

# otomasyon AVM

Technology  
Interaction  
Vitality  
SANCH

All Rights Reserved. Subject to  
change without notice.

SANCH  
三基电气



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

SANCH

S2000S2800110 V1.0 2010-03-10

Headquarter in Quanzhou Fujian,China

TEL:+86 595 22555311 FAX:+86 595 22555211-803  
ADD:#1305 Block B Section F Binjiang Industrial park Jiangbin  
Road Licheng District Quanzhou,Fujian,China

Production Base Quanzhou, Fujian Province

Technical Support Hotline: +86 595 22555011  
ADD: Zixin Road,Jiangnan High-Tech Industrial  
District,Quanzhou City,Fujian Province,China

Manual Service

For S2800 Series Inverters

## Contents

<b>Preface</b> .....	1
<b>1. Safety instructions</b> .....	2
1.1 NOTES FOR OPERATION.....	2
1.2 NOTES FOR OPERATION ENVIRONMENT.....	4
<b>2. DESCRIPTIONS FOR SANCH AND INSTALLATION</b> .....	5
2.1 OPERATION ENVIRONMENT.....	5
2.2 MODEL DESCRIPTION.....	6
2.3 PRODUCT SPECIFICATION.....	7
2.4 WIRING.....	15
2.5 OUTLINE SIZE.....	16
<b>3. DESCRIPTION OF OPERATORS</b> .....	19
3.1 KEYBOARD DESCRIPTION FOR IP03/IP05 DIGITAL OPERATOR.....	19
3.2 DESCRIPTION OF KEYBOARD OPERATION.....	21
3.3 PRELIMINARY OPERATION-NOT CONNECTING WITH MOTOR.....	25
<b>4. LIST OF DESCRIPTIONS FOR FUNCTIONAL PARAMETERS</b> .....	27
<b>5. DESCRIPTION OF FUNCTIONAL PARAMETERS</b> .....	38
0: USER'S PARAMETERS.....	38
1: Motor Control Parameters.....	43
2: Vector Control Parameter.....	45
3: V/F Control Parameters.....	46
4: Input Terminal Parameters.....	48
5: Multi-velocity Control Parameters.....	54
6: Output Terminal Parameters.....	55
7: Start-stop Control Parameters.....	57
8: Man-machine Interface Parameters.....	60
9: Enhanced Function Parameters.....	65
10: PID Control Parameters.....	71
11: Protection Parameters.....	74
12 : Serial Communication Parameters.....	77
<b>6. TROUBLE SHOOTING</b> .....	92
6.1 Failures &Failure Elimination.....	92
6.2 Troubleshooting for faults in general.....	95
<b>7. MAINTENANCE AND AMBIENT ELEMENTS</b> .....	96
<b>Interleaf of Taking the Top Cabinet of S2800-4T7.5G/4T11G</b> .....	99

## Preface

This instruction manual, which includes operation descriptions and notes for maintenance, shall be delivered to the end-user.

For safety running and effective operation, this instruction manual shall be read thoroughly prior to use, which shall also be preserved for later use. Provided problems occur and solution is not provided in this instruction manual, contact your SANCH ELECTRIC representative or contact with our company directly. Our professional technicians will serve for you actively. And please continue to adopt products of SANCH, give valuable opinion and advice.


### 1. Reading Instructions


symbols of " DANGER" and " ATTENTION" in the manual indicates that, for safety running or maintenance of inverters or other electrical products, attention shall be attached during delivering, installation, operation and checks for the inverter. And these notes shall be applied for a better and safer operation.



indicates a potentially hazardous situation visiting. If not used correctly, personnel damage even death may be caused.

indicates a potentially hazardous situation visiting. If not used correctly, serious damage to inverter or machine may be resulted.

 <b>DANGER</b>
<ul style="list-style-type: none"><li>● Never connect wires while power on. Do not check components or signal for circuit board during operation.</li><li>● Do not dismantle or change inner wire, circuit or components unnecessarily.</li><li>● Make sure grounding terminals are correctly grounded. 220V level: Grounding III; 200V level: Special Grounding</li></ul>

 <b>ATTENTION</b>
<ul style="list-style-type: none"><li>● Do not perform a withstand voltage test for components of inverter, it can cause semi-conductor components to be damaged by high voltage.</li><li>● Never connect the output terminals U, V, W to AC power supply.</li><li>● IC of CMOS on control circuit of the inverter shall be damaged by electrostatic influence. Do not touch main circuit board.</li></ul>

### 2. Products receiving

All products have been performed with strict test and inspection. After receiving the inverters, the following checks shall be performed.

- To check that SANCH inverter, an instruction manual and a cover is inside of the package
- To check whether model number correspond with model and capacity your purchase order.
- To check whether there are damaged parts during transportation and delievering. If there are, do not connect with power supply.

If any of the above checkpoints are not satisfactory, contact your SANCH ELECTRIC representative for a quick resolution.

# **1 SAFETY INSTRUCTIONS**

## **1.1 NOTES FOR OPERATION**

### **Before wiring**

 **CAUTION**

Specification of applying power supply shall correspond to input voltage of the inverter.

 **DANGER**

Main circuit terminals must be correct, R/L1, S/L2 and T/L3 is input terminals and it's forbidden to use mixing with U/T1, V/T2 and W/T3. Failure to observe this may cause the inverter damaged.

 **CAUTION**

- When delivering the inverter, do not take the cover directly. Take the air fan seat to prevent the cover got off. Inverters getting off which may cause damage to personal or machine shall be avoided.
- Install the inverter on metal or other non-inflammable materials. Do not fix it on inflammable materials which may cause a fire hazard.
- In case of several inverters are installed together in one control panel, a fan shall be prepared to make sure temperature lower than 40℃, thus over -heating or a fire hazard shall be avoided.
- Operator shall be dismantled or refitted after power supply is off. Fixed operator shall be processed as diagram shows to prevent operator fault or no display.
- Make sure applied power supply comply with label showed on the right of the machine. Failure to observe this may cause action failure.

### **During operation**

 **DANGER**

- Never put in or take off the motor during operation, otherwise over-current even over burning the main circuit of the inverter may happen.
- Do not remove the cover while current is flowing. Failure to observe this may result in electrical shock to personnel.
- When auto-restart function is set, do not approach the machine since motor can be reset suddenly after being stopped.
- Since STOP button can be selected by function set, which is different from usage of emergency stop/on switch, attention shall be given to the usage.

**⚠ CAUTION**

- Never touch heatsink or discharging resistor since temperature may be very high.
- Since it is easy to change running speed from low to a high speed, verify safe working range of motor and machine before running.
- Pay attention to relative settings before using the brake.
- Do not check signals during running.
- All parameters of the inverter have been preset at the factory according to line frequency. Do not change the settings unnecessarily.
- Do not perform dismantling or checks while power supply and charging indicator" CHARGE" are still on.

**During check and maintenance**

**⚠ CAUTION**

- Ambient temperature for operating the inverter shall be  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  and 90%RH non moistring condensation.
- After removing the dust-cover, ambient temperature for operating the inverter shall be  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  and 95%RH non moistring condensation. However under this condition, the ambient environment must be without drips of water or metal dust. If there are, the dust cover shall be refitted and check whether ambient temperature is within  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  simultaneously.

**During rejection**

**⚠ CAUTION**

- Explosion may occur when burning the electrolytic capacitor of the main circuit and printing plate. Toxic gas may be generated when burning control panel and other plastic fittings.  
It shall be treated as Industrial waste.

## 1.2 NOTES FOR OPERATION ENVIRONMENT

Make sure the inverter is protected from the following during operation:



Direct Sunlight.



Corrosive gas or fluids



Oil



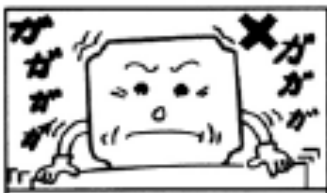
Salt or saline



Rain, moisture



Iron chips and dust



Large impelling



Extreme low temperatures



Extreme high ambient temperatures (Above 40°C)



Electromagnetic waves and ultra high-angle rays (For example: locations of welding machines and etc.)



Radioactive materials



Locations of inflammable materials

## **2 DESCRIPTIONS FOR SANCH AND INSTALLATION**

### **2.1 OPERATION ENVIRONMENT**

Since operation environment can directly influence functions and operation life, to ensure proper performance and long operation, follow the recommendations below when choosing allocation for installing the inverter. Make sure it is protected from the following:

Extreme cold and heat.

Use only with the ambient temperature range:  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ;  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  applicable when dust cover is removed.

Rain, moisture

Direct sunlight.(Avoid using outdoors)

Corrosion of oil sprays or salt

Corrosive fluid and methane

Dust or metallic particles in the air.

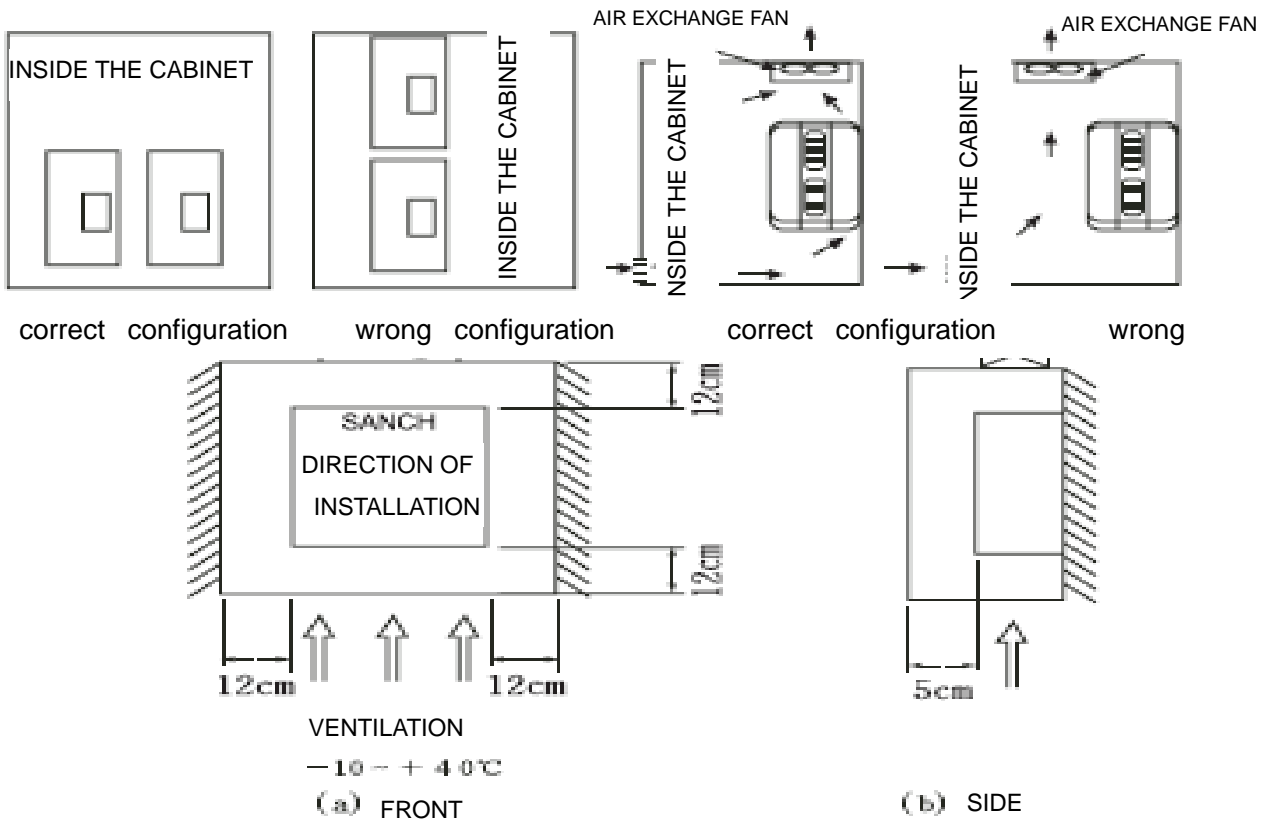
Radioactive materials and inflammable materials

Electromagnetic interference (Avoid using together with welding machine or dynamic machines.)

Vibration.

(If inverter must be used in this environment, an anti vibration pad is necessary).

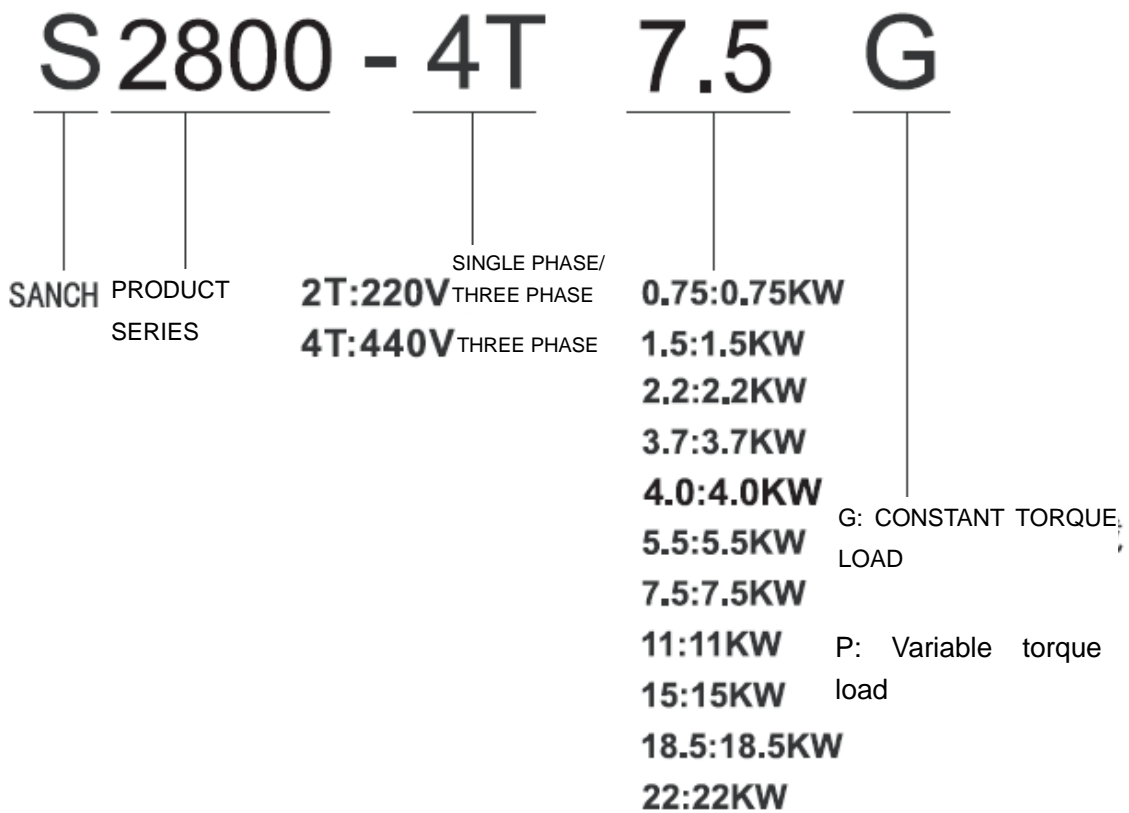
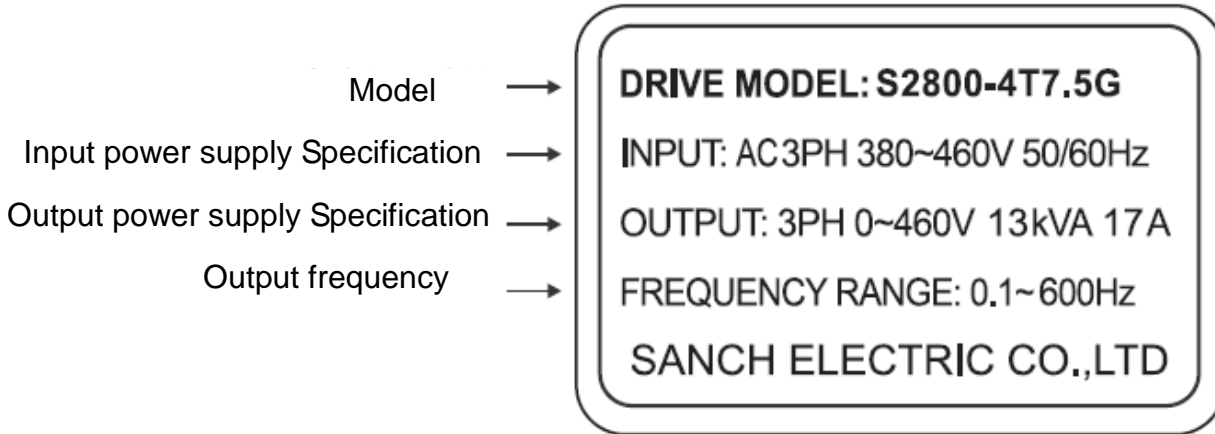
Attention shall be attached to clearance of inverters allocated closely. A fan shall be installed to make sure temperature is lower than  $40^{\circ}\text{C}$



For cooling off, face shall be toward front and upper parts shall be upwards.

Clearance shall meet the following specifications: (If the inverter is installed inside the cabinet or environment is allowable, dust cover shall be available to be removed for ventilating.)

**2.2 MODEL DESCRIPTION**



## 2.3 PRODUCT SPECIFICATION

### Individual Specification

#### ■220V Signal phase/ Three phase Series

Model number S2800-2T□□□G		0.75	1.5	2.2													
Output	Max applicable motor output power(kW)	0.75	1.5	2.2													
	Max applicable motor output power(HP)	1	2	3													
	Output rated capacity(kVA)	1.9	2.5	4.2													
	Output rated current (A)	5.0	6.5	11													
	Output frequency range	0.1~600Hz															
	Over load capacity	150% of rated output current and run for 65sec.															
	Max output voltage	Correspond to input power supply															
Input	Phase number. Voltage. Frequency	Signal phase/ Three phase. 200 to 240V. 50/60Hz															
	Allowable variation range for Voltage. Frequency	Voltage: ±15%, Frequency: ±5%															
	Input current (A)	11/7.4	15/10	27/15													
Cooling System		Forced air cooling															

#### ■440V Three phase Series

Model number S2800-4T□□□G		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75			
Output	Max applicable motor output power(kW)	0.75	1.52	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75			
	Max applicable motor output power(HP)	1	2.8	3	6.9	7.5	10	15	20	25	30	40	50	60	74	100			
	Output rated capacity(kVA)	1.9	3.7	3.8	6.3	9.9	13	19.1	24.4	28.2	34.3	45.7	57.1	68.6	83.8	114.3			
	Output rated current (A)	2.5	3.7	5	9.7	13	17	25	32	37	45	60	75	90	110	150			
	Output frequency range	0.01~600Hz																	
	Over load capacity	150% of rated output current and run for 65sec.																	
	Max output voltage	Correspond to input power supply																	
Input	Phase number. Voltage. Frequency	Three phase. 380 to 460V. 50/60Hz																	
	Allowable variation range for Voltage. Frequency	Voltage: ±15%, Frequency: ±5%																	
	Input current (A)	3.4	5.0	5.8	11.2	15	20	26	35	38	46	62	76	90	105	140			
Cooling System		Forced air cooling																	

Model number S2800-4T□□□G		90	110	132	160	185	200	220	250	280	315	350	400	500	560	630			
Output	Max applicable motor output power(kW)	90	110	132	160	185	200	220	250	280	315	350	400	500	560	630			
	Max applicable motor output power(HP)	120	147	176	214	247	267	294	334	374	420	534	467	667	747	840			
	Output rated capacity(kVA)	134	160	191	229	259	290	316	358	358	457	526	488	656	724	838			
	Output rated current (A)	176	210	250	300	340	380	415	470	520	600	640	690	860	950	1100			
	Output frequency range	0.01~600Hz																	
	Over load capacity	150% of rated output current and run for 65sec.																	
	Max output voltage	Correspond to input power supply																	
Input	Phase number. Voltage. Frequency	Three phase. 380 to 460V. 50/60Hz																	
	Allowable variation range for Voltage. Frequency	Voltage: ±15%, Frequency: ±5%																	
	Input current (A)	160	210	250	290	330	410	500	580	620	670	835	920	1050					
Cooling System		Forced air cooling																	

## Individual Specification

### ■ Standard Specification

Controlling Characteristics	Control mode		V/F control, without PG vector control
	Output frequency range		0.01~600.0Hz
	Frequency setting analyzing degree		0.01Hz
	Output frequency analyzing degree		0.01Hz
	PWM load wave frequency		Available to modulate from 0.5 to 15kHz.
	Torque increase		without PG vector control 0.5Hz/150%(SVC)
	Jog frequency		3 points can be set from 0.01 to 600.0Hz
	Acceleration/deceleration time		0.01 to 600.0seconds. (2 steps of accel/decel time can be set separately.)
	Stall Prevention Level		According to the load characteristics of motor, it's available to be set as 50 to 200% of rated current of the drive
	DC braking		Stopping function can be performed from 0.01~60Hz. Stopping current is 0~100% of rated current. Starting time is 0-60.0s, stopping time is 0-60.0s.
	Braking torque		20%(125% shall be available if connected with purchased braking resistor externally) (for 1 to 25HP, equipped within the electric crystals, for 30HP, braking unit module shall be connected externally.)
	Operation Characteristics	speed regulation ratio	
Frequency setting signal		Digital Operator	Set by UP and DOWN
		External terminals	0-10VDC, 4-20Madc, Serial Communication Board(RS-485)
Running operating signal		Digital Operator	Available to be operated by RUN, STOP and JOG keys.
		External terminals	2 wire style (Fwd/Stop, Rev/Stop, Run/Stop and Fwd/Rev)/ 3 wire operation, JOG running, Serial Communication Board(RS-485)
Intelligent Input Terminal		Switching of 16 step pre-set available speed; Switching of First/Second acceleration/deceleration time; prohibiting acceleration/deceleration and external interrupt input; Jog running UP/DOWN frequency terminal setting; Count terminals	
Intelligent Output Terminal		During running, frequency agreement output, non-zero count agreement output, over torque output, external interrupt reference, low voltage detection, operation mode reference, fault output and external fault interruption.	
Analog signal output		Correspond to actual output frequency or output current.	
Fault signal contact		Contact of ON at AC motor drive fault (Relay with one C contact or two open collector output.)	
Built-in Function		Setting max/min output frequency; momentary power off restarting; fault restarting; setting of S curve acceleration/deceleration time; auto-voltage stabilizing output modulation; digital frequency output signal; fault records; parameters locking; reset to factory setting; inhibiting reverse run; over current stalling prevention, over voltage stalling prevention, electrical thermal relay.	
Protection Function		converting unit phase protection, to accelerate and decelerate the over current and over voltage and keep the over current and over voltage in constant rate, UV failure of busbar, motor overload, inverter overload, input side phase failure, output side phase failure, rectifier module overheating, converting module overheating failure, external failure, communication failure, current sense failure, motor self-taught failure, EEPROM operation failure, PID feedback disconnection failure, stopping unit failure	
Digital operator		Consisting of 8 functional keys, 7 step LED in 5 digits; 5 status LED indicators. Available to set frequency, display actual output frequency, output current, self-determined unit parameter overview of users, modify settings and for parameter locking, fault displaying. Available to perform running, stop, reset, fwd/rev run and jog run.	
environment	Operational Environment temperature		-10℃ to +50℃ (+40℃ to +50℃ available when the dust cover is removed.)
	Storing temperature		-20℃ to +60℃
	Operational Environment dampness		Below 90%RH without moister
	Installation height		Lower than 1000m, without corrosive gas, fluid and dust.
	Vibration		Below 20Hz 9.80665m/s <sup>2</sup> (1g), 20~50Hz 5.88m/s <sup>2</sup> (0.6g)
Protection degrees		IP20(Determined by the installation environment of the end-users.)	

## Applicable electromagnetic contactor and wiring specifications

Non-fuse breaker/Magnetic contactor

SANCH ELECTRIC shall not be responsible for faults due to the following:

- (1) Absence or inapplicable or over large non fuse breakers was put between the power supply and the inverter, which results in the inverter fault.
- (2) Magnetic contactors or advance capacitor or Surge Absorber were connected in series between the inverter and motor.
  - A three phase Squirrel-cage induction motor which corresponds with the capacity of the inverter shall be adopted.
  - If more than one motors were driven simultaneously by one inverter, the current of these motors when running shall below capacity of the inverter. And each motor shall be prepared with a thermal relay in appropriate capacity.
  - Phase advance capacitors and other capacity elements such as LC or RC shall not be fixed between the inverter and motor.

### List of applicable non-fuse switches for S2800 series

220V Series

S2800-SERIES MODEL	Rated Input Current(A)	Rated Output Current(A)	Motor Output(kW)	Non-fuse Switch Rated Current(A)
S2800-2T0.75G	11	5.0	0.75	20
S2800-2T1.5G	15	6.5	1.5	30
S2800-2T2.2G	27	11	2.2	40

## 440V Series

S2800-SERIES MODEL	Rated Input Current(A)	Rated Output Current(A)	Motor Output(kW)	Non-fuse Switch Rated Current(A)
S2800-4T0.75G	3.4	2.5	0.75	5
S2800-4T1.5G	5.0	3.7	1.5	10
S2800-4T2.2G	5.8	5.0	2.2	15
S2800-4T4.0G	11.2	9.7	4.0	20
S2800-4T5.5G	15	13	5.5	20
S2800-4T7.5G	20	17	7.5	30
S2800-4T11G	26	25	11	50
S2800-4T15G	35	32	15	60
S2800-4T18.5G	38	37	18.5	75
S2800-4T22G	46	45	22	100
S2800-4T30G	62	60	30	100
S2800-4T37G	76	75	37	100
S2800-4T45G	90	90	45	125
S2800-4T55G	105	110	55	160
S2800-4T75G	140	150	75	200
S2800-4T90G	160	176	90	250
S2800-4T110G	210	210	110	330
S2800-4T132G	240	250	132	330
S2800-4T160G	290	300	160	400
S2800-4T185G	330	340	185	500
S2800-4T200G	370	380	200	500
S2800-4T220G	410	415	220	630
S2800-4T250G	460	470	250	700
S2800-4T280G	500	520	280	780
S2800-4T315G	580	600	315	900
S2800-4T350G	620	640	350	960
S2800-4T400G	670	690	400	1035
S2800-4T500G	835	860	500	1290
S2800-4T560G	920	950	560	1425
S2800-4T630G	1050	1100	630	1635

**Application and description for ambient equipments**

Power supply:



Power supply:

- Make sure voltage class is correct, otherwise inverter may be damaged.
- A no fuse breaker (air circuit breaker) shall be provided between AC supply and inverter.

No fuse Breaker



No fuse Breaker:

- Circuit breaker which complies with rated voltage and current of inverter shall be applied as ON/OFF control for inverter. And it shall also be protective to the inverter.
- Never use circuit breaker as ON/OFF switch for inverter.

Magnetic Contactor



Leakage Breaker

- A leakage breaker shall be installed to prevent mal-functioning and to ensure the safety of operators; To prevent the mal functions, those of which the sensitivity current above 200mA and action time above 0.1 sec shall be applied.

Power Improving AC Electric Reactor



Magnetic Contactor

- Inverters can be used without a magnetic contactor (MC) installed at the power supply side. However, when used for external control or automatically restart after power off, or when braking control is used, a magnetic contactor shall be applied.
- Do not use the magnetic contactor as RUN/STOP switch for inverter.

Input side Noise Filter



Power Improving AC Electric Reactor

- If power supply of large capacity (Above 600k VA) is used, an AC reactor can be added to inverters which is below 220/440V 15Kw, thus the power of power supply shall be improved.

S2800 Inverter



Input side Noise Filter

- The Input side Noise Filter must be applied if inverter has electronic induction load around.

Zero Phase Noise Filter



Inverter

- Input Power supply terminals R/L1, S/L2 and T/L3 can be connected without phase sequence.
- Connect output terminals U/T1, V/T2 and W/T3 to U/T1, V/T2 and W/T3 of motors, if the inverter is in forward run reference, while motor reverse runs, change any two of U/T1, V/T2 or W/T3
- Never connect U, V, W to AC Power supply otherwise inverter may be damaged.
- Grounding terminals shall be grounded correctly.  
Category III Grounding: below 100 Ω  
Special grounding: below 10Ω.

Three Phase Squirrel Cage Motor



Zero Phase Noise Filter

- If specialized noise filters are fit at inverter output side, radiation interference and induction noise shall be decreased.

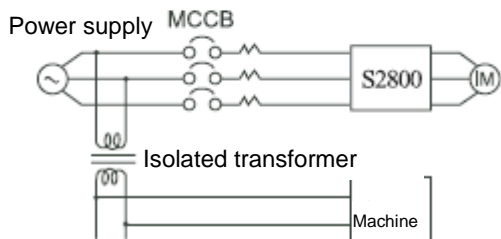
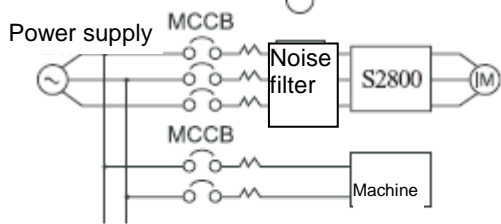
Wiring shall be checked whether correct or not. Peripheral wiring shall fulfill the following requirements. (Do not use a buzzer of control circuit to check wiring)

**(A) Wiring for control circuit Power supply must be isolated or far from other high voltage wirings or high current power lines, thus electromagnetic interference can be avoided. See diagrams below:**

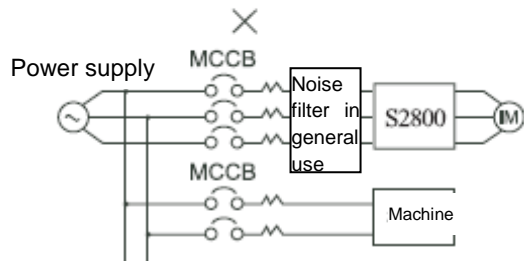
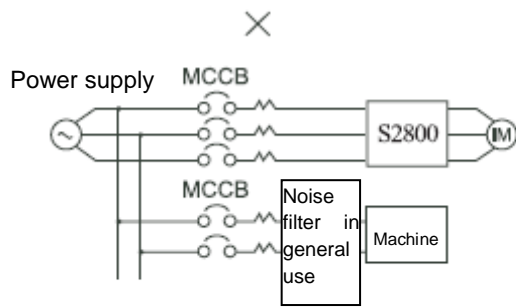
- Individual power supply bridge for inverter



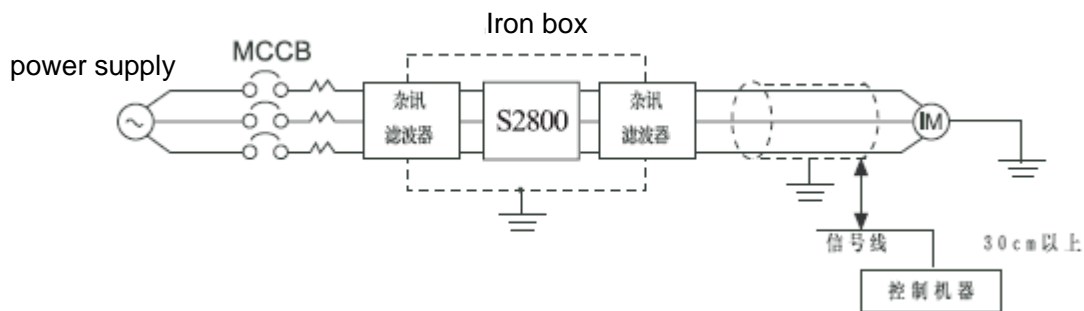
- If inverter power supply circuit is used commonly with other machines, inverter-specialized noise filter or isolating transformer shall be added.



- Good effect may not be received if general use noise filters are applied



- Interference during transmission can be prohibited by adding an inverter-specialized noise filter at main circuit output side. For preventing electromagnetic radiation, a metal tube shall be installed, and distance from signal wiring of other control machines shall be 30cm at least.



杂讯滤波器 Noise filter    信号线 Signal wire    控制机器 Control device  
30cm 以上 30cm above

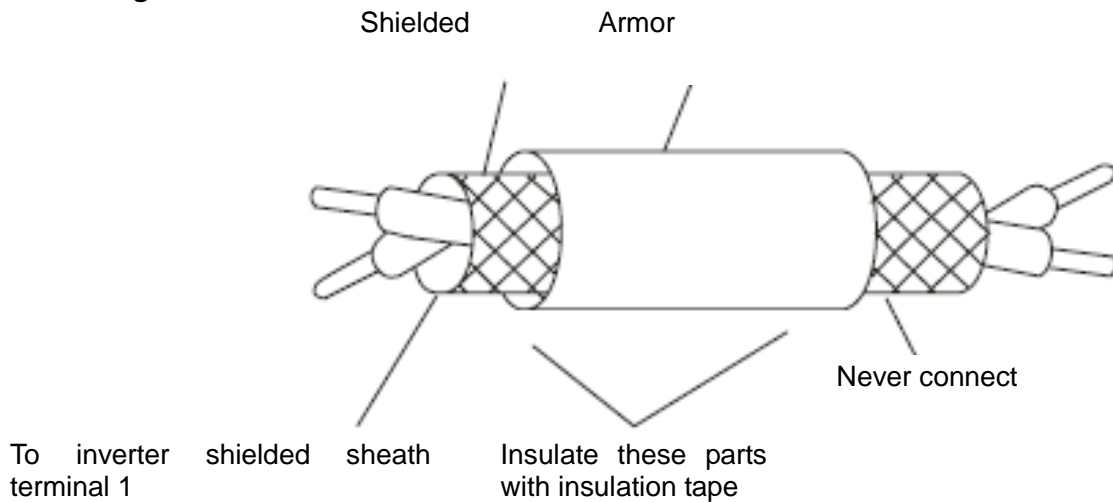
- Voltage drop of wiring shall be considered providing that inverter and motor are with an excessive distance. Voltage drop (V) =  $3^{1/2} \times \text{wiring resistance } (\Omega/\text{km}) \times \text{wire length (m)} \times \text{current(A)} \times 10^{-3}$ , load wave frequency shall be modified according to wiring prepared.

Distance between inverter and motor wiring	Below 50M	Below 100M	Above 100M
Allowable load wave no.	Below 12kHz	Below 9kHz	Below 6kHz
Set value for parameter 2-09	12	9	6

**(B) Wiring for control circuit shall be isolated or far from main circuit wiring or other high voltage/current power lines, thus electromagnetic interference shall be avoided.**

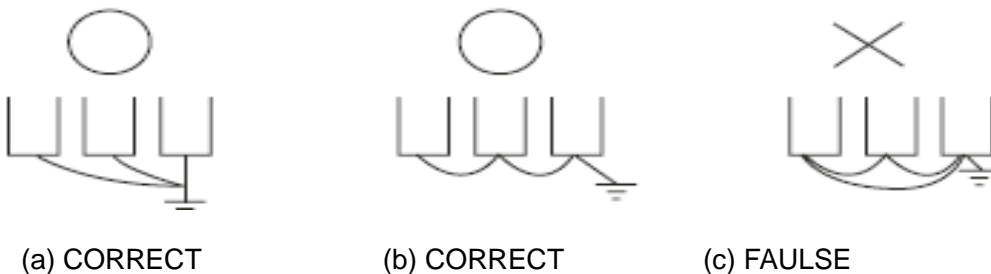
- For preventing electromagnetic interference and false sequence, shielding wiring shall be used for control circuit. Shielding wiring shall connect grounding terminals.

**Distance for wiring shall be 50m or less.**



**(C) Grounding terminal for inverters shall be grounded properly. Below 100Ω: Category Below 10Ω: Special**

- AWG shall be taken as standard for ground wire. Ground wire shall be as short as possible.
- Never ground simultaneously for Inverter ground wire with other large current load (such as welding machine or large Power motors). They shall be grounded separately.
- Ground circuit shall be avoided when several inverters are grounded simultaneously.



**(D) Cable line width for main circuit and control circuit shall be selected according to power line standard.**

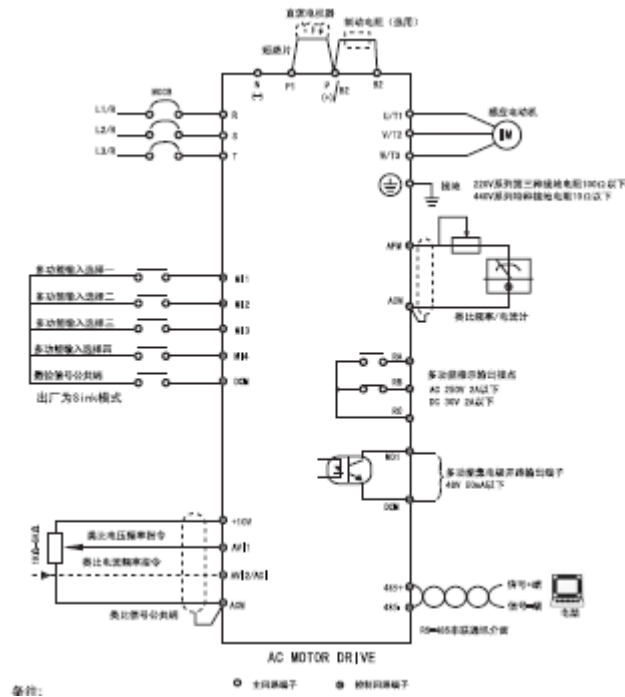
**(E) After completing of grounding and wiring, check for the following items: wiring is proper; wire is not broken and screws are securely tightened.**

## 2.4 WIRING

### Basic Wiring Diagram

Wiring of AC motor drive can be divided into two parts, the main circuit and control circuit. After removing the cover of inverter, terminals of main circuit and control circuit shall be discovered. Users must connect terminals as diagram shows.

Below is a standard wiring diagram for S2800 series AC motor drive. If only digital control panel was used, only main circuit terminal wiring applicable.



以上图片翻译为中英文对照:

#### (左侧:)

多功能输入选择一:Multi-input option 1

多功能输入选择二:Multi-input option 2

多功能输入选择三:Multi-input option 3

多功能输入选择四:Multi-input option 4

数位信号公共端:Digital signal Common terminal

出厂为 SINK 模式:SINK mode as preset at factory

类比电压频率指定:Analog voltage frequency reference

类比电流频率制定:Analog current frequency reference

类比信号公共端:Analog signal terminal common

#### (中间)

直流电抗器:DC reactor

制动电阻(选用):Braking resistor(optional)

短路片:Short circuit pad

主回路端子:Main circuit terminal

控制回路端子:Control circuit terminal

#### (右侧)

感应电动机:Induction motor

220V 系列第三种接地电阻 100Ω 以下

220V Series the third grounding resistance of 220V Series is less than 100Ω

440V 系列接地电阻 10V 以下:

Grounding resistance shall below 10Ω for 440V series

类比频率/电流机:Analog frequency/ flow meter

多功能指示输出接点:Multi-functional reference output contactor

AC250V 2A 以下:AC 250v below 2A

DC30V 2A 以下:DC 30v below 2A

多功能集电极开路输出端子 48V50MA 以下:

Multi-functional open-collector output terminal 48v50mA below

信号+端:Signal + terminal

信号-端:Signal - terminal

电脑:Computer


RS-485 串联通讯介面:RS-485 serial connected communication board

#### NOTES:

1. The external terminal has two ways of AVI input, one of which is shared with ACI and can be switched.
2. Analog current frequency reference ACI: Switching of 4-20mA or 0-+10V as input signal according to J3 shall be available.
3. The external terminal has four multi-functional input terminals, which can choose configuration input.
4. The external terminal has one open collector output.
5. The external terminal has one relay output.

## 2.5 OUTLINE SIZE

Main circuit terminal descriptions      Description for S2800 Series inverter terminals

Terminal symbols	Function
L1/R,L2/S,L3/T	Main circuit AC power supply input (For single phase input, connect to R and T.)
U/T,V/T2,W/T3	Connect to motor
P/B1,B2	Braking resistor(optional) connecting terminal
P/B1,N	Connecting to braking module
	For grounding (High voltage wave impact and noise interference shall be avoided.)

### Terminal Symbol Description

Terminal symbols	Function of Terminal	Specification
RA-RC	Multifunctional reference signal output contactor	See Description 06-01 for RELAY CONTACTOR OUTPUT
RB-RC	Multifunctional reference signal output contactor	
MI1-DCM	Multifunctional input option 1	See Description from 04-00 to 04-03
MI2-DCM	Multifunctional input option 2	
MI3-DCM	Multifunctional input option 3	
MI4-DCM	Multifunctional input option 4	
MO1-DCM	Multifunctional output terminal 1	See description 06-00 (Open collector output)
+10V-ACM	Power supply for speed setting	Speed reference power supply (+10V)
AVI1-ACM	Analog voltage frequency reference	0 to +10V/Max output frequency
AVI2-ACM	Analog voltage frequency reference	0 to +10V/Max output frequency
ACI-ACM	Analog current frequency reference	4 to +20mA/Max output frequency
AFM-ACM	Analog frequency/ current meter	0 to +10V/Max output frequency
485+ -485-	Serial connected communication board	RS-485 Serial connected communication connector
24-DCM	Assisted control power supply	DC 20V-24V (50Ma Max)

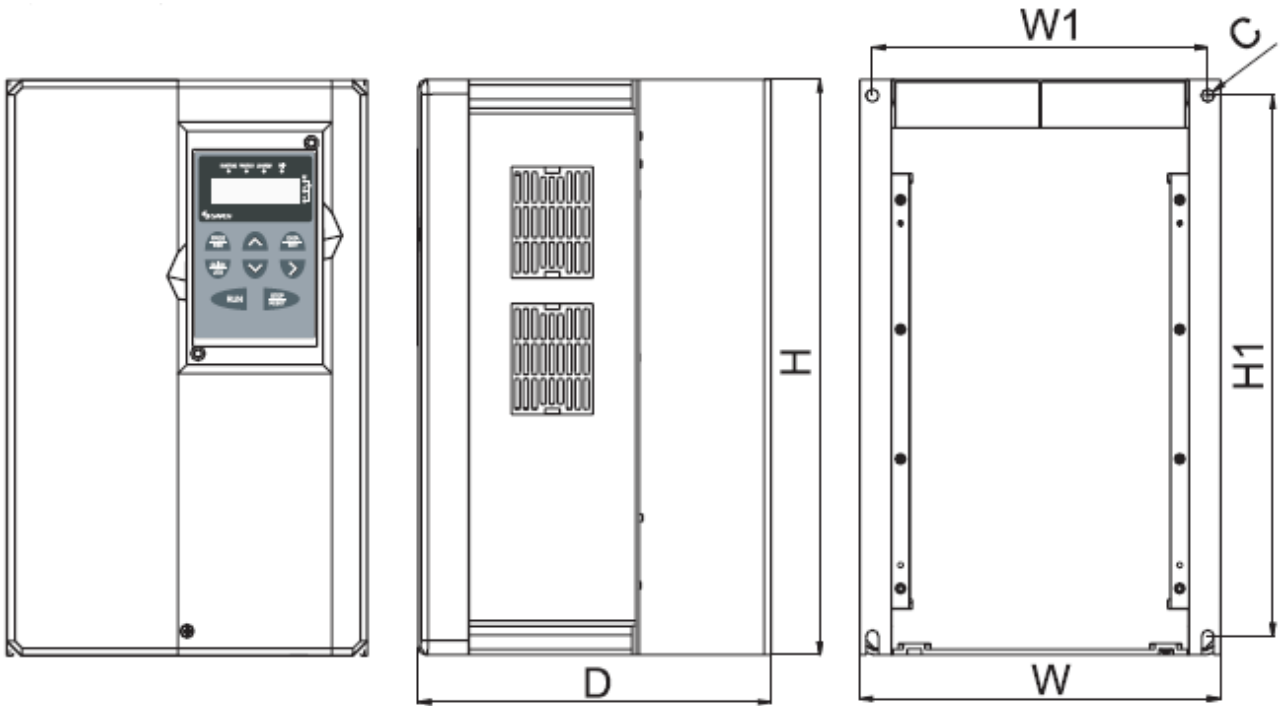
Pay attention to insulate the control signal wire with insulation tape.

Only use double Null Modem for communication cable of RS-485.

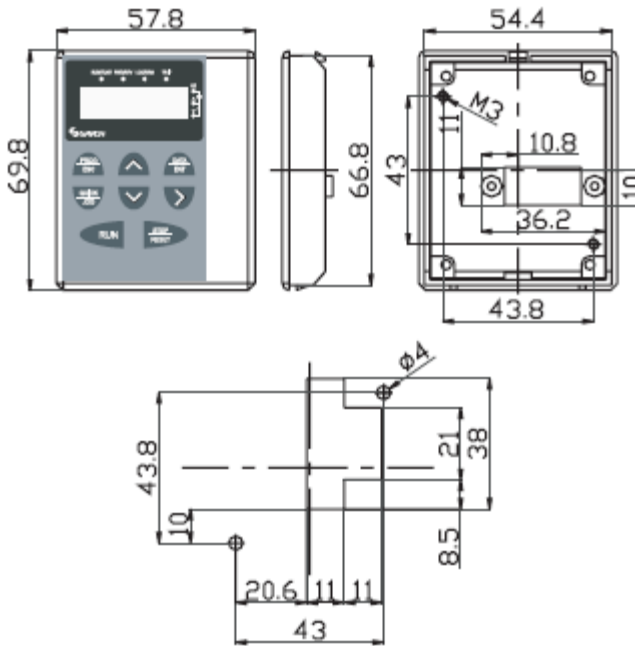
**Overview Outline Diagram**

Specification	W	W1	H	H1	D	C	Quantity (kg)	remarks	
S2800-2T0.75G	126.5	113.5	174	160	144.5	5.5	1.6	use IP03 exerciser	
S2800-2T1.5G									
S2800-4T0.75G									
S2800-4T1.5G									
S2800-4T2.2G									
S2800-2T2.2G	132	119.5	236	205	163	5.5	2.6	use IP05 exerciser	
S2800-4T4.0G	132	119.5	236	205	171	5.5	3.7		
S2800-4T5.5G									
S2800-4T7.5G	202.2	186.2	320	300.6	196.1	6.5	6.0		
S2800-4T11G							6.4		
S2800-4T15G	250	225.5	403	383.5	216	8	9.8		
S2800-4T18.5G							10.1		
S2800-4T22G							11.2		
S2800-4T30G									
S2800-4T37G									
S2800-4T45G									
S2800-4T55G									
S2800-4T75G									
S2800-4T90G									
S2800-4T110G									
S2800-4T132G									
S2800-4T160G									
S2800-4T185G									
S2800-4T200G									
S2800-4T220G									
S2800-4T250G									
S2800-4T280G									
S2800-4T315G									
S2800-4T350G									
S2800-4T400G									
S2800-4T500G									
S2800-4T560G									
S2800-4T630G									

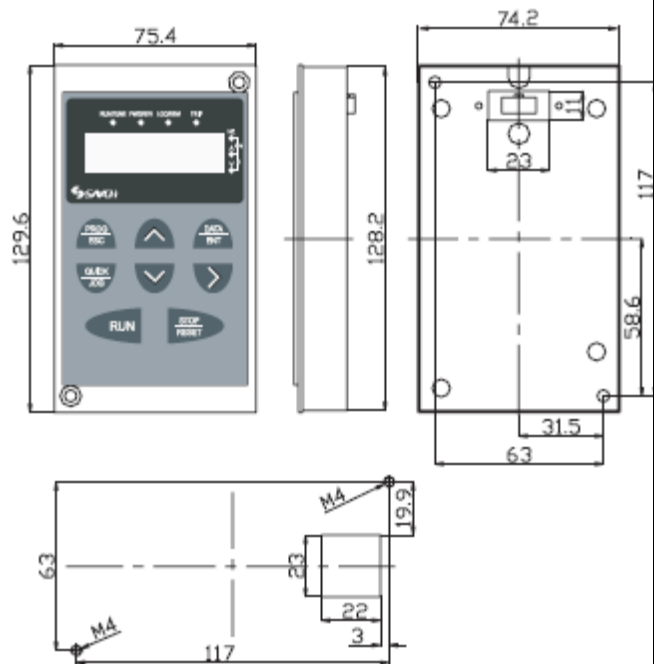
**DIAGRAM FOR PRODUCT OUTLINE**



◆ Outline of small power operator (IP03) and size for installation aperture



◆ Outline of large power operator (IP05) and size for installation aperture

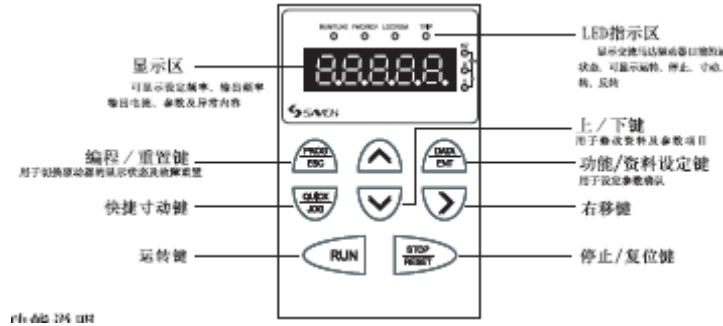


## 3 DESCRIPTION OF OPERATORS

### 3.1 KEYBOARD DESCRIPTION FOR IP03/IP05 DIGITAL OPERATOR

Descriptions and functions of the keyboard

Locating on AC motor drive, the digital operator IP03/IP05 has two spaces: display space and operating space. Programmed mode and different operation states shall be displayed on the display space, while for the operating space, it is an interface for communication of the operators and AC motor drive.



左侧依次为:

显示区 Display space

可显示设定频率、输出频率 输出电流、参数及异常内容  
Available to display set frequency and output frequency, output current, parameters and fault information

编程/重置键 Program/reset Key

用于切换驱动器的显示状态及故障重置 For switching display mode and fault resetting of the drive

快捷寸动键:shortcut jog-run key

运转键 Operation key

右侧依次为:

LED 指示区 LED indicator space

显示交流马达驱动器目前的运转状态,可显示运转、停止、寸动、正转、反转 To indicate current operation status of AC motor drive. Available to indicate operation, stop, jog run and fwd/rev run.

上/下键 UP/DOWN Key

用于修改资料及参数项目 For modifying data and parameter programs

功能/资料设定键 Function/ data set key

用于设定参数确认 For conform the set parameters

右移键:rightshift

停止/复位键:stop / reset key



#### Program

Enter or quit the first menu



#### Enter key

Enter into menu step by step, set parameter and enter



#### UP key

Increase of data or function code



#### DOWN key

Decrease of data or function code



#### Shift key

In stopping and running display interfaces, the display parameter can be selected circularly. the modified bit can be selected by this button when the frequency given is keyboard input.



#### Running key

For start operation under keyboard operation mode



#### Stop / reset key

To stop operation by pressing this key, limited by function code 08-04;  
To reset fault in the state of fault alarm, unlimited by function code 08-04.



### Shortcut multifunction key

The function of this key is identified by function code 08-03.

0: function of shortcut key QUICK, the first menu to enter or quit shortcut key

1: switching key for forward and reverse

2: key for jog-run operation

3: clear the frequency value set by UP / DOWN



### Composite key

The inverter will freely stop when pressing keys of RUN and STOP / RST at the same time.

## Description of Indicator Light

### 1) Description of function indicator light

Name of indicator light	Description of indicator light
RUN / TUNE	Indicator light of running state: Light-off = in the state of stopping, light-flicker = in the state of parameter self-learning, light-on = in the state of running
FWD / REV	Indicator light of forward and reverse: Light-off = in the state of forward, light-on = in the state of reverse
LOCAL / REMOT	Indicator light of control mode: Light-off = keyboard control state, light-flicker = terminal control state, light-on = telecommunications state
TRIP	Indicator light of overload pre-alarm: Light-off = in normal state, light-flicker = in the state of overload pre-alarm, light-on = in fault state

### 2) Description of unit indicator light

symbol	Description of symbol
Hz	frequency unit
A	current unit
V	voltage unit
RPM	rotating speed
%	percentage

## 3.2 Operation Instructions of Keyboard

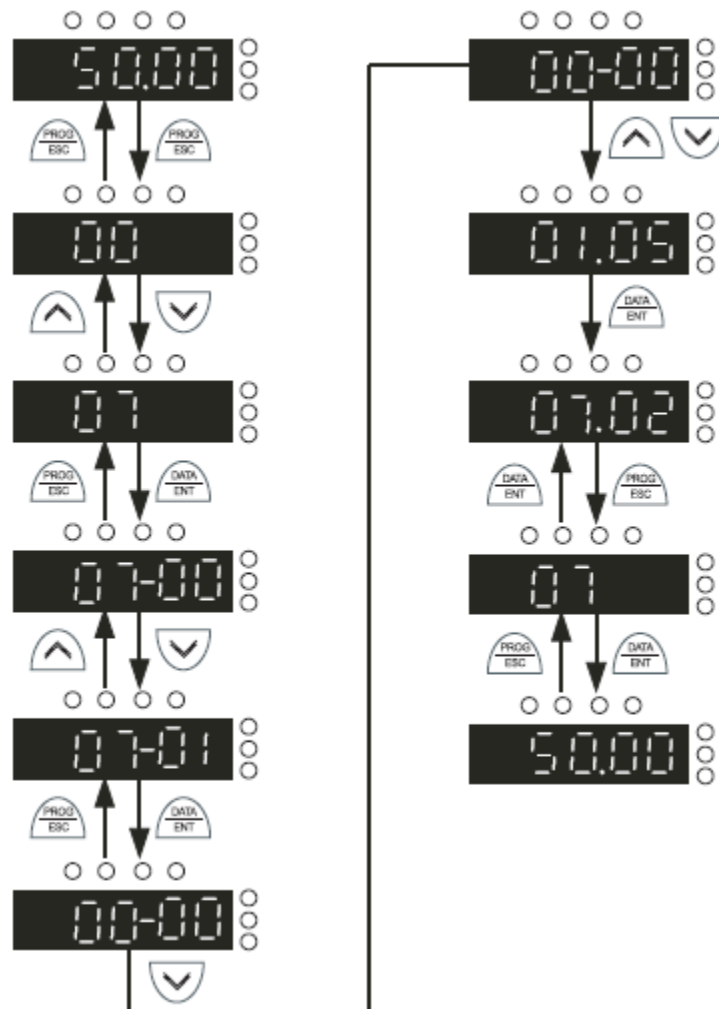
### 3.2.1 Parameter Setting

Three levels of menu are:

1. group number of function code (first-level menu)
2. labeling of function code (second-level menu)
3. set value of function code(third-level menu)

Press PRG / ESC or DATA / ENT to back to second-level menu when in the state of third-level menu. The difference between PRG / ESC and DATA / ENT is as follows. DATA / ENT key stores the set parameter into control plate before backing to second-level menu and shifts to the next function code automatically. While PRG / ESC key directly backs to the second-level menu without storing parameters and keep remaining to the current function code.

For example, set the frequency of function code 07-01 from 00.00Hz to 01.05Hz.



In the state of third-level menu, it is indicated that the function code can't be modified if the parameter has no flicker bit, the reason of which may be:

- 1) The function code is not a modifiable parameter, e.g. actual inspection parameter, operation record parameter, etc.
- 2) The function code is unmodifiable in running state, needing to be modified after stopping.

### 3.2.2 Failure Resetting

When the inverter goes wrong, the inverter will display the relative failure information cue. The user can reset the failure by the STOP / RST key on keyboard or terminal function (group 04). The inverter will be in standby state after failure resetting. If the user doesn't reset failure when the inverter is in failure state, the inverter will be in running protection state and unable to be operated

### 3.2.3 Motor Parameter Self-learning

The nameplate parameter of motor has to be input accurately when choosing the PG vector control. The inverter will match the standard motor parameter according to this nameplate. To obtain the good control performance, it is recommended to do the motor parameters self-learning, the operation step is as follows.

First, choose the keyboard instruction channel (0) as the running instruction channel choice(00-00).

Then input following contents according to motor actual parameters.

01-02:rated power of motor

01-03: rated frequency of motor

01-04: rated rotating speed of motor

01-05: rated voltage of motor

01-06:rated current of motor

the keyboard displays TUN-0, TUN-1 in the self-taughtcourse and –END- when ending the self-learning.

Note: In self-taughtcourse, the motor has to be uncoupled from load. Otherwise, motor parameters obtained from self-taughtmay be incorrect.

### 3.2.4 Password Setting

S2800 series inverter provides password protection to users. When 08-00 is set as nonzero value, it is the user's password. The password protection comes into effect immediately after quitting the edit state of function code. "0.0.0.0.0." will be displayed when pressing PRG / ESC key again to enter the edit state of function code. The operator has to input the correct password, otherwise unsuccessful to enter.

Set 08-00 as value 0 to cancel the function of password protection. The user's password has no protection function to parameters in shortcut menu.

The password protection takes into effect in one minute after quitting the edit state of function code. "0.0.0.0.0." will be displayed when pressing PRG / ESC key to enter the edit state of function code. The operator has to input the correct password, otherwise unsuccessful to enter.

### 3.2.5 Running State

#### 3.2.5.1 Power on Initialization

In the course of inverter power on, the system first are initialized, LED displays "8.8.8.8.8", and seven indicator lights are all on. The inverter is in standby state after finishing initialization.

#### 3.2.5.2 Standby

It is possible to display parameters of multiple states in stopping or running state. Whether to display the parameter is determined by the function code 08-06 (running parameters) and 08-07 (stopping parameters) according to binary bit. The definition of each bit refers to the description of 08-06 and 08-07 function code.

There are nine parameters of stopping state in all to determine whether to display, they are: set frequency, busbar voltage, on-off input state, open-collector output state, PID setting, PID feedback, analog input of AVI1 voltage, analog input of AVI2 voltage, segments of Multi-velocity and torque set value, of which whether to be displayed is determined by the function code 08-07 according to binary bit. Switch and display the chose parameter according to the sequence of > key and press key of DATA / ENT + QUICK / JOG to switch and display the chose parameter in the left sequence.

### 3.2.5.3 Motor Parameters Self-learning

As for the detailed information, please refer to the description of function code 01-01.

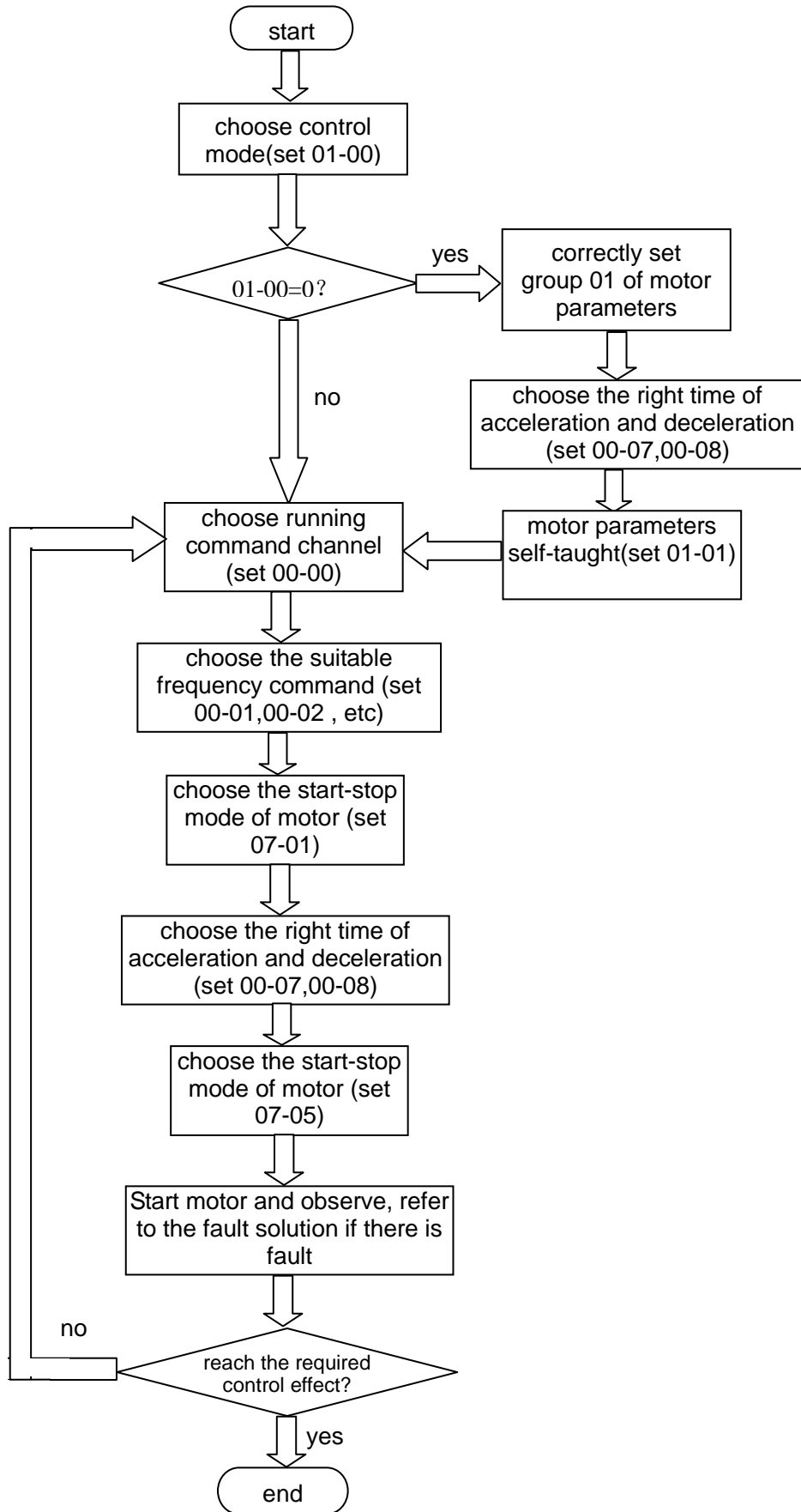
### 3.2.5.4 Running

There are fourteen parameters of running state in all to determine whether to display, they are: running frequency, set frequency, busbar voltage, output voltage, output current, running rotating speed, output power, output torque, PID setting, PID feedback, on-off input state, open-collector output state, analog input of AVI1 voltage, analog input of AVI2 voltage, segments of multistratum speed and torque set value, of which whether to be displayed is determined by the function code 08-06 according to binary bit. Switch and display the chose parameter according to the sequence of > key and press key of DATA / ENT + QUICK / JOG to switch and display the chose parameter in the left sequence.

### 3.2.5.5 Fault

S2800 series inverter provides all kinds of fault information. As for the detailed information, please refer to the fault and solution of S2800 series inverter.

### 3.2.6 Quick Debugging



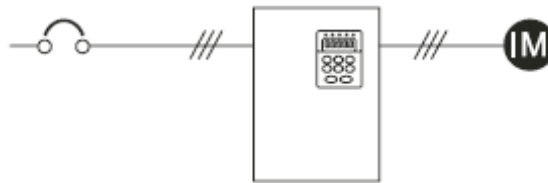
### 3.3 PRELIMINARY OPERATION-NOT CONNECTING WITH MOTOR

- Prior to connecting power supply with AC motor drive, check and make sure that AC power supply voltage is within input voltage range of the drive.
- Connect power supply to R, S and T input terminals of the AC motor drive.
- Operation mode control selection

Operation mode of SANCH can be divided into the following categories:

Both frequency and operation reference are controlled by keyboard.

(00-11=1) (Factory setting)



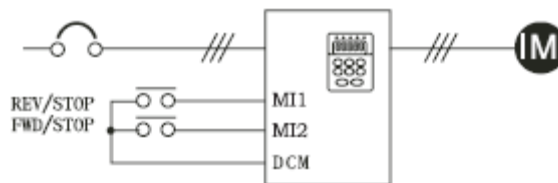
Frequency reference is controlled by keyboard.

Operation reference is controlled by external terminals.

STOP key on keyboard available.

Two line operation control, “REV/STOP” and “FWD/STOP”

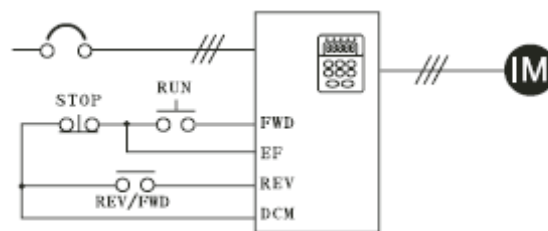
(04-01=1,04-02=2,04-05=0 or 1)



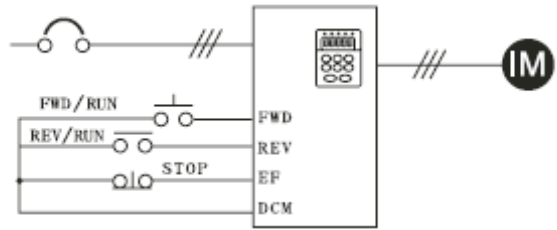
Frequency reference is controlled by keyboard.

Three-wire operation control mode configuration 2

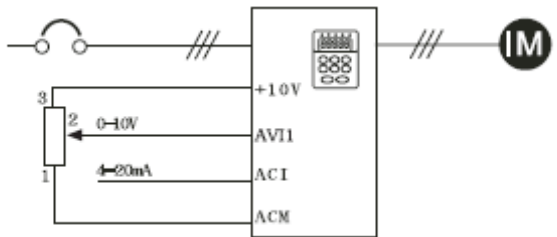
(04-00=1,04-01=3,04-02=2,04-05=2)



Frequency reference is controlled by keyboard.  
 Three line operation control mode Configuration 2  
 (04-00=1,04-01=3,04-02=2,04-05=3)



Frequency reference is input by analog signals.  
 (DC0 to +10V)+ (DC4 to +20mA)  
 Operation reference is controlled by keyboard.  
 (00-02 is set as 1, 2, 3)



## 4 LIST OF DESCRIPTIONS FOR FUNCTIONAL PARAMETERS

0 User's parameter		☑ set during running available			
Parameter	Parameter functions	Setting range	Factory setting	No.	
00-00	Operation command channel	1: keyboard command channel(LED off)	0	0	
		2: terminal command channel(LED flicker)			
		3: communication command channel(LED on)			
☑ 00-01	Keyboard and terminal UP / DOWN setting	0: effective, and the inverter powers down and stores	0	1	
		1: effective, and the inverter powers down and unstores			
		2: UP / DOWN setting is ineffective			
		3: setting is effective when running, reset when stopping			
☑ 00-02	Keyboard and terminal UP / DOWN setting	0: keyboard setting	0	2	
		1: analog quantity AV11 setting (single-phase corresponds to 0.4~0.75kW panel potentiometer)			
		2: analog quantity AV12 setting			
		3: AV11+ AV12 / ACI			
		4: Multi-velocity running setting			
		5: PID control setting			
6: remote communication setting					
00-03	Max output frequency	10.00~600.00Hz	50.00 Hz	3	
☑ 00-04	upper limit of running frequency	00-05~00-03(Max frequency)	50.00 Hz	4	
☑ 00-05	lower limit of running frequency	0.00Hz~00-04(upper limit of running frequency)	0.00 Hz	5	
☑ 00-06	Keyboard setting frequency	0.00Hz~00-03(Max frequency)	50.00 Hz	6	
☑ 00-07	Acceleration time 1	0.1~3600.0s	Type setting	7	
☑ 00-08	Deceleration time 1	0.1~3600.0s	Type setting	8	
00-09	Operation direction choosing	0: default orient operation	0	9	
		1: opposite direction operation			
		2: no reverse operation			
☑ 00-10	Carrier frequency setting	0.5~15.0kHz	Type setting	10	
00-11	Function parameters reset	0: no operation	0	11	
		1: restore defaults			
		2: clear default records			
☑ 00-12	AVR function choosing	0: ineffective	2	12	
		1: the whole process is effective			
		2: ineffective only when deceleration			
00-13	Inverter	0: G-type	Type setting	13	
		1: P-type			

01 Motor Control Parameters				☒ set during running available	
Parameter	Parameter functions	Setting range	Factory setting	No	
01-00	Velocity control mode	0: no vector control	0	14	
		1: V/F control			
		2: torque control (without vector control)			
01-01	Motor parameters self-learning	0: no operation	0	15	
		1: parameters overall self-learning			
		2: parameters static self-learning			
01-02	Motor rated power	0.4~900.0kw	Type setting	16	
01-03	Motor rated frequency	0.01Hz~00-03(Max frequency)	50.00 Hz	17	
01-04	Motor rated rotating speed	0~36000rpm	Type setting	18	
01-05	Motor rated voltage	0~460v	Type setting	19	
01-06	Motor rated current	0.1~2000.0A	Type setting	20	
☒ 01-07	Motor stator resistance	0.001~65.535 Ω	Type setting	21	
☒ 01-08	Motor	0.001~65.535 Ω	Type setting	22	
☒ 01-09	Inductor of motor stator and rotor	0.1~6553.5mH	Type setting	23	
☒ 01-10	Mutual-inductor of motor stator and rotor	0.1~6553.5mH	Type setting	24	
☒ 01-11	Motor no-load current	0.01~655.35A	Type setting	25	

02 Vector Control Parameters				☒ set during running available	
Parameter	Parameter functions	Setting range	Factory setting	No	
☒ 02-00	Velocity loop proportional gain 1	0~100	20	26	
☒ 02-01	Velocity loop integral time 1	0.01~10.00s	0.50s	27	
☒ 02-02	02-05	0.00Hz~02-05	5.00Hz	28	
☒ 02-03	Velocity loop proportional gain 2	0~100	15	29	
☒ 02-04	Velocity loop integral time 2	0.01~10.00s	1.00	30	
☒ 02-05	Switch high frequency	02-02~00-03 (Max frequency)	10.00Hz	31	
☒ 02-06	100%	50%~200%	100%	32	
☒ 02-07	Setting of torque upper limit	0.0~200.0%(inverter rated current)	150.0%	33	

03 V/F Control Parameters			☑ set during running available		
	03-00	V/F curve setting	0: line V/F curve	0	34
			1: square drop torque V/F curve		
☑	03-01	Torque increase	0.0%:(automatic)0.1%~30.0%	0.0%	35
	03-02	Torque increase cut-off point	0.0%~50.0%(relative motor rated frequency)	20.0%	36
☑	03-03	V/F slip compensation limit	0.0~200.0%	0.0%	37
	03-04	Running choosing of energy saving	0: inaction	0	38
			1: automatic energy-saving operation		
	03-05	Carrier wave limit	0: carrier wave limit 10K	0	39
			1: carrier wave limit 14K		
			2: reserved		
			3: reserved		
			4: reserved		

04 Input Terminal Parameters			☑ set during running available		
Parameter	Parameter functions	Setting range	Factory setting	No	
04-00	MI1 terminal function choosing	0: no function	1	40	
04-01	MI2 terminal function choosing	1: forward operation	4	41	
04-02	MI3 terminal function choosing	2: reversal operation	7	42	
04-03	MI4 terminal function choosing	3: three-wire operation control	0	43	
		4: forward jog-on			
		5: reversal jog-on			
		6: free stopping			
		7: fault reset			
		8: external fault input			
		9: frequency setting increase (UP)			
		10: frequency setting decrease (DOWN)			
		11: setting clearance of frequency increase and decrease			
		12: multi-velocity terminal 1			
		13: multi-velocity terminal 2			
		14: multi-velocity terminal 3			
		15: time choosing of acceleration and deceleration			
		16: PID control pause			
		17: wobble frequency suspension (suspend on the current frequency)			
18: wobble frequency resetting (return to center frequency)					
19: prohibition of acceleration and deceleration					
20: prohibition of torque control					
21: Temporary clearance of frequency increase and decrease setting)					
22: stopping DC braking					
23~25: reserved					

04 Input Terminal Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	04-04	Switching value filtering times	1~10	5	44
	04-05	Operation mode of terminal control	1: two-wire control 1	0	45
			2: two-wire control 2		
			3: three-wire control 1		
			4: three-wire control 2		
☑	04-06	Change rate of terminal UP/DOWN frequency increase	0.01~50.00Hz/s	0.50 Hz/s	46
☑	04-07	AVI1 lower limit	0.00V~10.00V	0.00V	47
☑	04-08	Corresponding setting of AVI1 lower limit	-100.0%~100.0%	0.0%	48
☑	04-09	AVI1 upper limit	0.00V~10.00V	10.00V	49
☑	04-10	Corresponding setting of AVI1 upper limit	-100.0%~100.0%	100.0%	50
☑	04-11	AVI1 input filtering time	0.00S~10.00S	0.10S	51
☑	04-12	AVI2/ACI lower limit	0.00V~10.00V	0.00V	52
☑	04-13	Corresponding setting of AVI2/ACI lower limit	-100.0%~100.0%	0.0%	53
☑	04-14	AVI2/ACI upper limit	0.00V~10.00V	10.00V	54
☑	04-15	Corresponding setting of AVI2/ACI upper limit	-100.0%~100.0%	100.0%	55
☑	04-16	AVI2/ACI input filtering time	0.00S~10.00S	0.10S	56

05 Multi-velocity Control Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
	05-00	Multi-velocity 0	-100.0%~100.0%	0.0%	57
	05-01	Multi-velocity 1	-100.0%~100.0%	0.0%	58
	05-02	Multi-velocity 2	-100.0%~100.0%	0.0%	59
	05-03	Multi-velocity 3	-100.0%~100.0%	0.0%	60
	05-04	Multi-velocity 4	-100.0%~100.0%	0.0%	61
	05-05	Multi-velocity 5	-100.0%~100.0%	0.0%	62
	05-06	Multi-velocity 6	-100.0%~100.0%	0.0%	63
	05-07	Multi-velocity 7	-100.0%~100.0%	0.0%	64

06 Output Terminal Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	06-00	M01 output choosing	0: no output	1	65
☑	06-01	Relay output choosing	1: the motor is in the forward running.	3	66
			2: the motor is in the reversal running.		
			3: fault output		
			4: frequency level test FDT output		
			5: frequency reaching		
			6: running in zero-speed		
			7: upper limit frequency reaching		
			8: lower limit frequency reaching		
			9~10: reserved		

06 Output Terminal Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	06-02	AFM output choosing	0: running frequency	0	67
			1: setting frequency		
			2: running rotating speed		
			3: output current		
			4: output voltage		
			5: output power		
			6: output torque		
			7: analog AVI1 input value		
			8: analog AVI2 input value		
9~10: reserved					
☑	06-03	Lower limit of AFM output	0.0%~100.0%	0.0%	68
☑	06-04	Lower limit corresponds to AFM output	0.00V~10.00V	0.00v	69
☑	06-05	Upper limit of AFM output	0.0%~100.0%	100.0%	70
☑	06-06	Upper limit corresponds to AFM output	0.00V~10.00V	10.00v	71

07 Start-stop Control Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
	07-00	Starting operation mode	0: direct starting	0	72
			1: start after DC braking		
☑	07-01	Beginning frequency of direct starting	0.00~10.00Hz	0.50Hz	73
☑	07-02	Reserving time of starting frequency	0.0~50.0s	0.0s	74
☑	07-03	Braking current before starting	0.0~150.0%	0.0%	75
☑	07-04	Braking time before starting	0.0~50.0s	0.0s	76
☑	07-05	Stopping mode choosing	0: slow down to stop	0	77
			1: free stopping		
☑	07-06	Beginning frequency of stopping braking	0.00~00-03 (Max frequency)	0.00Hz	78
☑	07-07	Latency time of stopping braking	0.0~50.0s	0.0s	79
☑	07-08	Stopping DC braking current	0.0~150.0%	0.0%	80
☑	07-09	Stopping DC braking time	0.0~50.0s	0.0s	81
☑	07-10	Dead time of forward and reversal rotating	0.0~3600.0	0.0s	82
☑	07-11	Choice of power-on terminal operation protection	0: terminal operation command is ineffective when powering on.	0	83
			1: terminal operation command is effective when powering on.		
☑	07-12	Polarity choosing of input and output terminal	0x00~0x3F	3F	84

08 Man-machine Interface Parameters			☒ set during running available		
	Parameter	Parameter functions	Setting range	Factory setting	No
☒	08-00	User password	0~65535	0	85
☒	08-01	Choice of LCD display language	0: Chinese 1: English	0	86
	08-02	Function parameter copy	0: no operation 1: local function parameters upload to LCD keyboard 2: function parameters of LCD keyboard download to local Note: The parameter becomes to be 0 automatically after finishing the operation of 1~2 items.	0	87
	08-03	Choice of QUICK/JOG key function	0: jog-on operation 1: switch between forward and reversal rotating 2: clear UP/DOWN setting	0	88
☒	08-04	Choice of STOP/RST key stopping function	0: only be effective to panel control 1: be effective to both panel and terminal control 2: be effective to both panel and communication control 3: be effective to all control modes	0	89
☒	08-05	Choice of keyboard display	0: introduced keyboard preferentially uses power. 1: local and introduced keyboard display simultaneously, but only the introduced keyboard is effective 2: local and introduced keyboard display simultaneously, but only the local keyboard is effective 3: local and introduced keyboard display simultaneously and both are effective (logical relationship between them is "or")	0	90
☒	08-06	Choice of parameters displayed by running status	0~0x7FFF BIT0: running frequency BIT1: setting frequency BIT2: busbar voltage BIT3: output voltage BIT4: output current BIT5: operation rotating speed BIT6: output power BIT7: output torque BIT8: PTD set value BIT9: PID feedback value BIT10: input terminal status BIT11: output terminal status BIT12: analog quantity AVI1 value BIT13: analog quantity AVI2 value BIT14: current segments of multi-velocity BIT15: torque setting value	0x3FF	91

08 Man-machine Interface Parameters				☑ set during running available	
Parameter	Parameter functions	Setting range	Factory setting	No	
☑	08-07	Choice of parameters displayed by stopping status	1~0x1FF	0xFF	92
			BIT0: setting frequency		
			BIT1: busbar voltage		
			BIT2: input terminal status		
			BIT3: output terminal status		
			BIT4: PTD set value		
			BIT5: PID feedback value		
			BIT6: analog quantity AVI1 value		
			BIT7: analog quantity AVI2 value		
			BIT8: current segments of multi-velocity		
			BIT9: torque setting value		
			BIT10~BIT15: reserved		
08-08	Rectifier module temperature	0~100.0℃		93	
08-09	Inverter module temperature	0~100.0℃		94	
08-10	Software version			95	
08-11	Local accumulated running time	0~65535h		96	
☑	08-12	Fault types of first two times	0~24		97
			0: no fault		
			1: inverter unit U phase protection(OUT1)		
			2: inverter unit V phase protection(OUT2)		
			3: inverter unit W phase protection(OUT3)		
			4: accelerated over current(OC1)		
			5: decelerated ove current(OC2)		
			6: keep the over current on constant speed(OC3)		
			7: accelerated over voltage(OV1)		
			8: decelerated over voltage(OV2)		
			9: keep the over voltage on constant speed(OV3)		
			10: busbar undervoltage fault(UV)		
			11: motor overload(OL1)		
			12: inverter overload(OL2)		
			13: input-side phase failure(SPI)		
			14: output-side phase failure(SPO)		
			15: rectifier module overheating(OH1)		
			16: inverter module overheating fault(OH2)		
			17: external fault(EF)		
			18: communication error(CE)		
			19: current test error(ITE)		
			20: motor self-taughterror(TE)		
			21: EEPROM operation error(EEP)		
			22: PID feedback disconnection error(PIDE)		
			23: braking cell error(bCE)		
24: Reserved					

08 Man-machine Interface Parameters <span style="float: right;">☒ set during running available</span>				
Parameter	Parameter functions	Setting range	Factory setting	No
08-13	Fault type of last time			98
08-14	Present fault type			99
08-15	Present fault operation frequency		0.00Hz	100
08-16	Present fault output current		0.0A	101
08-17	Present fault busbar current		0.0V	102
08-18	Input terminal status of present fault		0	103
08-19	Output terminal status of present fault		0	104

09 Enhanced Function Parameters <span style="float: right;">☒ set during running available</span>				
Parameter	Parameter functions	Setting range	Factory setting	No
☒ 09-00	Acceleration time 2	0.1~3600.0S	Type setting	105
☒ 09-01	Deceleration time 2	0.1~3600.0S	Type setting	106
☒ 09-02	Jog-on operation frequency	0.00~00-03(Max frequency)	5.00Hz	107
☒ 09-03	Acceleration time of jog-on operation	0.1~3600.0S	Type setting	108
☒ 09-04	Deceleration time of jog-on operation	0.1~3600.0S	Type setting	109
☒ 09-05	Hopping frequency	0.00~00-03 (Max frequency)	0.00Hz	110
☒ 09-06	Hopping frequency width	0.00~00-03 (Max frequency)	0.00Hz	111
☒ 09-07	Wobble frequency width	0.0~100.0% (relative setting frequency)	0.0%	112
☒ 09-08	Jumping frequency width	0.0~50.0%(relative wobble frequency width)	0.0%	113
☒ 09-09	Rise time of wobble frequency	0.1~3600.0S	5.0s	114
☒ 09-10	Fall time of wobble frequency	0.1~3600.0S	5.0s	115
☒ 09-11	Times of fault automation reset	0~3	0	116
☒ 09-12	Interval time setting of fault automation reset	0.1~100.0S	1.0s	117
☒ 09-13	FDT level detection value	0.00~00-03 (Max frequency)	50.00Hz	118
☒ 09-14	FDT hysteresis detection value	0.0~100.0% (FDT level)	5.0%	119
☒ 09-15	Frequency reaching detection width	0.0~100.0% (Max frequency)	0.0%	120
☒ 09-16	Braking threshold voltage	115.0~140.0%(standard busbar voltage) (380V series) 115.0~140.0% (standard busbar voltage) (220V series)		121
☒ 09-17	Coefficient of rotating speed display	0.1~999.9% Mechanical rotating speed=120*running frequency*09-17/motor pole number	100.0%	122
☒ 09-18	Low frequency threshold point of oscillation suppression	0~500	5	123
☒ 09-19	High frequency threshold point of oscillation suppression	0~500	100	124
☒ 09-20	Amplitude limiting value of oscillation suppression	0~10000	5000	125
☒ 09-21	Dividing frequency of high and low frequency of oscillation suppression	0.00Hz~00-03(Max frequency)	12.50Hz	126
☒ 09-22	oscillation suppression	0: oscillation suppression is effective 1: oscillation suppression is ineffective	1	127
☒ 09-23	PWM choosing	0: PWM mode 1 1: PWM mode 2 2: PWM mode 3	0	128

09 Enhanced Function Parameters			☑ set during running available		
	Parameter	Parameter functions	Setting range	Factory setting	No
↗	09-24	Choice of torque setting mode	0: set torque by keyboard (corresponding to 09-25) 1: set torque by analog quantity AVI1 (100% corresponding to twice of inverter rated current) 2: set torque by analog quantity AVI2/ACI (be same with 1 ) 3: set torque by analog quantity AVI1+AVI2/ACI (be same with 1 ) 4: multisection torques setting (be same with 1 ) 5: set torque by remote communication (be same with 1 )	0	129
↗	09-25	Output terminal status of present fault	-200.0%~200.0% (inverter rated current)	50.0%	130
↗	09-26	Choice of upper limiting frequency setting	0: set upper limiting frequency by keyboard (00-04) 1: set upper limiting frequency by analog quantity AVI1 (100% corresponding to the Max. frequency) 2: set upper limiting frequency by analog quantity AVI2/ACI (be same with 1 ) 3: multisection upper limiting frequencys setting (be same with 1 ) 4: set upper limiting frequency by remote communication (be same with 1 )	0	131

10 PID Control Parameters			☑ set during running available		
	Parameter	Parameter functions	Setting range	Factory setting	No
↗	10-00	Choice of PID given source	0: given by keyboard (10-01) 1: given by analog channel AVI1 2: given by analog channel AVI2/ACI 3: given by remote communication 4: given by multisection	0	132
↗	10-01	Keyboard presets the PID given.	0.0%~100.0%	0	133
↗	10-02	Choice of PID feedback source	0: analog channel AVI1 feedback 1: analog channel AVI2/ACI feedback 2: AVI1+AVI2/ACI feedback 3: remote communication feedback	0	134
↗	10-03		0: PID output is positive 1: PID output is negative	0	135
↗	10-04	Proportion gain (kp)	0.00~100.00	1.00	136
↗	10-05	Integration time(ti)	0.01~10.00s	0.10s	137
↗	10-06	Derivative time(td)	0.01~10.00s	0.00s	138
↗	10-07	Sampling period(t)	0.01~100.00s	0.10s	139
↗	10-08	PID control deviate	0.0~100.0%	0.0%	140
↗	10-09	Feedback disconnection test value	0.0~100.0%	0.0%	141
↗	10-10	Feedback disconnection test time	0.0~3600.0s	1.0s	142

11 Protection Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	11-00	Choice of motor overload protection	0: no protection	2	143
			1: general motor (with low-velocity compensation)		
			2: frequency motor (without low-velocity compensation)		
☑	11-01	motor overload protection current	20.0%~120.0% (motor rated current)	100.0%	144
☑	11-02	Frequency droop percentage of instant power-down	70.0~110.0%Standard busbar voltage	80.0%	145
☑	11-03	Frequency droop rate of instant power-down	0.00Hz~00-03 Max. frequency	0.00Hz	146
☑	11-04	Over voltage stall protection	0: prohibited	0	147
			1: permitted		
☑	11-05	Protection voltage of over voltage stall	110~150% (380V series)	130%	148
			110~150%(220V series)	120%	
☑	11-06	Automatic current limiting	100~200%	G type:160%	149
				P type: 120%	
☑	11-07	Frequency droop rate when limiting current	0.00~100.00 Hz/s	10.00Hz/s	150
☑	11-08	Choice of current limiting action	0: current limiting is always effective	0	151
			1: ineffective when the current limiting is on a constant speed		

12 Serial Communication Parameters <span style="float: right;">☑ set during running available</span>					
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	12-00	Local communication address	1~247, 0 is broadcast address	1	152
☑	12-01	Setting of communication baud rate	0:1200bps	3	153
			1:2400bps		
			2:4800bps		
			3:9600bps		
			4:19200bps		
			5:38400bps		
	12-02	Setting of data bit checking	0: no checking(N,8,1) for RTU	1	154
			1: even parity checking(E,8,1) for RTU		
			2: odd parity checking(O,8,1) for RTU		
			3: no checking(N,8,2) for RTU		
			4: even parity checking(E,8,2) for RTU		
			5: odd parity checking(O,8,2) for RTU		
			6: no checking(N,7,1) for ASCII		
			7: even parity checking(E,7,1) for ASCII		
			8: odd parity checking(O,7,1) for ASCII		
			9: no checking(N,7,2) for ASCII		
			10: even parity checking(E,7,2) for ASCII		
			11: odd parity checking(O,7,2) for ASCII		
			12: no checking(N,8,1) for ASCII		
13: even parity checking(E,8,1) for ASCII					


12 Serial Communication Parameters				☑ set during running available	
	Parameter	Parameter functions	Setting range	Factory setting	No
☑	12-02	Setting of data bit checking	14: odd parity checking(O,8,1) for ASCII	1	154
			15: no checking(N,8,2) for ASCII		
			16: even parity checking(E,8,2) for ASCII		
			17: odd parity checking(O,8,2) for ASCII		
☑	12-03	Communication answer delay	0~200ms	5ms	155
☑	12-04	Time of Communication overtime fault	0.0 (ineffective), 0.1~100.0s	0.0s	156
☑	12-05	Transmission error handle	0: alarm and free stop 0.1~100.0s	1	157
			1: not alarm and continue to run		
			2: not alarm and stop according to stopping mode (only under communication control mode)		
			3: not alarm and stop according to stopping mode (under all control modes)		
☑	12-06	Transmission response handle	0: write operation has response	0	158
			1: write operation has no response		

## **5 DESCRIPTION OF FUNCTIONAL PARAMETERS**

All the functional parameters are described in detail in this chapter. According to attributes, the parameters can be divided into 13 groups; in most of the applications, presetting for operation shall be completed by performing with these parameters of groups.


**The 13 groups of parameters are listed as below:**

- 0: basic function parameters**
- 1: motor control parameters**
- 2: vector control parameters**
- 3: V/F control parameters**
- 4: input terminal parameters**
- 5: multi-velocity control parameters**
- 6: output terminal parameters**
- 7: start-stop control put terminal parameters**
- 8: man-machine interface put terminal parameters**
- 9: enhanced function put terminal parameters**
- 10: PID control parameters**
- 11: protection parameters**
- 12: serial communication put terminal parameters**

 : indicates that it's available to be set during running.

### **0 User's Parameters**

<b>0-00</b>	Operation Command Channel	Factory setting	0
	Setting range	0: keyboard command channel (LED off)	
		1: terminal command channel (LED flicker)	
		2: communication command channel (LED on)	

 Choose the channel of inverter control command.

The inverter control command includes starting, stopping, forward, reverse, jog-on and fault reset, etc.

0: keyboard command channel (light of LOCAL/REMOT is off)

Control the operation command by RUN and STOP/RST keys on keyboard panel. If the multi-function key QUICK/JOG is set as switch function FWD/REV (set 08-03 as 1), it is possible to change the rotating direction through this key.

In running state, if press RUN and STOP/RST keys at the same time, the inverter will free stop.


1: terminal command channel (light of LOCAL/REMOT flickers)

Control the operation command by inputting terminal forward and reverse, normal inching turning and reverse inching turning, etc.

2: communication command channel (light of LOCAL/REMOT is on)

Control the operation command with upper computer through communication mode.

00-01	Keyboard and terminal UP/DOWN setting		Factory setting	0
⚡	Setting range	0: effective,and the inverter powers down and stores		
		1: effective,and the inverter powers down and unstores		
		2: UP / DOWN setting is ineffective		
		3: setting is effective when running, reset when stopping		

 Set frequency through “^”and “v” on keyboard and terminal UP/DOWN (frequency setting increase/ decrease) function. It has the highest authority and can combine with any other frequency setting channel. It mainly fine adjusts the output frequency of inverter in the debugging course of control system.

0:be effective and the inverter stores after powering down. It can set the frequency command and store this setting frequency value after powering down. And combine with present setting frequency automatically when powering on again.


1: effective,and the inverter powers down and unstores. It can set the frequency command, but not store this setting frequency value after powering down.

2: ineffective, the function of “^”and “v” on keyboard and terminal UP/DOWN are ineffective and the setting resets automatically.

3: the function setting of “^”, “v” on keyboard and terminal UP/DOWN is effective when running and resets when stopping.

**Note: when the user restores the function parameter of inverter, the frequency value set by keyboard and terminal UP/DOWN function will reset automatically.**

00-02	Parameter resetting		Factory setting	1
⚡	Setting range	0: keyboard setting		
		1: analog quantity AV11 setting (single-phase 0.4~0.75kW corresponds to panel potentiometer)		
		2: analog quantity AV12 setting		
		3: AV11+ AV12 / ACI		
		4: Multi-velocity running setting		
		5: PID control setting		
		6: Remote communication setting		

 Choose the frequency command input channel of inverter A. There are seven given frequency channels.

0: keyboard setting

Set the frequency value by keyboard through modification function code 00-06.

1: analog quantity AV11 setting (single-phase 220V 0.4~0.75kW corresponds to the potentiometer on local keyboard. And it corresponds to the potentiometer on communication keyboard 485 if using the introduced communication keyboard 485, while the local potentiometer ceases to be effectiveness automatically.)

2: analog quantity AV12 setting

3: analog quantity AV11+ AV12 / ACI setting

It refers that the frequency is set by analog quantity input terminal and S2800 serial inverter standard configuration provides two-way analog quantity input terminal, in which AV11 is voltage input of 0~10V and AV12 / ACI 0~10V/0 (4)~20mA input. The current and voltage can be switched through jumper wires.

**Note:When the analog quantity AV12 / ACI selects the current input of 0~20mA, the corresponding voltage is 5V. The 100.0% set by analog quantity input corresponds to the maximum frequency (00-03), and -100.0% the maximum inverted frequency.**

4: Multi-velocity running setting

The inverter will run in multi-velocity mode if choose this kind of frequency setting mode. It is necessary to set parameters of multi-velocity control group of groups 04 and 05 to determine the given percentage and corresponding relationship of given frequency.


### 5: PID control setting


The inverter running mode will be course PID control if choose this parameter. It is necessary to set 10 groups of PID control group. The inverter running frequency is the frequency value after PID's action. As for definitions of PID given source, given value and feedback source and so on, please refer to the introduction of 10 groups of PID function.


### 6: Remote communication setting


The frequency command is given by upper computer through communication. Please refer to the communication protocol 12 for details.


<b>00-03</b>	Max. output frequency	Factory setting	<b>50.00</b>
	Setting range	00-04~600.00	


 It is used to set the maximum output frequency of inverter. It's the basic of frequency setting and speed of acceleration and deceleration.


<b>00-04</b>	Upper limit of running frequency	Factory setting	<b>50.00</b>
	Setting range	00-05~00-03	


 It is the upper limit of inverter output frequency. The value should not be more than the maximum output frequency.


<b>00-05</b>	Lower limit of running frequency	Factory setting	<b>0.00</b>
	Setting range	0.00~00-04	


 It is the lower limit of inverter output frequency.  
 When the set frequency is less than the lower limit frequency, the inverter runs in lower limit frequency.  
 Max. output frequency  $\geq$  upper limit frequency  $\geq$  lower limit frequency

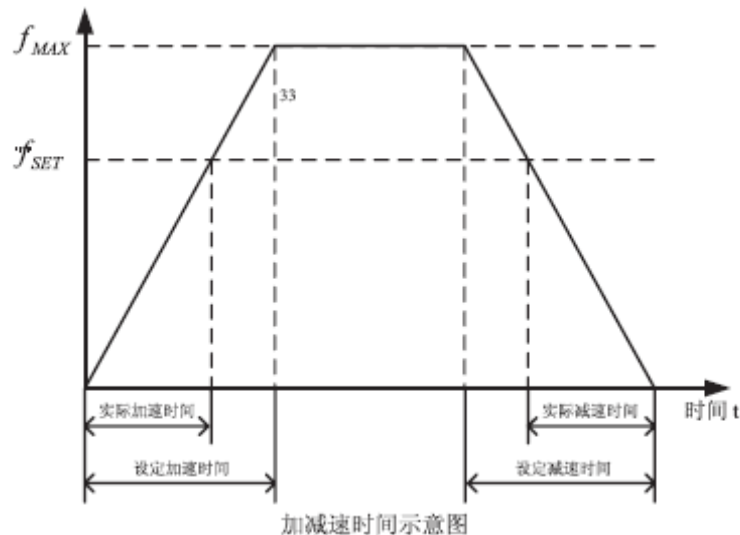
<b>00-06</b>	Keyboard setting frequency	Factory setting	<b>50.00</b>
	Setting range	0.00~00-03	

 When the frequency command chooses keyboard setting, the value of this function code is the initial setting value of inverter frequency.

<b>00-07</b>	Acceleration time 1	Factory setting	<b>10.00</b>
	Setting range	0.1~3600.0[type setting]	

<b>00-08</b>	Deceleration time 1	Factory setting	<b>10.00</b>
	Setting range	0.1~3600.0[type setting]	

 Acceleration time refers to the needed time t1 that accelerates the inverter from 0Hz to the maximum output frequency(00-03).  
 Deceleration time refers to the needed time t2 that decelerates the inverter from maximum output frequency(00-03) to 0Hz.  
 As shown in the diagram below:



实际加速时间:actual acceleration time 设定加速时间:set acceleration time  
 实际减速时间:actual deceleration time 设定减速时间:set deceleration time 时间 t:time t  
 加减速时间示意图 schematic diagram of time for deceleration and acceleration

When the set frequency equals to maximum frequency, actual time for acceleration and deceleration equals to set time for acceleration and deceleration .

When the set frequency is less than maximum frequency, actual time for acceleration and deceleration is less than set time for acceleration and deceleration .

actual time for acceleration and deceleration = set time for acceleration and deceleration ×(set frequency/Max. frequency)

S2800 series inverter has two groups of acceleration and deceleration time.

Group 1: 00-07, 00-08

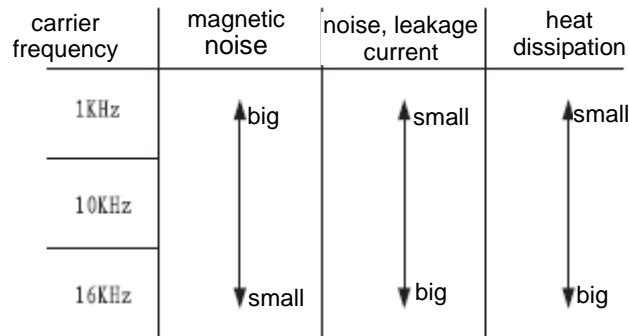
Group 2: 09-00, 09-01

Time for acceleration and deceleration can be chosen through time for acceleration and acceleration of multi-function digital input terminal to choose the terminal combination.

00-09	Deceleration time 1		Factory setting	<b>0</b>
	Setting range	0: default orient operation		
		1: opposite direction operation		
		2: no reversal operation		

- 0: default orient operation. The inverter runs in the actual direction after powering on.
- 1: opposite direction operation. It is used to change the rotating direction of inverter, which corresponds to change the rotating direction by adjusting any two of motor wires.
- Note: the running direction of motor will restore to its original state after initializing parameters. In some places, it is strictly prohibited to change the rotating direction of motor again after system debugging, which should be cautiously used.**
- 2: no reversal operation. It is prohibited to run the inverter in reversal direction, which is used in some special places.

00-10	Carrier frequency setting		Factory setting	<b>8.00</b>
	Setting range	0.5~15.0 [type setting]		



relational graph of effect of carrier frequency on environment

relation table of type and carrier frequency

type	Max	Min	factory setting
1.5~11kw	15	0.5	8kHz
15~55kw	8	0.5	4kHz
15~185kw	6	0.5	2kHz
200~315kw	6	0.5	1kHz

Advantage of high carrier frequency: better current waveform, less current harmonics and lower motor noise


Disadvantage of high carrier frequency: more starting consumption, more temperature rise of inverter, affect inverter output capacity

The inverter should be derated to use under high carrier frequency. And the leakage current of inverter increases, which enhances the electromagnetic interference to the outside world.

The situation will be contrary to above content if using low carrier frequency. The too low carrier frequency will result to the unstable running of low frequency, torque decrease and even oscillation.

The carrier frequency has been set properly when the inverter leaves factory. Generally speaking, the user has no need to alter this parameter.


<b>00-11</b>	Function parameters reset	Factory setting	<b>0</b>
	Setting range	0: no operation	
		1: restore defaults	
		2: clear default records	


 0: no operation

1: The inverter restores defaults of all parameters.

2: The inverter clears latest default records.


**Note: after finishing this operation, the value of the function code will return to 0 automatically. Restore defaults will not reset parameters of group 01.**

<b>00-12</b>	Function parameters reset	Factory setting	<b>1</b>
	AVR function choosing	0: ineffective	
		1: the whole process is effective	
		2: ineffective only when deceleration	

 AVR function equals to the automatic adjustment function of output voltage. When AVR function is ineffective, the output voltage varies with input voltage (or DC busbar voltage). When AVR function is effective, the output voltage doesn't vary with input voltage (or DC busbar voltage) and keep basically constant in its output range.

**Note: When the motor decelerates to stop, the motor will stabilize voltage automatically and close AVR function to stop in shorter deceleration time without over voltage.**

<b>00-13</b>	Type choosing	Factory setting	<b>0</b>
	Setting range	0: G-type (type setting)	
		1: P-type (type setting)	

 0: be suitable for constant torque load with defined rate parameter.

1: be suitable for variable torque load with defined rate parameter (load of fan and water pump).

**Note: The user can set this group of parameter to change type and realize G/P unification. The 220V level inverter only has G type.**

### 1: Motor Control Parameters

<b>01-00</b>	Velocity control mode	Factory setting	<b>0</b>
	Setting range	0: no vector control	
		1: V/F control	
		2: torque control (without vector control)	

 Choice of inverter operating mode

0: no vector control

It refers to open loop vector and is suitable for the high-performance general occasion without coder PG. One inverter only can drive one motor, such as loads of machine tool, centrifugal machine, drawing mill and injection machine and so on.

1: V/F control


It is suitable for occasions not asking too much for control precision, such as load of fan and pumps. One inverter can drive several motors.

2: torque control (without vector control)

It is suitable for occasions not asking too much for torque control precision, such as wire-wound and wire drawing. Under torque control mode, the rotating speed of motor is determined by motor load. And its speed of acceleration and deceleration isn't determined by time for acceleration and deceleration of inverter any more.

**Note: when choose vector control mode, it is necessary to do the motor parameter self-learning. Only by obtaining correct parameters can the vector control exert its advantages. The better performance can be achieved by adjusting parameter (group 02) of speed regulator.**

<b>01-01</b>	Motor parameters self-learning	Factory setting	<b>0</b>
	Setting range	0: no operation	
		1: parameters overall self-learning	
		2: parameters static self-learning	

 0: no operation

1: rotating parameters self-taught

The nameplate parameter (01-02~01-06)of motor has to be input accurately before motor parameter self-learning. The motor has to be uncoupled from load to stay in static and no-load state. Otherwise, motor parameters obtained from self-taught may be incorrect.

Time for acceleration and deceleration (00-07, 00-08) should be set properly according to motor inertia before motor parameter self-learning. Otherwise, the fault of over current and over voltage may happen in the course of motor parameter self-learning.

Set 01-01 as 1 and press DATA/ENT to begin motor parameter self-learning, LED displays “-TUN-” and flickers this time. Press RUN to start self-learning, LED displays “TUN-0”. Then the motor start to run when LED displays “TUN-1” and RUN/TUNE flickers. After finishing the self-taught course, LED displays “-END-“ and return to stopping interface. Press PRG/ESC to quit parameter self-taught when “-TUN-” flickers.

Press STOP/RST to stop the operation of parameter self-taught during self-taught course.

**Note: The starting and stopping of parameter self-taught can be controlled only by keyboard. The function code returns to 0 automatically after completing self-learning**

2: parameters static self-learning

It is not necessary to uncouple motor from load in mode of parameters static self-learning. The nameplate parameter (01-02~01-06)of motor has to be input accurately before motor parameter static self-learning. The stator resistance, rotator resistance and leakage inductance of motor will be detected after self-learning. While the mutual-inductor and no-load current of motor can't be detected, which can be input by the user according to experience.


01-02	Motor rated power	Factory setting	*****
	Setting range	0.4~900.0kw(type setting)	

01-03	Motor rated frequency	Factory setting	50.00
	Setting range	0.01~00-03(Max frequency)	

01-04	Motor rated rotating speed	Factory setting	*****
	Setting range	0~36000rpm (type setting)	

01-05	Motor rated voltage	Factory setting	*****
	Setting range	0~460v(type setting)	

01-06	Motor rated current	Factory setting	*****
	Setting range	0.1~2000.0A (type setting)	

 **Note: set above parameters according to the nameplate parameter of motor. Correct motor parameter is important for the good control performance of vector control.**

The inverter provides function of parameters self-learning. Correct parameter self-taught comes from the correct input of motor nameplate parameter.

To ensure the control performance, please keep inverter power match for motor power to the greatest extent. If the difference between them is too large, the control performance of inverter will decline significantly.

**Note: The reset of motor rated power (01-06) will initialize the motor parameter 01-07 and 01-11.**


<b>01-07</b>	Motor stator resistance	Factory setting	*****
	Setting range	0.001~65.535 Ω (type setting)	

<b>01-08</b>	Motor rotator resistance	Factory setting	*****
	Setting range	0.001~65.535 Ω (type setting)	

<b>01-09</b>	Inductor of motor stator and rotor	Factory setting	*****
	Setting range	0.1~6553.5mH(type setting)	

<b>01-10</b>	Mutual-inductor of motor stator and rotor	Factory setting	*****
	Setting range	0.1~6553.5mH (type setting)	

<b>01-11</b>	Motor no-load current	Factory setting	*****
	Setting range	0.01~655.35A(type setting)	

 Setting values of 01-07~01-11 will update automatically after finishing the motor parameter self-taught normally. These parameters are standard parameters of high-performance vector control, which have direct effect on control performance.

**Note: Please don't modify this group of parameters at will.**

## 2: Vector Control Parameter

<b>02-00</b>	Velocity loop proportional gain 1	Factory setting	<b>20</b>
	Setting range	0~100	


<b>02-01</b>	Velocity loop integral time 1	Factory setting	<b>0.50</b>
	Setting range	0.01~10.00s	

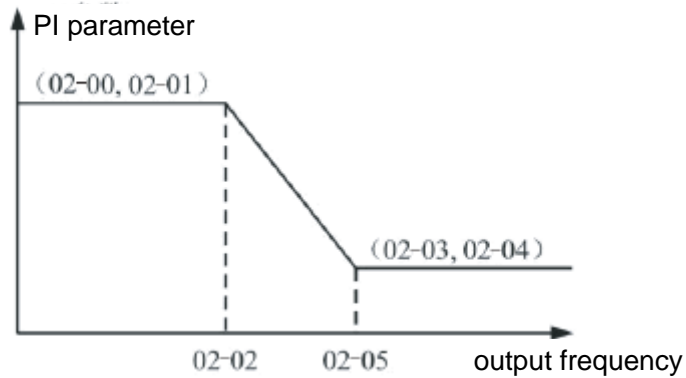
<b>02-02</b>	Switch low frequency	Factory setting	<b>5.00</b>
	Setting range	0.00~02-05	

<b>02-03</b>	Velocity loop proportional gain 2	Factory setting	<b>25</b>
	Setting range	0~100	

<b>02-04</b>	Velocity loop integral time 2	Factory setting	<b>1.00</b>
	Setting range	0.01~10.00s	

<b>02-05</b>	Switch high frequency	Factory setting	<b>10.00</b>
	Setting range	02-02~00-06 (Max frequency)	

 Above parameters are only suitable for vector control mode. When switch the frequency lower than 1 (02-02), the velocity loop PI parameter is 02-00 and 02-01. When switch the frequency higher than 2 (02-05), the velocity loop PI parameter is 02-03 and 02-04. When switch the frequency from 1 (02-02) to 2 (02-05), the PI parameter is obtained from linear variation of two groups of parameters as follows:



PI parameter schematic diagram

Adjust the dynamic response performance of vector control speed loop by setting the proportion coefficient and integral time of speed regulator. The increase of proportion gain and decrease of integral time both can accelerate the dynamic response of speed loop. But the over great proportion gain and over short integral time both easily result to system oscillation and great over-control. While over small proportion gain will also cause steady-state oscillation of system and may have static error of speed.

Velocity loop PI parameter has close relation with system inertia and has to be adjusted based on default PI parameter for different load performances to meet the demand of various occasions.

<b>02-06</b>	VC slip compensation coefficient	Factory setting	<b>100%</b>
	Setting range	50%~200%	

The slip compensation coefficient is used to adjust the slip frequency of vector control and improve the velocity control precision of system. The proper adjustment of this parameter can suppress the static error efficiently.

<b>02-07</b>	Setting of torque upper limit	Factory setting	<b>150%</b>
	Setting range	0.0~200.0%(inverter rated current)	

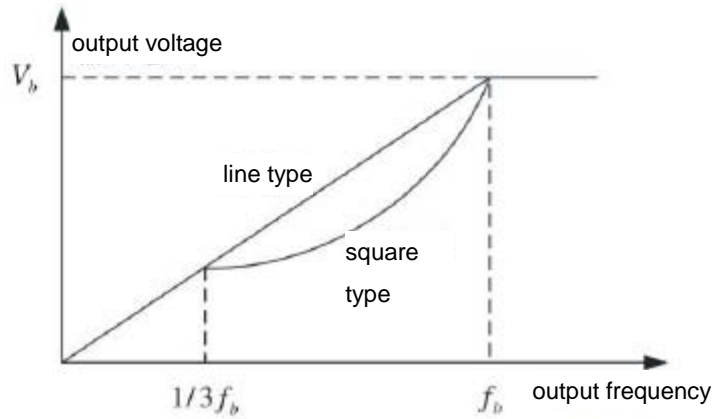
set it as 100% to corresponds to the rated output current of inverter.

### 3: V/F Control Parameters

This group function code is only effective for V/F control (01-00=1)

<b>03-00</b>	V/F curve setting	Factory setting	<b>0</b>
	Setting range	0: line V/F curve	
		1: square drop torque V/F curve	

0: line V/F curve. It is suitable for general constant torque load.  
 1: square drop torque V/F curve. It is suitable for the centrifugal load, such as fan, water pump, etc.



schematic diagram of V/F curve

03-01	Torque increase	Factory setting	<b>0%</b>
	Setting range	0.0~10.0%	

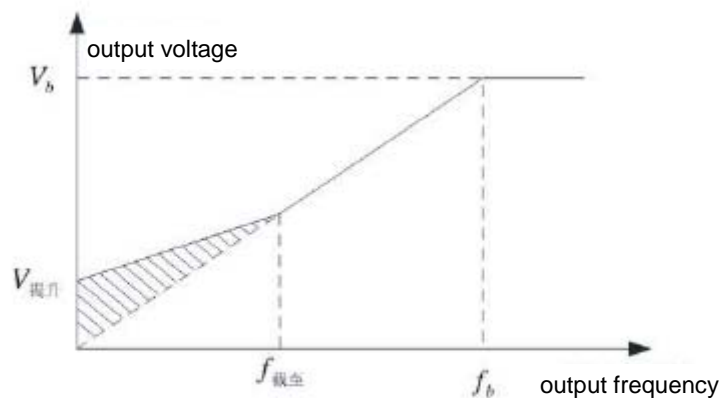
03-02	Torque increase cut-off point	Factory setting	<b>20%</b>
	Setting range	0.0~50.0%	

The torque increase is mainly used for the frequency lower than cut-off frequency (03-02) and the increased V/F curve is as the diagram below. The torque increase can improve the low-frequency torque performance of V/F.


Choose the proper torque value according to load quantity. Large load can improve the increase quantity, but the increase value can't be set too large, otherwise, the motor will run in over excitation mode, which causes the increased output current of inverter, increased heating of motor and decreased efficiency.


The inverter increases torque automatically when the torque increase is set as 0.0%.

Torque increase cut-off: under this frequency point, the torque increase is effective, and ineffective when go beyond this setting frequency.



schematic diagram of manual torque increase


<b>03-03</b>	V/F slip compensation limit	Factory setting	<b>0%</b>
	Setting range	0.0~200.0%	

 The setting of this parameter can compensate the variation of motor rotating speed due to on-load operation with V/F control to improve the rigidity of motor machinery performance. Value of this parameter should be set as the rated slip frequency of motor. And the rated slip frequency can be computed with the following formula:

$$03-03 = f_b - n * p / 60$$


**in which,  $f_b$  is motor rated frequency and corresponds to the function code 01-02;  $n$  is motor rated rotating speed and corresponds to the function code 01-04;  $p$  is pole-pairs of motor.**

<b>03-04</b>	Choosing of energy saving operation	Factory setting	<b>0</b>
	Setting range	0: inaction	
		1: automatic energy-saving operation	

 When the motor runs with no-load or light load, it adjusts the output voltage properly through detecting the load current to achieve the purpose of energy-saving.

**Note: This function is especially effective to fan and pump loads.**

<b>03-05</b>	Carrier wave limit	Factory setting	<b>0</b>
	Setting range	0: carrier wave limit 10.0K	
		1: carrier wave limit 14.0K	

 It is possible to set the limit range of carrier wave when the power section is above 11KW. The highest carrier wave is 10K when set as 0 and 14K when set as 1.

#### 4: Input Terminal Parameters

<b>04-00</b>	MI1 terminal function choosing	Factory setting	<b>1</b>
	Setting range	0~55	

<b>04-01</b>	MI2 terminal function choosing	Factory setting	<b>4</b>
	Setting range	0~55	

<b>04-02</b>	MI3 terminal function choosing	Factory setting	<b>7</b>
	Setting range	0~55	

<b>04-03</b>	MI4 terminal function choosing	Factory setting	<b>0</b>
	Setting range	0~55	

## Function List

Setting value	Function	Setting value	Function
0	no function	13	multi-velocity terminal 2
1	forward operation	14	multi-velocity terminal 3
2	reversal operation	15	time choosing of acceleration and deceleration
3	three-wire operation control	16	PID control pause
4	forward jog-on	17	wobble frequency suspension (suspend on the current frequency)
5	reversal jog-on	18	wobble frequency resetting (return to center frequency)
6	free stopping	19	prohibition of acceleration and deceleration
7	fault reset	20	prohibition of torque control
8	external fault input	21	Temporary clearance of frequency increase and decrease setting
9	frequency setting increase (UP)	22	stopping DC braking
10	frequency setting decrease (DOWN)	23	reserved
11	setting clearance of frequency increase and decrease	24	reserved
12	multi-velocity terminal 1	25	reserved

This parameter is used to set functions corresponding to digital multi-function input terminal.

0: no function

1: forward operation (FWD)

2: reversal operation (REV)

When operation command channel is terminal control, the operation command of inverter is given by above terminal function.

3: three-phase operation control

Please refer to the introduction of 04-05 three-wire system function code for the information of three-wire control input terminal.

4: forward jog-on

5: reversal jog-on

Please refer to the introduction of 09-02~09-04 for the detailed information of jog-on frequency and time for acceleration and deceleration.

6: free stopping

When the command is effective, the inverter immediately blocks output. The stopping course of motor is not controlled by inverter. It is recommended to adopt this mode when there is no requirement to the big-inertia load and stopping time. The definition of this mode is same to that of free stopping defined in 07-05.

7: fault reset

It is used to reset the distant fault and has the same function with the STOP/RST key on keyboard.

8: external fault input

When this signal is effective, the inverter will alarm the external fault and stop.

9: frequency setting increase (UP)

10: frequency setting decrease (DOWN)

11: setting clearance of frequency increase and decrease

Above three functions are mainly used to modify the given frequency with external terminal. UP is increase command; DOWN is decrease command; and setting clearance of frequency increase and decrease is used to clear the frequency value set by UP/DOWN to make the given frequency return to the frequency given by frequency command channel.

12,13,14: multi-velocity terminal 1~3

It is possible to realize the setting of 8 velocities by combining states of these three terminals.

**Note: multi-velocity terminal 1 is low bit, while multi-velocity terminal 3 is high bit.**

multi-velocity terminal 3	multi-velocity terminal 2	multi-velocity terminal 1
BIT2	BIT1	BIT0

15: acceleration and deceleration time choosing terminal  
terminal of acceleration and deceleration time choosing

terminal	acceleration and deceleration time choosing	corresponding parameter
OFF	acceleration and deceleration time 0	00-10、01-01
ON	acceleration and deceleration time 1	09-00、09-01

16: PID control pause

PID is ineffective temporarily, the inverter remains the present frequency output.

17: wobble frequency suspension

The inverter suspends on the present output and continues its wobble frequency operation in present frequency after canceling this function.

18: wobble frequency resetting

The setting frequency of inverter returns to central frequency.

19: prohibition of acceleration and deceleration

To prevent the inverter from being disturbed by external signals (except for stopping command) and maintain present output frequency.

20: prohibition of torque control

The inverter switches to speed control mode from torque control mode.


21: Temporary clearance of frequency increase and decrease setting


The frequency value set by UP/DOWN can be cleared when terminal closes to make the given frequency return to the frequency given by frequency command channel and will return to the frequency set by frequency acceleration and deceleration when terminal breaks.

22: stopping DC braking


In the course of inverter deceleration to stop, close of terminal will make inverter DC brake immediately. The braking work state is determined by 07-07~07-09.

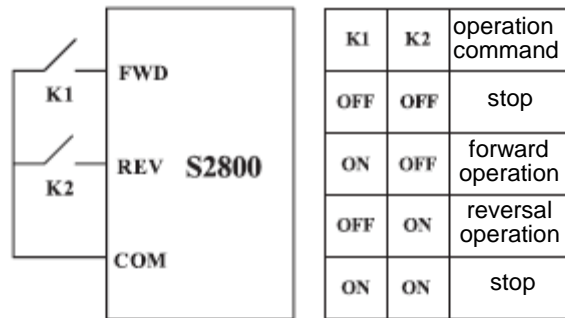
23~25: reserved

<b>04-04</b>	Switching value filtering times	Factory setting	<b>5</b>
	Setting range	1~10	

 Set the filtering time of MI1~MI4 terminal samplings. When there is too much interference, it is necessary to increase this parameter to prevent faulty operation.

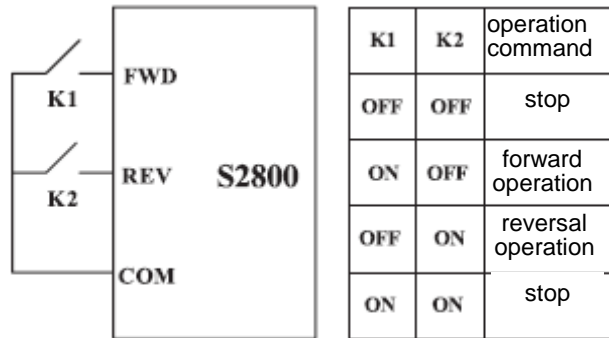
<b>04-05</b>	Operation mode of terminal control	Factory setting	<b>0</b>
	Setting range	0: two-wire control 1	
		1: two-wire control 2	
		2: three-wire control 1	
		3: three-wire control 2	

 This parameter defines four different ways to control inverter operation through external terminal.  
 0: two-wire control , enabling unifies with direction. This mode is the most commonly used two-wire mode. The forward and reversal rotating of motor is determined by defined FWD, REV terminal commands.



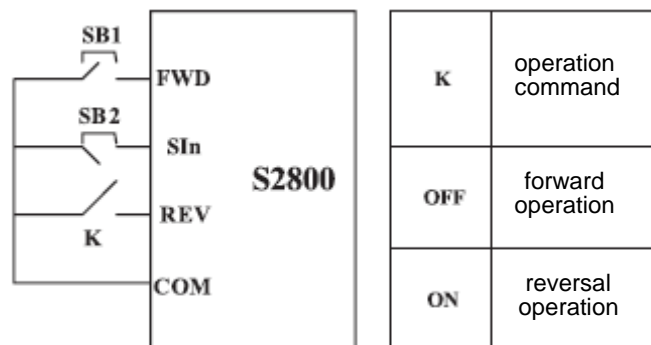
two-wire control 1, enabling unifies with direction

1: two-wire control, enabling departs with direction. In this mode, the defined FWD is the enabling terminal. And the direction is determined by state of defined REV



two-wire control, enabling departs with direction

2: three-wire control 1. In this mode, Sin is the enabling terminal. Operation command is produced by FWD, direction is controlled by REV. Sin is normally close input.

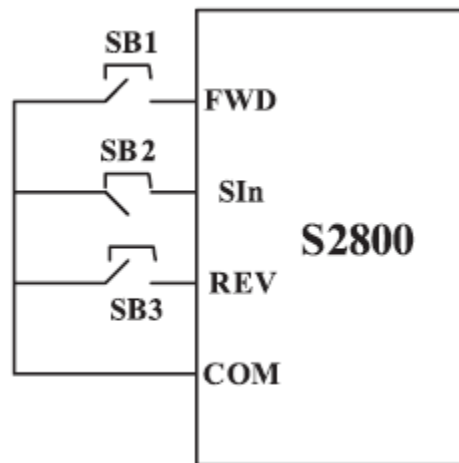


three-wire control mode 1

Of which, K: switch of forward and reverse SB1: starting button  
 SB2: stopping button

SIn: the multi-function input terminal set as function No.3 “three-wire” operation control.

3: three-wire control 2. In this mode, SIn is the enabling terminal; Operation command is produced by SB1 or SB3, which both control the operation direction at the same time. The stopping command is produced by normally close input SB2.



three-wire control mode 2

Of which, SB1: forward operation button SB2: stopping button SB3: reversal operation button

**Note: As for the operation mode of two-wire system, when FWD/REV terminal is effective, the stopping command produced by other source makes inverter stop, which means that remain the FWD/REV terminal still effective and inverter will not operate after disappearance of stopping command. Trigger FWD/REV again to make inverter operate.**

04-06	Change rate of terminal UP/DOWN frequency increase	Factory setting	<b>0.50</b>
	Setting range	0.01~50.00[Hz/s]	

Make use of UP/DOWN function to adjust the change rate when set frequency.


04-07	AVI1 lower limit	Factory setting	<b>0.00</b>
	Setting range	0.00~10.00[V]	

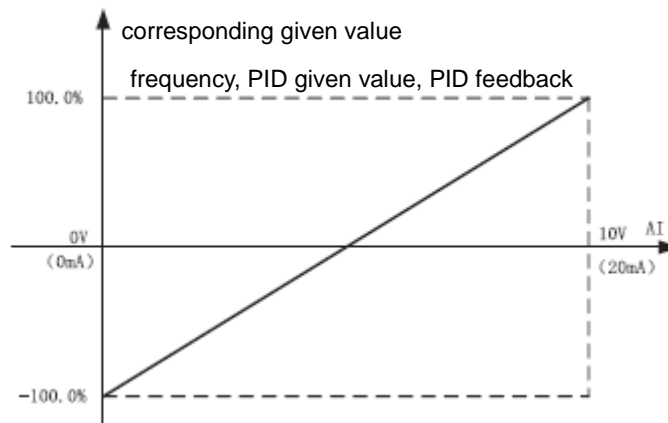
04-08	Corresponding setting of AVI1 lower limit	Factory setting	<b>0.0%</b>
	Setting range	-100.0~100.0	

04-09	AVI1 upper limit	Factory setting	<b>10.00</b>
	Setting range	0.00~10.00[V]	

04-10	Corresponding setting of AVI1 upper limit	Factory setting	<b>100.0%</b>
	Setting range	-100.0~100.0	

<b>04-11</b>	AVI1 input filtering time	Factory setting	<b>0.10</b>
	Setting range	0.00~10.00[S]	

 Above function codes define the relationship between analog input voltage and corresponding setting value of analog input. When the analog input voltage exceeds range of maximum or minimum input, the exceeding part will be computed as maximum or minimum input. when the analog input is current input, 0mA~2 mA corresponds to 0V~5V voltage. In different occasions, 100.0% set by analog corresponds to different nominal values. Please refer to the description of each application part for detailed information. Following figures describe the situation of several settings.



corresponding relationship between analog given and setting value

AVI1 input filtering time: to adjust the sensitivity of analog quantity. The proper increase of this value can enhance the anti-interference performance of analog quantity, but weaken the sensitivity of analog quantity.


<b>04-12</b>	AVI2/ACI lower limit	Factory setting	<b>0.00</b>
	Setting range	0.00~10.00[V]	

<b>04-13</b>	Corresponding setting of AVI2/ACI lower limit	Factory setting	<b>0.0%</b>
	Setting range	-100.0~100.0	

<b>04-14</b>	AVI2/ACI upper limit	Factory setting	<b>10.00</b>
	Setting range	0.00~10.00[V]	

<b>04-15</b>	Corresponding setting of AVI2/ACI upper limit	Factory setting	<b>100.0%</b>
	Setting range	-100.0~100.0	

<b>04-16</b>	AVI2/ACI input filtering time	Factory setting	<b>0.10</b>
	Setting range	-100.0~100.0	

 The function of AVI2/ACI is similar to the setting way of AVI1. The analog quantity supports 0~10V or 0~20mA input. When AVI2/ACI chooses 0~20mA input, 20mA corresponds to voltage of 5V.

## 5. Multi-velocity Control Parameters

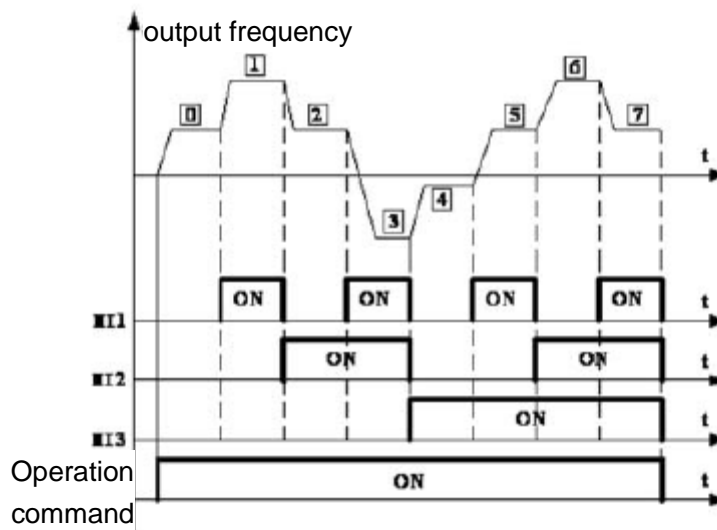
Simple PLC function refers to a multi-velocity generator. The inverter can automatically change operation frequency and direction according to operation time to meet process needs. This function needed external PLC to complete auxiliary previously. However, it can be completed now only depending on the inverter itself.

This series inverter can realize 16 velocities control and have four groups of acceleration and deceleration time for choosing.

When the set PLC has finished a circle (or a segment), the multi-function digital output terminal or multi-function relay would output an “on” signal.

05-00	Multi-velocity 0	Factory setting	<b>0.00</b>
05-01	Multi-velocity 1	Factory setting	<b>0.00</b>
05-02	Multi-velocity 2	Factory setting	<b>0.00</b>
05-03	Multi-velocity 3	Factory setting	<b>0.00</b>
05-04	Multi-velocity 4	Factory setting	<b>0.00</b>
05-05	Multi-velocity 5	Factory setting	<b>0.00</b>
05-06	Multi-velocity 6	Factory setting	<b>0.00</b>
05-07	Multi-velocity 7	Factory setting	<b>0.00</b>
⚡	Setting range	-100.0~100.0%	Unit 0.1%

📖 Explanation: Symbol of multi-velocity determines operation direction. Negative value stands for reversal operation. Frequency setting 100.0% corresponds to the maximum frequency (00-03). When MI1=MI2=MI3=OFF, the frequency input mode is determined by code 00-02. When MI1, MI2 and MI3 are not all OFF, the multi-velocity operates. The priority of multi-velocity is higher than frequency input of keyboard, analog and communication. It is possible to choose 8 velocities at most through combination code of MI1, MI2 and MI3.



logical diagram of multi-velocity operation

The channel choosing of starting and stopping of multi-velocity operation is also determined by function code 00-02. The multi-velocity control course is as shown in the diagram 6-20 above. And the relationship between MI1, MI2 and MI3 terminals and multi-velocity is as shown in the diagram below.

## Relationship of multi-velocity and MI1, MI2 and MI3 terminals

MI1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
MI2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
MI3	OFF	OFF	OFF	OFF	ON	ON	ON	ON
segment	1	2	3	4	5	6	7	8

## 6. Output Terminal Parameters

The standard unit of S2800 series inverter has one multi-function digital output terminal, one multi-function relay output terminal and one multi-function analog quantity output terminal

06-00	MO1 output choosing	Factory setting	<b>1</b>
06-01	Relay output choosing	Factory setting	<b>3</b>
⚡	Setting range	0: no output	
		1: the motor is in the forward running.	
		2: the motor is in the reversal running.	
		3: fault output	
		4: frequency level test FDT output	
		5: frequency reaching	
		6: running in zero-speed	
		7: upper limit frequency reaching	
		8: lower limit frequency reaching	
		9~10: reserved	



0: no output

1: forward running of inverter. The inverter outputs signal ON when run forward.

2: reversal running of inverter. The inverter outputs signal ON when run reversally.

3: fault output. The inverter outputs signal ON when it has fault.

4: frequency level test FDT reaching. Please refer to the detailed description of function code 09-13 and 09-14.


5: frequency reaching. Please refer to the detailed description of function code 09-15.


6: running in zero-speed. When the output frequency and given frequency of inverter are both zero, the inverter outputs signal ON.

7: reaching of defined counting pulse value. When the counting value reaches to the set value, the inverter outputs signal ON.

8: length reaching. When the actual detecting length exceeds the set length, the inverter outputs signal ON.

9~10: reserved.

<b>06-02</b>	AFM output choosing	Factory setting	<b>0</b>
	Setting range	0: running frequency	
		1: setting frequency	
		2: running rotating speed	
		3: output current	
		4: output voltage	
		5: output power	
		6: output torque	
		7: analog AVI1 input value	
		8: analog AVI2/ACI input value	
		9~10: reserved	

 The standard output of analog output is 0~10V. The range of corresponding content it stands for is as shown in the table below.


Setting value	Function	Range
0	running frequency	0~Max. output frequency
1	setting frequency	0~Max. output frequency
2	running rotating speed	0~twice of inverter rated rotating speed
3	output current	0~twice of inverter rated current
4	output voltage	0~1.5 times of inverter rated voltage
5	output power	0~twice of rated power
6	output torque	0~twice of motor rated current
7	analog AVI1 input value	0~10V
8	analog AVI2 input value	0~10V/0~20ms
9-10	reserved	reserved

<b>06-03</b>	Lower limit of AFM output	Factory setting	<b>0.0</b>
	Setting range	0.0~100.0[0.0%]	

<b>06-04</b>	Lower limit corresponds to AFM output	Factory setting	<b>0.00</b>
	Setting range	0.00~100.00[0.00V]	

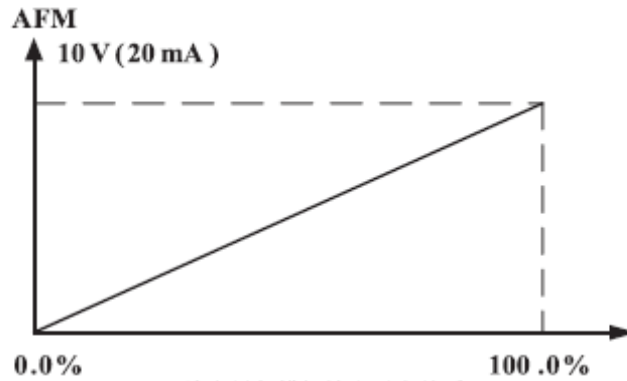
<b>06-05</b>	Upper limit of AFM output	Factory setting	<b>100.0</b>
	Setting range	0.0~100.0[0.0%]	

<b>06-06</b>	Upper limit corresponds to AFM output	Factory setting	<b>10.00</b>
	Setting range	0.00~100.00[0.00V]	

 Above function codes define the relationship of output value and analog output. When the output value exceeds range of maximum or minimum setting value, the exceeding part will be computed as upper limit or lower limit output.

When the analog output is current output, 1mA current corresponds to 0.5V voltage.

In different occasions, 100.0% output value corresponds to different analog output quantity. Please refer to the description of each application part for detailed information.



corresponding relationship of given value and analog output

### 7: Start-stop Control Parameters

<b>07-00</b>	Starting operation mode	Factory setting	<b>0</b>
	Setting range	0: direct starting	
		1: start after DC braking	



0: direct starting: begin to start from starting frequency.

1: start after DC braking: first of all, DC brake according to the mode set in 07-01 and 07-04; then start from starting frequency. It is suitable for the occasion that the small inertia load may produce reversal rotating when it starts.

<b>07-01</b>	Beginning frequency of direct starting	Factory setting	<b>0.50</b>
	Setting range	0.00~10.00 Hz [Hz]	

<b>07-02</b>	Reserving time of starting frequency	Factory setting	<b>0.0</b>
	Setting range	0.0~50.0s[s]	



The inverter begins to operation from starting frequency (07-01). And accelerate to the target frequency according to set acceleration time after having passes the reserving time of starting frequency. If the target frequency is smaller than starting frequency, the inverter will be in ready mode. The starting frequency value isn't limited by lower limit frequency.

<b>07-03</b>	Braking current before starting	Factory setting	<b>0.0</b>
	Setting range	0.0~150.0% [%]	

<b>07-04</b>	Braking time before starting	Factory setting	<b>0.0</b>
	Setting range	0.0~50.0s[s]	



07-03 : When DC brake before starting, the input DC current value is the percentage of inverter rated current.

07-04: duration of DC current. If the DC braking time is set as 0, DC braking is ineffective.

The higher the DC braking current is, the larger the braking force is.

<b>07-05</b>	Stopping mode choosing		Factory setting	<b>0</b>
⚡	Setting range	0: slow down to stop		
		1: free stopping		

📖 0: slow down to stop

When the stopping command is effective, the inverter decreases the output frequency according to deceleration way and defined deceleration time and stops when is frequency is decreased to 0.

1: free stopping

When the stopping command is effective, the inverter terminates output immediately. The load freely stops as per machinery inertia.

<b>07-06</b>	Beginning frequency of stopping braking		Factory setting	<b>0.00</b>
⚡	Setting range	0.00~10.00 [Hz]		

<b>07-07</b>	Latency time of stopping braking		Factory setting	<b>0.0</b>
⚡	Setting range	0.0~50.0s[s]		

<b>07-08</b>	Stopping DC braking current		Factory setting	<b>0.0</b>
⚡	Setting range	0.0~150.0% [%]		

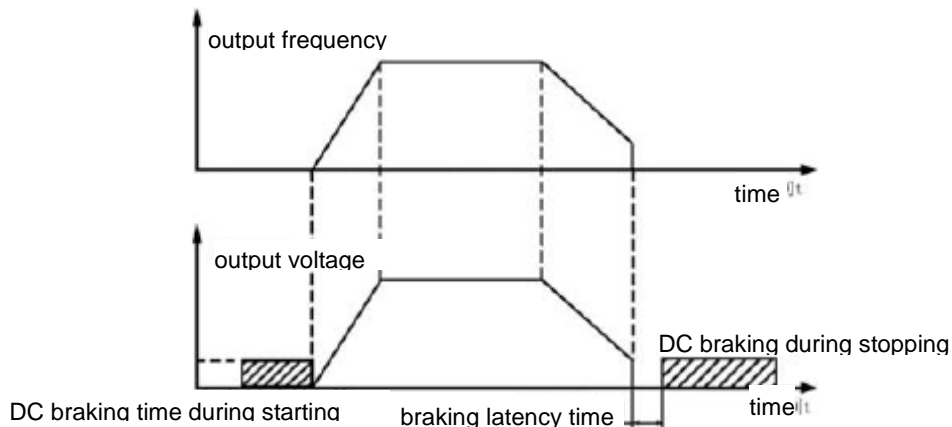
<b>07-09</b>	Stopping DC braking time		Factory setting	<b>0.0</b>
⚡	Setting range	0.0~50.0s[s]		

📖 Beginning frequency of stopping braking: in the course of slowing down to stop, the stop DC braking begins when it reaches to this frequency. When the beginning frequency of stopping braking is 0, the DC braking is ineffective and the inverter stops as per the set deceleration time.


Latency time of stopping braking: before beginning of stopping DC braking, the inverter blocks output. And begins the stopping DC braking after the latency time to prevent the over current fault caused by DC braking with high velocity.


Stopping DC braking current: it refers to the set DC braking quantity. The bigger the value is, the larger the braking torque is.

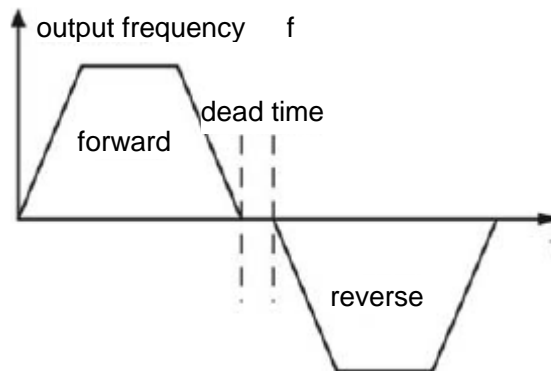
Stopping DC braking time: the duration time of DC braking




schematic diagram of DC braking


<b>07-10</b>	Dead time of forward and reversal rotating	Factory setting	<b>0.0</b>
	Setting range	0.0~3600.0[s]	

 It refers to the transition time when the output frequency is 0 in the transient process of forward and reversal rotating of inverter. As shown in the diagram below:



schematic diagram of forward and reverse dead time


<b>07-11</b>	terminal function detection choosing as power-on	Factory setting	<b>0</b>
	Setting range	0:terminal operation command is ineffective when powering on. 1: terminal operation command is effective when powering on.	

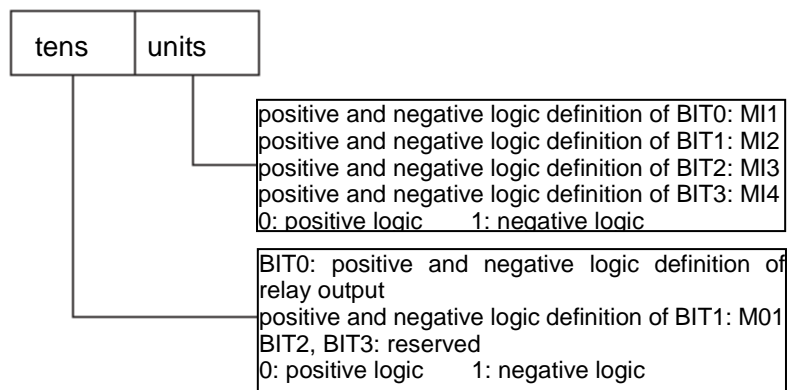
 When the operation command channel is terminal control, the system will automatically detect the state of operation terminal in the course of inverter power-on.


0:terminal operation command is ineffective when powering on. The inverter will not operate even if the operation command terminal has been detected in the course of power-on. The system is in the operation protection status at this moment. The inverter can operate only if canceling this operation command terminal and enabling it again.

1: terminal operation command is effective when powering on. In the course of inverter power-on, if the operation command terminal is detected to be effective, the system will automatically start the inverter to operate after finishing the initialization.

**Note: the user must choose this function carefully as it may result to serious consequence.**

<b>07-12</b>	Polarity choosing of input and output terminal	Factory setting	<b>3F</b>
	Setting range	0x00~0x3F	



 This function code defines the positive and negative logic of terminal.


Positive logic: It is effective when terminals such as M1 and so on connect with corresponding common terminal and ineffective when disconnect.


Negative logic: It is ineffective when terminals such as M1 and so on connect with corresponding common terminal and effective when disconnect.

If it is required that MI1~MI4 are positive logic, relay output is positive logic and MO1 is negative logic, the setting way is as follows:

MI1~MI4 logic states are 0000, the corresponding hexadecimal system is 0, units display of LED is 0; logic state of MO1 and relay output is 0010, the corresponding hexadecimal system is 2, tens display of LED is 2; at this moment, the function code 07-12 should be set as 20.

## 8: Man-machine Interface Parameters


08-00	User password	Factory setting	<b>00000</b>
	Setting range	0~65535	


 If it is set as any one nonzero digital, the password protection function will cease to be effective.

00000: set the value of user password and make password protection function ineffective. Restoring factory defaults can also clear the password.

When the user password is set and effective, the user can't enter parameter menu if the password is incorrect. The user can check parameters and modify them only if the correct password is entered. So please remember the user password set firmly.


The password protection takes into effect in one minute after quitting the edit state of function code. "0.0.0.0.0." will be displayed when pressing PRG / ESC key to enter the edit state of function code. The operator has to input the correct password, otherwise unsuccessful to enter.

08-01	Choice of LCD display language	Factory setting	<b>0</b>
	Setting range	0: Chinese 1: English	

 0: Chinese  
1: ENGLISH

Above function is effective only for introduced LCD keyboard. It is used to choose the language of LCD display.

08-02	Function parameter copy	Factory setting	<b>0</b>
	Setting range	0: no operation 1: local function parameters are uploaded to LCD keyboard 2: function parameters of LCD keyboard are downloaded to local. Note: The parameter becomes to be 0 automatically after finishing the operation of 1~2 items.	


 This function code determines the mode of parameter copy. The parameter copy function is embedded in the introduced LCD keyboard.

1: local function parameters are uploaded to LCD keyboard. Local function parameters are copied to the introduced LCD keyboard.

2: function parameters of LCD keyboard are downloaded to local. Function parameters of introduced LCD keyboard are downloaded to local.


**Note: The parameter becomes to be 0 automatically after finishing copying parameters.**

<b>08-03</b>	Choice of QUICK/JOG key function	Factory setting	<b>0</b>
	Setting range	0: jog-on operation	
		1: switch between forward and reversal rotating	
		2: clear UP/DOWN setting	

 QUICK/JOG is the multi-function key. Its function can be defined by parameter setting.  
0: jog-on operation. Press QUICK/JOG key to realize jog-on operation.  
1: switch of forward and reverse. Press QUICK/JOG key to realize the switch of frequency command direction.


**Note: When the switch of forward and reverse is set by QUICK/JOG key, the inverter will not store the switched state when power down and operate as per the direction set by parameter 00-09 at next powering on. The inverter will store the operation direction set by parameter 00-09 when power down.**


2: clear UP/DOWN setting. The QUICK/JOG key can clear the setting value of UP/DOWN.

<b>08-04</b>	Choice of STOP/RST key stopping function	Factory setting	<b>0</b>
	Setting range	0: only be effective to panel control	
		1: be effective to both panel and terminal control	
		2: be effective to both panel and communication control	
		3: be effective to all control modes	

 This function code defines the effective choice of STOP/RST stop function.


0: only be effective to panel control  
1: be effective to both panel and terminal control  
2: be effective to both panel and communication control  
3: be effective to all control modes  
STOP/RST is effective to the fault reset in any situation.

<b>08-05</b>	Choice of keyboard display	Factory setting	<b>0</b>
	Setting range	0: enable the introduced keyboard preferentially	
		1: local and introduced keyboard display simultaneously, but only the introduced keyboard is effective	
		2: local and introduced keyboard display simultaneously, but only the local keyboard is effective	
		3: local and introduced keyboard display simultaneously and both are effective (logical relationship between them is “or”)	

 0: enable the introduced keyboard preferentially. This parameter must be set as 0 when introduce the LCD keyboard in. And only display parameter 0 in the state of introduced LCD keyboard.  
1: local and introduced keyboard display simultaneously, but only the introduced keyboard is effective. Local key also can be used if the introduced keyboard isn't connected.  
2: local and introduced keyboard display simultaneously, but only the local keyboard is effective.  
3: local and introduced keyboard display simultaneously and both are effective (logical relationship between them is “or”)


**Note: Please use the function No. 3 carefully as it may cause serious consequence.**

08-06	Choice of parameters displayed by running status	Factory setting	0xFF
⚡	Setting range	BIT0: running frequency	
		BIT1: setting frequency	
		BIT2: busbar voltage	
		BIT3: output voltage	
		BIT4: output current	
		BIT5: operation rotating speed	
		BIT6: output power	
		BIT7: output torque	
		BIT8: PTD set value	
		BIT9: PID feedback value	
		BIT10: input terminal status	
		BIT11: output terminal status	
		BIT12: analog quantity AVI1 value	
		BIT13: analog quantity AVI2 value	
		BIT14: current segments of multi-velocity	
		BIT15: torque setting value	


 In operation state, the parameter display of S2800 series inverter is affected by this function code. It is a binary number of 16 bits. If some bit is 1, the corresponding parameter of this bit can be checked through key ">" in operation state. If the bit is 0, the corresponding parameter of this bit will not display. When set the function code 08-06, the binary number must be converted to hexadecimal number and input this function code.

The display content indicated by each bit is shown in the table below.

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10
Torque setting value	Current segments of multi-velocity	Analog quantity AI2 value	Analog quantity AI1 value	Output terminal state	Input terminal state
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
PID feedback value	PID given value	Output torque	Output power	Operation rotating speed	Output current
BIT3	BIT2	BIT1	BIT0		
Output voltage	Busbar voltage	Setting frequency	Operation frequency		


 The status of input and output terminal is displayed by decimal system. MI1(MO1) corresponds to the least significant bit. For example, if input state displays 3, it means that terminals MI1 and MI2 close and other terminals break. Please refer to the description of 08-18 and 08-19.


08-07	Choice of parameters displayed by stopping status	Factory setting	0xFF
⚡	Setting range	BIT0: setting frequency	
		BIT1: busbar voltage	
		BIT2: input terminal status	
		BIT3: output terminal status	
		BIT4: PTD set value	
		BIT5: PID feedback value	
		BIT6: analog quantity AVI1 value	
		BIT7: analog quantity AVI2 value	
		BIT8: current segments of multi-velocity	
		BIT9: torque setting value	
		BIT10: input terminal status	


 The setting of this function is same to that of 08-06. The parameter display is affected by this function code only when the S2800 series inverter is in the stopping state.


The display content indicated by each bit is shown in the table below.


BIT15	BIT14	BIT13	BIT12	BIT11	BIT10
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
Torque setting value	Current segments of multi-velocity	Analog quantity AI2 value	Analog quantity AI1 value	PID feedback value	PID given value
BIT3	BIT2	BIT1	BIT0		
Output terminal state	Input terminal state	Busbar voltage	Setting frequency		

<b>08-08</b>	Rectifier module temperature	Factory setting	<b>00000</b>
	Setting range	0~100.0℃	

<b>08-09</b>	Inverter module temperature	Factory setting	<b>00000</b>
	Setting range	0~100.0℃	

<b>08-10</b>	Software version	Factory setting	<b>00000</b>
	Setting range	0~65535	

<b>08-11</b>	Local accumulated running time	Factory setting	<b>00000</b>
	Setting range	0~65535h	

 These function codes only can be viewed but not modified.

Rectifier module temperature: it stands for the temperature of rectifier module. Rectifier module with different types may have different over temperature protection values.

Inverter module temperature: it stands for the temperature of inverter module. Inverter module with different types may have different over temperature protection values.


Software version: version number of DSP software.

Local accumulated running time: display the accumulated running time of inverter up to now.

08-12	Fault types of first two times	Factory setting	*****
	Setting range	0: no fault 1: inverter unit U phase protection(OUT1) 2: inverter unit V phase protection(OUT2) 3: inverter unit W phase protection(OUT3) 4: accelerated over current(OC1) 5: decelerated ove current(OC2) 6: keep the over current on constant speed(OC3) 7: accelerated over voltage(OV1) 8: decelerated over voltage(OV2) 9: keep the over voltage on constant speed(OV3) 10: busbar undervoltage fault(UV) 11: motor overload(OL1) 12: inverter overload(OL2) 13: input-side phase failure(SPI) 14: output-side phase failure(SPO) 15: rectifier module overheating(OH1) 16: inverter module overheating fault(OH2) 17: external fault(EF) 18: communication error(CE) 19: current test error(ItE) 20: motor self-taughterror(tE) 21: EEPROM operation error(EEP) 22: PID feedback disconnection error(PIDE) 23: braking cell error(Bce) 24: Reserved	

08-13	Fault type of last time	Factory setting	*****
	Setting range	0~24	

08-14	Present fault type	Factory setting	*****
	Setting range	0~24	

 Record the latest three times of fault type of inverter. 0 is no fault. 1~24 refer to 24 kinds of fault. Please refer to the fault analysis for detailed information.

08-15	Present fault operation frequency	Factory setting	*****
	Setting range		

08-16	Present fault output current	Factory setting	*****
	Setting range		

<b>08-17</b>	Present fault busbar voltage	Factory setting	*****
	Setting range		
<b>08-18</b>	Input terminal status of present fault	Factory setting	*****
	Setting range		

<b>08-19</b>	Output terminal status of present fault	Factory setting	*****
	Setting range		



Input terminal status of present fault is the decimal number, which displays status of all number input terminals of the last time. The display sequence is as shown in the following table.

BIT3	BIT2	BIT1	BIT0
MI4	MI3	MI2	MI1

When the input terminal is ON, its corresponding bit is 1 and OFF is 0. The status of number input signal when it is out of order can be known through this value.

Output terminal status of present fault is the decimal number, which displays status of all number output terminals of the last time. The display sequence is as shown in the following table.

BIT1	BIT0
AFM	M01

When the output terminal is ON, its corresponding bit is 1 and OFF is 0. The status of number output signal when it is out of order can be known through this value.

## 9: Enhanced Function Parameters

<b>09-00</b>	Acceleration time 2	Factory setting	<b>10.0</b>
	Setting range	0.0~3600.0s[s]	

<b>09-01</b>	Deceleration time 2	Factory setting	<b>10.0</b>
	Setting range	0.0~3600.0s[s]	



The acceleration and deceleration time can choose 00-07, 00-08 and above time. The meanings of them are all same. Please refer to the relative description of 00-07 and 00-08. The acceleration and deceleration time 0 and 1 can be switched to each other through multi-function number input terminal. Please refer to parameter group 04 of multi-function number input terminal for detailed information.

<b>09-02</b>	Jog-on operation frequency	Factory setting	<b>5.00</b>
	Setting range	0.00~00-06[Hz]	

09-03	Acceleration time of jog-on operation	Factory setting	10.0
⚡	Setting range	0.0~3600.0s[s]	

09-04	Deceleration time of jog-on operation	Factory setting	10.0
⚡	Setting range	0.0~3600.0s[s]	

They are used to define the given frequency and acceleration and deceleration time of inverter when in jog-on operation state. The start-stop mode of jog-on includes direct start-stop mode and deceleration stop mode.

The acceleration time of jog-on refers to the needed time that accelerates the inverter from 0Hz to the maximum output frequency (00-03).

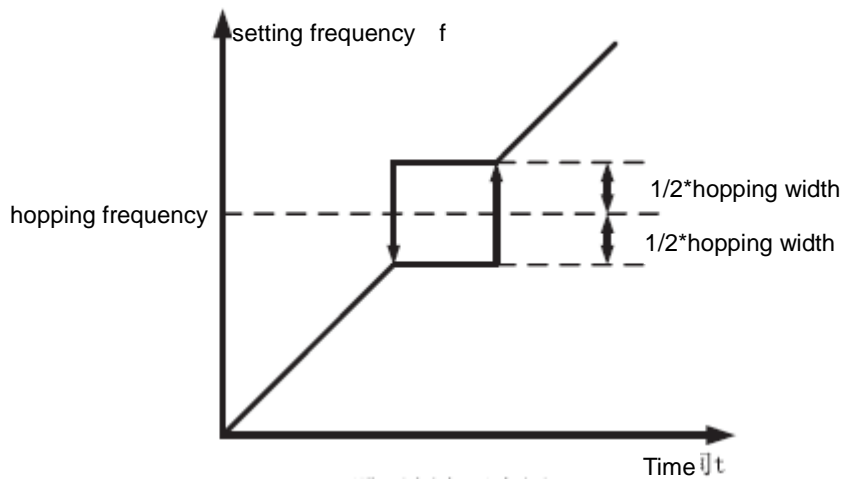
The deceleration time of jog-on refers to the needed time that decelerates the inverter from maximum output frequency (00-03) to 0Hz.

09-05	Hopping frequency	Factory setting	0.00
⚡	Setting range	0.00~00-03[Hz]	

09-06	Hopping frequency width	Factory setting	0.00
⚡	Setting range	0.00~00-03[Hz]	

When the setting frequency is in the range of hopping frequency, the actual operation frequency will be hopping frequency boundary.

Make the inverter keep away from the machinery resonance point of load through setting hopping frequency. This inverter can be set one hopping frequency point. If set all hopping frequency as 0, this function will be ineffective.





schematic diagram of hopping frequency

09-07	Wobble frequency width	Factory setting	0.0
⚡	Setting range	0.0~100.0[%]	

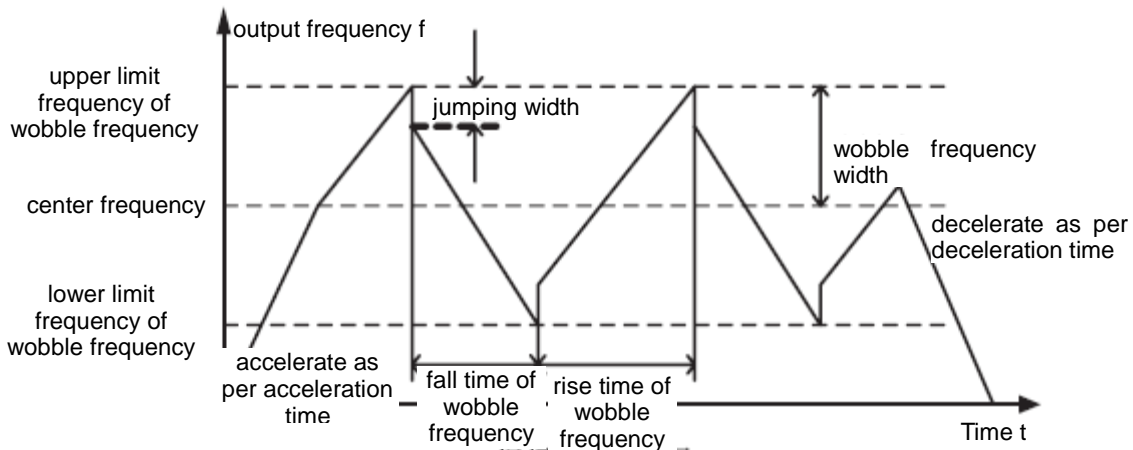
09-08	Jumping frequency width	Factory setting	0.0
⚡	Setting range	0.0~50.0[%]	

09-09	Rise time of wobble frequency	Factory setting	5.0
⚡	Setting range	0.1~3600.0s[s]	

<b>09-10</b>	Fall time of wobble frequency	Factory setting	<b>5.0</b>
	Setting range	0.1~3600.0s	

 The wobble frequency function is applied to occasions needed traversing and winding, such as textile and chemical fiber industries and so on.

The wobble frequency function refers to that the inverter output frequency wobbles up and down centering around the setting frequency. The track of operation frequency on time axis is as shown in the diagram below. The wobble width is set by 09-07. When 09-07 is set as 0, which means the wobble width is 0, the wobble frequency will be ineffective.



schematic diagram of wobble frequency operation


Wobble frequency width: the operation frequency of wobble frequency is limited by upper and lower limit frequency.


Wobble width corresponding to center frequency: Wobble width  $AW = \text{center frequency} \times \text{wobble frequency width } 09-07$


Jumping frequency = Wobble width  $AW \times \text{jumping frequency width } 09-08$ . That is the value of jumping frequency corresponding to wobble width.

Rise time of wobble frequency: time for wobble frequency to operate from the lowest point to the highest point

Fall time of wobble frequency: time for wobble frequency to operate from the highest point to the lowest point


<b>09-11</b>	Times of fault automation reset	Factory setting	<b>0</b>
	Setting range	0~3	


<b>09-12</b>	Interval time setting of fault automation reset	Factory setting	<b>1.0</b>
	Setting range	0.1~100.0s	


 Times of fault automation reset: when the inverter chooses fault automation reset, it is used to set times for automatic reset.

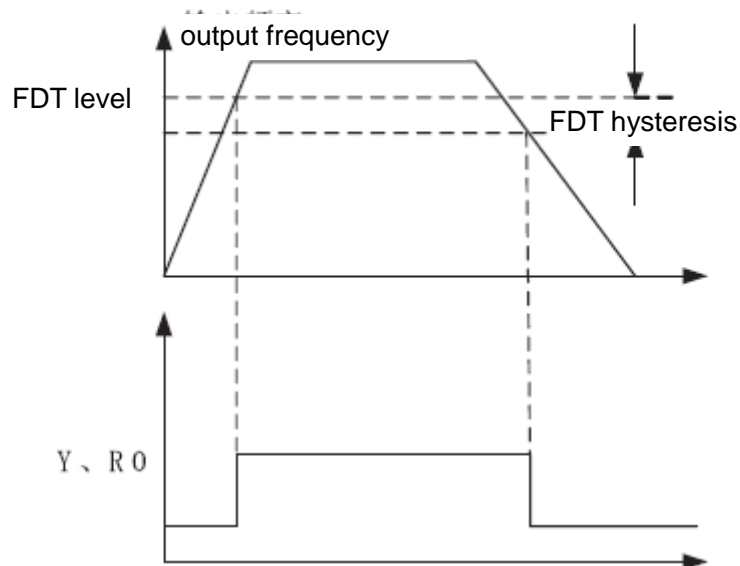
When times of inverter continuous reset exceed this value, the inverter will have fault and keep in ready state, which needs artificial interference.

Interval time setting of fault automation reset: choose the time interval from fault occurrence to automatic reset action.

<b>09-13</b>	FDT level detection value	Factory setting	<b>50.00</b>
	Setting range	0.00~00-03[Hz]	

<b>09-14</b>	FDT hysteresis detection value	Factory setting	<b>5.0</b>
	Setting range	0.0~100.0[%]	

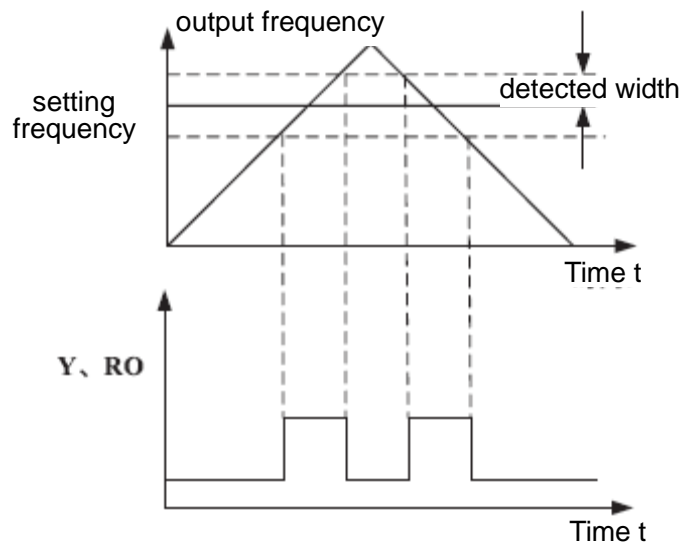
 When the output frequency exceeds the FDT level of some set frequency, it is necessary to output the indicator signal until the output frequency decrease to some frequency lower than FDT level (FDT level-FDT hysteresis detection value). The detailed wave form is as follows.



schematic diagram of FDT level

09-15	Frequency reaching detection width	Factory setting	<b>0.0</b>
⚡	Setting range	0.0~100.0[%]	


📖 The inverter outputs the pulse signal in the positive and negative detection width of setting frequency. The detailed information is as follows.





schematic diagram of frequency reaching detection width


09-16	Braking threshold voltage	Factory setting	<b>130</b>
⚡	Setting range	115~140%[380V:130%]	


📖 This function code is the start busbar voltage for setting the power consumption. The proper adjustment of this value can brake the load efficiently.


<b>09-17</b>	Coefficient of rotating speed display		Factory setting	<b>100.0</b>
	Setting range	0.1~999.9%[100.0%]		


 Machinery rotating speed=120\*operation frequency\*09-17/motor pole-pairs. This function code is used to calibrate the scale of rotating speed to display the error, having no effect on actual rotating speed.


<b>09-18</b>	Low frequency threshold point of oscillation suppression		Factory setting	<b>5</b>
	Setting range	0~500		


<b>09-19</b>	High frequency threshold point of oscillation suppression		Factory setting	<b>100</b>
	Setting range	0~500		


 Most inverters easily appear the current oscillation when operate in some frequency interval, which may result to the unstable operation of motor and even over current of inverter. When 00-03 equals to 0, it enables to suppress the oscillation. When setting values of 09-18 and 09-19 are smaller, the effect of suppressing oscillation and current increase are more obvious. When setting values of 09-18 and 09-19 are bigger, the effect of suppressing oscillation is weaker.


<b>09-20</b>	Amplitude limiting value of oscillation suppression		Factory setting	<b>5000</b>
	Setting range	0~10000		

 The rise value of high voltage produced by suppressing oscillation can be limited through 09-20 setting.

<b>09-21</b>	Dividing frequency of high and low frequency of oscillation suppression		Factory setting	<b>12.50</b>
	Setting range	0.00~00-03[Hz]		


 09-21 is the dividing point of 09-18 and 09-19.

<b>09-22</b>	oscillation suppression		Factory setting	<b>1</b>
	Setting range	0: oscillation suppression is effective		
		1: oscillation suppression is ineffective		

 0: oscillation suppression is effective  
1: oscillation suppression is ineffective

The oscillation suppression function refers to VF. The general motor often appears current oscillation when motor is with no-load or light load, which causes the abnormal operation of motor and even the over current of inverter. When 09-22 equals to 0, it will enables to suppress oscillation. The inverter will suppress the oscillation of motor as per parameters of function groups 09-08~09-20.

<b>09-23</b>	PWM mode choosing		Factory setting	<b>0</b>
	Setting range	0: PWM mode 1		
		1: PWM mode 2		
		2: PWM mode 3		


 0: PWM mode 1. This mode is the normal PWM mode. The motor noise is weaker at low frequency and stronger at high frequency.

1: PWM mode 2. The motor noise is weak in this mode, but the temperature rising is higher. The inverter has to be derated if choose this mode.

2: PWM mode 3. The motor noise is strong in this mode, but it can well suppress the motor oscillation if choose this mode.

09-24	Torque setting mode	Factory setting	0
⚡	Setting range	0: set torque by keyboard (corresponding to 09-25)	
		1: set torque by analog quantity AVI1 (100% corresponding to twice of inverter rated current)	
		2: set torque by analog quantity AVI2/ACI (be same to 1)	
		3: set torque by analog quantity AVI1+AVI2/ACI (be same to 1)	
		4: multi-section torques setting (be same to 1)	
		5: set torque by remote communication (be same to 1)	

09-25	Choice of torque setting mode	Factory setting	50.0
⚡	Setting range	-200.0~200.0[%]	

 09-24: choice of torque setting mode:

- 0: set torque by keyboard (09-25)
- 1: set torque by analog quantity AVI1 (100% corresponding to twice of inverter rated current)
- 2: set torque by analog quantity AVI2/ACI (same as above)
- 3: set torque by analog quantity AVI1+AVI2/ACI (same as above)
- 4: multi-section torques setting (same as above)
- 5: set torque by remote communication (same as above)

Only when 01-00=2, the torque control and 09-24 function code are effective. When in torque control mode, the inverter outputs torque as per the set torque command. The output frequency is limited by upper limit frequency. when the load speed is higher than the set upper limit frequency, the inverter output frequency is limited and the output torque is different from setting torque.

When the torque command is set by keyboard (09-24=0), it obtains the torque command by setting function code 09-25.

When the torque setting is negative, the motor rotates reversely. The 100% of input setting of analog quantity, multi-velocity and communication setting corresponds to twice of inverter rated current and -100% corresponds to negative twice of inverter rated current.


The torque control and velocity control can be switched to each other by multi-function input terminal.

When the inverter setting torque is more than load torque, the inverter output frequency will rise. When the inverter output frequency reaches to the upper limit of frequency, the inverter will operate at upper limit frequency all the way.

When the inverter setting torque is less than load torque, the inverter output frequency will fall. When the inverter output frequency reaches to the lower limit of frequency, the inverter will operate at lower limit frequency all the way.

**Note: The inverter switches to velocity control from torque control automatically when stop.**

09-26	Choice of upper limiting frequency setting	Factory setting	0
⚡	Setting range	0: set upper limiting frequency by keyboard (00-04)	
		1: set upper limiting frequency by analog quantity AVI1 (100% corresponding to the Max. frequency)	
		2: set upper limiting frequency by analog quantity AVI2/ACI (be same to 1)	
		3: multi-section upper limiting frequency setting (be same to 1)	
		4: set upper limiting frequency by remote communication (be same to 1)	

 Given source choosing of upper limit frequency, especially for torque control, the output frequency of inverter can be changed through changing the upper limit frequency.

- 0: set upper limiting frequency by keyboard (00-04)
- 1: set upper limiting frequency by analog quantity AVI1 (100% corresponding to the Max. frequency)
- 2: set upper limiting frequency by analog quantity AVI2/ACI (be same to 1)
- 3: multi-section upper limiting frequency setting (be same to 1)
- 4: set upper limiting frequency by remote communication (be same to 1)

## 10: PID Control Parameters

PID control is a common method for process control, which often does proportion, integral and differential operation through the deviation of feedback signal and target signal of controlled volume to adjust the output frequency of inverter, form the negative feedback system and make the controlled volume be stabilized above the target volume. It is suitable for the process control, such as flow control, pressure control and temperature control and so on. The block diagram of control fundamental principle is as follows.



过程PID原理框图

给定量 given value 百分数 percentage PID control PID control 设定频率 setting frequency  
控制算法 control computing 输出频率 output frequency 滤波器 filter 反馈量 feedback quantity  
过程 PID 原理框图 block diagram of process PID principle

10-00	Choice of PID given source	Factory setting	0
⚡	Setting range	0: given by keyboard (10-01)	
		1: given by analog channel AVI1	
		2: given by analog channel AVI2/ACI	
		3: given by remote communication	
		4: given by multi-section	

- 📖 0: given by keyboard (10-01)  
1: given by analog channel AVI1  
2: given by analog channel AVI2/ACI  
3: given by remote communication  
4: given by multi-section

When the frequency source chooses PID, that is to say 00-02 chooses 5, this group of function takes effect. This parameter determines the target volume given channel of process PID.

The setting target volume of process PID is relative value. The setting 100% corresponds to 100% of feedback signal of controlled system. The system is computed as per the relative value (0-100%) all the way.


**Note: The multi-section setting can be realized by setting parameters of group 05.**

10-01	Keyboard presets the PID given.	Factory setting	0.0
⚡	Setting range	-100.0~100.0[%]	


📖 The target source is given by keyboard when choose 10-00=0. This parameter has to be set at this moment.


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


10-02	Choice of PID feedback source	Factory setting	0
⚡	Setting range	0: analog channel AVI1 feedback	
		1: analog channel AVI2/ACI feedback	
		2: AVI1+AVI2/ACI feedback	
		3: remote communication feedback	


-  0: analog channel AV11 feedback
  - 1: analog channel AV12/ACI feedback
  - 2: AV11+AV12/ACI feedback
  - 3: remote communication feedback
- Choose PID feedback channel through this parameter.


**Note: The given channel and feedback channel can't coincide. Otherwise, PIID can't control efficiently.**


10-03	Choice of PID output characteristic	Factory setting	<b>0</b>
	Setting range	0: PID output is positive characteristic	
		1: PID output is negative characteristic	


-  0: PID output is positive characteristic. When the feedback signal is more than PID given, it is necessary to decline the inverter output frequency to make PID reach balance, e.g. PID control of winding tension.
- 1: PID output is negative characteristic. When the feedback signal is less than PID given, it is necessary to increase the inverter output frequency to make PID reach balance, e.g. PID control of unwinding tension.


10-04	Proportion gain (Kp)	Factory setting	<b>0.10</b>
	Setting range	0.00~100.00	

10-05	Integration time (Ti)	Factory setting	<b>0.10</b>
	Setting range	0.01~10.00s[s]	


10-06	Differential time (Td)	Factory setting	<b>0.00</b>
	Setting range	0.00~10.00s[s]	


 Proportion gain (Kp): it determines the adjustment intensity of whole PID adjuster. The greater the P is, the greater the adjustment intensity is. When the parameter value is 100, it means that the adjusting range of PID adjuster to output frequency command is the maximum frequency when the deviation of PID feedback quantity and given quantity is 100% (ignoring the effect of integral and differential).


 Integral time (Ti): It determines the integration adjusting speed of deviation of PID feedback quantity and given quantity by PID adjuster. Integral time means that when the deviation of PID feedback quantity and given quantity is 100%, the integral adjuster continuously adjusts in this time to make the adjusted quantity reach to maximum frequency (00-03). The shorter the integral time is, the greater the adjusting intensity is.


 Differential time (Td): It determines the adjusting intensity of change rate of deviation of PID feedback quantity and given quantity by PID adjuster. Differential time means if feedback quantity changes 100% in this time, the adjusted quantity of integral adjuster is the maximum frequency (00-03) (ignoring the effect of proportion and integral). The longer the differential time is, the greater the adjusting intensity is.


PID is the most commonly used control method in process control, each part of which has different function. The following content gives a brief introduction to the working principle and adjusting method.


 Proportion adjustment (P): when there is deviation between feedback quantity and given quantity, the adjusted quantity must be proportional to deviation. If the deviation is invariable, the adjusted quantity is also constant. The proportion adjustment can rapidly reflect the variation of feedback. But using proportion adjustment alone can't realize the indifference control. The greater the proportion gain is, the faster the adjusting speed of system is. And the over great of proportion gain will cause oscillation. The adjusting step is as follows: first, set integral time as a long time and differential time as zero, making system run only with proportion adjustment. Then change the given quantity and observe the stable deviation (steady-state deviation) of feedback signal and given quantity. If the steady-state deviation is in the direction of variation of given quantity (e.g., When increase given quantity, the feedback quantity is always less than given quantity after the stabilization of system), increase the proportion gain continuously, on the other hand decrease the proportion gain. Repeat above steps until the steady-state deviation is very small (It is difficult to make steady-state deviation disappear.).

 Integral time (I): when there is deviation between feedback quantity and given quantity, the output adjusted quantity accumulated continuously. If the deviation exists persistently, the adjusted quantity will increase continuously until there is no deviation. The integral adjuster can eliminate the steady-state deviation efficiently. If the integral adjustment is too strong, repeated overshoot will occur, which makes system unstable until producing oscillation. The oscillation characteristics are as follows. The feedback signal wobbles up and down on given quantity. The wobble width is increased gradually until producing oscillation. Adjust the parameter of integral time in descending order and observe the effectiveness of system adjustment until the speed of system stabilization meets requirement.

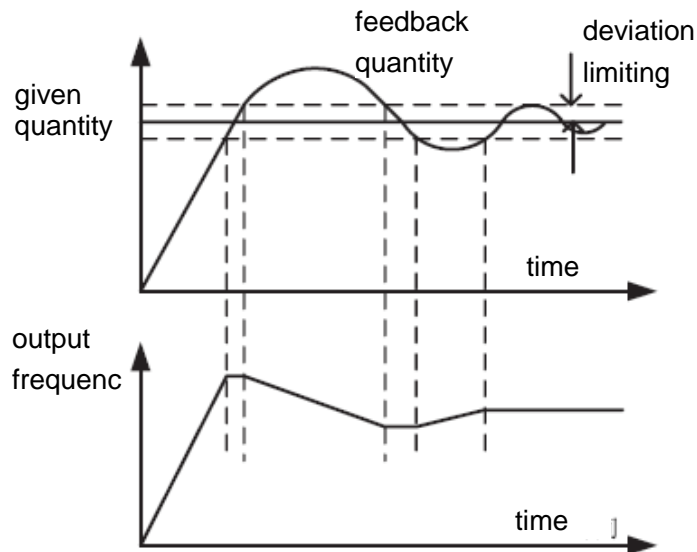
 Differential time (D): When the deviation between feedback quantity and given quantity varies, input the adjusted quantity proportional to change rate of deviation. The adjusted quantity only has something to do with variation direction and variation quantity, while having nothing to do with deviation itself. When the feedback signal varies, the differential adjustment will adjust according to the varying tendency to suppress the variation of feedback signal. Please use differential adjustment carefully. The differential adjustment easily enlarges the system interference, especially the interference to change the frequency greatly.

<b>10-07</b>	Sampling period (T)	Factory setting	<b>0.50</b>
	Setting range	0.01~100.00s[s]	

<b>10-08</b>	Limiting of PID control deviate	Factory setting	<b>0.0</b>
	Setting range	0.0~100.0[%]	

 Sampling period (T): it refers to the sampling period of feedback quantity. The adjuster computes once in every sampling period. The longer the sampling period is, the slower the response is.

Limiting of PID control deviate: PID system output value corresponds to the maximum deviation allowed for close loop given value. As shown in the diagram below, The PID adjuster stops adjusting within the deviation limit. The proper setting of this function code can adjust the accuracy and stability of PID system.



the corresponding relationship of deviation limiting and output frequency

<b>10-10</b>	Feedback disconnection test value	Factory setting	<b>0.0</b>
	Setting range	0.0~100.0[%]	

<b>10-11</b>	Feedback disconnection test time	Factory setting	<b>1.0</b>
	Setting range	0.0~3600.0[s]	

Feedback disconnection test value: this test value corresponds to full scale (100%). The system tests the feedback quantity of PID all the way. When the feedback value is less than or equal to the feedback disconnection test value, the system begins the test timing. When the test time exceeds feedback disconnection test time, the system will report the PID feedback disconnection error (PIDE).

### 11: Protection Parameters

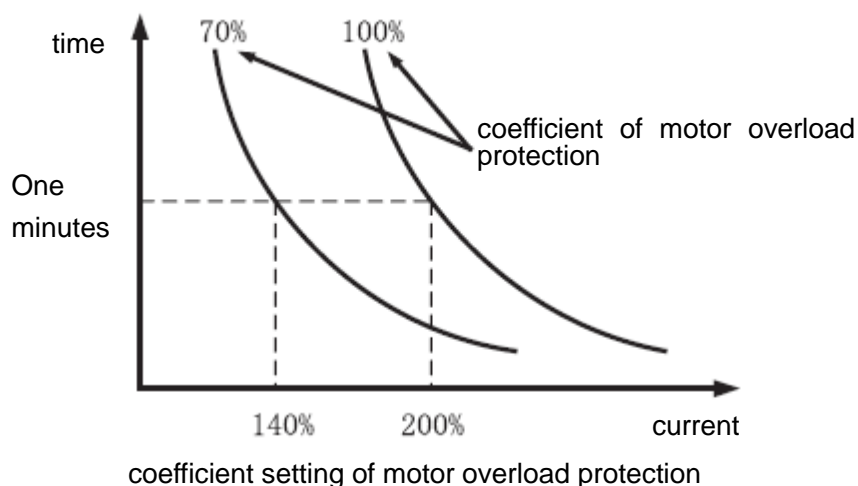
<b>11-00</b>	Choice of motor overload protection	Factory setting	<b>2</b>
	Setting range	0: no protection	
		1: general motor (with low-velocity compensation)	
		2: frequency motor (without low-velocity compensation)	

0: no protection. It means no performance of motor over load protection. At this moment, the inverter has no over load protection to the loaded motor.

1: general motor (with low-velocity compensation). Because the heat dissipation of general motor will be weakened at low-velocity, the corresponding electronic heat protection value also should be adjusted properly. Here mentioned motor has low-velocity compensation, which means that to adjust the threshold of over load protection downward of motor whose operation frequency is less than 30Hz.

2: frequency motor (without low-velocity compensation). The heat dissipation of motor specified for frequency conversion is not affected by rotating speed. So there is no need to adjust the protection value at low velocity.

<b>11-01</b>	Motor overload protection current	Factory setting	<b>100.0</b>
	Setting range	20.0~120.0[%]	



This value can be determined by the following formula:

$$\text{motor overload protection current} = (\text{the maximum load current allowed} / \text{inverter rated current}) * 100\%$$

It is necessary to set this function code correctly to protect the motor when big inverter drives small motor.

11-02	Frequency droop point of instant power-down	Factory setting	80.0
⚡	Setting range	70.0%~110.0%(Standard busbar voltage)	

11-03	Frequency droop rate of instant power-down	Factory setting	100.0
⚡	Setting range	0.00~00-06[Hz]	

📖 When the frequency droop rate of instant power-down is set as 0, the function of frequency droop of instant power-down is ineffective.

Frequency droop percentage of instant power-down: it refers to that after the power grid powers down, when the busbar voltage falls to the frequency droop point of instant power-down, the inverter begins to decrease the operation frequency as per the frequency droop rate of instant power-down (11-03), which makes the motor generate electricity and the returned power maintain the busbar voltage to ensure the normal operation of inverter until the inverter is powered on again.

**Note: when switch the power grid, the production stop resulted from inverter protection can be avoided if adjust these two parameters properly.**

11-04	Over voltage stall protection	Factory setting	0
⚡	Setting range	0: prohibit from protecting 1: permit to protect	

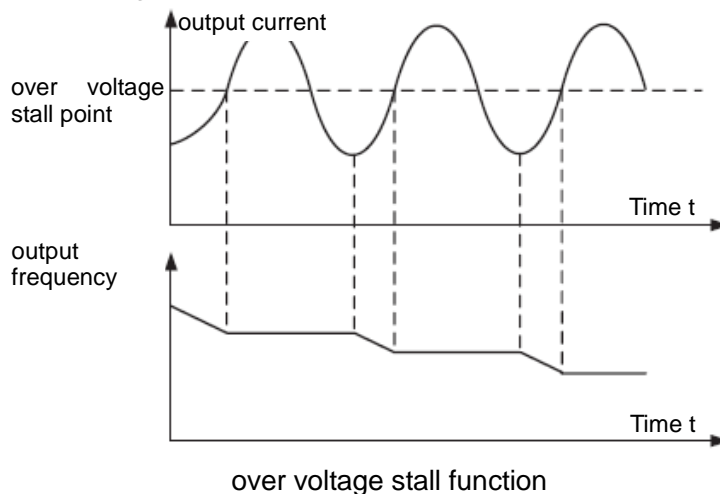
11-05	Protection voltage of over voltage stall	Factory setting	120
⚡	Setting range	120~150%[380V:130%] 120~150%[220V:120%]	


📖 11-04:

- 0: prohibit from protecting
- 1: permit to protect


In the course of inverter deceleration operation, the actual droop rate of inverter rotating speed may be less than that of output frequency due to the effect of load inertia. At this moment, the motor will return electric power to inverter, making the busbar voltage of inverter increase, which may cause the over voltage fault of inverter if measures are not taken.

Over voltage stall protection is used to test the busbar voltage in the course of inverter operation and compare with the over load stall point defined by 11-05 (corresponding to standard busbar voltage). If the busbar voltage exceeds the over load stall point, the output frequency of inverter stops falling and continues to decelerate until the busbar voltage is lower than over voltage stall point. As shown in the diagram below:



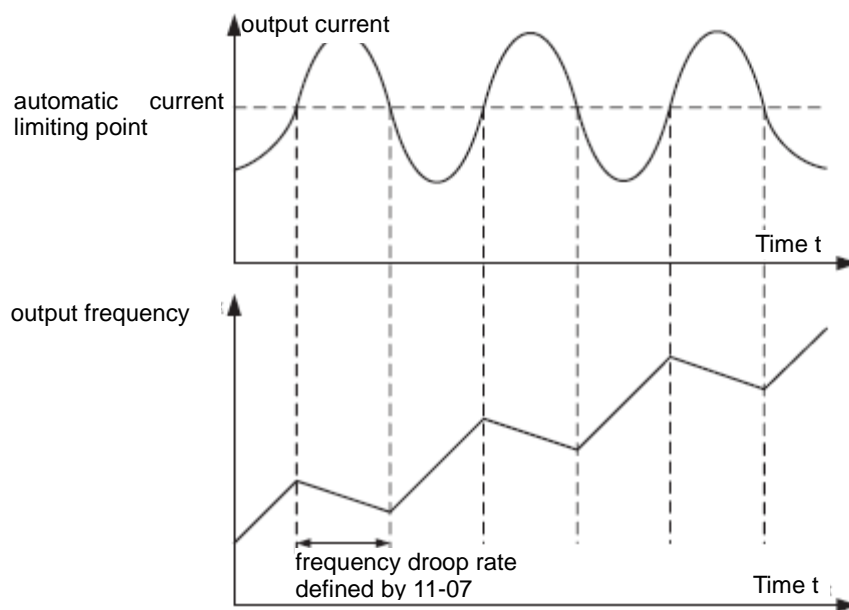
<b>11-06</b>	Automatic current limiting	Factory setting	<b>160</b>
	Setting range	100~200%[160]	

<b>11-07</b>	Droop rate of over current frequency	Factory setting	<b>1.00</b>
	Setting range	0.00~50.00[1.00Hz/s]	


 In the course of inverter operation, the actual rise rate of motor rotating speed is less than that of output frequency due to the oversize load, which may result to the acceleration over current fault to let the inverter trip if no measures are taken.


Automatic current limiting is used to test the output current in the course of inverter operation and compare with the current limiting point defined by 11-06. If the output current exceeds the current limiting point, the output frequency of inverter falls as per the droop rate of over current frequency and return to normal operation when the output current is lower than current limiting point again.

As shown in the diagram below:



over current stall function

<b>11-08</b>	Choice of current limiting action	Factory setting	<b>0</b>
	Setting range	0: current limiting is always effective	
		1: ineffective when the current limiting is on a constant speed	

 The function of automatic current limiting is always effective in the state of acceleration and deceleration. It is determined by current limiting action choosing (11-09) whether the function of automatic current limiting is effective at constant speed.

11-09=0: The automatic current limiting is effective when operate at constant speed.

11-09=1: The automatic current limiting is ineffective when operate at constant speed.

The output frequency may vary when the automatic current limiting acts. So the function of automatic current limiting is not suitable for occasions needing stable output frequency when operate at constant speed.

When the automatic current limiting is effective, the overload capacity of inverter may be affected due to the too lower setting of current limiting level.

## **12: Serial Communication Parameters**

### **A. Communication Protocol**

The S2800 series inverter is a kind of host-slave communication, which provides RS485 communication interface and adopts the international standard ModBus communication protocol. The user can realize the centralization control (inverter control command setting, operation frequency, modification of relative function code parameters, working state of inverter and monitoring of fault information, etc.) through PC/PLC and controlling the upper seat to adapt to special application requirement.

### **B. Protocol Content**

The ModBus serial communication protocol defines the frames content and application format of asynchronous transmission in serial communication, which includes host polling and broadcast frames. The frames content organized by host includes the slave address (or broadcast address), executive command, data and error correction and so on. The slave response also adopts the same structure, including action confirmation, return data and error correction and so on. If the slave occurs error when receiving frames, or can't complete the action required by host, a fault frames will be organized as the response to host.

### **C. Application Mode**

The S2800 series inverter can be switched in "single host-multiple slaves" control network with RS485 bus.

### **D. Bus Structure**

#### (1) interface mode

RS485 hardware interface

#### (2) transmission mode

Asynchronous Serial Interface, half duplex transmission. As for the host and slave, only can one sends data and the other receives data at one time. The data in serial asynchronous communication is sent one frames by another in the form of message mode.

#### (3) topological structure

Single host-multiple slaves system. The setting range of slave address is 1~247. 0 is the address of broadcast communication. Address of every slave in the network is unique, which is the base for ensuring ModBus serial communication.

### **E. Protocol Specification**

The communication protocol of S2800 series inverter is a kind of asynchronous serial host-slave ModBus communication protocol. In this network, only one piece of equipment (host) can set up protocol (called interrogation command). Other equipments (slaves) only can react to the interrogation command of host by providing data or actuate correspondingly as per the interrogation command of host. The host here refers to personal computer (PC), industry control equipment or programmable logic controller (PLC) and so on. The slave refers to S2800 series inverter or other control equipments with same communication protocol. The host can communicate with some slave lonely and send broadcast information to all slaves as well. As for the host interrogation command accessed individually, the slave has to return to a information (called response). While as for the broadcast information sent by host, slaves don't need to give response information to the host.

### **F. Communication Frames Structure**

The digit format of ModBus protocol communication of S2800 series inverter has two forms: RTU (remote terminal unit) mode and ASCII mode (American Standard Code for Information International Interchange).

In RUN mode, the format of each byte is as follows:

Coding system: 8-binary, every 8-bit frames field includes two hexadecimal characters, hexadecimal system 0~9, A~F.

In ASII mode, the format of each byte is as follows:

Coding system: communication protocol is hexadecimal system. The information character meaning: "0"... "9", "A"... "F". Every hexadecimal system is expressed by ASII information of corresponding character.

character	'0'	'1'	'2'	'3'	'4'	'5'
ASCII CODE	0x30	0x31	0x32	0x33	0x34	0x35
character	'6'	'7'	'8'	'9'	'A'	'B'
ASCII CODE	0x36	0x37	0x38	0x39	0x41	0x42
character	'C'	'D'	'E'	'F'		
ASCII CODE	0x43	0x44	0x45	0x46		

Data format: start bit, seven or eight data bits, parity bit and stop bit.

The description of data format is as follows:

11-bit character frames

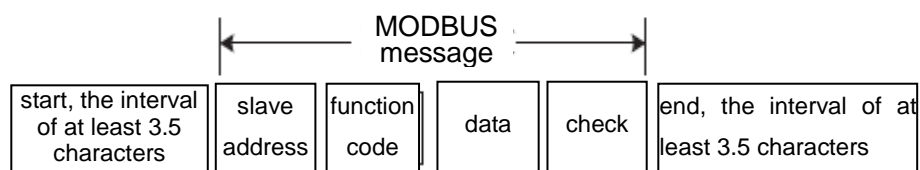
start bit	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	BIT8	check bit	stop bit
-----------	------	------	------	------	------	------	------	------	-----------	----------

10-bit character frames

start bit	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	check bit	stop bit
-----------	------	------	------	------	------	------	------	-----------	----------

In RUN mode, the new frames always treat the transmission time of at least 3.5 characters as the silence period. In the network computing the transmission speed by baud rate, the transmission time 3.5 characters can be easily controlled. The following transmitted data fields are slave addresses, operation command codes, data and CRC check words successively. The transmission character of every field is hexadecimal system 0...9, A...F. The network monitors the action of communication bus all the way. When the first field is received, this byte will be confirmed by every piece of network equipment. Once the last byte has been transmitted, a similar transmission time interval of 3.5 characters will be used to express the end of this frame. The transmission of a new frame will be started after then.

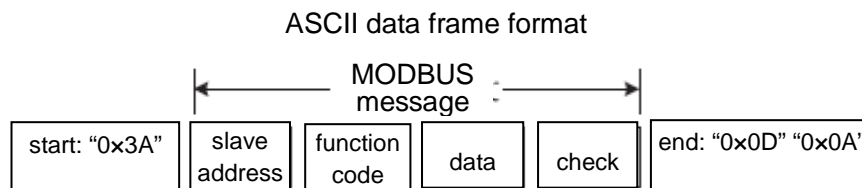
RTU data frame format



The information of one frame must be transmitted in a continuous data flow. If there is the time interval more than 1.5 characters before the end of whole frames transmission, the receiving equipment will clear these incomplete information and treat mistakenly the following byte as the address field part of a new frame. Similarly, if the time interval between the start of a new frame and the previous one frame is smaller than 3.5 characters, the receiving equipment will treat it as continuation. of previous one frame, resulting to frames disorder, incorrectness of final CRC check value and communication fault. The standard structure of RUN frame is as follows:

Frame header (START)	T1-T2-T3-T4 (transmission time of 3.5 characters)
Slave address field (ADDR)	Communication address: 0~247 (decimal system) ( 0=broadcast address)
Function domain (CMD)	03H: read slave parameter 06H: write slave parameter
Data field DATA (N-1) ... DATA (0)	Data of 2*N characters. This part is the main content of communication and the core of data exchange in communication
CRC CHK upper bite	Test value: CRC check value (16 BIT)
CRC CHK lower bite	
Ending-frame (END)	T1-T2-T3-T4 (transmission time of 3.5 characters)

In ASCII mode, the frame header is "0" ("0x3A"), the ending frame default is "CRLF" ("0x0D" "0x0A"). In ASCII mode, except the frame header and ending frame, all data bytes are sent in the form of ASCII code, which first sends high 4-bite byte and then low 4-bite byte. The data in this mode is 8 bits. As for "A" ~"F", it adopts ASCII code in capital letter. At this moment, the data adopts LRC check. The check covers the information part from slave address to data. The check summation equals to the complement code of summation (abandoning the carry bit) of characters of all data participating in checking.



The standard structure of ASCII frame is as follows:

START	“.”(0x3A)
Address Hi	Communication address: 8-bit address is combined by 2 ASCII codes
Address Lo	
Function Hi	Function code: 8-bit address is combined by 2 ASCII codes
Function Lo	
DATA (N-1) ... DATA (0)	Data content: nx8-bit data content is combined by 2n ASCII codes, n<=16, 32 ASCII codes at most
LRC CHK Hi	LRC check code: 8-bit check code is combined by 2 ASCII codes
LRC CHK Lo	
END Hi	End: END Hi=CR (0x0D), END Lo=LF (0x0A)
END Lo	

### G. Description of Command Code and Communication Data

Command code: 03H (0000 0011), read N words (can sequentially read 16 words at most)

E.g. from the inverter whose slave address is 01H, the start address of internal memory is 0004, read 2 words sequentially, the structure of this frame is described as follows.

RUT host command information

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Start address upper bit	00H
Start address lower bit	04H
Date number upper bit	00H
Date number lower bit	02H
CRC CHK upper bit	85H
CRC CHK lower bit	CAH
END	T1-T2-T3-T4

RUT slave response information

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Byte number	04H
Date address 0004H upper bit	13H
Date address 0004H lower bit	88H
Date address 0005H upper bit	13H
Date address 0005H lower bit	88H
CRC CHK lower bit	73H
CRC CHK upper bit	CBH
END	T1-T2-T3-T4

ASCII host command information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
Start address upper bit	‘0’
	‘0’
Start address lower bit	‘0’
	‘4’
Date number upper bit	‘0’
	‘0’
Date number lower bit	‘0’
	‘2’
LRC CHK Hi	‘F’
LRC CHK Lo	‘6’
END Hi	CR
END Lo	LF

ASCII slave response information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
Byte number	‘0’
	‘4’
Date address 0004H upper bit	‘1’
	‘3’
Date address 0004H lower bit	‘8’
	‘8’
Date address 0005H upper bit	‘1’
	‘3’
Date address 0005H lower bit	‘8’
	‘8’
LRC CHK Hi	‘C’
LRC CHK Lo	‘2’
END Hi	CR
END Lo	LF

Command code: 06H (0000 0110), write one word

For example, 5000 (1388H) is written to 0008H address of slave address 02H inverter.

ASCII slave response information The structure of this frame is described as follows:

RUT host command information

START	T1-T2-T3-T4
ADDR	02H
CMD	06H
Write data address upper bit	00H
Write data address lower bit	05H
Date content upper bit	13H
Date content lower bit	88H
CRC CHK lower bit	94H
CRC CHK upper bit	AEH
END	T1-T2-T3-T4

RUT slave response information

START	T1-T2-T3-T4
ADDR	02H
CMD	06H
Write data address upper bit	00H
Write data address lower bit	05H
Date content upper bit	13H
Date content lower bit	88H
CRC CHK lower bit	94H
CRC CHK upper bit	AEH
END	T1-T2-T3-T4

ASCII host command information

START	‘.’
ADDR	‘0’
	‘2’
CMD	‘0’
	‘6’
Write data address upper bit	‘0’
	‘0’
Write data address lower bit	‘0’
	‘5’
Date content upper bit	‘1’
	‘3’
Date content lower bit	‘8’
	‘8’
LRC CHK Hi	‘5’
LRC CHK Lo	‘8’
END Hi	CR
END Lo	LF

ASCII slave response information

START	‘.’
ADDR	‘0’
	‘2’
CMD	‘0’
	‘6’
Write data address upper bit	‘0’
	‘0’
Write data address lower bit	‘0’
	‘5’
Date content upper bit	‘1’
	‘3’
Date content lower bit	‘8’
	‘8’
LRC CHK Hi	‘5’
LRC CHK Lo	‘8’
END Hi	CR
END Lo	LF

Command code: 08H (0000 1000), diagnostic function  
 meaning of sub-function code

sub-function code	description
0000	Return to query the communication data

For example, Do loop test to the driven address 01H, the character string of query information is same to that of response information. Its format is shown as follows.

RUT host response information

START	T1-T2-T3-T4
ADDR	01H
CMD	08H
Sub-function code upper bit	00H
Sub-function code lower bit	00H
Date content upper bit	12H
Date content lower bit	ABH
CRC CHK lower bit	ADH
CRC CHK upper bit	14H
END	T1-T2-T3-T4

RUT slave response information

START	T1-T2-T3-T4
ADDR	01H
CMD	08H
Sub-function code upper bit	00H
Sub-function code lower bit	00H
Date content upper bit	12H
Date content lower bit	ABH
CRC CHK lower bit	ADH
CRC CHK upper bit	14H
END	T1-T2-T3-T4

ASCII host command information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘8’
Sub-function code upper bit	‘0’
	‘0’
Sub-function code lower bit	‘0’
	‘0’
Date content upper bit	‘1’
	‘2’
Date content lower bit	‘A’
	‘B’
LRC CHK Hi	‘3’
LRC CHK Lo	‘A’
END Hi	CR
END Lo	LF

ASCII slave command information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘8’
Sub-function code upper bit	‘0’
	‘0’
Sub-function code lower bit	‘0’
	‘0’
Date content upper bit	‘1’
	‘2’
Date content lower bit	‘A’
	‘B’
LRC CHK Hi	‘3’
LRC CHK Lo	‘A’
END Hi	CR
END Lo	LF

**H. Communication Frame Error-checking Method**

The error-checking method of frame mainly includes two parts: bit checking of byte (odd/even parity) and whole data checking of frame (CRC checking and LRC checking).

**I. Byte Checking**

The user can choose different byte checking method as required, and also can choose no checking, which will affect the checking bit setting of every byte.

Even parity checking: adding an even parity bit before data transmission to express that the number of “1” in transmitted data is odd or even. If the number is even, the checking bit is “0”, otherwise “1”. It is used to keep the parity of data constant.

Odd parity checking: adding an odd parity bit before data transmission to express that the number of “1” in transmitted data is odd or even. If the number is odd, the checking bit is “0”, otherwise “1”. It is used to keep the parity of data constant.

For example, the transmitted data is “11001110”. There are five “1” in it. If even checking is adopted, its even parity checking bit is “1”. If odd checking is adopted, its odd parity checking bit is “0”. In data transmission, the parity bit is put on the checking bit of frame through computing. The receiving equipment also needs parity checking. If the parity of received data is different from the preset situation, it indicates that there is something wrong with communication.

**J. CRC Checking**

In RUC frame format, the frame includes frame incorrect test field based on CRC computing. The CRC field tests the content of whole frames. The CRC field is 2 bytes and includes 16-binary. It is added to frame after being computed by transmission equipment. The receiving equipment recalculates the CRC which has received frames and compare it with values in the received CRC field. If the two CRC values are different, it indicates that there is something wrong with transmission.

In CRC checking mode, it first stores in 0xFFFF, then calls a procedure and processes the continuous more than 6 bytes in frames and values in current register. Only the 8-bit data in every character is effective to CRC, the stop bit, end bit and parity checking are all ineffective to it.

In CRC production course, every 8-bit character is XOR with register content. The result moves to the direction of lowest effective bit. And the highest effective bit is filled with 0. LSB is picked up to test. If LSB is 1, the register is XOR with the preset value alone. If LSB is 0, nothing is does. The whole process has to be repeated 8 times. As the last bit (8th bit) is finished, the next 8-bit character is again XOR with the present value of register. The final value in register is the CRC value after all bytes in frame have been executed.

This calculation method of CRC adopts international standard CRC checking rule. The user can refer to the CRC algorithm of relative standard when edit the CRC algorithm to edit the real CRC calculation program meeting requirement.

Here provides a simple function of CRC algorithm for users' reference (using C language programming).

```

Unsigned int crc_cal_value(unsigned char *data_value, unsigned char data_length)
{
    int i;
    unsigned int crc_value=0xffff; while(data_length--)
        {
            Crc_value^=*data_value++;
            For(i=0;i<8;i++)
                {
                    If(crc_value&0x0001)
                        Crc_value=(crc_value>>1)^0xa001;
                    Else
                        Crc_value=crc_value>>1;
                }
        }
    Return(crc_value);s
}

```

In ladder logic, CKSM calculates CRC value according to frame content with table look-up method. This program is simple and fast calculation, but occupies larger ROM space. So please use it carefully for occasions with requirement to program space.

#### **K. ASCII analog Checking (LRC check)**

Checking code (LRC check) is the summation from address to data content result. For example, the checking code of above 1.6.2 communication information: 0x02+0x06+0x00+0x08+0x13+0x88=0xAB, then supplement code of 2=0x55.

Here provides a simple function of LRC calculation summation for users' reference (using C language programming).

```

Static unsigned char
LRC(auchMsg,usDataLen)
unsigned char *auchMsg;
{
    unsigned char uchLRC=0;
    while(usDataLen--)
        uchLRC+=*auchMsg++;
    return(((unsigned char)(~((char)uchLRC))););
}

```

## L. Definition of Communication Data Address

It is the definition of communication data address, which is used to control inverter operation, obtain the state information and relative function parameters of inverter.

### (1) representation method of function code parameter address

Using numbers of function code as parameters to correspond to the register address, which has to be converted to hexadecimal system. For example, the number of 05-05 is 62, the function code address expressed by hexadecimal system is 003EH.

Ranges of high and low characters: high-bit character—00~01; low-bit character--00~FF.

Note: the group 13 is the parameter set in factory, whose parameters can't be read and modified either. Some parameters can't be modified when the inverter is in operation state. Some always can't be modified no matter what the state of inverter is. When modify the function code parameter, pay attention to the setting range and unit of parameter and relative description.

In addition, the frequent storage of EEPROM will reduce its service life. For users, some function codes don't need to be stored in communication mode. The using requirement can be meet only through altering values in RAM. This function can be realized as long as changing the highest bit of corresponding function code address from 0 to 1. For example, function code 00-06 isn't stored into EEPROM, just alter the value in RAM and set the address as 8007. This address is used only when write RAM, which can't be used as read function, otherwise, it is an ineffective address.

### (2) Description of other function address

Function description	Address meaning	Description of data meaning	R/W characteristic
Communication control command	1000H	0001H:Forward operation	W/R
		0002H:Reverse operation	
		0003H:forward jog	
		0004H:Reverse jog	
		0005H:Stop	
		0006H:Free stop (emergency stop)	
		0007H:Fault reset	
		0008H:Jog stop	
Inverter status	1001H	0001H:In forward operation	R
		0002H:In reverse operation	
		0003H:Inverter is standby	
		0004H:Out of order	
Address of communication setting value	2000H	Range of communication setting value (-10000~10000) Note: the communication setting value is the percentage (-100.00%~100.00%) of corresponding value, can be communication write operation. When it is used as frequency source setting, it corresponds to the percentage of maximum frequency (00-06). When it used as torque given, it corresponds to percentage of torque upper limit. When it used as PID given or feedback, t corresponds to percentage of PID.	W/R
Function setting of virtual terminal input	2001H	Reserved	W/R
Address description of start/stop parameters	3000H	Operation speed	R
	3001H	Setting speed	R
	3002H	Busbar voltage	R
	3003H	Output voltage	R
	3004H	Output current	R
	3005H	Operation rotating speed	R

Function description	Address meaning	Description of data meaning	R/W characteristic
Address description of start/stop parameters	3006H	Output power	R
	3007H	Output torque	R
	3008H	PID given value	R
	3009H	PID feedback value	R
	300AH	Terminal input flag state	R
	300BH	Terminal output flag state	R
	300CH	Analog quantity AVI1 value	R
	300DH	Analog quantity AVI2/AC1 value	R
	300EH	Analog quantity AVI3 value	R
	300FH	Analog quantity AVI4 value	R
	3010H	High-speed pulse frequency (HDI1)	R
	3011H	High-speed pulse frequency (HDI2)	R
	3012H	Multi-velocity and present PLC segments	R
	3013H	Length value	R
	3014H	Input value of external counter	R
	3015H	Torque direction (0: forward, 1: reverse)	R
3016H	Equipment code	R	
Check address of parameter lock password	4000H	****	
Command address of parameter lock password	4100H	55AAH	W
Inverter fault address	5000H	Fault information code coincides with number of fault type in function code menu. But the data here returned to the host is in hexadecimal system and not fault character.	R

Note: data read from 5000H corresponds to the actual fault as shown in the table below.

Number	Fault type
0x00	No fault
0x01	Inversion unit U-phase protection(OUT1)
0x02	Inversion unit V-phase protection(OUT2)
0x03	Inversion unit W-phase protection(OUT3)
0x04	Accelerate the over current(OC1)
0x05	Decelerate the over current(OC2)
0x06	Keep the over current at constant speed(OC3)
0x07	Accelerate the over voltage(OV1)
0x08	Decelerate the over voltage(OV2)
0x09	Keep the over voltage at constant speed(OV3)
0x0A	Busbar under voltage fault(UV)
0x0B	Motor overload(OL1)
0x0C	Inverter overload(OL2)
0x0D	Input side lacking phase(SPI)

Number	Fault type
0x0E	Output side lacking phase(SPO)
0x0F	Rectifier module over heating fault(OH1)
0x10	Inversion module over heating fault(OH2)
0x11	External fault(EF)
0x12	Communication error(CE)
0x13	Current test error(ITE)
0x14	Motor self-taught error(TE)
0x15	EEPROM operation error(EEP)
0x16	PID disconnection error(PIDE)
0x17	Braking cell error(Bce)
0x18	reserved

Parameters read from inverter are all expressed in hexadecimal system. All values = actual value\*10K, of which K is the bit number after decimal point of parameter.

### M. Response of Error Information

It uses function code field and fault address to indicate normal response (error-free) or there is some error (called objection response). As for the normal response, the corresponding function code, data address or sub-function code are responded from equipment. For the objection response, return to one code equal to normal code from equipment. But the first position must be logical 1.

For example, the information sent from a host to slave requires to read a group of data of inverter function code address, the following function codes will be produced:

0 0 0 0 0 1 1 (hexadecimal 03H)

To the normal response, the slave equipment responds the same function code. To the objection response, it returns to:


1 0 0 0 0 1 1 (hexadecimal 83H)


The slave equipment will respond one byte of abnormal code except that the function has been modified due to objection error, which is the reason of raising exceptions.

Once received the objected response, the typical handling process of application program of host equipment is resending message, or modify command aiming at corresponding errors.


### Meaning of Error Code


ModBus Abnormal Code		
Code	Name	Meaning
01H	illegal function	When the function code received from host is unallowed operation; or slave processes this demanding in error condition
02H	illegal data address	the demanding data address of host is unallowed address, especially the combination of register address and transmitted bytes is invalid.
03H	illegal data value	When the received data field includes unallowed value. Note: it doesn't mean that the data presented and stored has a value excepted of application program.
06H	slave unit busy	Inverter is busy. (EEPROM is storing)
10H	Password incorrect	The password written in by password check address is different from the 08-00 user password.
11H	Check incorrect	In the frame information sent by host computer, when RTU format CRC check bit or ASCII format LRC check bit is different from the check calculation value of slave computer, the information of check error is sent out.
12H	Parameter alter invalid	In parameter write command sent by host computer, the sent data is out of parameter range or the write address is unable to alter currently.
13H	System locked	When the host computer reads or writes, the user password has been set, and haven't unlocked the password locking, that the system is locked will be sent out.

<b>12-00</b>	Local communication address	Factory setting	<b>1</b>
	Setting range	0~247, 0 is broadcast address.	


 In the course of host editing frame, when the slave communication address is set as 0, that is broadcast communication address. all slaves on ModBus busbar will receive this frame, but not give response. Note: the slave address can't be set as 0.

Local communication address is unique in communication network, which is the basis to realize the point-to-point communication of host computer and inverter.

<b>12-01</b>	Setting of communication baud rate	Factory setting	<b>3</b>
	Setting range	0:1200bps 1:2400bps 2:4800bps 3:9600bps 4:19200bps 5:38400bps	


-  0:1200bps  
1:2400bps  
2:4800bps  
3:9600bps  
4:19200bps  
5:38400bps


This parameter is used to set the data transmission rate between host computer and inverter. Pay attention that the host computer must coincide with the baud rate set by inverter, or communication can't be operated. The greater the baud rate is, the higher the communication speed is.


<b>12-02</b>	Setting of data bit check	Factory setting	<b>3</b>
	Setting range	0: no checking(N,8,1) for RTU 1: even parity checking(E,8,1) for RTU 2: odd parity checking(O,8,1) for RTU 3: no checking(N,8,2) for RTU 4: even parity checking(E,8,2) for RTU 5: odd parity checking(O,8,2) for RTU 6: no checking(N,7,1) for ASCII 7: even parity checking(E,7,1) for ASCII 8: odd parity checking(O,7,1) for ASCII 9: no checking(N,7,2) for ASCII 10: even parity checking(E,7,2) for ASCII 11: odd parity checking(O,7,2) for ASCII 12: no checking(N,8,1) for ASCII 13: even parity checking(E,8,1) for ASCII 14: odd parity checking(O,8,1) for ASCII 15: no checking(N,8,2) for ASCII 16: even parity checking(E,8,2) for ASCII 17: odd parity checking(O,8,2) for ASCII	


- 0: no checking(N,8,1) for RTU
- 1: even parity checking(E,8,1) for RTU
- 2: odd parity checking(O,8,1) for RTU
- 3: no checking(N,8,2) for RTU
- 4: even parity checking(E,8,2) for RTU
- 5: odd parity checking(O,8,2) for RTU
- 6: no checking(N,7,1) for ASCII
- 7: even parity checking(E,7,1) for ASCII
- 8: odd parity checking(O,7,1) for ASCII
- 9: no checking(N,7,2) for ASCII
- 10: even parity checking(E,7,2) for ASCII
- 11: odd parity checking(O,7,2) for ASCII
- 12: no checking(N,8,1) for ASCII
- 13: even parity checking(E,8,1) for ASCII
- 14: odd parity checking(O,8,1) for ASCII
- 15: no checking(N,8,2) for ASCII
- 16: even parity checking(E,8,2) for ASCII
- 17: odd parity checking(O,8,2) for ASCII


Pay attention that the host computer must coincide with the data format set by inverter, or communication can't be operated.


<b>12-03</b>	Communication answer delay	Factory setting	<b>5</b>
	Setting range	0~200ms[ms]	

 Communication answer delay refers to the interval time from ending of inverter data receiving to sending response data to host computer. If the answer delaying time is less than system processing time, the answer delay is subject to system processing time. If the answer delaying time is greater than system processing time, the system has to delay after processing the data. And send data to the host computer until the delay time is reached.

<b>12-04</b>	Time of communication overtime fault	Factory setting	<b>0.0</b>
	Setting range	0.0~200.0s[s]	

 When this function code is set as 0.0s, the parameter of communication overtime time is invalid. When this function code is set as valid value, if the interval time between one communication and the next communication exceeds the time of communication overtime, the system will report communication error (CE). Normally, this parameter is set as invalid value. setting this parameter in system of continuous communication can monitor the communication status.

<b>12-05</b>	Transmission error handle	Factory setting	<b>1</b>
	Setting range	0: alarm and free stop 1: not alarm and continue to run 2: not alarm and stop according to stopping mode (only under communication control mode) 3: not alarm and stop according to stopping mode (under all control modes)	

 0: alarm and free stop


1: not alarm and continue to run

2: not alarm and stop according to stopping mode (only under communication control mode)

3: not alarm and stop according to stopping mode (under all control modes)

When the inverter communication is abnormal, it is feasible to set the process action of communication error to shield CE fault, stop or continue to operate.

12-06	Transmission response handle	Factory setting	<b>0</b>
	Setting range	0: write operation has response	
		1: write operation has no response	

 When LED unit of this function code is set as 0, the inverter has response to the read-write command of host computer.

When LED unit of this function code is set as 1, the inverter only has response to the read command of host computer, but no response to the write command, through which can improve the communication efficiency.

When LED tens of this function code is set as 0, the inverter will not store the communication setting value when power down.

## **6 TROUBLE SHOOTING**

AC motor drive is provided with functions of warning and protection such as over voltage, low voltage and over current. Once fault occurs, protection function shall act, AC motor drive output stop, fault contactor act and also free running of motor shall stop. For causes and corrective measures of fault, display of fault shall be taken for reference. The exception record will be stored in the memory of AC motor driver. Please pay attention that: Attention shall be paid that, depressing RESET after fault shall only be available after fault has been eliminated.

### **6.1 Failures & Failure Elimination**

Show symbol	Description of abnormal occurrence	Possible reason	counter-measure
<b>OUt1</b>	Conversion unit U-phase failure	<ol style="list-style-type: none"> <li>1. accelerate too much</li> <li>2. IGBT internal damage of this phase</li> <li>3. interference causes incorrect action</li> <li>4. grounding is not good</li> </ol>	<ol style="list-style-type: none"> <li>1. increase acceleration time</li> <li>2. ask for support</li> <li>3. check the peripheral equipment, whether has interference source</li> </ol>
<b>OUt2</b>	Conversion unit V-phase failure		
<b>OUt3</b>	Conversion unit W-phase failure		
<b>OC1</b>	Accelerate the over current	<ol style="list-style-type: none"> <li>1. accelerate too much</li> <li>2. Electricity grid voltage is too low.</li> <li>3. inverter power is too low</li> </ol>	<ol style="list-style-type: none"> <li>1. increase acceleration time</li> <li>2. check input power supply</li> <li>3. choose the inverter with higher power</li> </ol>
<b>OC2</b>	Decelerate the over current	<ol style="list-style-type: none"> <li>1. decelerate too much</li> <li>2. load inertia torque is large</li> <li>3. inverter power is too low</li> </ol>	<ol style="list-style-type: none"> <li>1. increase deceleration time</li> <li>2. add proper braking component for power consumption</li> <li>3. choose the inverter with higher power</li> </ol>
<b>OC3</b>	Keep the over current at constant speed	<ol style="list-style-type: none"> <li>1. load mutation or abnormal</li> <li>2. Start motor again when it is still rotating after interrupt power-supply</li> </ol>	<ol style="list-style-type: none"> <li>1. check load or decrease load mutation</li> <li>2. check input power supply</li> <li>3. choose the inverter with higher power</li> </ol>
<b>OV1</b>	Accelerate the over voltage	<ol style="list-style-type: none"> <li>1. input voltage is abnormal</li> <li>2. start motor again when it is still rotating after interrupt power-supply</li> </ol>	<ol style="list-style-type: none"> <li>1. check input power supply</li> <li>2. avoid the restart after stop</li> </ol>
<b>OV2</b>	Decelerate the over voltage	<ol style="list-style-type: none"> <li>1. decelerate too much</li> <li>2. load inertia is big</li> <li>3. input voltage is abnormal</li> </ol>	<ol style="list-style-type: none"> <li>1. increase deceleration time</li> <li>2. increase braking component for power consumption</li> <li>3. check input power supply</li> </ol>
<b>OV3</b>	Keep the over voltage at constant speed	<ol style="list-style-type: none"> <li>1. input voltage has unusual change</li> <li>2. load inertia is big</li> </ol>	<ol style="list-style-type: none"> <li>1. install input reactor</li> <li>2. add proper braking component for power consumption</li> </ol>
<b>UV</b>	Busbar under voltage	<ol style="list-style-type: none"> <li>1. Electricity grid voltage is too low.</li> </ol>	<ol style="list-style-type: none"> <li>1. check power supply of electricity grid input</li> </ol>

Show symbol	Description of abnormal occurrence	Possible reason	counter-measure
<b>OL1</b>	Motor overload	<ol style="list-style-type: none"> <li>1. Electricity grid voltage is too low.</li> <li>2. Setting of motor rated current is incorrect.</li> <li>3. Motor is locked or the load mutation is too large.</li> <li>4. power matching unreasonable</li> </ol>	<ol style="list-style-type: none"> <li>1. check the voltage of electricity grid</li> <li>2. reset motor rated current</li> <li>3. check load and adjust torque increase quantity</li> <li>4. choose proper motor</li> </ol>
<b>OL2</b>	Inverter overload	<ol style="list-style-type: none"> <li>1. accelerate too much</li> <li>2. start motor again when it is still rotating after interrupt power-supply</li> <li>3. Electricity grid voltage is too low.</li> <li>4. too much load</li> </ol>	<ol style="list-style-type: none"> <li>1. increase acceleration time</li> <li>2. avoid the restart after stop</li> <li>3. check the voltage of electricity grid</li> <li>4. choose the inverter with higher power</li> </ol>
<b>SPI</b>	Input side lacking phase	R, S, T lacking phase input	<ol style="list-style-type: none"> <li>1. check input power supply</li> <li>2. check the installation wiring</li> </ol>
<b>SPO</b>	Output side lacking phase	U, V, W lacking phase output (or load three phases are serious unsymmetrical)	<ol style="list-style-type: none"> <li>1. check output wiring</li> <li>2. check motor and cable</li> </ol>
<b>OH1</b>	Rectifier module over heating	<ol style="list-style-type: none"> <li>1. inverter instant over current</li> <li>2. Output three-phase has interphase or grounding short circuit.</li> <li>3. air duct blocked or fan damaged</li> <li>4. environment temperature over high</li> <li>5. loose of control panel connection wire or plug-in unit</li> <li>6. damage of auxiliary power-supply, under voltage of driven voltage</li> <li>7. bridge shoot-through of power module</li> <li>8. control panel is abnormal</li> </ol>	<ol style="list-style-type: none"> <li>1. refer to over current solution</li> <li>2. rewiring</li> <li>3. dredge the air duct or replace fan</li> <li>4. decline environment temperature</li> <li>5. check and connect again</li> <li>6. ask for service</li> <li>7. ask for service</li> <li>8. ask for service</li> </ol>
<b>OH2</b>	Conversion module over heating		
<b>EF</b>	External fault	SI external fault input terminal act	Check external equipment input
<b>CE</b>	Communication error	<ol style="list-style-type: none"> <li>1. Improper setting of baud rate</li> <li>2. communication error of serial communication</li> <li>3. long pause of communication</li> </ol>	<ol style="list-style-type: none"> <li>1. set proper baud rate</li> <li>2. press key of STOP/RST to reset and ask for service</li> <li>3. check wiring of communication interface</li> </ol>

Show symbol	Description of abnormal occurrence	Possible reason	counter-measure
<b>ItE</b>	Current test circuit fault	<ol style="list-style-type: none"> <li>1. poor connect of control panel connector</li> <li>2. damage of auxiliary power-supply</li> <li>3. damage of Hall device</li> <li>4. magnify circuit abnormal</li> </ol>	<ol style="list-style-type: none"> <li>1. check connector, and plug wire again</li> <li>2. ask for service</li> <li>3. ask for service</li> <li>4. ask for service</li> </ol>
<b>tE</b>	Motor self-taught	<ol style="list-style-type: none"> <li>1. motor capacity doesn't match with inverter capacity</li> <li>2. improper setting of motor rated parameters</li> <li>3. deviation between self-taught parameters and standard parameters is too large</li> <li>4. overtime of self-taught</li> </ol>	<ol style="list-style-type: none"> <li>1. replace inverter type</li> <li>2. set rated parameters according to motor nameplate</li> <li>3. make motor no-load and identify again</li> <li>4. check motor wiring and parameter setting</li> </ol>
<b>EEP</b>	EEPROM read-write error	<ol style="list-style-type: none"> <li>1. read-write used to control parameter has error</li> <li>2. EEPROM damage</li> </ol>	<ol style="list-style-type: none"> <li>1. press key of STOP/RST to reset and ask for service</li> <li>2. ask for service</li> </ol>
<b>PIDE</b>	PID feedback disconnection error	<ol style="list-style-type: none"> <li>1. PID feedback disconnection</li> <li>2. PID feedback source disappears</li> </ol>	<ol style="list-style-type: none"> <li>1. check PID feedback signal wire</li> <li>2. check PID feedback source</li> </ol>
<b>bCE</b>	Brake ell error	<ol style="list-style-type: none"> <li>1. brake circuit error or brake pipe damage</li> <li>2. resistance of introduced brake is too small</li> </ol>	<ol style="list-style-type: none"> <li>1. check brake cell and replace new brake pipe</li> <li>2. increase the brake resistance</li> </ol>
	Factory reserved		

## 6.2 Troubleshooting for faults in general

Fault	Check points	Treatment
Motor doesn't run	Check connection of power supply to terminals R, S, T? (check charging LED is ON)	Input power supply Supply power again after power firstly interrupted. Verify voltage class of power supply Tighten screws for terminals
	Check voltage output from output terminals U, V, W.	Supply power again after power firstly interrupted.
	Check motor is not blocked due to load over-large	Decrease load to make motor running available
	Check fault of inverters	Check wiring and correct it if necessary in accordance with reference for fault.
	Check fwd/rev run reference achieved	
	Check input of Analog frequency setting	Verify wiring for analog frequency input signal Verify frequency input set voltage
	Verify operation mode setting	Controlled by digital operator.
Contrary rotation direction of motor	Check wiring for output terminals U, V, W.	Match correctly with terminals U, V, W of motor
	Check wiring for FWD/REV run	Verify wiring and correct if necessary
Velocity variation unavailable for motor running	Check wiring for analog frequency input	Verify wiring and correct if necessary
	Check operation mode setting	Check and verify operation mode setting
	Check motor is free from overload.	Decrease load
Motor running speed over high or over low	Check specification(number of poles and voltage)of motor	Confirm specification of motor
	Check gear proportion	Confirm gear proportion
	Check Max output frequency setting	Confirm Max output frequency setting
	Check voltage is not dropping at motor side	Verify V/F curve setting
Speed variation fault during motor running	Check motor overload	Decrease load
	Check load is not in sharp variation	Decrease load variation Increase capacity of inverter and motor.
	Check no phase failure occur to power supply	For single phase mode, fix AC reactor to power supply side Verify wiring for Three phase mode.

## **7 MAINTENANCE AND AMBIENT ELEMENTS**

For safety and normal operation, the inverter shall be provided with daily as well as periodical maintenance.

Diagram below shows items that must be checked.

Check shall only performed 5 minutes after charging LEDs of the inverter go off, to prevent injury to operators caused by residual power of inverter condenser.

Inspection item	Inspection content	Inspection period		Inspection method	Assessment base	Corrective measures to fault
		Daily	Annual			
Machine ambient environment	Verify ambient temperature and humidity	○		Measure with temperature or humidity meter in accordance with notes for installation	Temperature: -10 to 40°C ; humidity: below 95%RH	Improve environments
	Check stacking with inflammable materials	○		View inspection	No foreign materials	
Inverter installing and grounding	Check abnormal vibration to machine	○		View and auditory inspection	No foreign materials	Tighten securing screws
	Check grounding resistance complies with specification		○	Measure resistance with three-functional meter	200V Class: below 100Ω ; 400V Class: below 100Ω	Modify grounding
Input power supply voltage	Check main circuit voltage	○		Measure resistance with three-functional meter	Voltage value complies with specifications	Modify input power supply
External terminal securing screws of the inverter	Check security of screwed parts		○	View inspection and check screws are secured tightly with screwdriver	All OK	Tighten or sent for factory maintenance and overhaul
	Check terminal board is not damaged		○			
	Check no clear rust exists		○			
Inverter inner wiring	Check no distortion appears		○		All OK	
	Check outer shielding is not broken		○	View inspection	All OK	Replace or sent for factory maintenance and overhaul
Radiator	Check no dust or chipping stacked	○		View inspection	All OK	Remove stacking such as dust
Printing circuit board	Check no inductive metal or oil stacked		○	View inspection	All OK	Remove or replace electric board
	Check elements are exclusive of color changing or burning due to overheat		○			
Cooling fan	Check abnormal vibration or noise		○	View inspection and auditory inspection	All OK	Replace cooling fan
	Check no dust or chipping stacked	○		View inspection		Remove
Power elements	Check no dust or chipping stacked		○	View inspection	All OK	Remove
	Check resistance between terminals		○	Check using three-functional meter	No short circuit or circuit break for three phase output	Replace power elements or inverter
Condenser	Check for odor or leakage	○		View inspection	All OK	Replace elec condenser or inverter
	Check for expansion or distortion	○				

**Always inspection and maintenance is not necessary for S2800.**

**For long time safety operation, periodical inspection shall be prepared to the inverter in accordance with descriptions below. Inspection shall only performed after power supply is off and charging LEDs off (since residual voltage may exist in the large capacity condensers.)**

- (1) Remove dirty stacking inside the machine
- (2) Check screws securing terminals or elements are securely tightened; if not, tighten the screws

**Braking resistor list**

Voltage	Applicable motor		Full load output torque Nm	Applied resistor specification	Braking unit	Quantity	Braking torque 10%ED %	Min resistance
	HP 4P	kW						
220 V series	1	0.75	4.187	80W 200Ω	×	1	125	80Ω
	2	1.5	8.326	300W 100Ω	×	1	125	55Ω
	3	2.2	12.376	300W 70Ω	×	1	125	35Ω
	5	3.7	20.398	400W 40Ω	×	1	125	25Ω
440 V series	1	0.75	4.187	80W 750Ω	×	1	125	260Ω
	2	1.5	8.326	300W 400Ω	×	1	125	190Ω
	3	2.2	12.376	300W 250Ω	×	1	125	145Ω
	5	3.7	20.398	400W 150Ω	×	1	125	95Ω
	7.5	5.5	30.508	500W 100Ω	×	1	125	60Ω
	10	7.5	11.258	1000W 75Ω	×	1	125	45Ω
	15	11	60.664	1000W 50Ω	×	1	125	50Ω
	20	15	80.885	1500W 40Ω	×	1	125	40Ω
	25	18.5	100.822	4800W 32Ω	×	1	125	32Ω
	30	22	120.994	4800W 27.2Ω	○	1	125	27.2Ω

**Notes:**

1. Watts of voltage value and frequency applied(ED %) shall be in accordance with specifications of this company.
2. This company shall not be responsible for damaging of inverter or other devices, which shall be caused by braking resistor or braking module that were not produced by this company.
3. When installing braking resistor, great care shall be given to safety or inflammability of the ambient environments
4. In case of Min resistance shall be used, contact your SANCE ELECTRIC for suggestion of watts calculating.
5. O: refers to that fixing braking unit is necessary.
6. x: refers to that fixing braking unit unnecessary.

## Interleaf of Taking the Top Cabinet of S2800-4T7.5G/4T11G

Dismount the top cabinet according to the following steps.



Mount the top cabinet according to the following steps.

