is set as per model.

## NO.6 Detailed Function Description

P042	Setting range	Unit	Ex-factory value	Alteration
Jog frequency	0.00-400.00Hz	0.01Hz	5.00	○

This parameter can realize the jog function in machine testing and jog operation only can be realized through 6-way programmable terminals. Jog frequency is limited by maximum operation frequency and lower frequency limit. When the jog function is enabled, other operating command will not be accepted and the acceleration time of jog frequency is determined by acceleration time IV. After the jog button is released, inverter will immediately stop output. When realizing the jog function, please set any one of corresponding 6-way programmable terminals as 07 or 08.

Jog function is only valid under shutdown status but invalid during running.

Refer to P044-P049 for relevant parameters.

P043	Setting range	Unit	Ex-factory value	Alteration
S curve time	0.0-6500.0s	0.1s	0.0	○

This parameter is used to set the soft start or soft stop without impact during start or stop of inverter; when S curve is started, the inverter will make the acceleration/deceleration curves with different speed as per the acceleration/deceleration time. Refer to Figure 6-6 for S curve time description.

When P043 is set as zero, S curve is invalid, i.e. it will accelerate and decelerate in a straight line, irrespective of stalling situation, this parameter will be valid when P014 is smaller than P043 provided that the actual acceleration is  $(P014+P043)/2$ .

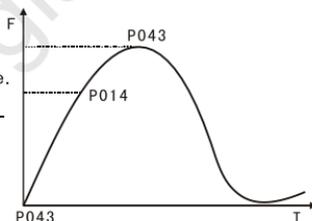


Figure 6-6 S Curve Time

### 6.3 Functional parameter of input/output terminals

P044	Setting range	Unit	Ex-factory value	Alteration
X1 terminal function	00-32	1	02	×
P045			03	
X2 terminal function			14	
P046			22	
X3 terminal function			23	
P047			24	
X4 terminal function				
P048				
X5 terminal function				
P049				
X6 terminal function				

01: RUN refers to running, and can form several control mode in combination with other terminals.

02: FOR refers to forward rotating

03: REV refers to reverse rotating

04: STOP refers to stopping

05: FOR/REV refers to forward/reverse switching, which may also be enabled through three-wire connection. Refer to the following text for details.

06: JOG refers to jog

07: Jog forward, with related parameters of P020 and P042.

08: Jog reverse, with related parameters of P020 and P042.

09: External control timer 1 start

10: External control timer 2 start

Upon contact closure, the timer is started to time. When time is over, multi-functional output point will be actuated.

11: Set forced frequency switching as P003.

## NO.6 Detailed Function Description

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12: In case radiator or motor is overheating, this contact shall be used for detection to protect motor and inverter.

13: Emergency cut-off may receive external fault signals such as emergency stop.

14: Reset can be used after fault elimination.

15-16: Reserve

17: Acceleration/deceleration time selection I

18: Acceleration/deceleration time selection II

Four selections of acceleration/deceleration time for inverter are given here.

19: Multi-segment speed I

20: Multi-segment speed II

21: Multi-segment speed III      16-segment speed can be set with multi-segment speed I, II, III and IV.

22: High speed

23: Medium speed

24: Low speed

Combination of high, medium and low speed can enable three running modes with different frequency, wherein high-end signal prevails. Three kinds of speed are respectively determined by frequency II, III and IV.

25: PID is allowed to close; PID function is enabled and is allowed to be only effective during running.

26: Multi-segment speed IV

27: UP function

28: DOWN function

Upon actuation of this terminal, inverter frequency will increase or decrease for one unit. When switch is retained, frequency will uniformly change after rapidly increasing or decreasing to some extent. Altered frequency can be memorized or not based on parameter selection in case of power failure and recover.

29: Draft allowance      Draft actuation is allowed upon triggering of this contact.

31: Pulse counter      This terminal can receive pulse signals not more than 250Hz and make counting after being set as counter.

32: Counter reset      Actuation of this contact will make current count value eliminated, with "C00" showed and recounting conducted.

### ◆ Three-wire connection

Three multi-functional terminals shall be used for three-wire connection to enable switching between forward and reverse rotating, which is widely used for optoelectronic switch and other cases, as shown in Figure 6-7.

- (1) Button description      B1: Forward Button (normally open), with effective edge  
                                   B2: Reverse Button (normally open), with effective edge  
                                   B3: Stop Button (normally closed), with effective edge
- (2) Parameter set            P001=1 under external terminal control  
                                   P044=02 X1 is set as forward function  
                                   P045=03 X2 is set as reverse function  
                                   P046=04 X3 is set as stop function
- (3) Actuation description    Triggering of X1 enables inverter forward (start);  
                                   Triggering of X2 enables inverter reverse;  
                                   Disconnection of normally closed button B3 enables inverter stop.

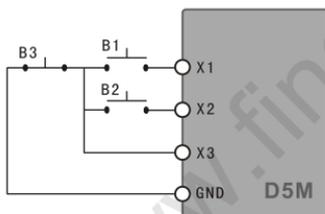


Figure 6-7 Three-wire Wiring Diagram

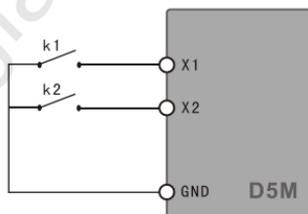


Figure 6-8 Two-wire Wiring Diagram

### ◆ Two-wire connection

Enable start, stop, forward/reverse switching, as shown in Figure 6-8.

- (1) K1 and K2 refer to effective level.
- (2) Parameter set            P001=1 under external terminal control  
                                   P044=01 X1 is set as RUN function  
                                   P045=05 X2 is set as FOR/REV switching function
- (3) Actuation description    Upon closing of K1, inverter runs in a forward way when K2  
                                   is disconnected and in a reversed way when K2 is closed.

### ◆ Acceleration/deceleration time selection I & II

X4 terminal	X5 terminal	Result
OFF	OFF	Acceleration/deceleration time I
ON	OFF	Acceleration/deceleration time II
OFF	ON	Acceleration/deceleration time III
ON	ON	Acceleration/deceleration time IV

[Description] 1) This function is enabled when P080 is set as 0, 2 and 3 and disabled upon disturbed and internally controlled multi-segment speed;

2) Four selections of acceleration/deceleration are available with combination of any two multi-function input terminals;

3) Related multi-function input terminals are set as acceleration/deceleration time selection I and II. Take terminals X4 and X5 for example. If P047 of terminal X4 is set as 17 and P048 of terminal X5 is set as 18, then acceleration/deceleration time selection I and II are enabled for terminals X4 and X5 respectively.

◆Function of high, medium and low speed terminals

RUN	X6 terminal	X5 terminal	X4 terminal	Result
ON	OFF	OFF	OFF	Main speed, with set value of P003 as the frequency
ON	ON	OFF	OFF	Low speed, with set value of P086 as the frequency
ON	ON/OFF	ON	OFF	Medium speed, with set value of P087 as the frequency
ON	ON/OFF	ON/OFF	ON	High speed, with set value of P088 as the frequency

[Description] 1) This function is only enabled when P080 is set as 2, i.e. externally controlled 4-segment speed is effective;

2) Acceleration/deceleration time is determined through acceleration/deceleration selection terminal;

3) In case of simultaneous signals from high, medium and low speed, priority shall be given as per the sequence of high, medium and low speed.

◆UP and DOWN functions

UP	DOWN	Result
ON	OFF	Frequency up
OFF	ON	Frequency down

ON	ON	Frequency remains the same
----	----	----------------------------

[Description] 1) UP and DOWN functions are only enabled when the frequency source is under keyboard operation, i.e. P002 is 0.

2) UP and DOWN functions are effective during running and the frequency cannot be changed during standby.

3) Operating frequency will not rise when it reaches the maximum.

4) Operating frequency will not decrease when it reaches the minimum or lower limit.

5) When UP and DOWN functions are adopted, up and down speed shall be dependent on current acceleration/deceleration time.

6) If UP or DOWN is long pressed, the frequency will rapidly increase or decrease to some extent and then increase or decrease uniformly.

7) The value modified through UP or DOWN may be memorized or not through setting of P077. Refer to description of parameter P077 for details.

#### ◆ Description of counter function

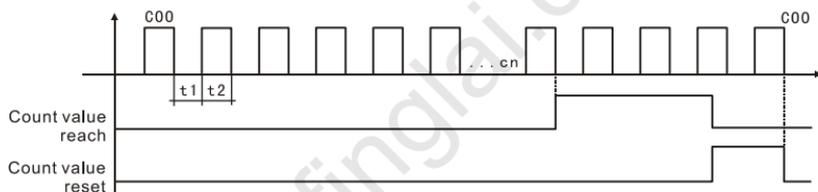


Figure 6-9 Description Diagram of Counter Function

[Description] 1) Trigger signal duration shall not be lower than 2ms ( $t_1, t_2 \geq 2\text{ms}$ )

2) Count value reach is corresponding to actuation of multifunctional output contact.

3) Recounting may be conducted only after the counter is reset;

4) The counter will stop counting upon 65535.

P050	Setting range	Unit	Ex-factory value	Alteration
Y1 output function	00-32	1	01	○
P051			05	
Y2 output function			00	
P052				
Output function of terminals KA and KC				

## NO.6 Detailed Function Description

P053			03	
Output function of terminals FA, FB and FC				

01: Indications during running	Contact is enabled in case of output or running indication from inverter.
02: Zero-speed indication	Contact is enabled if output frequency is less than start-up frequency.
03: Fault indication	Contact is enabled in case inverter is abnormal.
04: DC braking indication	Contact is enabled if inverter is under DC braking condition.
05: Set frequency reaching indication	Contact is enabled if output frequency reaches set frequency.
06: Underway acceleration indication	Contact is enabled if inverter is under accelerating condition.
07: Underway deceleration indication	Contact is enabled if inverter is under decelerating condition.
08: Frequency consistency I arrival indication	Contact is enabled if output frequency reaches designated frequency (P60).
09: Frequency consistency II arrival indication	Contact is enabled if output frequency reaches designated frequency (P61).
10: Motor overload warning indication	Contact is enabled if motor overload is detected by the inverter.
11: Torque rich detection indication	Contact is enabled if torque rich is detected by the inverter.
12: Inverter overload warning indication	Contact is enabled if overload is detected by the inverter.
13: Pulse set counter reaching indication	Contact is enabled if count value reaches set value (P065) when external counter is executed.
14: Pulse medium counter reaching indication	Contact is enabled if count value reaches set value (P066) when external counter is executed.
15: External control timer I reaching indication	Contact is enabled if timer I reaches set value.
16: External control timer II reaching indication	Contact is enabled if timer II reaches set value.

17: Low voltage warning indication	Contact is enabled if low voltage is detected by the inverter.
18: Stage completion indication for internally controlled multi-segment speed	Contact is enabled and one pulse is output after each stage is completed under programming operation of the inverter.
19: Process completion indication for internally controlled multi-segment speed	Contact is enabled and one pulse is output after all stages are completed (i.e. after one circle) under programming operation of the inverter.
20: 4-20mA disconnection indication	Contact is enabled if AI input signal is disconnected and P070 is more than 2.
21-24: Reserve	
25: Actuation indication of auxiliary pump 1	Contact controls start-up and stop of the auxiliary pump. Refer to description of multi-pump operation for details.
26: Actuation indication of auxiliary pump 2	
27: Draft completion indication	Contact is enabled when draft is completed and it will automatically reset when the inverter stops.
28: PID lower limit warning indication	Contact is enabled if PID feedback quantity is less than the lower limit (P162).
29: PID upper limit warning indication	Contact is enabled if PID feedback quantity is more than the upper limit (P161).
30: Braking resistor actuation indication	Contact is enabled if the inverter is under operation and DC voltage is higher than braking voltage.
31: Electromagnetic relay actuation indication	Corresponding contact is enabled when contactor pulls in.
32: Fan actuation indication	Corresponding contact is enabled when the inverter temperature rises or the inverter is running.

P054	Setting range	Unit	Ex-factory value	Alteration
A0 output function	0-3	1	0	○

Digit frequency output terminal outputs pulse quantity or 0-10V analog quantity. In combination with P055, it can be used for external monitoring after being connected to corresponding instruments with range under 10V.

0: 0-10V analog quantity output, corresponding to output frequency, 0-10V corresponding to

0-maximum operation frequency

1: 0-10V analog quantity output, corresponding to output current, 0-10V corresponding to 0-two times of rated current of the inverter

2: Analog quantity output, corresponding to DC bus voltage, 0-10V corresponding to 0-1000V

3: Analog quantity output, corresponding to output AC voltage, 0-10V corresponding to 0-510V/255V

**[Note] Three-phase 380V model is corresponding to 510V and single-phase 220V model is corresponding to 255V.**

P055	Setting range	Unit	Ex-factory value	Alteration
A0 analogy output gain	0-100%	1%	100	○

This parameter can be used to adjust output voltage of analog terminal so as to adapt to frequency instrument with different range and to calibrate the instruments. It can also be used for calibration if a revolution meter with a range of 0-5V is connected to display operating frequency through multi-functional terminals, with P055 set as 50.

P056	Setting range	Unit	Ex-factory value	Alteration
Hopping frequency 1	0.00-400.00 Hz	0.01Hz	0.0	○
P057				
Hopping frequency 2				
P058	0.10-10.00 Hz	0.01Hz	0.5	
Hopping frequency 3				
P059	0.10-10.00 Hz	0.01Hz	0.5	
Hopping frequency range				

To avoid mechanical resonance point, these three frequency hopping points are set. The actual hopping frequency range is two times that of P059 and all hopping frequency will be invalid when P059=0, as shown in Figure 6-10.

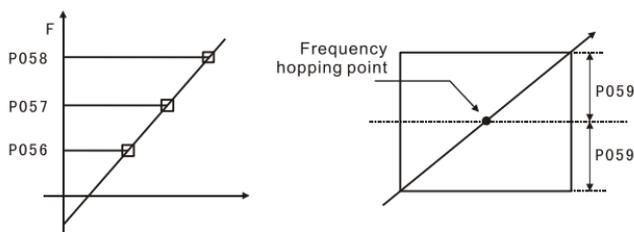


Figure 6-10 Frequency Hopping

P060	Setting range	Unit	Ex-factory value	Alteration
Frequency consistency I	0.00-400.00 Hz	0.01Hz	0.00	○
P061				
Frequency consistency II	0.10-10.00 Hz	0.01Hz	0.50	
P062				
Frequency consistency range				

When output frequency is more than consistent frequency, corresponding multi-functional output terminal is enabled, with consistent frequency range as a hysteresis loop. When the inverter is used for constant-pressure water supply, P060 is used as high-speed frequency and P061 is set as low-speed frequency.

P063	Setting range	Unit	Ex-factory value	Alteration
Time set of external control timer I	0.1-10.0s	0.1s	0.1	×
P064	1-100s	1s	1	×
Time set of external control timer II				

External control timer I is a timer of 0.1S-10.0s and external control timer II is of 1s-100s. When multi-functional input terminal timer opens or closes, the timer starts to time; when the timer reaches, corresponding multi-functional output contact is enabled; when the timer disconnects, multi-functional output terminal timer resets. During operation, the timer will continue timing normally in spite of stop due to fault and will reset automatically in case of stop due to power failure.

P065	Setting range	Unit	Ex-factory value	Alteration
Pulse count value set	0-65500	1	0	○
P066	0-65500	1	0	○
Pulse medium counter set				

6-way multi-function input terminals can be used as trigger terminal of the counter. When count value reaches the set value P065, corresponding multi-functional output contact is enabled. After zero clearing, the counter resets to enable recounting. Proximity switch and optoelectronic switch can be used for trigger signal.

P067	Setting range	Unit	Ex-factory value	Alteration
Positive and negative logic of digital input terminal	0-1	1	0	×

0: Positive logic, with NPN as wiring mode

1: Negative logic, with PNP as wiring mode

It shall be used together with Jumper J2. In case of NPN as the external wiring mode, J2 jumps to NPN, with P067 set as 0; in case of PNP as the external wiring mode, J2 jumps to

PNP, with P067 set as 1.

P068-P069	Reserve
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## 6.4 Functional parameter of analog quantity

P070	Setting range	Unit	Ex-factory value	Alteration
Input channel selection for analog quantity	0-4	1	0	×

There are two channels AI1 and AI2 and three modes to be selected for analog quantity input:

[Channel 1] 0: 0-10V 1: 0-5V

[Channel 2] 2: 0-20mA/0-10V 3: 4-20mA/2-10V

[Overlying of channel 1 and channel 2] 4: Overlying of 0-10V and 4-20mA/2-10V

**[Note] Current or voltage input can be selected by channel 2 through jumper J1**

This parameter can be set to satisfy different analog input signals.

When P070=4, output frequency is equal to  $1/2 (U/U_{max} + I/I_{max}) \times 50\text{Hz}$ , wherein:

U: analog quantity voltage

$U_{max}$ : Maximum analog quantity voltage

I: analog quantity current

$I_{max}$ : Maximum analog quantity current

P071	Setting range	Unit	Ex-factory value	Alteration
Filtering constant of analog quantity	0-50	1	20	×

Setting of this parameter is related to reaction speed of analog quantity; the larger the P071 is set, the slower the analog quantity makes response.

P072	Setting range	Unit	Ex-factory value	Alteration
High-end frequency of analog quantity	0.00-400.00 Hz	0.01 Hz	50.00	×
P073	0.00-400.00 Hz	0.01 Hz	0.00	×
Low-end frequency of analog quantity				
P074	0-1	1	0	×
Bias direction of high-end frequency				
P075	0-1	1	0	×
Bias direction of low-end frequency				

0: Positive direction 1: Negative direction

Bias direction refers to forward/reverse command instruction; positive bias represents forward and negative bias symbolizes reverse. Refer to diagram description of P076 for details.

P076	Setting range	Unit	Ex-factory value	Alteration
Reverse selection for negative bias of analog quantity	0-1	1	0	×

0: Reverse unavailable for negative bias 1: Reverse available for negative bias

This parameter can be used to set range and zero point of external analog terminal, thus composing any form of curve to control the motor, as shown in Figure 6-11.

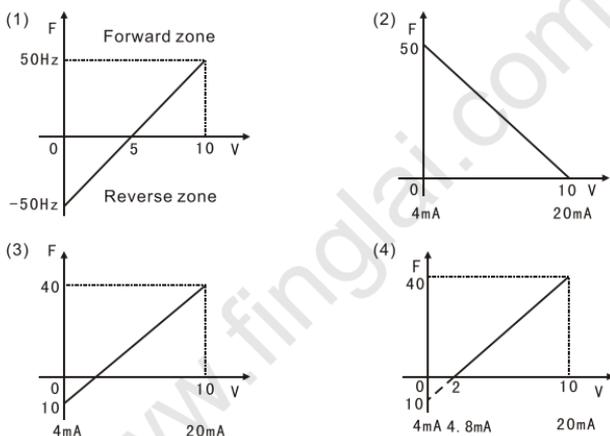


Figure 6-11 Setting Curve for Analog Quantity

(1) Parameters: P073=50 P075=1 P072=50 P074=0 P076=1

**[Description]** The curve can be used to make easy combination with other systems for various complex applications. When the curve is applied, forward/reverse instruction of external terminals is still effective, meaning the curve will be reversed upon forward/reverse switching.

(2) Parameters: P073=50 P075=0 P072=0 P074=0 P076=0

**[Description]** The curve is specially applied to negative slope setting, where pressure and temperature are controlled by transducer, with a large quantity of pressure and output signals. Therefore, the curve exactly meets requirements when stop or deceleration is required of corresponding inverter.

(3) Parameters: P073=10 P075=1 P072=40 P074=0 P076=1

**[Description]** It can be widely and flexibly used by users.

(4) Parameters: P073=10 P075=1 P072=40 P074=0 P076=0

**[Description]** This curve is an extended one of the above curve. 2V-10V (4.8mA-20mA) is corresponding to 0Hz-40Hz and signals of 0V-2V (4-4.8mA) are invalid. The curve can be used to avoid noise disturbance. Under severe environment, signals under 1V shall not be used as far as possible to set operating frequency of the inverter.

P077	Setting range	Unit	Ex-factory value	Alteration
Memory function selection for UP and DOWN	0-1	1	0	×

0: Not memorized      1: Memorized

This parameter can be used to select whether the value modified through UP and DOWN is memorized or not after stop. When P077 is set as 1, the value upon stop will be memorized after re-startup; when P077 is set as 0 or the inverter is restarted after power failure, the value modified through UP and DOWN as well as the value whose frequency is set as P003 will not be memorized.

Refer to P044-P049 description for details about related parameters.

P078	Setting range	Unit	Ex-factory value	Alteration
Increment selection For UP and DOWN	0-1	1	0	×

0: For 0.01HZ, minimum up/down speed is 0.01HZ

1: For 0.1HZ, minimum up/down speed is 0.1HZ

This parameter can be used to adjust up/down speed unit for UP and DOWN to meet users' need.

P079	Setting range	Unit	Ex-factory value	Alteration
Increment multiple for UP and DOWN	1-250	1	0	×

The actual increment of UP and DOWN refers to the result after values of P078 and P079 are multiplied.

## 6.5 Functional parameters of multi-segment speed

P080	Setting range	Unit	Ex-factory value	Alteration
Operation mode selection	1-5	1	0	×

0: Common operation refers to operation in a commonly controlled way.

1: Internally controlled multi-segment speed (16-segment speed)

**[Description] 1) 16-segment speed is composed by main speed and 15-segment speed;**

**2) Acceleration/deceleration time of each segment speed is set through P084 and P085;**

**3) Operating time is set by timers P101-P116 and timers for unused control segments are set as 0;**

**4) Operating direction of each segment speed is set through P082 and P083;**

**5) Under operation of internally controlled multi-segment speed, operating time and direction is dependent on the setting of internal parameters, with invalid external time and forward/reverse switching.**

2: Externally controlled 4-segment speed (refer to function description for high-speed, medium-speed and low-speed terminals P044-P049)

3: Externally controlled 16-segment speed

Multi-function digital input terminal				Result
Multi-segment speed I	Multi-segment speed II	Multi-segment speed III	Multi-segment speed IV	
OFF	OFF	OFF	OFF	Main frequency
ON	OFF	OFF	OFF	For multi-segment speed II, the frequency is determined by P086
OFF	ON	OFF	OFF	For multi-segment speed III, the frequency is determined by P087
ON	ON	OFF	OFF	For multi-segment speed IV, the frequency is determined by P088
OFF	OFF	ON	OFF	For multi-segment speed V, the frequency is determined by P089

ON	OFF	ON	OFF	For multi-segment speed VI, the frequency is determined by P090
OFF	ON	ON	OFF	For multi-segment speed VII, the frequency is determined by P091
ON	ON	ON	OFF	For multi-segment speed VIII, the frequency is determined by P092
OFF	OFF	OFF	ON	For multi-segment speed IX, the frequency is determined by P093
ON	OFF	OFF	ON	For multi-segment speed X, the frequency is determined by P094
OFF	ON	OFF	ON	For multi-segment speed XI, the frequency is determined by P095
ON	ON	OFF	ON	For multi-segment speed XII, the frequency is determined by P096
OFF	OFF	ON	ON	For multi-segment speed XIII, the frequency is determined by P097
ON	OFF	ON	ON	For multi-segment speed XIV, the frequency is determined by P098
OFF	ON	ON	ON	For multi-segment speed XV, the frequency is determined by P099
ON	ON	ON	ON	For multi-segment speed XVI, the frequency is determined by P100

**[Description] 1) When P080 is set as 3, externally controlled multi-segment speed mode is effective;**

**2) Any four digital input terminals are selected, with their functions set as 19 multi-segment speed I, 20 multi-segment speed II, 21 multi-segment speed III and 26 multi-segment speed IV respectively;**

**3) Multi-segment speed I, II, III and IV can be used to form 15-segment speed; 16-segment speed will be available when main frequency is involved;**

**4) Each acceleration/deceleration time and programming operation direction is determined by external terminals X1-X2;**

**5) Main frequency is set by P002; when P002=0, i.e. main frequency is set by manipulator, main frequency is value of P003.**

4: Draft is a special parameter used to realize a constant speed for taking up and paying off of curl cord, i.e. constant linear speed can be realized within certain accuracy, as shown in

Figure 6-12.

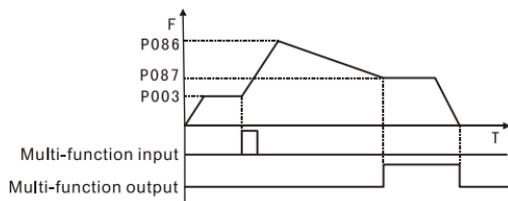


Figure 6-12 Daft Actuation Curve

**[Description] 1) Draft will be actuated upon triggering of the external multi-function terminal.**

**2) During draft actuation, running time T is  $P101 \times 10$ .**

**3) After the completion of draft actuation, the inverter outputs at a constant speed (P087), and corresponding multi-function output contacts are actuated until the stop command is issued, and then, the inverter stops running, and multi-function output contact resets.**

5: Disturbance (traverse function) This parameter is specific for the chemical fiber, printing and dyeing; any command input, except stop, external fault, and emergency stop in the running, is not accepted.

**[Description] 1) Each frequency of the turning point is determined by P003 and P086;**

**2) The hopping frequency is determined by P092;**

**3) The running time is determined by P101 and P102;**

**4) Related parameters: P003 and P086-P116.**

P081	Setting Range	Unit	Ex-factory value	Alteration
Running mode selection of internally controlled multi-segment speed	0-3	1	0	×

0: Program running stops after one cycle

1: Circular running

2: Automatic running (stop interval) stops after one cycle

3: Automatic running (stop interval) in circular running.

This parameter setting is only effective when P080 is set as 4. Refer to P003, P080, and P082-P116 for related parameters.

**[Description] 1) Program running stops after one cycle: the inverter runs at the set value of internal parameters after the command of automatic program running is given, and stops automatically after running for one cycle. The inverter can restart after the second running command is given.**

2) **Circular running:** the inverter runs in sequence and circularly at the set value of internal parameters for segment speed frequency and running time; any command input, except stop, external fault, and emergency stop in the circular running, is not accepted.

3) **Automatic running (stop interval) stops after one cycle.**

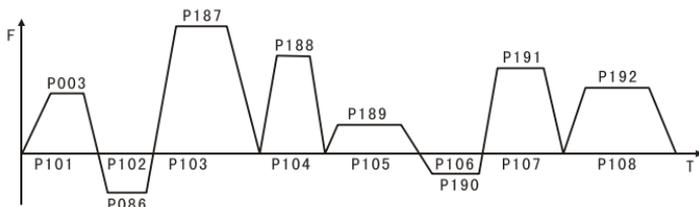


Figure 6-13 Running Curve and Control Parameters for Internally Controlled Multi-segment Speed

[Description] 1) The inverter runs according to parameters after the command of automatic programming running is given, but stop first and then restart in the transformation of each stage; stop automatically after running for one cycle, and the inverter restarts after the second running command is given;

2) The frequency for each segment speed is set by P003 and P086-P092;

3) The running time for each segment speed is set by P101-P108;

4) The running direction is set by P082.

P082	Setting Range	Unit	Ex-factory value	Alteration
Speed running direction of first 8 segments	0-255	1	0	×
P083			0	×
Speed running direction of last 8 segments				

This parameter set is only effective when P080 is set as 1. The setting mode of running direction for frequency band of P086-P092 and P003 in the programming running is as follows:

The running direction is set by binary 8bit which can be changed into decimal value for the parameter setting. For example, parameter value 01001010 can be changed into decimal value, i.e.,  $1 \times 2^6 + 1 \times 2^3 + 1 \times 2^1 = 64 + 8 + 2 = 74$ , P082=74. P083 is set for the speed running direction of last 8 segments (calculation method is as the same as that for P082).

P084	Setting Range	Unit	Ex-factory value	Alteration
Acceleration/deceleration time	0-65535s	1s	0	×

## NO.6 Detailed Function Description

selection for first 8 segments				
P085				×
Acceleration/deceleration time selection for last 8 segments				

This parameter set is only effective when P080 is set as 1. The setting methods of acceleration/deceleration time for internally controlled multi-stage speed and segment speed are as follows:

(1) Acceleration/deceleration time is determined by binary 2bit

Bit1	Bit0	Acceleration/deceleration time
0	0	First acceleration/deceleration time P014, P015
0	1	Second acceleration/deceleration time P016, P017
1	0	Third acceleration/deceleration time P018, P019
1	1	Fourth acceleration/deceleration time P020, P021

(2) Acceleration/deceleration time for each segment is determined by binary 16bit

Eighth segment speed		Seventh segment speed		Sixth segment speed		Fifth segment speed		Fourth segment speed		Third segment speed		Second segment speed		First segment speed	
t8		t7		t6		t5		t4		t3		t2		t1	
0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1

t1 acceleration/deceleration time IV

t2 acceleration/deceleration time I

t3 acceleration/deceleration time III set value

t4 acceleration/deceleration time II  $1 \times 2^0 + 1 \times 2^1 + 1 \times 2^5 + 1 \times 2^6 = 99$

t5 acceleration/deceleration time I P084 is set as 99

t6 acceleration/deceleration time I Attached:  $2^0=1$   $2^1=2$   $2^2=4$   $2^3=8$

t7 acceleration/deceleration time I  $2^4=16$   $2^5=32$   $2^6=64$   $2^7=128$

t8 acceleration/deceleration time I

P085 is a selection for the acceleration/deceleration time of last 8 segments (calculation method is the same as that for P084).

P086	Setting Range	Unit	Ex-factory Value	Alteration
Frequency II setting	0.00-400.00 Hz	0.01 Hz	15	○
P087			20	
Frequency III setting			25	
P088			30	
Frequency IV setting			35	
P089			40	
Frequency V setting			0.5	
P090			10	
Frequency VI setting			15	
P091			20	
Frequency VII setting			25	
P092			30	
Frequency VIII setting			35	
P093			40	
Frequency IX setting			45	
P094				
Frequency X setting				
P095				
Frequency XI setting				
P096				
Frequency XII setting				
P097				
Frequency XIII setting				
P098				
Frequency XIV setting				
P099				
Frequency XV setting				
P100				
Frequency XVI setting				

The parameter can be set, combining multi-function input terminals, with externally controlled 4-segment speed, externally controlled multi-segment speed and internally controlled multi-segment speed selectable. Refer to P080 and P086-P100 description for details about related parameters.

## NO.6 Detailed Function Description

P101	Setting Range	Unit	Ex-factory Value	Alteration
Timer I	0.0-6500.0s	0.1s	10.0	○
P102			10.0	
Timer II			0.0	
P103			0.0	
Timer III			0.0	
P104			0.0	
Timer IV			0.0	
P105			0.0	
Timer V			0.0	
P106			0.0	
Timer VI			0.0	
P107			0.0	
Timer VII			0.0	
P108			0.0	
Timer VIII			0.0	
P109			0.0	
Timer IX	0.0			
P110	0.0			
Timer X	0.0			
P111	0.0			
Timer XI	0.0			
P112	0.0			
Timer XII	0.0			
P113	0.0			
Timer XIII	0.0			
P114	0.0			
Timer XIV	0.0			
P115	0.0			
Timer XV	0.0			
P116	0.0			
Timer XVI	0.0			

The parameter setting is applicable to the running time setting for internally controlled multi-segment speed and draft actuation. Refer to P080 and P101-P116 description for details about related parameters.

P117	Setting Range	Unit	Ex-factory Value	Alteration
Memory function for internally controlled multi-segment speed	0-1	1	0	×

0: Not memorized 1: Memorized

This parameter determines the pause function during inverter control at internally controlled multi-segment speed; when P117=1, it can memorize the inverter operating state, and can even memorize during stop or failure, then continue to run after back to normal; when P117=0, memorizing is unavailable.

## 6.6 Protection function parameters

P118	Setting range	Unit	Ex-factory value	Alteration
Selection of overvoltage stall prevention	0-1	1	1	×

0: Overvoltage stall prevention function is invalid    1: Overvoltage stall prevention function is valid

During inverter deceleration, the motor shall produce rebound energy into inverter under the influence of load inertia to make the voltage on inverter DC side rise; while overvoltage stall function is started and inverter DC voltage is overhigh, the inverter shall stop decelerating till DC side voltage is lower than set value, and for the inverter is decelerating, deceleration time shall automatically prolong.

P119	Setting range	Unit	Ex-factory value	Alteration
Stall level during acceleration	0-200%	1%	150	×

During inverter acceleration, output current of the inverter shall rise rapidly due to overload or excessively short acceleration time, and the inverter shall stop accelerating while exceeding rated set level; when the current is lower than set value, the inverter shall continue accelerating.

**[Note] 100% current refers to rated current of the motor, and when the parameter is set to 0, stall prevention function is invalid during acceleration.**

P120	Setting range	Unit	Ex-factory value	Alteration
Stall level during constant speed	0-200%	1%	0	×

During constant running of variable frequency accelerator, the current increases due to fluctuation of load or other reason; when the current exceeds rated set value, the inverter shall decrease output frequency, and if output current returns to normal, the inverter shall reaccelerate up to set frequency.

P121	Setting range	Unit	Ex-factory value	Alteration
Deceleration time for stall prevention during constant speed	0.1-25.5s	0.1s	5.0	○

When the inverter is applied to the load of fans and pumps, P120 can be set as 120%; when the current of inverter is greater than 120%, output frequency shall decrease, consequently the current shall decrease; however, after the current returns to normal, the frequency also shall become normal gradually, thus achieving stall prevention function; decrease rate of the frequency depends on P121.

P122	Setting range	Unit	Ex-factory value	Alteration
------	---------------	------	------------------	------------

Stall level during deceleration	0-200%	1	150	×
---------------------------------	--------	---	-----	---

Please refer to P120 description.

P123	Setting range	Unit	Ex-factory value	Alteration
Selection of over torque detection method	0-3	1	0	×

0: While achieving the frequency, start to detect over torque; after the detection of over torque, continue operating.

1: While achieving the frequency, start to detect over torque; after the detection of over torque, stop operating.

2: Detect the over torque during running; after the detection of over torque, continue operating.

3: Detect the over torque during operating; after the detection of over torque, stop operating.

P124	Setting range	Unit	Ex-factory value	Alteration
Over torque detection level	0-200%	1%	0	×

When output current goes beyond torque detection level and exceeds half of set time value (ex-factory value 1.0s), over torque detection shall be indicated and corresponding multi-function alarm contact shall be actuated; when it exceeds set time value, the inverter shall provide protection, and when this parameter is set to 0, over torque shall not be detected.

P125	Setting range	Unit	Ex-factory value	Alteration
Over torque detection time	0.1-20.0s	0.1s	1.0	×

When the inverter detects that output current exceeds set motor current, it shall start to calculate over torque time; when over torque time goes beyond half of set detection time value, corresponding multi-function output terminal shall be actuated with over torque alarm, and the inverter continue operating. In case that over torque time exceeds set detection time value (P125 setting), the inverter shall provide protection, failure information be displayed and the inverter stop outputting.

Refer to P123 and P124 for relevant parameters.

P126	Setting range	Unit	Ex-factory value	Alteration
Counter memory	0-1	0	0	×

0: Not memorized    1: Memorized

Determine whether to memorize counter values after power failure of the inverter via memory function of pulse counter.

P127 – P129

Reserve

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## 6.7 Function parameters of constant-pressure water supply

P130	Setting range	Unit	Ex-factory value	Alteration
Number of auxiliary pumps	0-2	1	0	×

The quantity of auxiliary pumps shall be set via this parameter; start or stop of auxiliary pumps are realized by using multi-function output contact, and auxiliary pump 1 or 2 shall be controlled through peripheral control circuit.

P131	Setting range	Unit	Ex-factory value	Alteration
Continuous operating time of auxiliary pump	1-9000 (min)	1	60	×

When only one of two pumps is in service, for the purpose of making each pump operating in an average manner, when operating time of one pump reaches P131, the other pump shall be switched for operating.

P132	Setting range	Unit	Ex-factory value	Alteration
Interlocking time of auxiliary pump	1-250s	1s	5	○

Setting of this parameter shall determine interlocking time of two auxiliary pumps during mutual switching as shown in Figure 6-14.

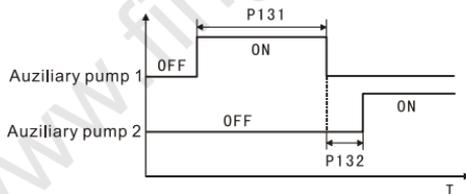


Figure 6-14 Interlocking Time Switching of Auxiliary Pump

P133	Setting range	Unit	Ex-factory value	Alteration
High-speed operating time	1-250s	1s	60	○

In the process of applying constant pressure water supply, main pump operates at fast frequency (as set in P060) due to larger water consumption; when high-speed operating time is achieved, corresponding multi-function contact shall be actuated and auxiliary pumps start to operate. Refer to Figure 6-15 for details.

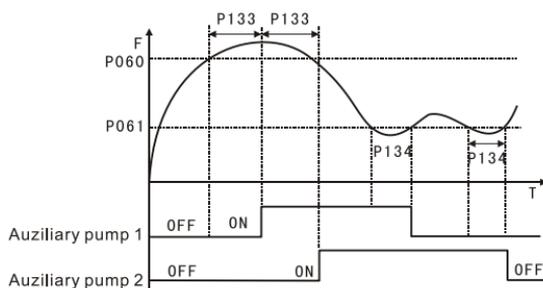


Figure 6-15 High/Low-speed Operating Time Curve of Pump

P134	Setting range	Unit	Ex-factory value	Alteration
Low-speed operating time	1-250s	1s	60	○

During the application of constant pressure water supply, when main pump frequency operates at low speed (set via P061) due to reduction of water consumption and low-speed operating time (P134) is achieved, corresponding multi-function contact shall be actuated and auxiliary pumps stop.

P133 and P134 must be used in coordination with p060, P061 and multi-function output terminal and mainly used for addition and reduction of auxiliary pumps. Refer to Figure 6-15 for details.

P135	Setting range	Unit	Ex-factory value	Alteration
Shutdown pressure level	0-150%	1%	95	○
P136	1-250s	1s	30	○
Shutdown level continuous time				
P137	1-150%	1%	80	○
Wake-up level	0.00-400.0	0.01 Hz	20.00	○
P138				
Sleep frequency	1-250s	1s	20	○
P139				
Sleep frequency continuous time				

Shutdown pressure level mainly refers to pressure level occurring when main pump enters the dormancy state; refer to Figure 6-16 for details.

Shutdown level continuous time refers to the duration time on the condition of shutdown pressure level before going sleep; refer to Figure 6-16 for details.

Wake-up level refers to wake-up pressure level from dormancy state to recovery; refer to

Figure 6-16 for details.

Sleep frequency refers to the minimum operating frequency while going sleep; refer to Figure 6-16 for details.

Sleep frequency continuous time refers to continuous time of operating under sleep frequency; refer to Figure 6-16 for details.

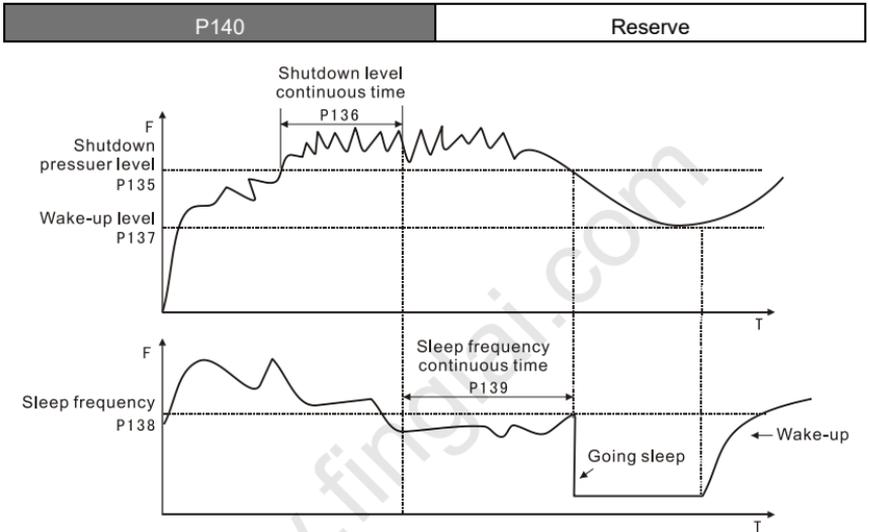


Figure 6-16 Main Pump State Setting and Time Curve

## 6.8 Motor function parameters

P141	Setting range	Unit	Ex-factory value	Alteration
Rated voltage of motor		0.1V	*	×

It shall be set as per rated voltage value on motor nameplate; ex-factory value of 230V grade inverter and that of 440V grade inverter are respectively 220 and 380.

P142	Setting range	Unit	Ex-factory value	Alteration
Rated current of motor		0.1A	*	×

This parameter shall be set according to rated value on motor nameplate and can be used for limiting output current of the inverter so as to prevent over current and protect the motor; in case that motor current exceeds this value, AC motor inverter shall provide the protection.

P143	Setting range	Unit	Ex-factory value	Alteration
Number of motor poles	02-22	1	04	×

Number of motor poles shall be determined via this parameter which is set according to motor nameplate.

P144	Setting range	Unit	Ex-factory value	Alteration
Motor rotating speed	0-9999	1r/min	1440	×

It shall be set according to actual speed of the motor; displayed value is identical to this parameter and can be used as the parameter used for monitoring to facilitate the user; this set value is corresponding to the rotating speed at 50Hz.

P145	Setting range	Unit	Ex-factory value	Alteration
Automatic torque compensation	0.0-10.0%	1%	2.0	×

This parameter can be used to make the inverter automatically output extra voltage during running and to compensate the insufficient torque of motor during low frequency. Excessive torque compensation is inadvisable and the setting shall be performed upward gradually based on actual situation. Insufficient compensation shall cause insufficient torque of the motor under low frequency while excessive compensation shall induce excessive torque, thus producing certain impact on machinery and even causing inverter tripping. As shown in the Figure 6-17 on the right.

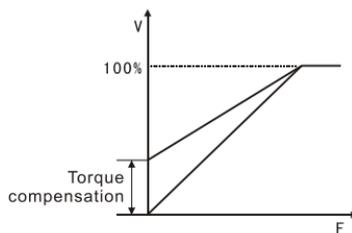


Figure 6-17 Automatic Torque Compensation

P146	Setting range	Unit	Ex-factory value	Alteration
No-load current of motor	0-100%	1%	40	×

The setting of motor no-load current shall affect the quantity of slip compensation and rated current of the motor is 100%.

P147	Setting range	Unit	Ex-factory value	Alteration
Motor slip compensation	0.-1.0	0.1	0.000	×

When the inverter drives the motor, both the load and the slippage shall increase, and motor running speed shall be closer to synchronous speed via slip compensation and slippage reduction.

P148-P149	Reserve
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P150	Setting range	Unit	Ex-factory value	Alteration
AVR function	0-1	1	1	×

0: Invalid 1: Valid

AVR function refers to automatic voltage regulation. On the condition of unstable input power, in case of overhigh voltage, the running of motor under the power supply exceeding rated voltage shall cause temperature rise of the motor, damage the insulation and make output torque unstable; however, automatic voltage regulation can be used to automatically regulate output voltage at rated voltage of the motor.

When this function set is invalid, output voltage shall fluctuate.

P151	Setting range	Unit	Ex-factory value	Alteration
Automatic energy-saving function	0.0-20.0%	0.1%	0.0	×

Automatic energy saving function is invalid while at 0; during acceleration and deceleration, it shall run with full voltage; during constant speed running, the optimum voltage value shall be calculated via load power and supplied to the load to achieving the purpose of energy saving.

P152	Setting range	Unit	Ex-factory value	Alteration
Fault restart time	0.2-25s	0.1s	1.0	○

When the inverter is set in the mode of fault restart, after the duration of inverter fault tripping exceeds the time as set in P152, the inverter shall be restarted. Attention must be paid to the safety during the application of this function.

P153	Setting range	Unit	Ex-factory value	Alteration
Power failure restart selection	0-1	1	0	×

0: Power failure restart is invalid No longer restart after momentary outage

1: Frequency tracking startup Please refer to P025 description

## NO.6 Detailed Function Description

P154	Setting range	Unit	Ex-factory value	Alteration
Allowable outage duration	0.1-5.0s	0.1s	0.5	×

The maximum duration of outage can be determined via this parameter; in case of going beyond set time, the inverter shall still stop outputting after power recovery; restart shall proceed as per general startup sequence.

P155	Setting range	Unit	Ex-factory value	Alteration
Times of fault restart	00-10	1	00	×

The inverter shall be automatically reset and restarted in case of abnormal situation (such as overcurrent and overvoltage); in case of common starting mode, this mode shall be followed; in case of frequency tracking start, the start shall be conducted in the manner of tracking start. After starting, if no anomaly occurs within 60s, set times shall be recovered; if any anomaly occurs and set number is achieved, the converter shall no longer output, and restart shall be conducted after resetting. If P155 is at 0, no automatic reset or restart function shall be performed in case of anomaly.

## 6.9 PID function parameters

P156	Setting range	Unit	Ex-factory value	Alteration
Proportional constant (P)	0.0-1000.0%	0.1%	100.0	<input type="radio"/>

Error value gain is set for proportional constant; in case of I=0 and D=0, only proportional control shall be actuated.

P157	Setting range	Unit	Ex-factory value	Alteration
Integration time (I)	0.1-3600.0s	0.1s	5.0	<input type="radio"/>

Response speed of PID actuation is set via integration time (I); the larger I value is, the slower the response speed is; contrarily, faster response speed and small integration time shall cause the oscillation.

P158	Setting range	Unit	Ex-factory value	Alteration
Derivation time (D)	0.01-10.00s	0.01s	0	<input type="radio"/>

The attenuation of PID actuation is set via derivation time (D); the larger D value is, the more obvious the attenuation is; D=0 indicate that no effect is produced, that is, invalid.

P159	Setting range	Unit	Ex-factory value	Alteration
Target value	0-100.0%	1%	*	<input type="radio"/>

Control target value can be set via external voltage signal or panel, and 100% target value is corresponding to the frequency at +10V analog.

PID closed-loop control is generally used for controlling the process with slow change in physical quantity, such as controlling pressure and temperature; generally feedback signal is acquired from temperature transmitter and pressure transmitter; during PID control, feedback signal input channel is analog current signal of 4-20mA.

PID closed-loop control is valid during starting of multi-function input PID. Generally adjustment method of PID control is as follows:

- 1) Correctly select the inverter, and use the inverter with the input specification in accordance with standard signal of 4-20mA;
- 2) Correctly set target value;
- 3) In case of nonoscillatory input, increase proportionality constant P;
- 4) In case of nonoscillatory input, decrease integration time I;
- 5) In case of nonoscillatory input, increase the derivation D;
- 6) Refer to the descriptions in Figure 6-19/6-20 for specific application.

PID control block is shown in Figure 6-18:

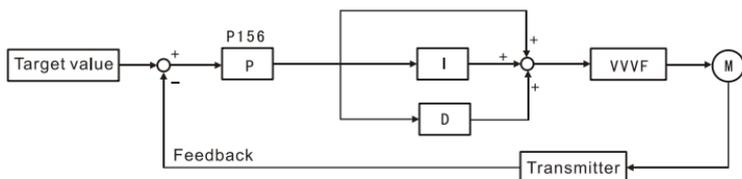


Figure 6-18 PID Control Block Diagram

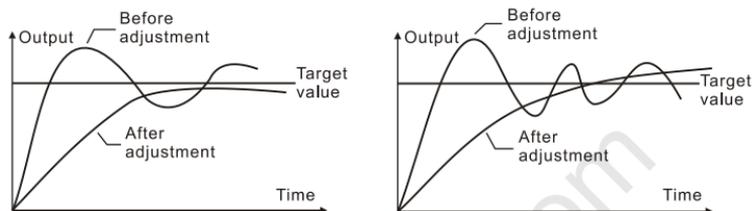


Figure 6-19 Suppress Output Exceeding of PID Control	Figure 6-20 Suppress Output Oscillation of PID Control
(1) Suppress output exceeding a: Decrease derivation time (D value) b: Extend integration time (I value)	(2) Suppress output oscillation a: Decrease derivation time (D value) or set it as 0 b: Decrease proportionality constant (P value)

P160	Setting range	Unit	Ex-factory value	Alteration
PID target value selection	0-1	1	0	×

0: PID target value refers to the value set as in P159.

1: PID target value refers to the value of external analog 0-10V (corresponding to 0-100%) and the value set as in P159 is invalid.

Target value selection can be set via selection panel and external analog which is 0-10V signal or set through potentiometer.

P161	Setting range	Unit	Ex-factory value	Alteration
PID upper limit	0~100%	1%	100	○

When PID feedback value is greater than set value in P161, corresponding multi-function output terminal shall be actuated and the machine shall not shut down.

P162	Setting range	Unit	Ex-factory value	Alteration
PID lower limit	0~100%	1%	0	○

When PID feedback value is less than set value in P162, corresponding multi-function output terminal shall be actuated and the machine shall not shut down.

## 6.10 Communication function parameters

P163	Setting range	Unit	Ex-factory value	Alteration
Communication address	0-250	1	1	×

When RS-485 communication port control is set for the inverter, the position of each inverter shall be set via a parameter.

0: No communication function

01-250: Position of inverter

P164	Setting range	Unit	Ex-factory value	Alteration
Communication transmission speed	0-3	1	2	×

0:4800 bit/s

1:9600 bit/s

2:19200 bit/s

3:38400 bit/s

P165	Setting range	Unit	Ex-factory value	Alteration
Communication data mode	0-5	1	3	×

0:8N1 For ASCII

1:8E1 For ASCII

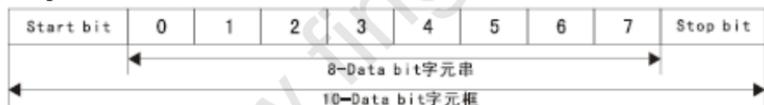
2:8O1 For ASCII

3: 8N1 For RTU

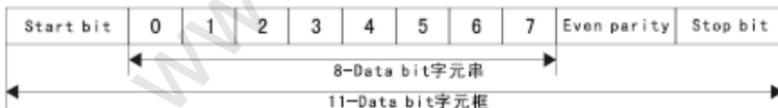
4: 8E1 For RTU

5: 8O1 For RTU

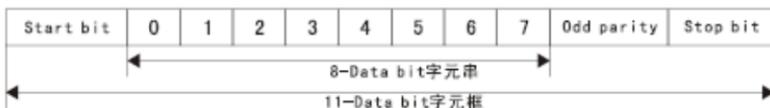
**[Note] 8N1 For ASCII P165=0 or 8N1 For RTU P165=3**



**8E1 For ASCII P165=1 or 8E1 For RTU P165=4**



**8O1 For ASCII P165=2 or 8O1 For RTU P165=5**



P166-P168	Reserve
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P169	Setting range	Unit	Ex-factory value	Alteration
Communication protocol	0-1	1	1	×

## NO.6 Detailed Function Description

selection			
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0: Standard Modbus protocol

1: D5M communication protocol

D5M communication protocol is default; in case of applying standard Modbus protocol, please contact the manufacturer.

### Format of D5M communication protocol

(I) Two modes of communication protocol

RTU mode: Each 8bit data is composed of two hexadecimal characters of 4bit, for example: 64H (hex).

ASCII mode: Each 8bit data is composed of two ASCII characters, for example: 64H (hex) is expressed in ASCII including 6 (36H) and 4 (34H).

Communication mode	Start bit	Data format				Check	End bit
		ADDR	CMD	LEN	D(n-1)-D(0)		
RTU mode	Mute	ADDR	CMD	LEN	D(n-1)-D(0)	CRC	Mute
ASCII mode	STX	ADDR	CMD	LEN	D(n-1)-D(0)	LRC	END

1. Start bit

- Mute: Indicate no Serial port interrupt over 50ms
- STX: Start bit ":" (3AH)

2. Data format

- ADDR: Communication address (8 bit)
  - 00: MODBUS broadcast mode
  - 01-250: Inverter address

**[Note] In case of ADDR=00, no returned data; in case that ADDR≠00 and is identical to inverter address, there is response.**

- CMD: Command code (8bit)
  - 01: Read function code data
  - 02: Alter function code
  - 03: Write command to control inverter state
  - 04: Read current inverter state
  - 05: Set frequency of serial port

LEN: Data length, referring to the length of D (n-1) - D (0), length setting: each 8bit serves as unit length.

- DATA: Data content, D (n-1) - D (0).

3. Check bit

## ◆ CRC: Error detection value

RTU mode, adopting CRC (cyclical Redundancy Check) error detection value; CRC value is obtained via C language below, and thus function requires two parameters:

unsigned char data ← index of message buffer

unsigned char length ← number of bytes in message buffer

This function shall send back CRC value in the form of unsigned integer.

unsigned int crc\_chk (unsigned char data, unsigned char length)

```
{ int j;
  unsigned int reg_crc=0xffff;
  while (length -- )
  { reg_crc ^=*data++;
    for (j=0;j<8;j++)
    { if (reg_crc&0x01)
      reg_crc=(reg_crc>>1) ^0xa001;
      else
      reg_crc=reg_crc>>1;
    }
  }
  return reg_crc; }
```

## ◆ LRC: Error detection value

ASCII mode, Adopt LRC (Longitudinal Redundancy Check) error detection value. LRC error detection value refers to totaling from ADDR to the last data content. The result obtained takes 256 as unit, excess part shall be removed, then secondary reverse compensation be calculated, the result got is LRC error detection value, for example: change function code P003 into 30.00Hz.

STX	ADDR	CMD	LEN	DATA	LRC	END
:	01	02	03	03 0B B8	34	CR LF
3AH	30H 31H	30H 32H	30H 33H	30H 33H 30H 42H 42H 38H	33H 34H	0DH 0AH

DATA data specification:

"03" is function parameter P003, main frequency, setting range 0.00-400.00Hz;

"0B B8" is hexadecimal value of set parameter value 3000 (i.e. 30.00Hz).

Calculation of LRC value: 01H+02H+03H+03H+0BH+B8H=CCH

## NO.6 Detailed Function Description

Secondary reverse compensation of CDH is 34H, so transmitted data content is:

3AH 30H 31H 30H 32H 30H 33H 30H 33H 30H 42H 42H 38H 33H 34H 0DH 0AH

### 4. End bit

RTU mode ends in a manner of mute (>50ms) and ASCII ends in a manner of CR(0DH)LF(0AH).

**[Note] Data type in the communication: Transmitted data in the communication is hexadecimal integer, for parameter value of function code, the minimum unit can be determined according to scaling position of the parameter in function list; for instance, the minimum unit of P003 is 0.01Hz. Thus, communications transmission 3000 represents 30.00Hz as per Modbus protocol.**

## (II) Function examples

### 1. 01 Read function code data

[Example] Read main frequency (function P003), parameter value is 30.00Hz (0B B8 in hexadecimal system)

Communication code		Start bit	Data format				Check bit	End
			ADDR	CMD	LEN	DATA		
RTU mode	Transmission	>50ms	01	01	01	03	11 89	>50ms
	Reception	>50ms	01	01	03	03 0B B8	CB 0C	>50ms
ASCII mode	Transmission	3AH	30H 31H	30H 31H	30H 31H	30H 33H	46H 41H	0DH 0AH
	Reception	3AH	30H 31H	30H 31H	30H 33H	30H 33H 30H 41H 41H 38H	33H 35H	0DH 0AH

### 2. 02 Alter function code

[Example] Alter parameter value of main frequency (function mode P003) into 30Hz (0B B8 in hexadecimal system)

Communication code		Start bit	Data format				Check bit	End
			ADDR	CMD	LEN	DATA		
RTU mode	Transmission	>50ms	01	02	03	03 0B B8	8F 0C	>50ms
	Reception	>50ms	01	02	03	03 0B B8	8F 0C	>50ms
ASCII	Transmission	3AH	30H	30H	30H	30H	33H	0DH

mode			31H	32H	33H	33H 30H 41H 41H 38H	34H	0AH
	Reception	3AH	30H 31H	30H 32H	30H 33H	30H 33H 30H 41H 41H 38H	33H 34H	0DH 0AH

**[Note]** When the maximum parameter value of function code is less than (256) FFH, data length is 02H. For example, function code P029 (1DH) shall be set as 1.0s (0AH), for maximum value of P029 is 25.0s (FAH) and less than FFH, at this time data length LEN=02H and data content DATA is 1DH 0AH.

3. 03 Write command to control inverter state (necessarily set P001 as 2)

Command list: Parameters value in the list serve as data content (DATA)

Function	Parameter
Jog reverse rotation	80H
Jog forward rotation	40H
Jog operation	20H
Forward/reverse	10H
Stop	08H
Reverse rotation	14H
Forward rotation	02H
Operation	01H

**[Example]** Write command to control inverter state to realize operating function of the inverter.

Communication code		Start bit	Data format				Check bit	End
			ADDR	CMD	LEN	DATA		
RTU mode	Transmission	>50ms	01	03	01	01	CRC	0
	Reception	>50ms	01	03	01	CNS T	CRC	>50ms
ASCII mode	Transmission	3AH	30H 31H	30H 33H	30H 31H	30H 31H	LRC	0DH 0AH
	Reception	3AH	30H 31H	30H 33H	30H 31H	CNS T	LRC	0DH 0AH

**[Note]** Received data CNST refers to the data consisting of 1 byte, after being written

in binary, each bit indicates different operating states of the inverter. The meaning of each Bit of CNST is as follows:

Bit of CNST	Operation state
Bit7	Frequency tracking
Bit6	In braking
Bit5	In forward/reverse rotation
Bit4	In jogging
Bit3	In operation
Bit2	Forward/reverse rotation
Bit1	Jogging
Bit0	Operation

#### 4. 04 Read current inverter state

When DATA=00-09: inverter state data is as follows:

00: Current set frequency	01: Current output frequency
02: Current output current	03: Current motor speed
04: Current DC voltage	05: Current output voltage
06: Current counter	07: Current inverter temperature
08: PID feedback value	09: PID target value

[Example] Read current set frequency of the inverter, whose parameter value is 30Hz (0B B8 in hexadecimal system)

Communication code		Start bit	Data format				Check bit	End
			ADD R	CMD	LEN	DAT A		
RTU mode	Transmission	>50ms	01	04	01	00	41 89	>50 ms
	Reception	>50ms	01	04	03	00 0B B8	F7 0C	>50 ms
ASCII mode	Transmission	3AH	30H 31H	30H 34H	30H 31H	30H 30H	46H 41H	0DH 0AH
	Reception	3AH	30H 31H	30H 34H	30H 33H	30H 30H 30H 41H 41H 38H	33H 35H	0DH 0AH

#### 5. 05 Set frequency of serial port (necessarily set P002 as 2)

[Example] Set frequency 30.00Hz

Communication code		Start bit	Data format				Check bit	End
			ADD R	CM D	LEN	DAT A		
RTU mode	Transmission	>50ms	01	05	02	0B B8	BF 8E	>50 ms
	Reception	>50ms	01	05	02	0B B8	BF 8E	>50 ms
ASCII mode	Transmission	3AH	30H 31H	30H 35H	30H 32H	30H 41H 41H 38H	33H 35H	0DH 0AH
	Reception	3AH	30H 31H	30H 35H	30H 32H	30H 41H 41H 38H	33H 35H	0DH 0AH

**[Note] ASCII Table**

Character symbol	0	1	2	3	4	5	6	7
ASCII	30	31H	32H	33H	34H	35H	36H	37H
Character symbol	8	9	A	B	C	D	E	F
ASCII	38	39H	41H	42H	43H	44H	45H	46H

## 6.11 Monitoring function parameters

P170	Setting range	Unit	Ex-factory value	Alteration
Selection of displayed content	0-7	1	2	○

This parameter is set to select PID feedback value and other contents to display, thus in favor of monitoring by the user, and the contents is displayed one by one through switching key; in respect of displayed contents, upon shipping out of factory, operating frequency, set frequency, current and AC voltage are defaulted to be displayed, and if other contents are required be monitored; P170 and P171 can be set for the purpose, as shown in Figure 6-22/6-22.

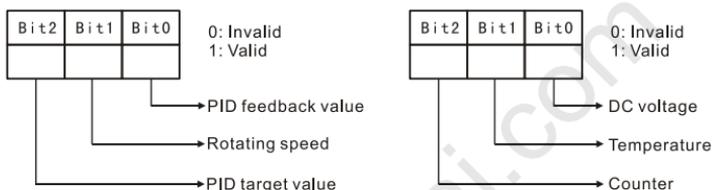


Figure 6-21 Selection of displayed content      Figure 6-21 Start of displayed content

P171	Setting range	Unit	Ex-factory value	Alteration
Start of displayed content	0-7	1	3	○

This parameter can be set to select DC voltage, temperature and other contents to display, thus in favor of monitoring by the user, and the contents is displayed one by one through switching key. See the description in P170.

Setting mode refers to triad mode, and then alternated by decimal system to set this value.

P172	Setting range	Unit	Ex-factory value	Alteration
Fault clearing	00-10	1	0	△

01 refers to fault clearing function and the others are reserved items in factory.

P173	Setting range	Unit	Ex-factory value	Alteration
Rated voltage of inverter	*	1	*	△

It is the value set in factory according to the model and read-only parameter; alteration is inapplicable.

P174	Setting range	Unit	Ex-factory value	Alteration
Rated current of inverter	*	1	*	△

It is the value set in factory according to the model and read-only parameter; alteration is inapplicable.

P175	Setting range	Unit	Ex-factory value	Alteration
Inverter type	0-1	1		△

0: Constant torque	1: Fans
--------------------	---------

Read-only parameter, alteration inapplicable.

P176	Setting range	Unit	Ex-factory value	Alteration
Standard for inverter frequency	0-1	1	0	△

0:50Hz                      1:60Hz

The value set in factory, read-only parameter, monitoring applicable and alteration inapplicable.

P177	Setting range	Unit	Ex-factory value	Alteration
Unexpected error 1			*	△
P178				
Unexpected error 2				
P179				
Unexpected error 3				
P180				
Unexpected error 4				

Check fault display via access to this parameter; 00 indicates there is no fault and 01 indicates fault occurs; check the code of specific fault after pressing enter key; in case of no fault record, display —.

P181	Setting range	Unit	Ex-factory value	Alteration
Software version No.	0-1	1	0	△

Check software version No. via 01 setting.

P182-P250	Reserve
-----------	---------

## NO.7 Maintenance and Fault Information

Regular maintenance and inspection during the application shall make your inverter in normal condition for long period.

### 7.1 Maintenance and inspection cautions

- 1 Be sure to first cut off power supply of inverter (L1. L2. L3) during maintenance and inspection.
- 2 Be sure cut off power supply of the inverter and make the display disappear; conduct maintenance and inspection till high-voltage indicator is off.
- 3 Never pull up or mismatch internal power supply, wires and cables during the inspection; otherwise the inverter shall not operate or be damaged.
- 4 During installation, do not leave the screws and other fittings inside the inverter so as to avoiding short circuit of circuit board.
- 5 After the installation, keep the inverter clean and prevent the dust, oil mist or moisture invading.

### 7.2 Regular inspection items

- 1 Confirm the voltage meets the demand of inverter;  
(In particular, pay special attention to the damage of power line and motor)
- 2 Whether the terminal and connector are loose;  
(Whether power line and terminal connecting line suffer from strand breakage)
- 3 Whether there is dust, scrap iron and corrosive liquids inside the inverter;
- 4 Prohibit measuring insulation impedance of the inverter;
- 5 Measure output voltage, output current and output frequency of the inverter;  
(avoid big difference in measurement results)
- 6 Inspect whether the ambient temperature is around  $-5^{\circ}\text{C}$ - $40^{\circ}\text{C}$  and installation environment has good ventilation;
- 7 Keep the humidity below 90% (without condensing into water droplet);
- 8 Whether there is abnormal sound or abnormal vibration during the running (avoid placing the inverter in the place with severe vibration);
- 9 Please regularly clean venthole.

### 7.3 Fault information and fault clearing

Inverters of D5M feature more perfect protection function in terms of overload, interphase short circuit, earthing short circuit, undervoltage, overheating and overcurrent, etc. In case of occurrence of inverter protection, ascertain the cause as per the information shown below. After handling, perform the running operation newly; if incapable of handling, please contact local dealer.

Fault display	Fault content and description	Handling method
<i>E.o.c.A</i>	Overcurrent during acceleration	1: Inspect whether the motor is in short circuit/partial short circuit and the insulation of output line is in good condition; 2: Extend acceleration time; 3: Unreasonable inverter configuration, increase the capacity of inverter; 4: Reduce the torque and increase set value.
<i>E.o.c.n</i>	Overcurrent during constant speed	1: Inspect whether the motor is in short circuit and the insulation of output connecting line is poor; 2: Inspect whether the motor is locked and mechanical load changes abruptly; 3: Whether the capacity of inverter is too small, if yes, increase the capacity of inverter; 4: Whether network voltage changes abruptly.
<i>E.o.c.d</i> <i>E.o.c.S</i>	Overcurrent during deceleration Overcurrent during stop	1: Whether the insulation of output connecting line is in good condition and the motor is in short circuit; 2: Extend deceleration time; 3: Apply the inverter with larger capacity; 4: DC braking amount is too large, so reduce it; 5: Machine fault, send it to the factory for maintenance.
<i>E.G.F.-</i>	Earthing short circuit	1: Inspect whether motor connecting line is in short circuit; 2: Inspect whether the insulation of output line is in good condition; 3: Send for repair.
<i>E.o.v.S</i> <i>E.o.v.A</i> <i>E.o.v.n</i> <i>E.o.v.d</i>	Overvoltage during stop Overvoltage during acceleration Overvoltage during constant speed Overvoltage during deceleration	1: Extend deceleration time or install brake resistor; 2: Improve network voltage and inspect whether the voltage with abrupt change emerges.
<i>E.F.b.-</i>	Fuse blowing	Fuse is blown, so send it to factory for overhaul.

<i>E.L.U.</i> -	Variable frequency low voltage	1: Inspect network voltage; 2: Send for repair.
<i>E.O.H.</i> -	Inverter overheating	1: Inspect whether the fan is locked and radiating fin is free of foreign matter; 2: Whether ambient temperature is normal; 3: Whether there is air space enough for air convection; 4: Inspect whether the thermistor and connecting line are in open circuit.
<i>E.O.L.</i> -	Inverter overloading 150% For 1min	1: Inspect whether the capacity of inverter is too small; if yes, increase the capacity; 2: Inspect whether mechanical load is locked; 3: Poor V/F curve setting, so reset.
<i>E.O.R.</i> -	Motor overloading 150% For 1min	1: Whether mechanical load changes abruptly; 2: Too small motor adapted; 3: Heating insulation of the motor becomes poor; 4: Whether the voltage fluctuates greatly; 5: Whether open-phase exists; 6: Mechanical load increases.
<i>E.O.T.</i> -	Motor over torque	1: Whether mechanical load fluctuates 2: Whether motor configuration is less than normal.
<i>E<sub>r</sub></i>	External interference	Isolate interference source
<i>E<sub>S</sub></i>	Emergency stop	In emergency stop state
<i>E<sub>S</sub></i>	4-20mA line breakage	Connect up broken line
<i>P<sub>r</sub></i>	Parameter setting error	Correctly set the parameter
<i>d c b</i>	DC braking mode	In DC braking mode

Code table:

A	b	C.c	d	E	F	G	H	0.o	S	n	L	T	P	r	u	2		
A	b	C	c	d	E	F	G	H	0	o	S	n	L	T	P	r	u	2

## 7.4 Fault and analysis

### 1. Motor fails to run after operating key is pressed

- (1) Operating mode is set in error, that is, the operating mode is enabled together with external control terminal on the condition of external control terminal.
- (2) Frequency instruction is low level or not given.
- (3) Peripheral wiring is in error, such as wrong two-wire system and three-wire system wiring and relevant parameters setting.
- (4) Setting of multi-function input terminal is in error (on the condition of external control).

(5) The inverter is in fault protection condition.

(6) Fault of motor or inverter.

## **2. Parameter setting failure**

(1) Password is locked; conduct setting after decoding.

(2) The inverter is operating.

(3) Abnormal connection of connector assemblies and abnormal communication of digital actuator; remove the actuator and reinstall after cutting off power supply.

## **3. Motor fails to reversely rotate**

Reverse is prohibited.

## **4. Motor rotates in opposite direction**

Motor output connecting line is wrong, it is only necessary to exchange any two connecting lines among U, V and W.

## **5. Motor decelerates too slowly**

(1) Too long deceleration time set, reduce deceleration time.

(2) Install brake resistor.

(3) Install DC brake.

## **6. Motor overheating**

(1) The load is too large and actual torque has exceeds rated torque of the motor, so it is proposed to increase the capacity of motor.

(2) Ambient temperature is overhigh; the motor may be burn out in the environment with high temperature, so it is necessary to reduce ambient temperature of the motor.

(3) Interphase withstand voltage of the motor is insufficient, on/off action of the inverter shall produce impulse wave among winding coils of the motor; generally the maximum impulse voltage shall be 3 times input power of the inverter, and the motor with interphase impulse withstand voltage higher than the maximum impulse voltage shall be used.

## **7. Starting of inverter interferes in other control devices**

(1) Reduce carrier frequency and the times of internal on/off action.

(2) Set up noise filter respectively on power input side and output side of the inverter.

(3) Please properly earth the inverter and motor.

(4) Encase the cable with metal tube for shielding.

(5) Separately route main circuit wiring and control line.

## **8. Overcurrent stall of inverter is detected during starting of fan**

(1) When the start is performed, the fan is in idling condition, so DC braking during starting is required to be set.

(2) DC braking during starting has been set, and it is required to increase DC braking value.

### 9. Vibration or roaring of the machine

(1) For resonance of vibration frequency of mechanical system and carrier wave, adjust carrier wave to avoid resonance point.

(2) Resonance of vibration frequency of mechanical system and inverter output frequency.

- a. Set skipping function to avoid the resonance point;  
b. Set rubber vibration insulator on bottom board of the motor.

## 7.5 Common anomalies and countermeasures

Analysis, judgment and countermeasures of common anomalies are shown in the table below:

Anomaly		Possible causes and countermeasures
Motor fails to run	No keyboard display	Inspect whether power failure occurs, input power is in open-phase and input power is connected in error.
	No keyboard display while charging indicator inside is on	Test the connecting wire and socket relating to keyboard are in good condition. Measure the voltage of each control power supply inside to confirm whether switching power supply is in normal operation. In case of abnormal operation of switching power supply, inspect the socket of switching power incoming line (DC+, DC-) is well connected, start-oscillation resistor is damaged or voltage regulator tube is normal.
	No voltage or low voltage of DC+ and DC- terminals	Inspect charging circuit.
	Buzzing of motor	Too big load of motor, try to reduce it.
	Anomaly not found	Confirm whether it is in tripping state or reset is not performed after tripping, whether it is in restarting state after power failure, whether the keyboard is reset, whether program operating state, operating state of multi-segment speed, set operating state or non-operating state is accessed; try restoring ex-factory value to confirm whether operating instruction is provided and inspect whether running frequency is set to 0.

Unfavorable acceleration/deceleration of motor	Improper setting of acceleration/deceleration time. Too low current limit is set. Overvoltage protection during deceleration. Improper setting of carrier frequency, overloading or oscillation.
Overhigh or overflow motor speed	Improper selection of V/F characteristic. Improper selection of reference for V/F characteristic and resetting shall be performed. Substandard or non-standard rated voltage of the motor. Low voltage of power supply. Wrong setting of frequency signal gain. Wrong setting of output frequency.

## No.8 Selection and Configuration of Peripheral Facilities

### 8.1 Options

Name	Function
Breaker and leakage switch for connection	Protect the connection of inverter, be sure to set breaker on power side, and please use the leakage switch with higher harmonic prevention
Electromagnetic contactor	Set electromagnetic contactor to prevent burning out brake resistor and connect surge absorber while applying.
Surge absorber	Absorb switching surge current of electromagnetic contactor and relay for controlling
Isolation transformer	Isolate input and output effects of the inverter and produce effect on reducing the interference
DC reactor	Improve input power factor of the inverter
AC reactor	Improve input power factor of the inverter and prevent surge voltage impact
Brake resistor and brake unit	Consume recovered energy of the motor and shorten deceleration time

#### 1. Leakage switch

The inside of inverter, inside of motor and input and output leads have earth electrostatic capacitance and the inverter has relatively high carrier frequency, so large earth leakage current is induced to the inverter, which is more obvious for high-capacity machines; the application of leakage switch may cause misoperation of protection circuit, so the attention should be paid to the selection of leakage switch during the application, simultaneously carrier frequency shall be reduced and the lead shortened appropriately.

#### 2. AC reactor

AC reactor can be used for suppressing higher harmonic of inverter input current, improving input power factor of the inverter and preventing leakage-induced impact. It is suggested to use input AC reactor under following circumstances:

- 1) Unbalanced three-phase power;
- 2) The same power supply is connected with thyristor or switch-controlled power factor compensating device;

## 8.2 Configuration

### 1. AC reactor configuration

Model	Matched power (W)	Rated current (A)	Inductance (mH)
220V	0.4	2.5	4.2
	0.75	5	2.1
	1.5	10	1.1
	2.2	15	0.71
380V	0.4	1.3	18
	0.75	2.5	8.4
	1.5	5	4.2
	2.2	7.5	3.6
	3.0	10	2.8
	4.0	12	2.2
	5.5	15	1.4
	7.5	20	1.0
	11	24	0.52
	15	34	0.397
	18.5	38	0.352

Line reactor, through which alternating current flows, is also called commutation reactor and applied to network incoming line and it is used for suppressing inverter harmonic and feedbacking to the network.

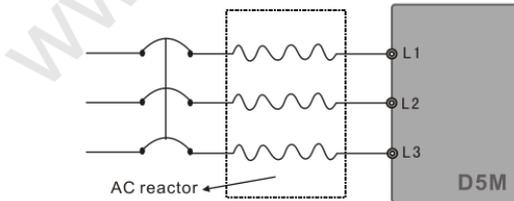


Figure 8-1 AC Reactor

**2. Brake resistor configuration**

Model of inverter	Specification of brake resistor		Brake torque 10%ED	Dedicated motor KW
	W	$\Omega$		
D5M-0.4T2-1A	80	200	125	0.4
D5M-0.75T2-1A	100	200	125	0.75
D5M-1.5T2-1A	300	100	125	1.5
D5M-2.2T2-1A	300	70	125	2.2
D5M-3.7T2-1A	390	40	125	3.7
D5M-5.5T2-1A	520	33	125	5.5
D5M-0.4T4-1A	80	750	125	0.4
D5M-0.75T4-1A	80	750	125	0.75
D5M-1.5T4-1A	300	400	125	1.5
D5M-2.2T4-1A	300	250	125	2.2
D5M-3.7T4-1A	400	150	125	3.7
D5M- 5.5T4-1A	500	100	125	5.5
D5M-7.5T4-1A	1000	75	125	7.5
D5M-11T4-1A	1000	50	125	11
D5M-15T4-1A	1500	40	125	15
D5M-18.5T4-1A	4800	32	125	18.5

[Note] 1) Please select resistance value and service power set by our company;

2) Our company shall assume no responsibility for the damage of inverter or other devices induced by the application of brake resistor and brake unit which are not provided by our company;

3) Be sure to take the safety and inflammability of the environment for installation of brake resistor and make the distance between it and inverter up to 100mm at least;

4) For changing resistance and power number, please contact local dealer;

5) In need of brake resistor, separately order brake resistor, and contact local dealer for details;

6) It is necessary to install brake unit if quick braking is required of the inverter over 11KW.

## Annex

### Annex I Examples of Simple Application

#### 1. Disturbance function (triangular wave achievement)

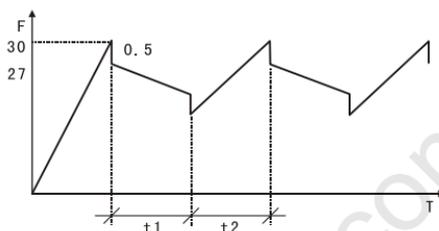


Figure F-1 Disturbance Function Curve

- (1) Achieve those shown in F-1 curve.
- (2) Parameter setting P080=5 P003=30 P086=27 P092=0.5 P101=10 P102=10

#### 2. Realization of drafting function

As shown in the curve of Figure F-2.

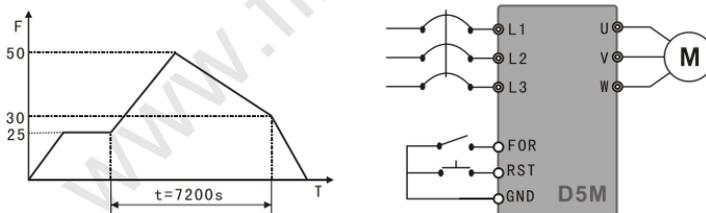


Figure F-2 Drafting Function Curve and Wiring Diagram

Parameter setting    P080=4            P003=25            P086=50            P087=30  
                                  P101=720        P046=29            P001=1

**[Description] 1) Enable drafting via triggering external multi-function terminal (RST selected as shown in the diagram);**

**2) While drafting is enabled, operating time T is  $P101 \times 10s$ .**

#### 3. Forward/reverse rotation of motor in the control of potentiometer

As shown in the curve of Figure F-3.

Parameter setting	P001=1	P002=1	P072=50	P073=50
	P074=0	P075=1	P076=1	

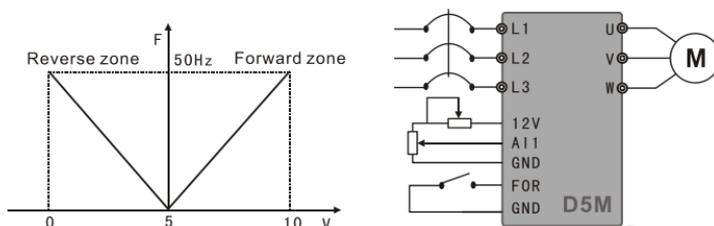


Figure F-3 Motor Forward/Reverse Curve and Wiring Diagram

#### 4. Internally controlled 8-segment speed operation

Realize those shown in the curve of Figure F-4 and stop internally controlled 8-segment speed after operating by one cycle.

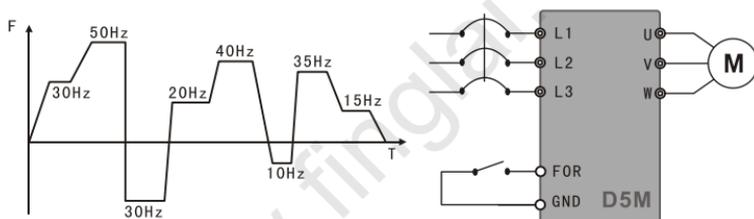


Figure F-4 Operation Curve and Wiring Diagram of Internally Controlled 8-segment Speed

Parameter setting	P080=1	P003=30	P086=50	P087=30	P088=20
	P089=40	P090=10	P091=35	P092=15	P082=36
	P081=0	P014=5	P015=5	P001=1	P083=0
	P044=1	P101-P108=15			

[Description] 1) Operating time of each segment speed is set via P101-P108=15;

2) Automatic cycle P081=1;

3) After giving operating instruction, stop after operating by one cycle as per set curve.

## 5. Simple constant-pressure water supply

(1) Use pressure transmitter with the range of 0-10kg and feedback of 4-20mA; pressure water supply of 5kg as required, alarm while above upper limit of 6kg and below lower limit of 4kg, and stop starting external terminal. As shown in Figure F-5.

Parameter setting	P001=1	P041=5	P046(X3 terminal function)=25		
	P052=28	P053=29	P156=*	P157=*	P158=*
	P159=50	P160=0	P161=60	P162=40	

**[Note] P156, P157 and P158 shall be set based on actual situations, and in general, constant-pressure water supply P156=80-100, P157=2.5~3 and P158=0.**

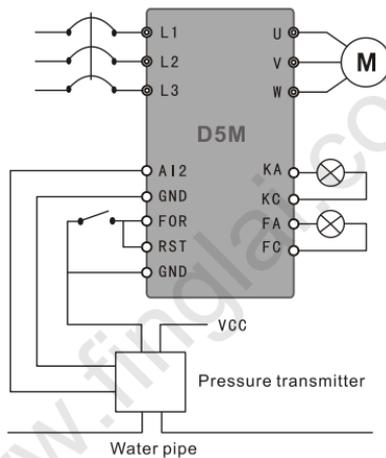


Figure F-5 Constant-Pressure Water Supply – Pressure Transmitter

(2) Use remote pressure gauge of 0-10kg; as required, use external terminal to control the operation and stop and set target value via potentiometer. As shown in Figure F-6.

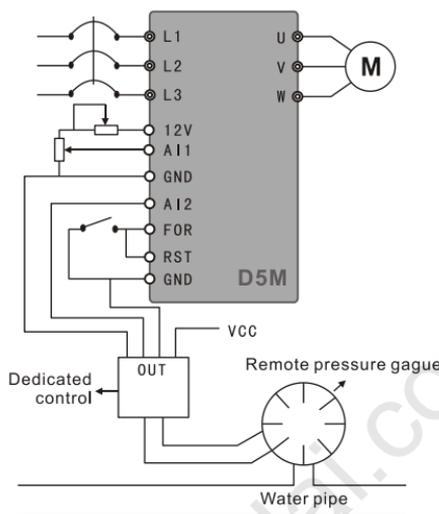


Figure F-6 Constant-pressure Water Supply – Remote Pressure Gauge

Parameter setting	P001=1	P002=0	d046=25	P156=*
	P157=*	P158=*	P160=1	

[Note] 1) Target value of D5M series inverter can be selected through two methods, one referring setting via panel and the other one referring to 0-10V analog ;

2) Feedback signal is 4-20mA and the others are invalid;

3) Target value in the case is set via potentiometer (0-10V);

4) P156, P157 and P158 shall be set based on concrete conditions (refer to parameter description for details);

5) PID special control board is designed as common remote pressure gauge and input internal resistance is converted into standard signal as per 0-400Ω; in case that the resistance of remote pressure gauge used by the user exceeds prescribed limit, remote pressure gauge shall be replaced or the previous resistor shall be connected in parallel for calibration;

6) Output resistances of remote pressure gauges are various for they are supplied by different manufacturers; after conversion, current signal varies in size, so the user can specifically set target value based on actual situations to make it consistent with actual condition;

7) When target value is set via potentiometer, P002 still must be set to 0; otherwise, PID shall be ineffective.

(3) Wiring diagram and parameters of single-machine and multi-pump are shown in Figure F-7.

Parameter setting	P001=1	P014=* P041=* P060=* P157=*	P015=* P045=25 P130=1 P158=*	P023=0 P046=04 P156=*
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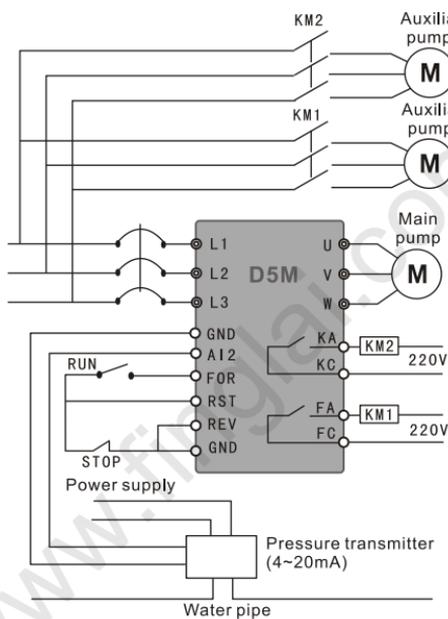


Figure F-7 Single-machine and Multi-pump Wiring Diagram

## 6. Cases of joint application of analog and multi-segment speed

Requirements: Set the frequency of the first segment speed via analog; after switching via a switch, switch to external multi-segment speed for operating. Wiring is as shown in Figure F-8.

Parameter setting	P002=1	P081=2	P047=20	P048=21
	P086=15	P087=30	P088=25	

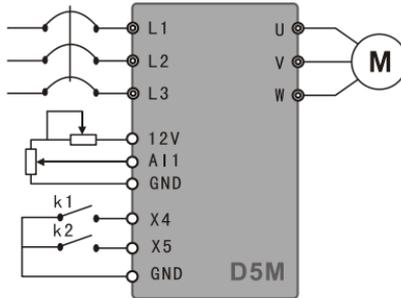


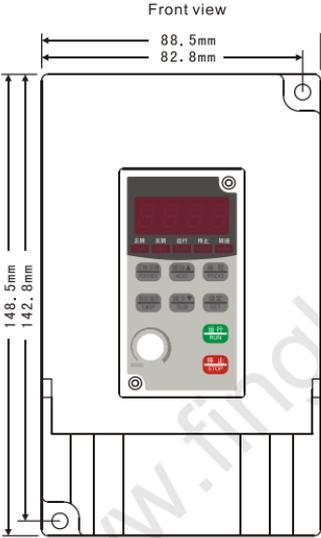
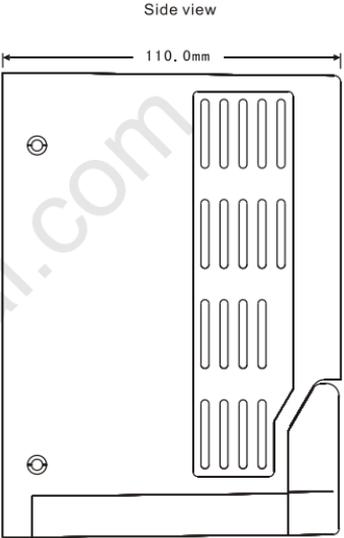
Figure F-8 Analog and Multi-segment Joint Application Wiring Diagram

**[Description]** Multi-function terminal can be used for reverse switching and the panel for forward/reverse switching (in this case, switching via panel).

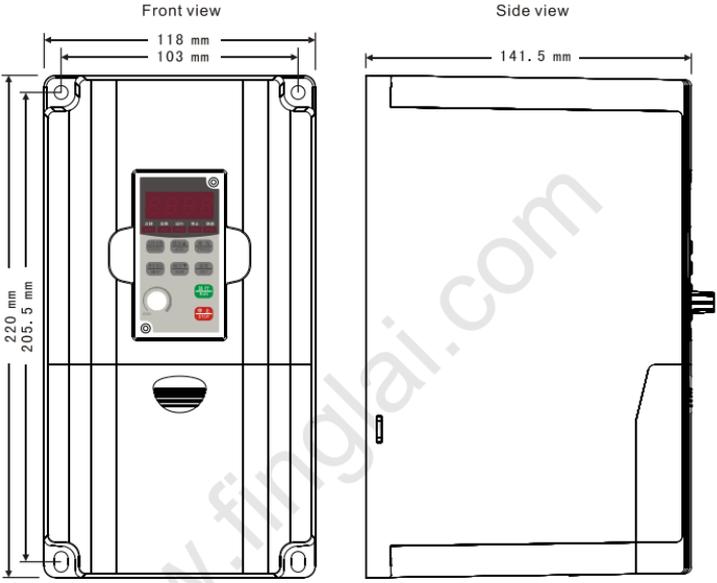
K1 state	K2 state	Operating frequency
OFF	OFF	Set via potentiometer
ON	OFF	Segment-speed II (15Hz)
OFF	ON	Segment-speed III (30Hz)
ON	ON	Segment-speed IV (25Hz)

## Annex II External and Installation Dimensions

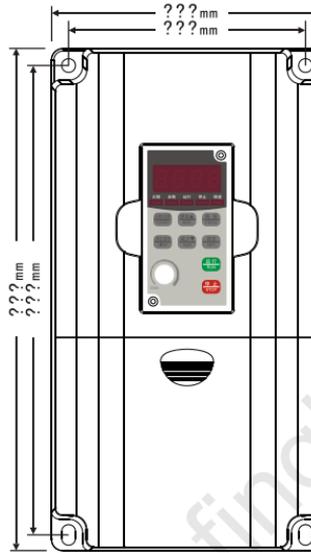
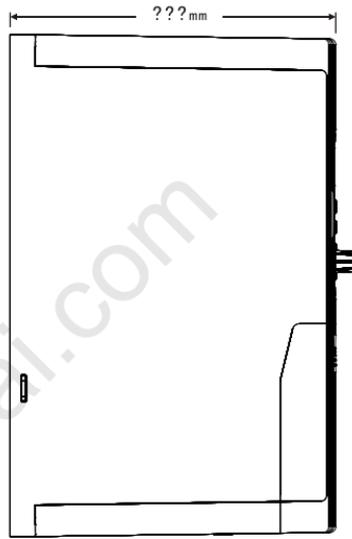
### 1. External dimension of machine with power of 0.4-2.2kW

Name	D5M-0.4S2-1A	D5M-0.75S2-1A	D5M-1.5S2-1A
	D5M-0.75T4-1A	D5M-1.5T4-1A	D5M-2.2T4-1A
External and installation dimensions	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front view</p>  </div> <div style="text-align: center;"> <p>Side view</p>  </div> </div>		
	<b>Unit: mm</b>		

## 2. External dimension of machine with power of 2.2-7.5kW

Name	D5M-2 2S2-1A D5M-3.7T4-1A	D5M-3.7S2-1A D5M-5.5T4-1A	D5M-7.5T4-1A D5M-7.5S2-1A
External and installation dimensions	 <p>Front view</p> <p>Side view</p> <p>118 mm</p> <p>103 mm</p> <p>220 mm</p> <p>205.5 mm</p> <p>141.5 mm</p> <p>Unit: mm</p>		

## 3. External dimension of machine with power of 11-18.5kW

Name	D5M-11T4-1A	D5M-15T4-1A	D5M-18.5T4-1A
External and installation dimensions	Front view		Side view
			
Unit: mm			

## Warranty and Services

The products of our company are of "Quality Commitment"; in case of any quality problem, please contact the dealer or corporate headquarters. Our company shall provide a full range of solutions for the users in combination with specific circumstances as per the rules below, and the users are requested to carefully read them.

(I) The warranty period is 18 months from the date of purchase.

(II) Scope of warranty

1. Main body of inverter.

2. Under warranty, our company shall provide free services and repairs or replacement for the fault or damage induced within the responsibility of our company.

(1) Free replacement within 6 months after purchase;

(2) Free repair within 18 months after purchase.

3. Under warranty, our company shall provide charged repair for machine fault or damage induced by the following situations.

(1) Machine fault due to the operation inconsistent with manual or the unapproved repair or reconstruction;

(2) Fault or damage due to the application beyond the requirements of standard specification;

(3) Damage due to throw or improper placement (such as water penetration) after purchase;

(4) Machine damage due to force majeure, such as earthquake, fire, lightning strike and abnormal voltage.

(III) After-sale services

1. In case of special requirements for product installation or debugging or unsatisfactory operating condition of the products (such as unsatisfactory performance and function), please contact the dealer or corporate headquarters.

2. In case of machine fault, please timely contact the dealer or corporate headquarters for obtaining assistance.

3. Under warranty, our company shall provide maintenance for the fault induced by product manufacturing and design.

4. Beyond the warranty, our company shall provide charged maintenance as per the requirements of customers.

5. Our company has the right to entrust others to provide free repair for the produces in fault; the service fee shall be calculated based on insurance premium; an agreement shall prevail during handling, if any.

Both the sellers and agencies of our company in China are authorized to provide after-sale services for the products of our company.

