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Manual Guideline

Shihlin universal electronic inverter is designed for various parameter functions in order to cater most application requirements in the market. The inverter with this massive parameters and complex functions may cause user confused, especially for the first time user, therefore, please carefully read every part of the manual to master how to use the inverter. Should anything to be further explained, please call us, Thank you.

The first chapter lists in detail about the specification of all series Shihlin universal electronic inverter. However, Section 1-5 instructs users the methods to install the inverters and highlights the safety matters which should be attended.

The second chapter explains how to use the inverter, and section 2-1 outlined **operating mode of the inverter.** Section 2-2 instructs the methods to shift the operating mode; Section 2-3 lists the operating procedure steps for every operating mode; Section 2-4 instructs the methods to use operation panel to shift operating mode, setting frequency and setting parameters so that users can enable the motor run easily by inverter. After users are familiar with basic operation above, users can begin chapter 3, and please literally read every parameter function.

1. The actual output current frequency from inverter is **"Output Frequency"**. The frequency set by users (it can be set from operation panel, multi-speed terminals, voltage signal, current signal) is **"Setting Frequency"**. After motor starts, the output frequency will gradually accelerate to Setting Frequency Value and then motor rotates stably as Frequency Setting given value, the output frequency now is called **"Stable Output Frequency"**.
2. There is detailed description in chapter 3 about inverter parameter setting. If the user isn't familiar with parameter setting, and the user randomly adjusts the parameter setting value, this may cause malfunction. Parameter Pr998 can be used to restore all parameters back to default value.
3. In order to maximize the inverter's function, there are 2 major operation modes designed for inverter: Inverter's operation mode (operation mode) and the Digital Unit operation mode (working mode).The operation mode of inverter is used to decide **reference source of running frequency** and **the source of start signal.** There are 9 operation modes totally for inverter, as **PU mode(Pr79=0、1)**, **External mode(Pr79=0、2), JOG mode(Pr79=0、1)**, **Combined mode 1(Pr79=3)**, **Combined mode 2(Pr79=4)**, **Combined mode 3(Pr79=5)**, **Combined mode 4 (Pr79=6)**, **Combined mode 5(Pr79=7)**, **Combined mode 6(Pr79=8)**, and there are 3 types of operation mode for operation panel as **Surveillance mode , Parameter Setting mode , and Frequency setting mode.**

4. The differences between “Terminals Name” and “Terminal Function”:
   Near the terminals of the control board or the main-circuit board, printed letters Can be found. These letters are used to differentiate each terminal. They are called Terminal name. Besides understanding “input terminal” and “output terminal”, we have to define its functional name. Function name is the actual application of its terminal. When we explain the functions of terminals, the name we used are called **Function Name.**

5. The difference between 「on」and「turn on」:
   For the description of [input terminal], we usually use [on] and [turn on]. [On] is used to describe the external switch of terminal is closed; this word is about the status description. [Turn on] is usually used to describe the external switch of terminal shifting from open to closed, it belongs to operation status description.

Chapter 1 Shihlin inverter introduction

1-1 Inverter specification

220V class series

Model # : SH020-□□□K		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K
Applicable Motor Capacity	HP	1	2	3	5	7.5	10	15	20	25	30
	kW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Output	Rated Capacity kVA (Note)	1.9	3	4.2	6.7	9.2	12.6	17.6	23.3	29	34
	Rated Current A(Note)	5	8	11	17.5	24	33	46	61	76	90
	Overload Current Rating	150% 60 seconds ; 200% 0.5 seconds (inverse-time characteristics)									
	Voltage	Three-Phase 200 to 230V									
Power Supply	Rated Input AC Voltage, Frequency	Three-Phase 200 to 230V 50Hz / 60Hz									
	Permissible AC Voltage Fluctuation	180 to 253V 50Hz / 60Hz									
	Permissible Frequency Fluctuation	±5%									
	Power Supply kVA	2.5	4.5	5.5	9	12	17	20	28	34	41
Protective Structure		Enclosed type									
Cooling System		Self Cooling	Forced air cooling								
Weight (kg)		1.3	1.5	2.2	2.2	5.6	5.6	8.3	8.3	20	20

● 440V class series

Model # : SH040-□□□K		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K
Applicable Motor Capacity	HP	1	2	3	5	7.5	10	15	20	25	30
	kW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Output	Rated Capacity kVA (Note)	2	3	4.6	6.9	9.1	13	17.5	23.6	29	32.8
	Rated Current A(Note)	2.6	4	6	9	12	17	23	31	38	44
	Overload Current Rating	150% 60 seconds ; 200% 0.5 seconds (inverse-time characteristics)									
	Voltage	Three-Phase 380 to 460V									
Power Supply	Rated Input AC Voltage, Frequency	Three-Phase 380 to 460V 50Hz / 60Hz									
	Permissible AC Voltage Fluctuation	323 to 506V 50Hz / 60Hz									
	Permissible Frequency Fluctuation	±5%									
	Power Supply kVA	2.5	4.5	5.5	9	12	17	20	28	34	41
Protective Structure		Enclosed type									
Cooling System		Self-cooling	Forced air cooling								
Weight kg		1.3	1.5	2.5	2.5	5.6	5.6	8.3	8.3	20	20

(Note) The test condition of rated output current, rated output capacity: the carrier frequency (Pr72) is 2 kHz the inverter output voltage is 220V / 440V; the output frequency is 60Hz;and the ambient temperature is 40℃.

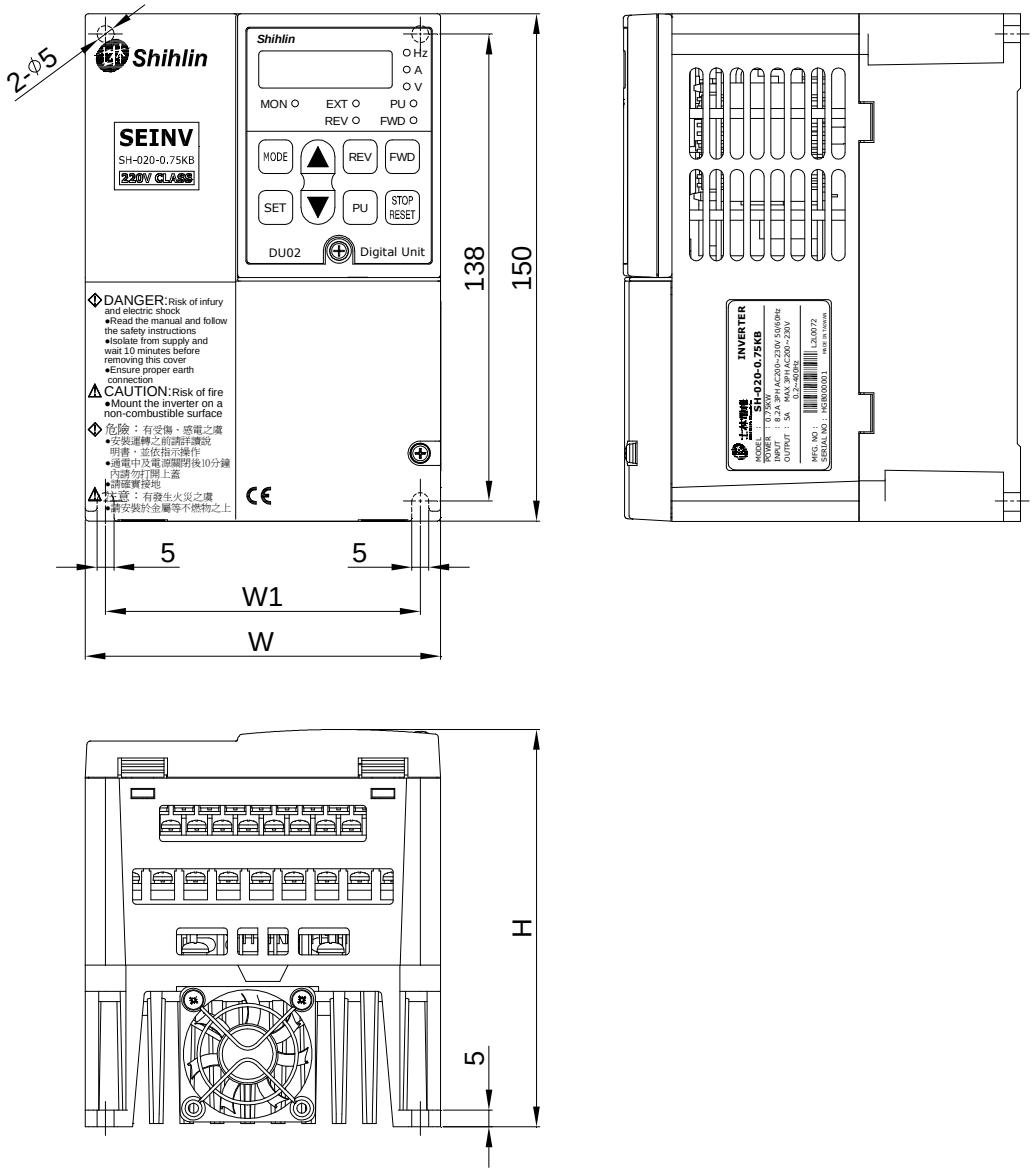
1-2 General Specification (Inverter Characteristic)

Control Specification	Control System		SPWM control、V/F control 、Sensorless vector control (motor parameter auto tuning).
	Output frequency range		0.2 to 400Hz (Starting Frequency Range is 0 to 60Hz).
	Frequency Setting resolution	Digital input	Rated frequency within 100Hz, resolution is 0.01Hz. Rated frequency above 100Hz, resolution is 0.1Hz.
		Analog input	Set Signal DC 0 to 5V, resolution is1/500. Set Signal DC 0 to 10V or 4 to 20mA, resolution is 1/1000.
	Output Frequency accuracy	Digital input	Within ±0.01% of maximum.
		Analog input	Within ±0.5% of maximum.
	Voltage/frequency characteristics		Base voltage (Pr19), base frequency (Pr3) can be set as required. Load Pattern Selection (Pr14).
	Starting torque		120%/0.5Hz、150%/3Hz.
	Torque boost(V/F control)		Range from 0 to 30% (Pr0).
	Acceleration/deceleration time setting		Setting range from 0 to 3600sec (Pr7, Pr8). Different pattern of “acceleration/deceleration mode” can be selected (Pr29).
	DC injection brake		Operation frequency 0 to 120Hz (Pr10), Operation time 0 to 10sec (Pr11), Operation ability 0 to 30% (Pr12).
	Stall prevention operation level		Stall prevention operation level 0 to 200% (Pr22).
Operation Specification	Frequency Setting		Digital Unit, DC 0 to 5V, DC 0 to 10V, DC 4 to 20mA, Multi-speed setting.
	Input Terminals	Motor Starting Signal	Use external signal or Digital Unit to start rotation.
		Second function	Second acceleration time (Pr44), Second deceleration time (Pr45), Second torque boost (Pr46), Second base frequency (Pr47).
		External thermal relay input	Can use external thermal relay to protect motor.

		Emergency stop	Use external switch for emergency stop. It will instantaneous shut-off of the inverter output.
		Reset	Use external switch or Digital Unit to reset inverter.
	Output Terminals	Operation status	Motor running detection, output frequency detection, overload detection, zero current detection, PID alarm detection, Permitting loading DC 24V, 0.1A.
		Alarm relay	When warning occurred, Alarm Relay start to operate detection alarm signal to detect alarm. Permitting loading DC 24V, 0.1A.
		Meter	Allow to connect with external meter: Frequency counter or 1mA full-scale meter is used to indicate output frequency or output current. Allowable load current 1mA, 1440pulse/sec at 60Hz.
Indication	Operation Penal	Operating status surveillance	Monitor output frequency, output current, output voltage, 4 alarm records can be restored.(Max accumulation records: 4 sets)
		Motor running indicate	LED indicator for motor forward or reverse rotation
	Inverter	LED indicator	Power indicator (Power), Alarm indicator (Alarm).
Protective/warming function			Overcurrent, Regenerative overvoltage protection, Motor overheat protection (Pr9), IGBT overhead protection, Brake-transistor alarm, Cooling fan fail alarm, Leakage current protection. Low voltage protection.
Environment	Ambient temperature		-10 to +50 ℃ (non-freezing)
	Ambient humidity		90%Rh Max. (non-condensing)
	Storage temperature		-20 to +65 ℃
	Atmosphere		Indoor, without corrosive gas, flammable gas, oil mist, dust, and dirt etc.
	Vibration		5.9m/sec^2 (0.6G) or less （Accord to standard JIS C0911）

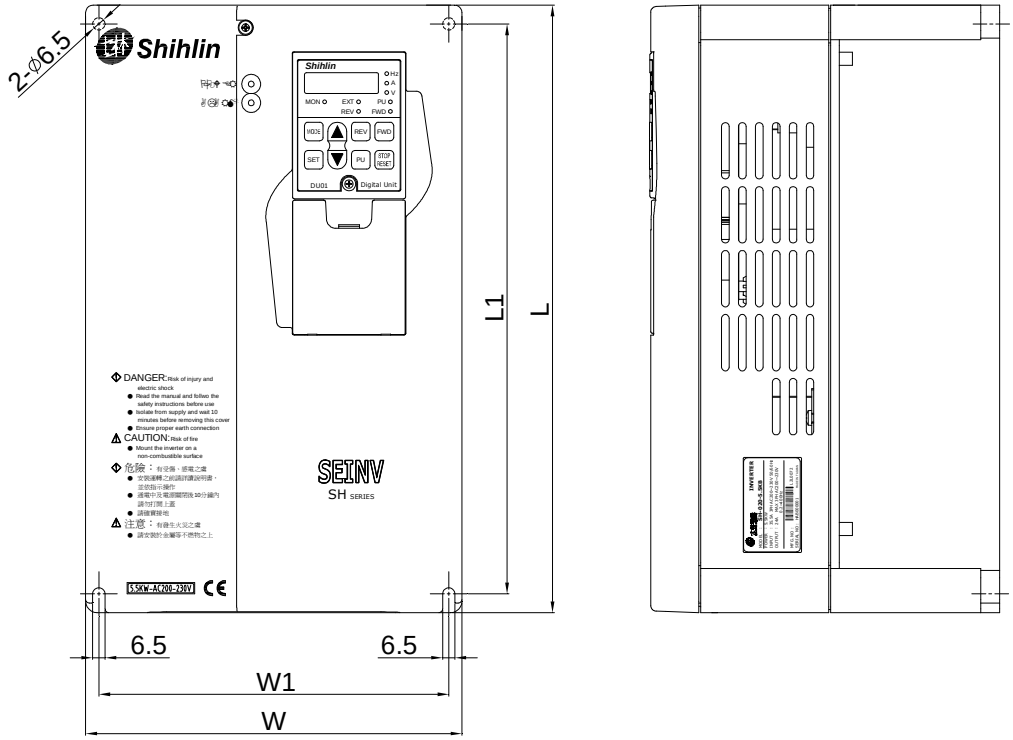
1-3 Outline Dimension Drawing

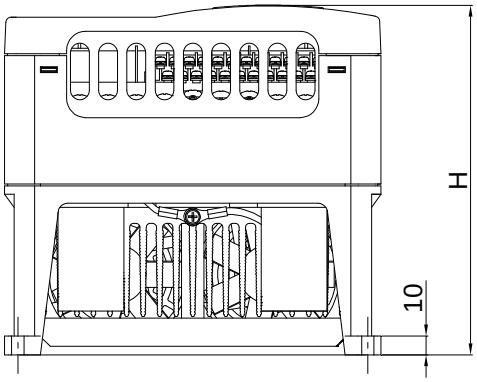
1-3-1 0.75K~3.7K (1HP~5HP)



Model #	W (mm)	W1 (mm)	H (mm)	Model #	W (mm)	W1 (mm)	H (mm)
SH020-0.75K	105	93	117	SH040-0.75K	140	128	128
SH020-1.5K	140	128	128	SH040-1.5K	200	188	138
SH020-2.2K	200	188	138	SH040-2.2K	200	188	138
SH020-3.7K	200	188	138	SH040-3.7K	200	188	138

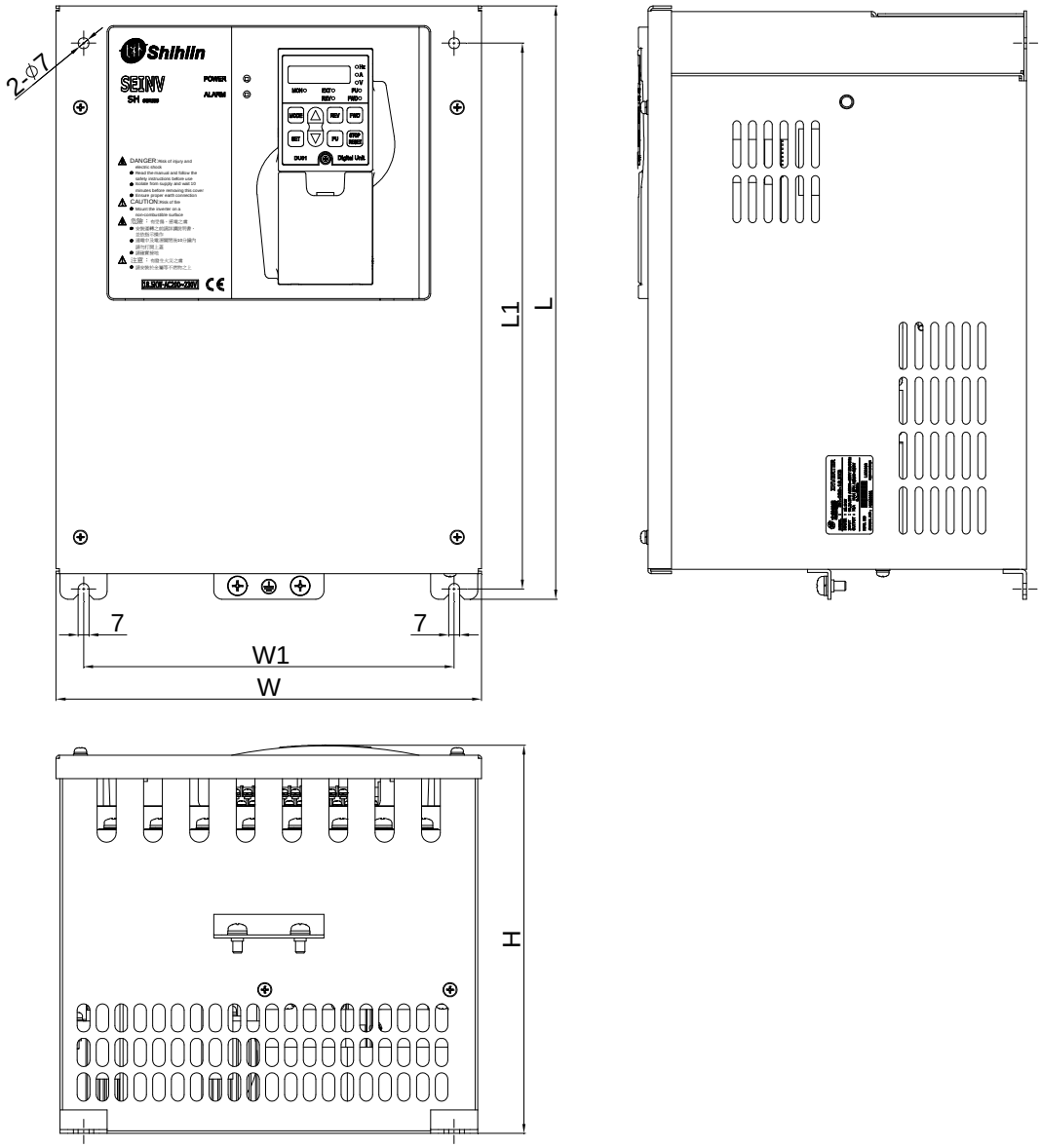
1-3-2 5.5K~15K (7.5HP~20HP)





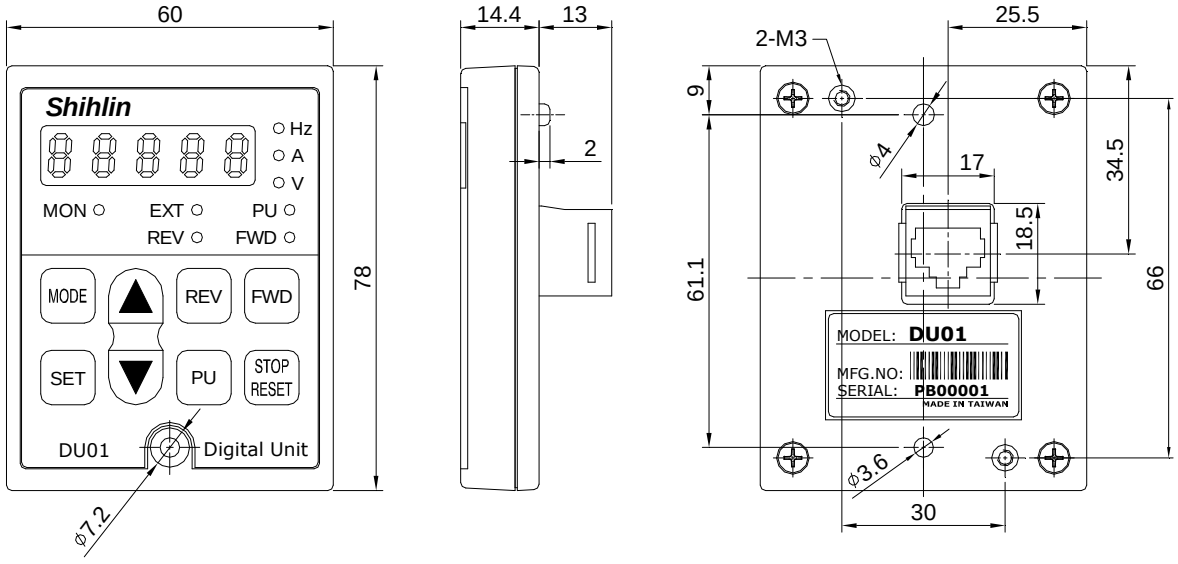
Model #	L (mm)	L1 (mm)	W (mm)	W1 (mm)	H (mm)
SH020/040-5.5K	323	303	200	186	186
SH020/040-7.5K	323	303	200	186	186
SH020/040-11K	350	330	230	214	195
SH020/040-15K	350	330	230	214	195

1-3-3 18.5K~22K (25HP~30HP)



Model #	L (mm)	L1 (mm)	W (mm)	W1 (mm)	H (mm)
SH020/040-18.5K	379	348	271	236	248
SH020/040-22K	379	348	271	236	248

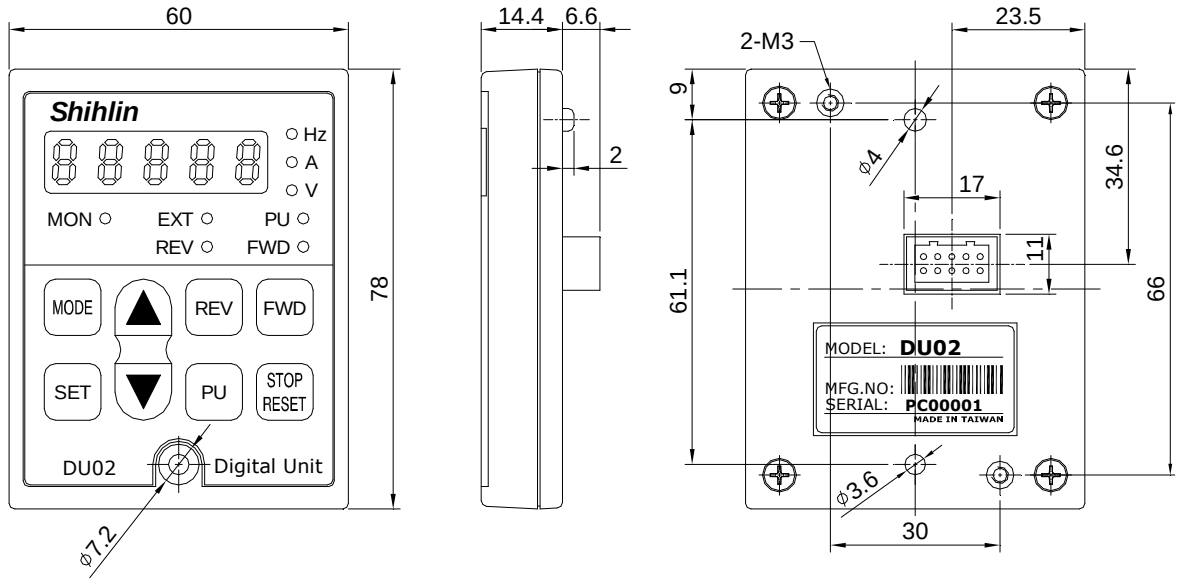
1-3-4 Operation panel DU01 (Range 5.5K~22K)



LNKSSCBL0XT[*1] series extension line is optional for range 5.5K~22K.

*1. 0X means that 01：the line length is 1.5m，02：the line length is 3m，03：the line length is 5m.

1-3-5 Operation panel DU02 (Range0.75K~3.7K)

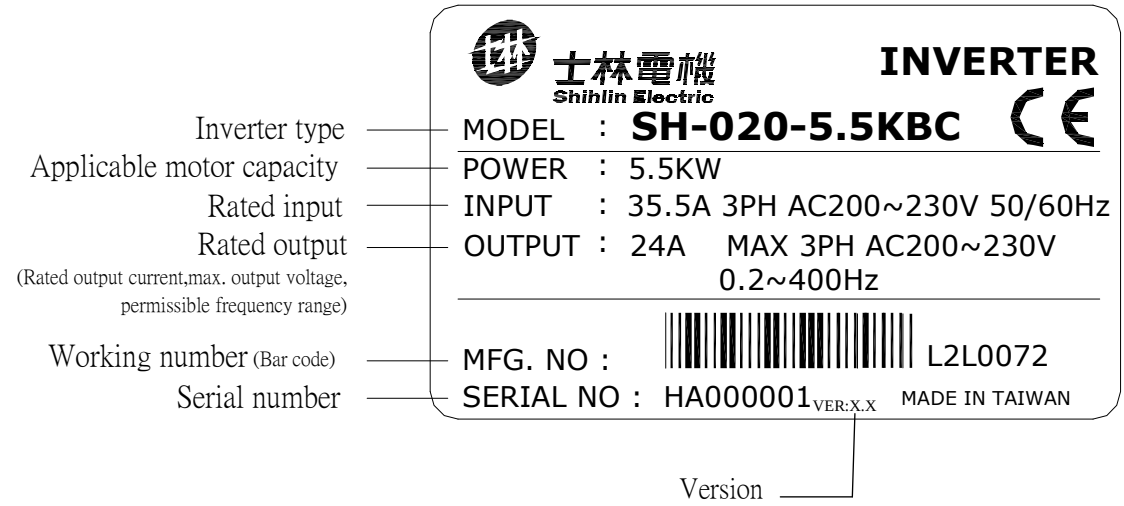


LNKCBL0XT[*2] series extension line is optional for range 0.75K~3.7K.

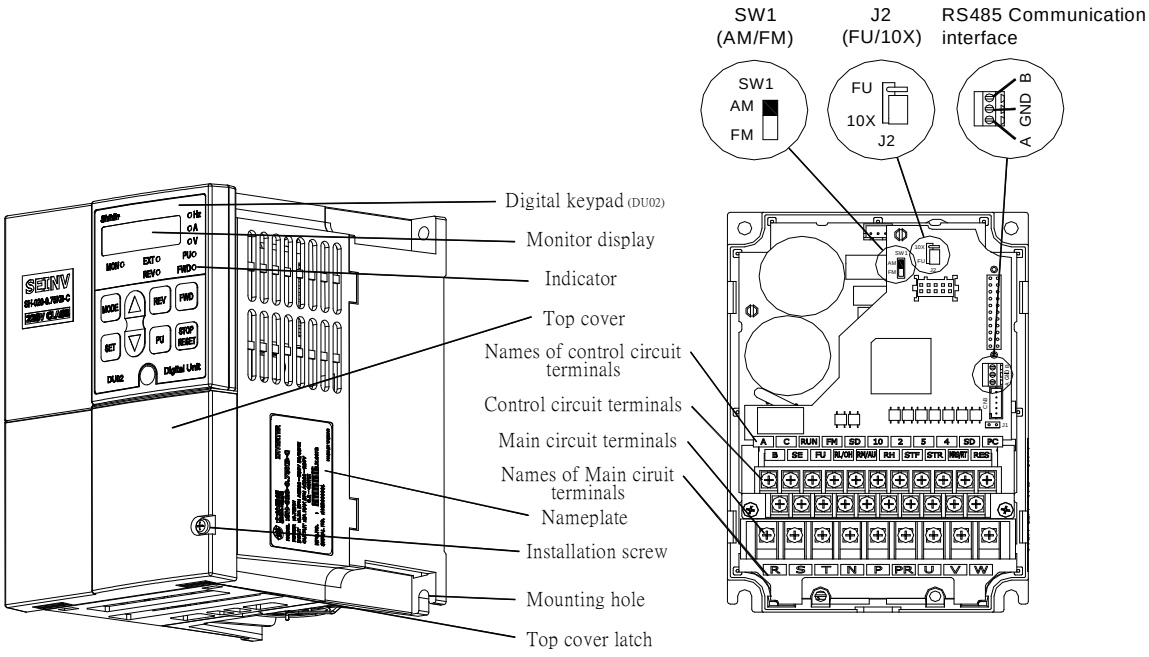
*2. 0X means that 01：the line length is 1.5m，02：the line length is 3m，03：the line length is 5m.

1-4 Component Name

1-4-1 Nameplate and Model Number

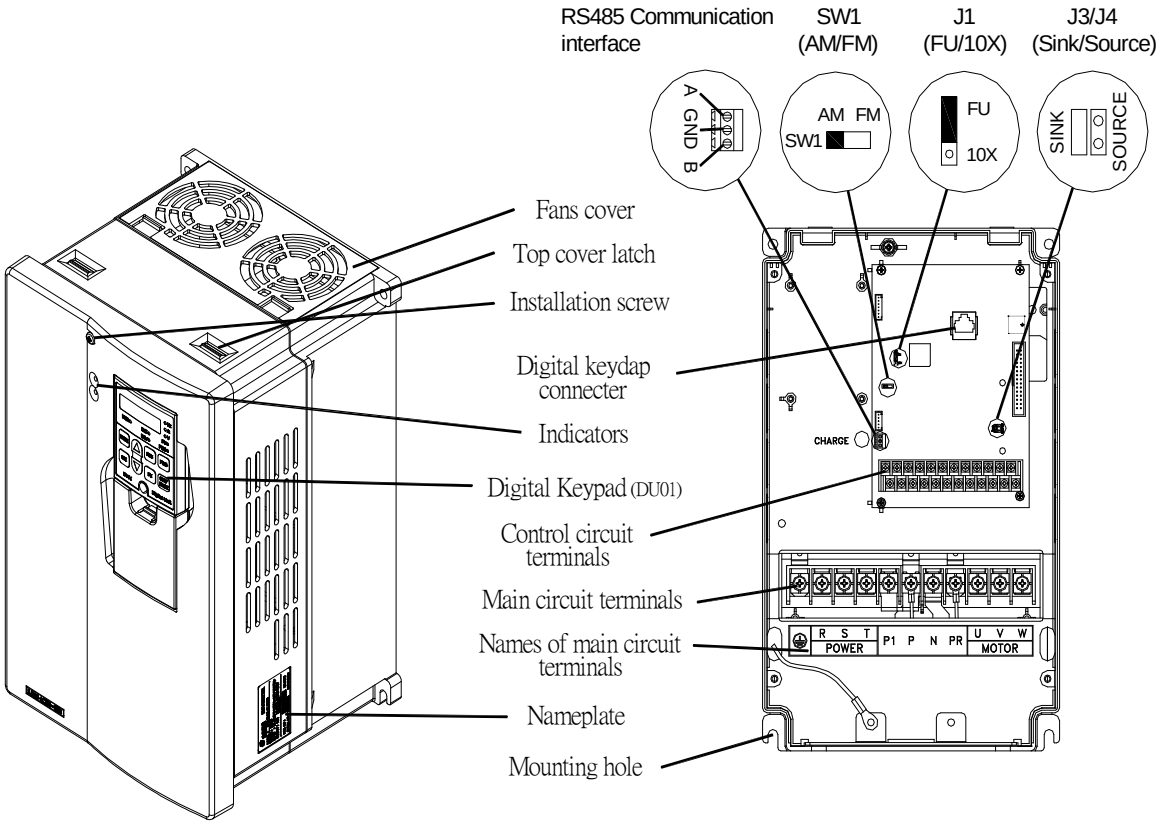


1-4-2 0.75K~3.7K (1HP~5HP)



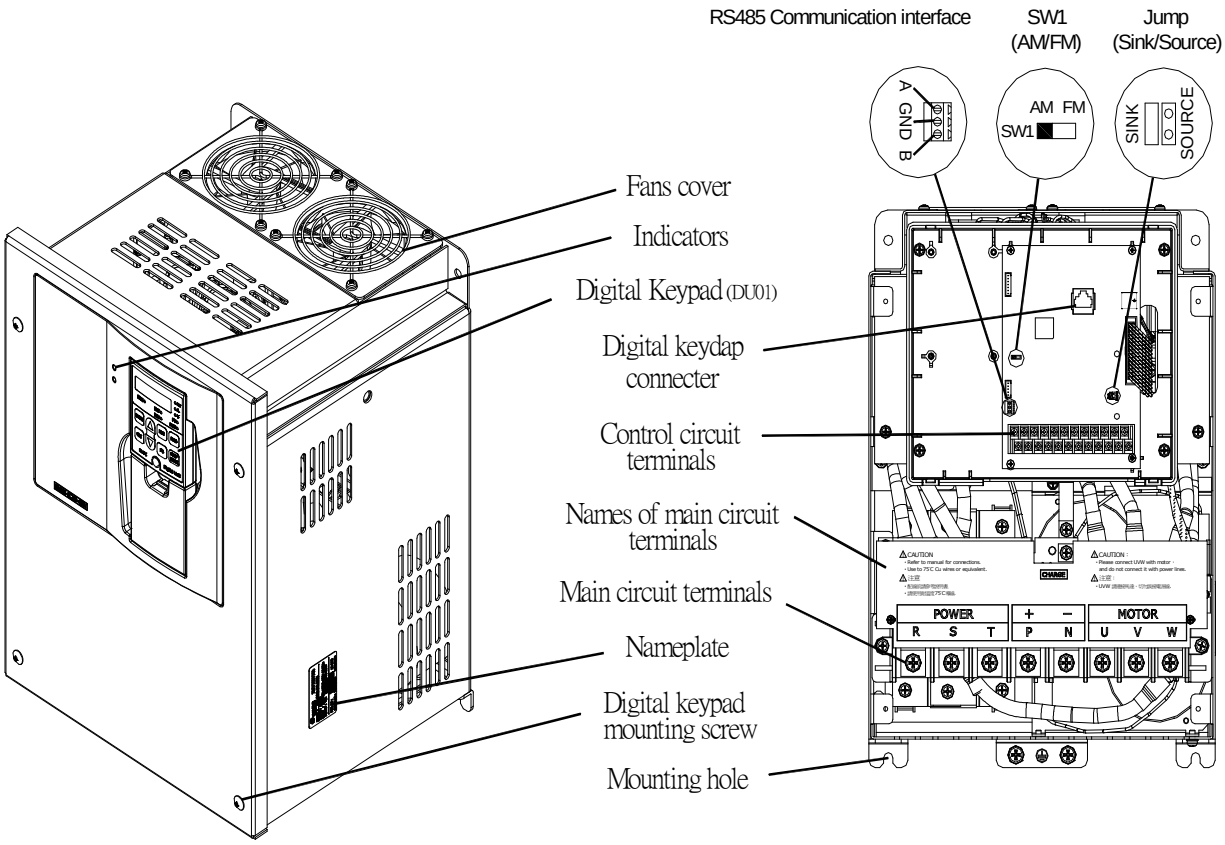
1. Push the latch of top cover and pull the cover toward you to remove.
2. 『Wiring outlet hole』 is designed for fixing and protecting the lead wire. When wiring, lead wire must pass through 『Wiring outlet hole』 and then connects with terminals, please use cable tie to tie the wires in a bundle.
3. To use the switch for the AM/FM functions、FU/10X jump and RS485 communication interface ,you must remove the operation panel and the top cover first. Please contact the qualified electrical engineer for configuring.

1-4-3 5.5K~15K (7.5HP~20HP)



1. Loosen the installation screw of the front cover, Push the top cover latch and pull the cover toward you to remove.
2. 『Wiring outlet hole』 is designed for fixing and protecting the lead wire. When wiring, lead wire must pass through 『Wiring outlet hole』 and then connects with terminals, please use cable tie to tie the wires in a bundle.
3. The inverter of 5.5K~15K (7.5HP~20HP) series, there is a pair of jumper connector provided for users to set the control logic. (shown on the chart) When jumper connector is set on sink logic (SINK) , it default the input terminals as sink input. When jumper connector is set on source logic (SOURCE), then the default of input terminals is source input. The output signals may be used in either the sink or source logic independently of the jumper connector position ,Otherwise there will be possible damage to the inverter.

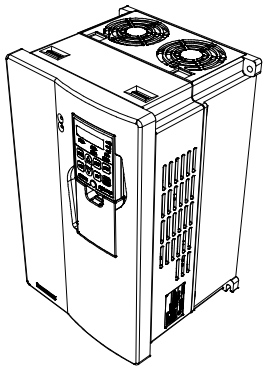
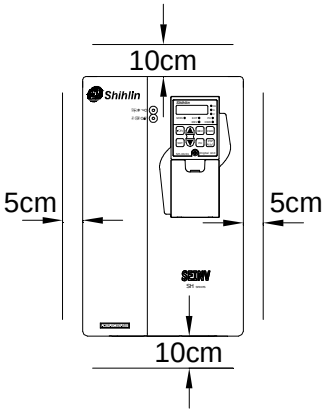
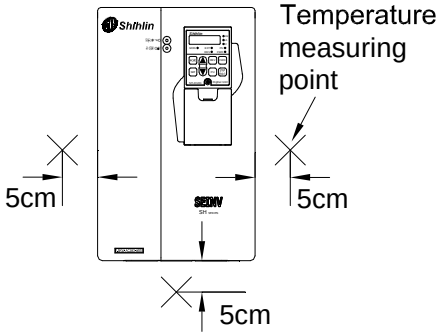
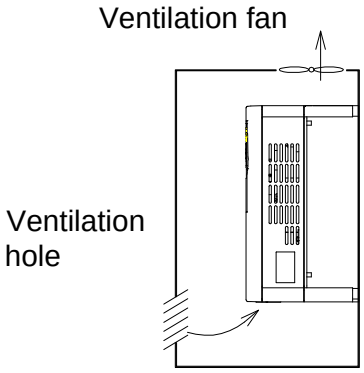
1-4-4 18.5K~22K (25HP~30HP)



1. Loosen the installation screw of the front cover, Pull the cover to remove.
2. 『Wiring outlet hole』 is designed for fixing and protecting the lead wire. When wiring, lead wire must pass through 『Wiring outlet hole』 and then connects with terminals, please use cable tie to tie the wires in a bundle.
3. The inverter of 18.5K~22K (25HP~30HP) series, there is a pair of jumper connector provided for users to set the control logic. (shown on the chart) When jumper connector is set on sink logic (SINK) , it default the input terminals as sink input. When jumper connector is set on source logic (SOURCE), then the default of input terminals is source input. The output signals may be used in either the sink or source logic independently of the jumper connector position ,Otherwise there will be possible damage to the inverter.

1-5 Installation and wiring

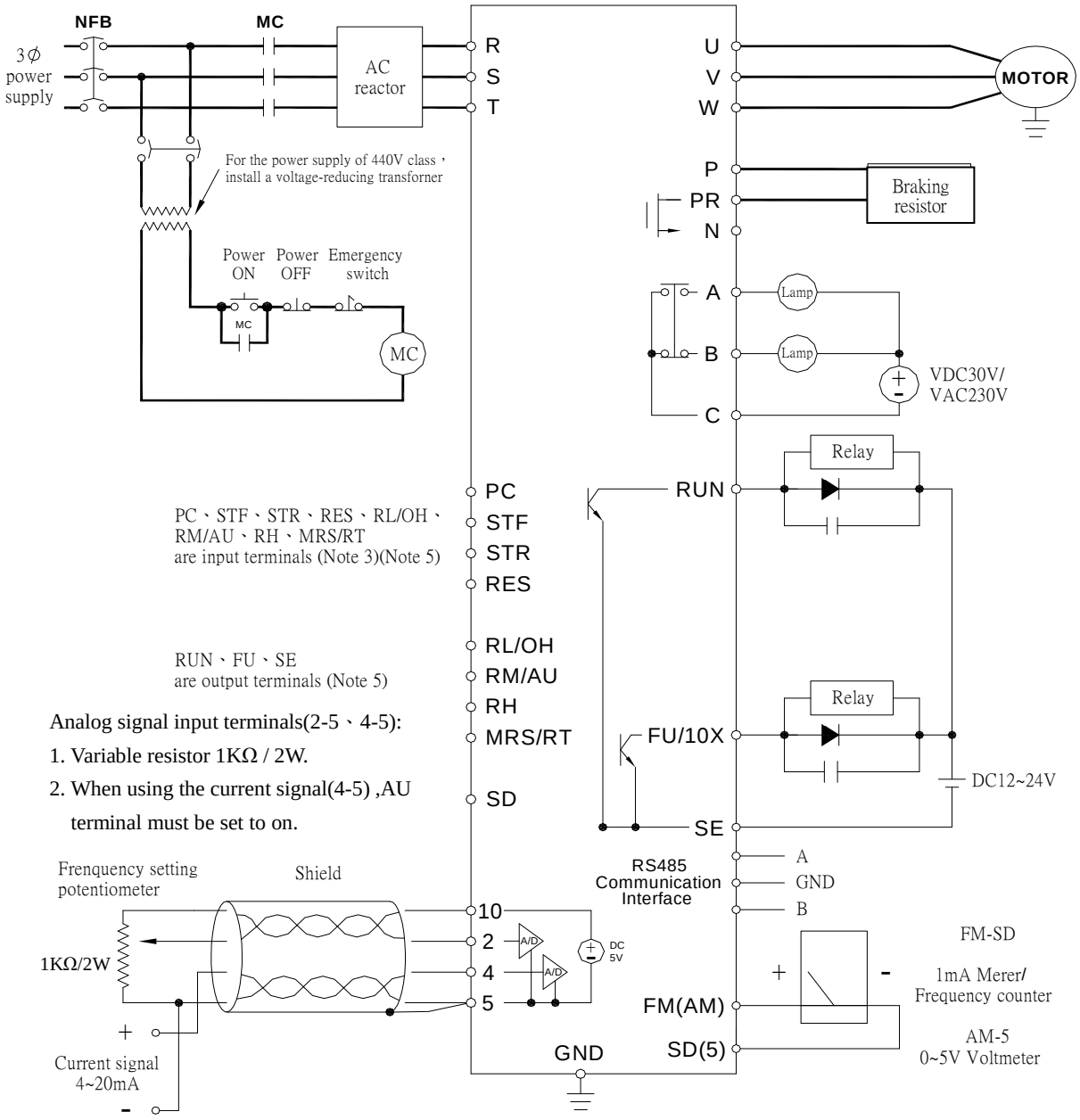
1-5-1 Installation Requirement

<table>
<tr>
<td>1. Vertical mount
  </td>
<td>2. Please make sure there is enough space around the inverter.
 
</td>
</tr>
<tr>
<td>3. Keep ambient temperature lower than rated value.
 
</td>
<td>4. Install inverter on right location with protection chassis.
 
</td>
</tr>
<tr>
<td colspan="2">5. Do not install the inverter on excessive vibration working platform (such as lathe, milling machine etc.
6. Do not install the inverter on wooden material and other combustible surface.
7. Do not install near the explosive, inflammable gas, dust and dirt environment.
8. Do not install near oil mist, dust and dirt environment.
9. Do not install near corrosive gas, salted air environment.
10. Do not install the inverter in a place subject to high temperature, high humidity.
11. Installed in the Distribution Box, Please be sure to install ventilation fan to prevent excessive temperature</td>
</tr>
</table>

(Note 1) Only certified electrician is allowed to perform installation, wiring, disassembly, and maintenance.

(Note 2) Please do follow the installation requirement to install inverter. Equipment damaged or serious jeopardized to public security can result from failure to follow above mentioned installation requirement, under the circumstance our company will be free from any legal responsibility. If there is any doubt on installation, please call for assistance and information.

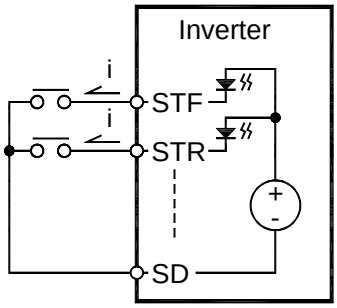
1-5-2 Terminals Wiring: 0.75K to 3.7K (1HP to 5HP) Series



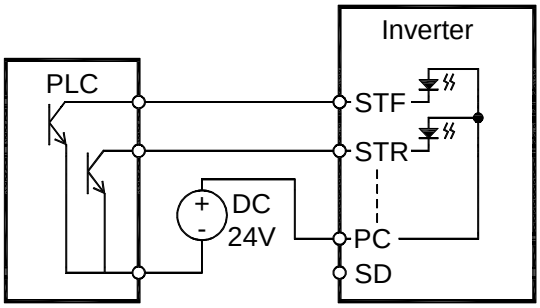
(Note 1) On above diagram, main circuit is with thicker lines and control circuit is with thin lines.

(Note 2) Please refer to Pr59 in chapter 3 (page 52) for using external thermal relay.

(Note 3) For inverter of 0.75K to 3.7K (1HP to 5HP) series, input terminals are Sink Input. As for wiring not matter what kind of control type of input terminals, the external wiring can be used as simple switch connection. When it is “ON”, input current drive photo coupler of inverter and then photo coupler transmits signal into CPU.



Sink input



Sink input and open collector output is used.

(Note 4) Definition of main circuit terminals:

Symbol	Description
R- S- T	Connect to commercial power supply.
U-V-W	Output to three-phases squirrel cage motor.
P- PR	Connect to brake resistor.
P- N	Connect to brake unit (Optional).
⏚	For grounding the inverter case. The third type of grounding shall be adopted for 220V series. Special type of grounding shall be adopted for 440V series.

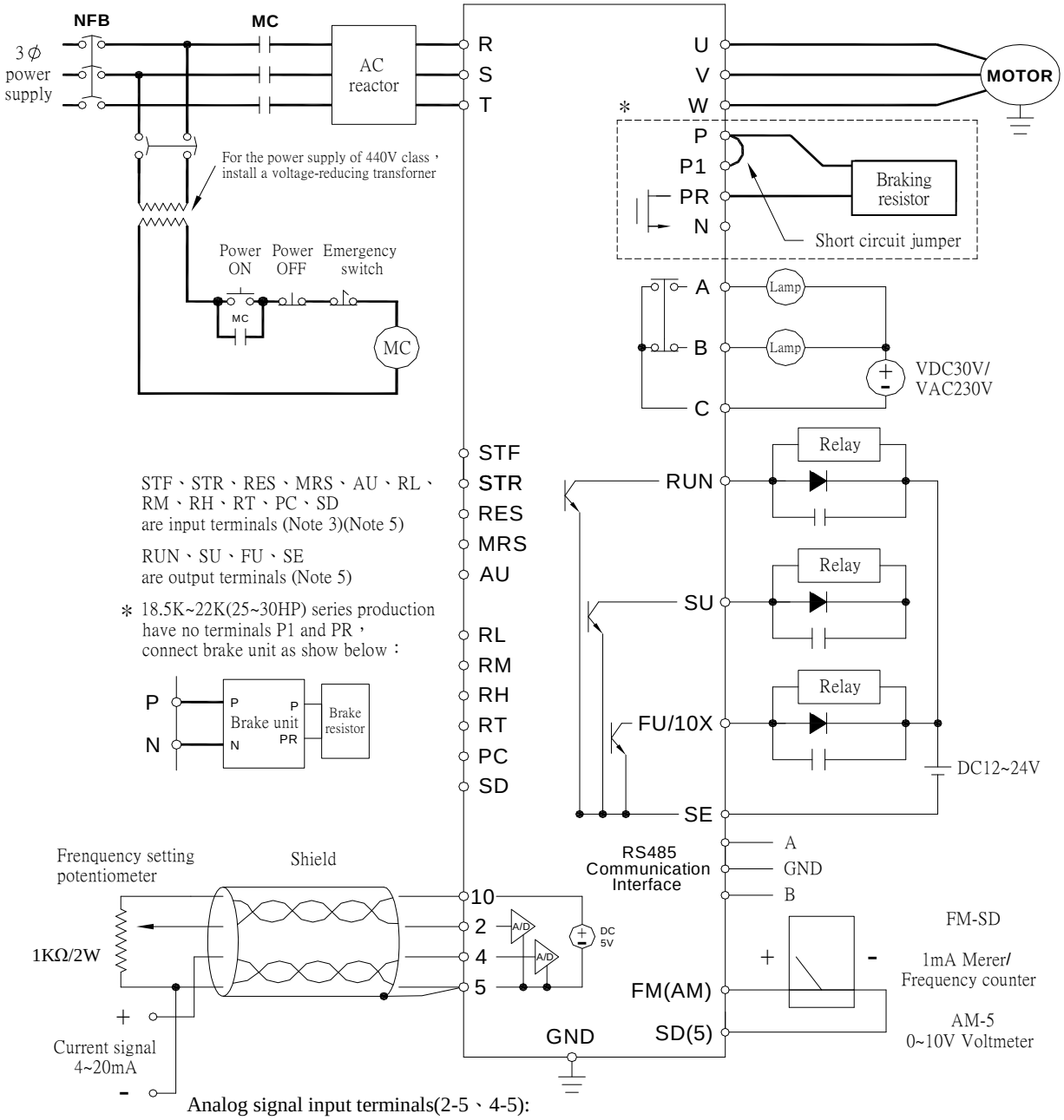
1. In order to improve the brake for deceleration, it is better to install optional [brake unit] between terminals P-N. [Brake unit] can effectively absorb the energy from inverter when decelerate. If there is any question for buying [brake unit], please call us for assistance.

2. 0.75K~3.7K（1HP~5HP）series inverters can be installed AC reactor but DC reactor not allowed to install.

(Note 5) Definition of control circuit terminals

<table>
<tr><th colspan="5">Terminals of Control Circuit</th></tr>
<tr><th>Type</th><th>Terminal Symbol</th><th>Terminal Function</th><th colspan="2">Description</th></tr>
<tr><td rowspan="8">Sink input
or
Source input</td><td>PC</td><td>PC</td><td colspan="2">Common point for external power input terminals.</td></tr>
<tr><td>STF</td><td>STF</td><td>Turn on STF to start forward rotation</td><td rowspan="2">Refer to Pr74 (page 69)</td></tr>
<tr><td>STR</td><td>STR</td><td>Turn on STR to start reverse rotation</td></tr>
<tr><td>RES</td><td>RES</td><td colspan="2">Turn on RES for more than 0.1sec to reset the inverter.</td></tr>
<tr><td>RL/OH</td><td rowspan="4">Selectable</td><td colspan="2" rowspan="4">These are “Multifunctional input terminals”. User can define its function name by setting different value into Pr59.(page 52)</td></tr>
<tr><td>RM/AU</td></tr>
<tr><td>RH</td></tr>
<tr><td>MRS/RT</td></tr>
<tr><td>SD</td><td>SD</td><td colspan="2">Common point to the contact input terminals.</td></tr>
<tr><td rowspan="4">Analog signal input terminals</td><td>10</td><td>-------</td><td colspan="2">Frequency setting power supply. DC 5V, permissible maximum load current: 10mA.</td></tr>
<tr><td>2</td><td>-------</td><td>Input terminals of DC 0 to 5V or 0 to 10V, this voltage signal can be used for rated frequency setting .Variable resistor 1KΩ / 2W</td><td>Refer to Pr38,Pr73 (page 59)</td></tr>
<tr><td>4</td><td>------</td><td>Terminals of 4 to 20mA, this current signal can be used for rated frequency setting.</td><td>Refer to Pr39 (page 59)</td></tr>
<tr><td>5</td><td>------</td><td colspan="2">Reference source for analog signal input.</td></tr>
<tr><td rowspan="3">Relay output Terminals</td><td>A</td><td rowspan="3">Selectable</td><td colspan="2" rowspan="3">1.Can be used as Alarm Terminal.
2.Can be used as Multifunctional output terminals.
Alarm: Continuity across A-C, Discontinuity across B-C.
(Note) inner relay contact capacity: DC 30V / AC 230V 0.3A.</td></tr>
<tr><td>B</td></tr>
<tr><td>C</td></tr>
<tr><td rowspan="3">Output terminals (Open collector mode)</td><td>RUN</td><td>Selectable</td><td colspan="2" rowspan="2">The terminal is “Multifunctional output terminals” user can define its function of these terminals by setting different value figures into Pr40 (page 60), permissible load DC 24V, 0.1A.</td></tr>
<tr><td>FU/10X</td><td>Selectable</td></tr>
<tr><td>SE</td><td>SE</td><td colspan="2">Common terminal of output terminals.</td></tr>
<tr><td>Pulse /Analog output</td><td>FM/AM</td><td>---</td><td colspan="2">Selection FM function can use “Frequency meter” or “1mA full-scale meter” to indicate the output frequency or the output current. Use AM function can use a 0 ~ 5V Voltage Meter .
Refer to Pr54, Pr55, Pr56 and Pr192.(page 63)</td></tr>
<tr><td>Communication interface</td><td>RS485</td><td>---</td><td colspan="2">Serial communication interface.</td></tr>
</table>

1-5-3 Terminal wiring 5.5K to 22K (7.5HP to 30HP) Series



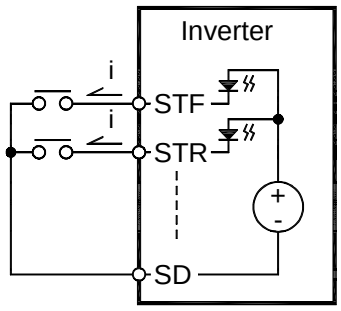
Analog signal input terminals(2-5、4-5):

1. Variable resistor 1KΩ / 2W.
2. When using the current signal(4-5) ,AU terminal must be set to on.

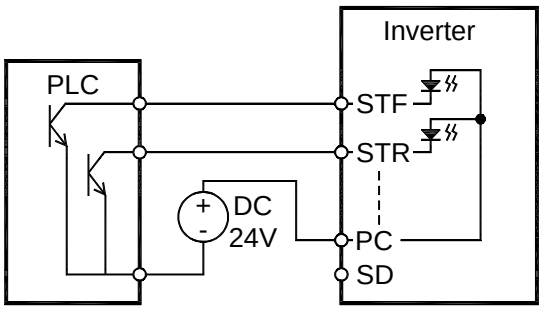
(Note 1) On above diagram, main circuit is with thicker lines and control circuit is with thin lines.

(Note 2) Please refer to Pr59 in chapter 3 (page 52) for using external thermal relay.

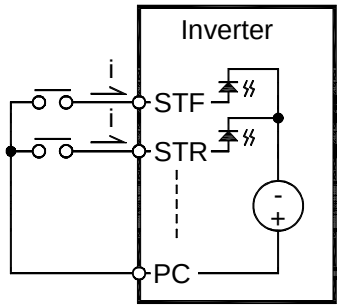
(Note 3) In inverter series of 5.5K to 22K (7.5HP to 30HP) use jump to set input terminal as Sink Input or Source Input. As for wiring please refer to following diagram. No matter what control type of input terminal, the external wiring is only a simple switch wiring connection. When switch is on, photo coupler of inverter is driving by input current and then the signal is transferring to CPU through photo coupler.



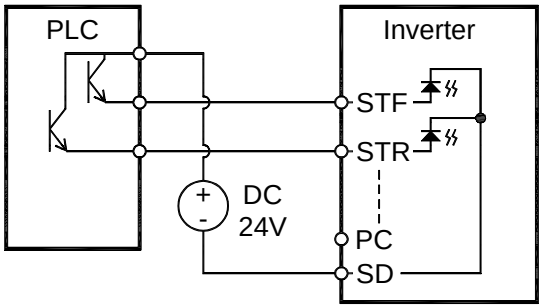
Sink input



Sink input and open collector output is used.



Sink input



Source input and open collectorr output is used.

(Note 4) Definition of main circuit terminals:

Description	
R- S- T	Connect to commercial power supply
U-V-W	Output to three-phase squirrel cage motor
P- PR.	Connect to brake resistor (11K~22K optional)
P- P1	Connect to DC reactor (Optional)
P- N	Connect to brake Unit (Optional)
⏚	For grounding the inverter case. The third type of grounding shall be adopted for 220V series. Special type of grounding shall be adopted for 440V series.

1 .There is a standard brake resistor already built-in for 5.5K to 7.5K (7.5HP to 10HP) series. If inverter is operating with frequent acceleration/deceleration or short deceleration time (Pr8<5sec), a high-duty brake resistor is needed to be used between P-PR terminals. Please remove the built-in brake resistor and replace the high duty brake resistor. (Only certified technician is allowed to perform replacement and remove brake resistor).

2. For the motors above 7.5K, please do not run them without brake resistor, for the motors above 25HP; please do not run them without brake resistor or brake unit. Otherwise, there may be the damage to inverter.

3. There is a brake transistor built-in for 5.5K to15K (7.5HP to 20HP) series. User only needs to install brake resistor (7.5HP~10HP built-in). There is no a brake transistor already built-in for 18.5K~22K (25HP~30HP) series In order to increase brake capability during deceleration, install a brake unit between terminals P-N is suggested. The brake unit is able to consume the regenerative power efficiently. If there is any question about brake unit procurement, please feel free to call for assistance.

4. To use DC /AC reactor is one way to increase input power factor and to do better control in inrush current harmonic. In the inverter series of 5.5K to 15K (7.5HP to 20HP), between P-P1 terminals there is a jumper. If a DC reactor is planning to use, please remove the jumper first and then to wire P-P1 terminals with DC reactor.

(Note 5) Definition of control circuit terminals

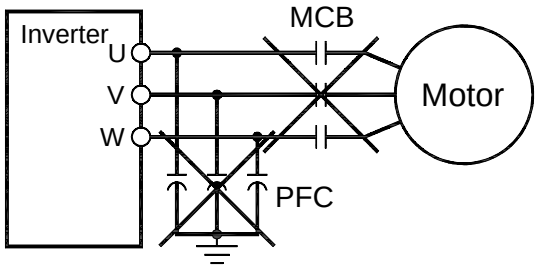
<table>
<tr><th colspan="5">Terminals of Control Circuit</th></tr>
<tr><th>Type</th><th>Symbol</th><th>Terminal Function</th><th colspan="2">Description</th></tr>
<tr><td rowspan="11">Sink input
or
Source input</td><td>PC</td><td>PC</td><td colspan="2">Common point for external power input terminals.</td></tr>
<tr><td>STF</td><td>STF</td><td>Turn on STF to start forward rotation</td><td rowspan="2">Refer to Pr74. (page 69)</td></tr>
<tr><td>STR</td><td>STR</td><td>Turn on STR to start reverse rotation</td></tr>
<tr><td>RES</td><td>RES</td><td colspan="2">Turn on RES for more than 0.1sec to reset the inverter.</td></tr>
<tr><td>MRS</td><td>MRS</td><td colspan="2">Turn on MRS for more than 20ms to shut down the output voltage of inverter.</td></tr>
<tr><td>AU</td><td>AU</td><td colspan="2">If the inverter operation mode is under external mode or combination mode 2,and AU terminal is on, the rated frequency of inverter is set by current signal.</td></tr>
<tr><td>RL</td><td rowspan="4">Selectable</td><td colspan="2" rowspan="4">These are “Multifunctional input terminals”. User can define its function name by setting different value into Pr59.(page 52)</td></tr>
<tr><td>RM</td></tr>
<tr><td>RH</td></tr>
<tr><td>RT</td></tr>
<tr><td>SD</td><td>SD</td><td colspan="2">Common point of the contact input terminals.</td></tr>
<tr><td rowspan="4">Analog signal input terminals</td><td>10</td><td>-------</td><td colspan="2">Frequency setting power supply. DC 5V, permissible maximum load current: 10mA.</td></tr>
<tr><td>2</td><td>-------</td><td>Input terminals of DC maybe 0 to 5V or 0 to10V,and this voltage signal can be used for frequency setting. Variable Resistors 1KΩ/ 2W</td><td>Refer to Pr38,Pr73 (page 59)</td></tr>
<tr><td>4</td><td>------</td><td>Terminals of 4 to 20mA, this current signal can be used for frequency setting.</td><td>Refer to Pr39. (page 59)</td></tr>
<tr><td>5</td><td>------</td><td colspan="2">Reference source for analog signal input.</td></tr>
</table>

Relay output Terminals	A	Selectable	1. Can be used as Alarm Terminal. 2. Can be used as Multifunctional output terminals. Alarm: Continuity across A-C, Discontinuity across B-C. (Note)Contact capacity: DC 30V / AC 230V 0.3A.
	B		
	C		
Output terminals (open collector mode)	RUN	Selectable	The terminal is “Multifunctional output terminals”, user can define its function of these terminals by setting different value into Pr40(page 60), permissible load DC 24V, 0.1A.
	FU/10X	Selectable	
	SU	Selectable	
	SE	SE	Common terminal of output terminals.
Pulse /Analog output	FM/AM	---	Selection FM function can use “Frequency meter” or “1mA full-scale meter” to indicate the output frequency or the output current. Use AM function can use a 0 ~ 10V Voltage Meter . Refer to Pr54, Pr55, Pr56 and Pr192.(page 63)
Communication interface	RS485	---	Serial communication interface.

1-5-4 Wiring Information

Main circuit wiring:

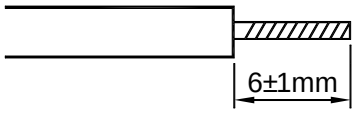
1. Do not connect power cable with motor U-V-W terminals to avoid possible damage to inverter.
2. Do not try to use phase filtering capacitors (PFC), harmonic filter, and electromagnetic contactor to connect to inverter power output as right sided diagram display.



3. Do not use electromagnetic contactor or no-fuse breaker to start or stop the motor.
4. Please make sure grounding the wire to the case of inverter and to motor to avoid possible electric shock.
5. Please refer to section 1-6 (page 23) for the specification of cable gauge, circuit rout, receptacles terminal, no- fuse breaker, and electromagnetic contactor for main circuit wiring. If the installation location between inverter and motor is distant from each other, please use wider cable gauge with pressure drop in 2%. (Please keep total wiring length in 500 meters).
6. The wire used in power supply side and load side must use insulated sleeves receptacles terminal.
7. After disconnected with power supply, please do not touch terminal of P-N to avoid electric shock, because there is remaining high voltage power.

Control wiring diagram

1. The wire used for analog input terminal must be insulated wire and wire and metal netted must be with terminal 5.
2. It is suggested to use 0.75mm^2 cable gauges for control circuit wiring. Please refer to following instruction for insulated sleeve stripped.



3. Please keep safe distance of control circuit wiring with main circuit wiring. It is strictly forbidden to tight the wiring cable of control circuit with main circuit together.
4. Terminals of SD, SE, 5, and PC are from separately power supply system, please do not wire them together.

(Note 1) Please make sure the screw is closed tightly with terminal. Do not leave any cable remains in the inverter.

(Note 2) Only certified technicians is allowed to perform the installation, and wiring, disassembly, and maintenance.

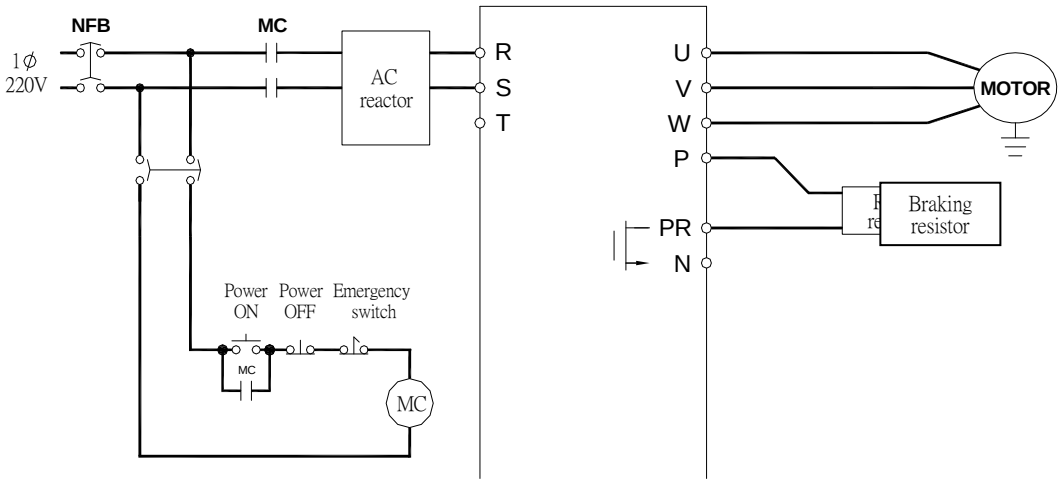
(Note 3) Please do follow wiring requirement when install inverter. If wiring without following above instruction and result in damage the inverter or offending against public security. Under such circumstance, Shihlin Electrics will be free from any legal responsibility for such incident. If there is any question, please call for professional assistance.

1-5-5 Single phase power supply

In 220V series of inverter when input power from single phase power supply, the inrush current of all rectifiers component is higher, temperature is also increased. Therefore the rated current must be decreased when single-phase AC Power is used. Please refer to below table for more detail.

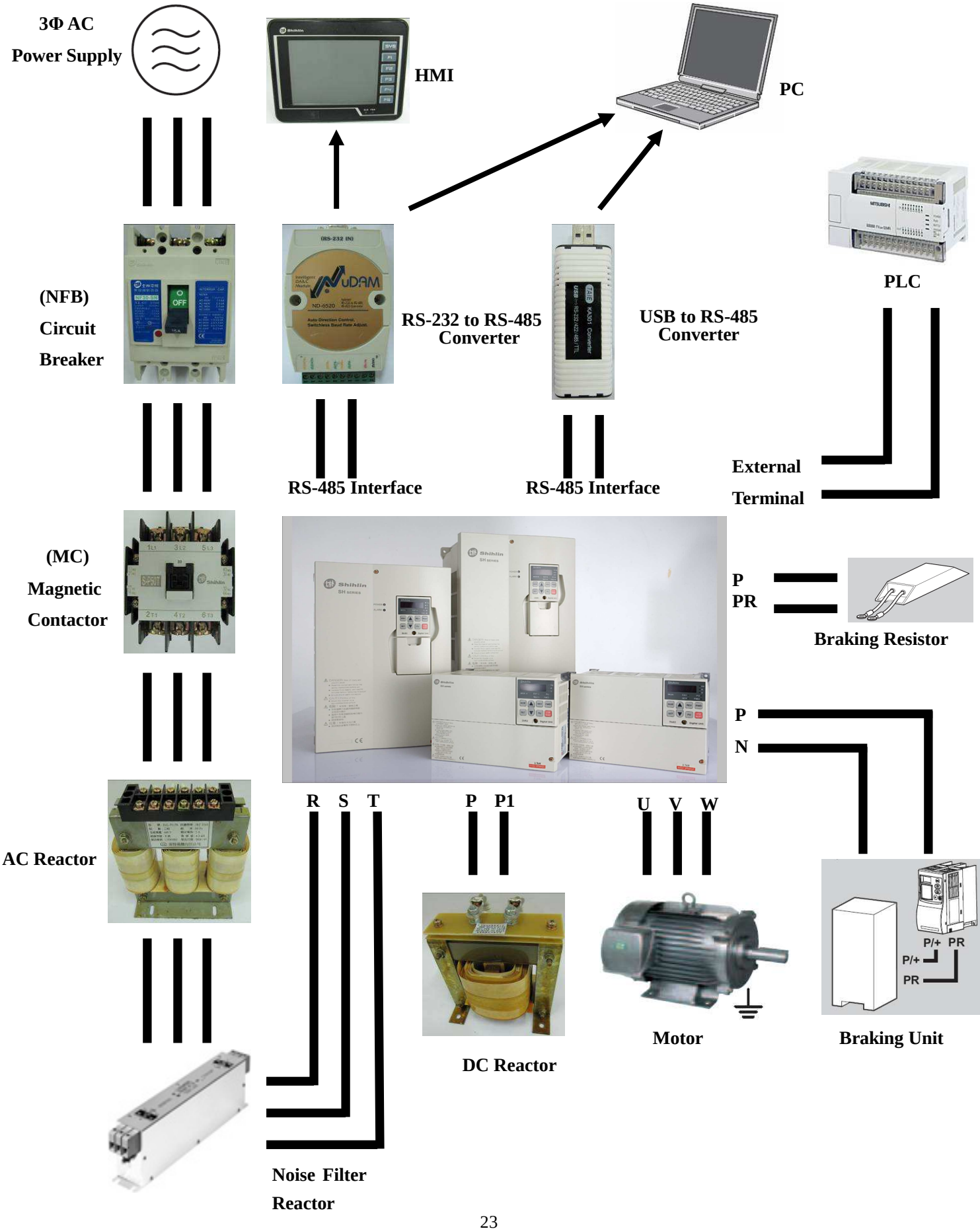
Model #	SH020-□□□K			
	0.75K	1.5K	2.2K	3.7K
Rated Output Current	3A	4A	5A	7A
Rated Output Voltage	Three-Phase AC200 to 230V			
Voltage	Single Phase AC200 to 230V 50 to 60Hz			
Capacity	2.5kVA	4.5kVA	5.5kVA	9kVA
Input Current	7.6A	11.2A	12.9A	17.4A

(Notes) Please do not use single phase power supply with 5.5K and above of inverters.



(Note) When inverter is operating with single phase power supply, please make sure to connect it with R and S terminals. Make sure the capacity of power supply is able to handle such operation.

1-6 Peripherals Selection



1-6-1 No-fuse breaker

Model #	Motor Capacity	Power Capacity (kVA)	Recommended No-fuse breaker (Shihlin Electrics)	Recommended Magnetic Contactor (Shinlin Electrics)
SH020-0.75K	220V 1HP	2.5	NF30 10A	S-P11/ S-P12
SH020-1.5K	220V 2HP	4.5	NF30 15A	S-P11/ S-P12
SH020-2.2K	220V 3HP	5.5	NF30 20A	S-P11/ S-P12
SH020-3.7K	220V 5HP	9	NF30 30A	S-P30T
SH020-5.5K	220V 7.5HP	12	NF50 50A	S-P30T
SH020-7.5K	220V 10HP	17	NF100 60A	S-P40T
SH020-11K	220V 15HP	20	NF100 75A	S-P50T
SH020-15K	220V 20HP	28	NF225 125A	S-P60T
SH020-18.5K	220V 25HP	34	NF225 150A	S-P80T
SH020-22K	220V 30HP	41	NF225 175A	S-P100T
SH040-0.75K	440V 1HP	2.5	NF30 5A	S-P11/ S-P12
SH040-1.5K	440V 2HP	4.5	NF30 10A	S-P11/ S-P12
SH040-2.2K	440V 3HP	5.5	NF30 15A	S-P11/ S-P12
SH040-3.7K	440V 5HP	9	NF30 20A	S-P11/ S-P12
SH040-5.5K	440V7.5HP	12	NF30 30A	S-P21
SH040-7.5K	440V 10HP	17	NF30 30A	S-P21
SH040-11K	440V 15HP	20	NF50 50A	S-P30T
SH040-15K	440V 20HP	28	NF100 60A	S-P40T
SH040-18.5K	440V 25HP	34	NF100 75A	S-P40T
SH040-22K	440V 30HP	41	NF100 100A	S-P50T

1-6-2 Cable specification / Terminal receptacle specification

Model #	Recommended Cable		Crimping Terminals	
	R, S, T (mm^2)	U, V, W (mm^2)	R, S, T	U, V, W
SH020-0.75K	2	2	2 - 4	2 - 4
SH020-1.5K	2	2	2 - 4	2 - 4
SH020-2.2K	2	2	2 - 4	2 - 4
SH020-3.7K	3.5	3.5	5.5 - 4	5.5 - 4
SH020-5.5K	5.5	5.5	5.5 - 5	5.5 - 5
SH020-7.5K	14	8	14 - 5	8 - 5
SH020-11K	14	14	14 - 5	14 - 5
SH020-15K	22	22	22 - 6	22 - 6
SH020-18.5K	38	38	38 - 8	38 - 8
SH020-22K	38	38	38 - 8	38 - 8

Model #	Recommended Cable		Crimping Terminals	
	R, S, T (mm^2)	U, V, W (mm^2)	R, S, T	U, V, W
SH040-1.5K	2	2	2 - 4	2 - 4
SH040-2.2K	2	2	2 - 4	2 - 4
SH040-3.7K	2	2	2 - 4	2 - 4
SH040-5.5K	3.5	2	5.5 - 4	2 - 4
SH040-7.5K	3.5	3.5	5.5 - 4	5.5 - 4
SH040-11K	5.5	5.5	5.5 - 6	5.5 - 6
SH040-15K	14	8	14 - 6	8 - 6
SH040-18.5K	14	8	14 - 6	8 - 6
SH040-22K	22	14	22 - 6	14 - 6

1-6-3 Wave filters (SCHAFFNER filters are only applying for manufacturer inner test, if the user uses other brands, please apply the same specification.)

Model	Filter specification	Model	Filter specification
SH020-0.75K	FN3258-7-45	SH040-0.75K	FN3258-7-45
SH020-1.5K	FN3258-16-45	SH040-1.5K	FN3258-7-45
SH020-2.2K	FN3258-16-45	SH040-2.2K	FN3258-7-45
SH020-3.7K	FN3258-30-47	SH040-3.7K	FN3258-16-45
SH020-5.5K	FN3258-30-47	SH040-5.5K	FN3258-16-45
SH020-7.5K	FN3258-42-47	SH040-7.5K	FN3258-30-47
SH020-11K	FN3258-55-52	SH040-11K	FN3258-30-47
SH020-15K	FN3258-75-52	SH040-15K	FN3258-42-47
SH020-18.5K	FN3258-100-35	SH040-18.5K	FN3258-42-47
SH020-22K	FN3258-100-35	SH040-22K	FN3258-55-52

1-6-4 Brake resistor

Shihlin Inverter Braking Resistor / Braking Unit			
Model	Braking Resistor		Braking Unit
	Specification	Order Number	Order Number
SH020-0.75K	150W / 100Ω	ABR150W100	—
SH020-1.5K	250W / 60Ω	ABR300W60	—
SH020-2.2K	250W / 60Ω	ABR300W60	—
SH020-3.7K	400W / 40Ω	—	—
SH020-5.5K	1000W / 25Ω	ABRH1000W25	—
SH020-7.5K	1200W / 20Ω	ABR1500W20	—
SH020-11K	2400W / 13.6Ω	ABR2400W13R	—
SH020-15K	3000W / 10Ω	ABR3000W10	—
SH020-18.5K	4800W / 8Ω	ABR4800W8	BR2022B
SH020-22K	4800W / 6.8Ω	ABR4800W6R8	BR2022B
SH040-0.75K	80W / 700Ω	ABRH80W700	—
SH040-1.5K	150W / 350Ω	ABRH150W350	—
SH040-2.2K	250W / 250Ω	ABR300W250	—
SH040-3.7K	400W / 150Ω	—	—
SH040-5.5K	1000W / 75Ω	ABRH1000W75	—
SH040-7.5K	1200W / 75Ω	—	—
SH040-11K	2400W / 50Ω	ABR2400W50	—
SH040-15K	3000W / 40Ω	ABR3000W40	—
SH040-18.5K	4800W / 32Ω	ABR4800W32	BR4030B
SH040-22K	4800W / 27.2Ω	ABR4800W32	BR4030B

(Note1) For the mentioned capacity of brake resistor is based on 10% of “Special Regenerative Brake Duty” (Pr70). Operating 5 sec stop 45 sec for cooling. This brake is a braking capacity utilization rather than the braking duty cycle representation.

(Note2) When making high frequency start/stop operation, high special regenerative brake duty (Pr70 refer to page 56) is demanded. Please use higher capacity resistor to increase the regenerative brake ability.

(Note 3) Only 5.5K~7.5K (7.5HP~10HP) series production have built-in brake resistor, Other series have no built-in resistor, 0.75~15K refer to above-mentioned resistor specification 18.5~22K required to choose the braking units and braking resistors if there is a need to make outside equipment connection , please refer to above specification and the wire connection method:

0.75K~15K (1HP~20HP): Connect braking resistor to P-PR terminals of the main circuit.

18.5K~22K (25HP~30HP): Connect braking unit to P-N terminals of the main circuit, then connect braking resistor to brake unit’s P-PR terminals. If there is any doubt about braking unit selection, please call for assistance.

Chapter 2 Basic operation

2-1 Operation Mode

The operation mode of inverter is related to **reference of rated running frequency** and **Signal of starting motor**. There are 9 operation modes of SH type inverter: PU mode (Pr79=0) , JOG mode(Pr79=1), External mode(Pr79=2), Combined mode 1(Pr79=3), Combined mode 2(Pr79=4), Combined mode 3(Pr79=5), Combined mode 4 (Pr79=6), Combined mode 5(Pr79=7), Combined mode 6(Pr79=8).

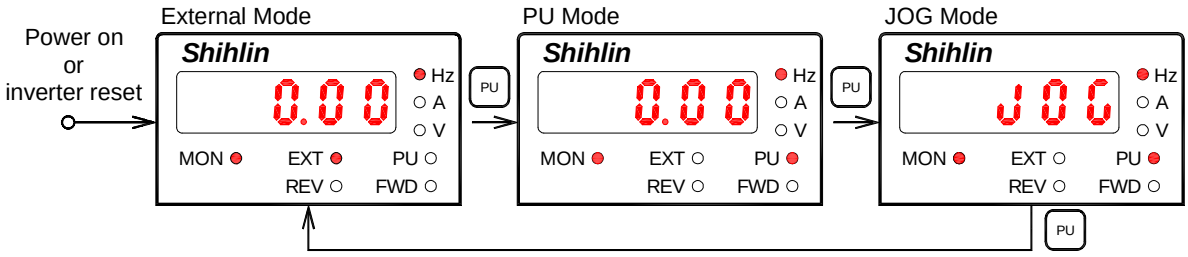
Relate Parameters	Setting Value	Description
Operation Mode Pr79	0	PU Mode, External Mode and JOG Mode enable switchover operation.
	1	PU Mode and JOG Mode enable switchover operation.
	2	External Mode.(external frequency and start up)
	3	Combined Mode 1. (inner PU frequency and external start up)
	4	Combined Mode 2. (external frequency and inner start up)
	5	Combined Mode 3 (inner PU frequency and external multi-speed frequency, external start up)
	6	Combined Mode 4 (RS485 Frequency RS485 start up)
	7	Combined Mode 5 (RS485 Frequency External start up)
	8	Combined Mode 6 (External Frequency or multi-speed RS485 start up)

Pr79 setting value		Reference of rated frequency	Reference value for starting signal
0 (switch over PU,external, Jog,mode)	PU Mode	Inner PU	Inner PU FWD, REV
	External mode	External current,voltage signal or external multi-speed	External STF,STR terminals
	JOG Mode	Setting by parameter Pr15	Inner PU FWD, REV
1 (switchable PU,Jog,mode)	PU Mode	Inner PU	Inner PU FWD, REV
	JOG Mode	Setting by parameter Pr15	Inner PU FWD, REV
2 (External mode)		External current,voltage signal or externalmulti-speed	External STF,STR terminals
3 (Combined Mode 1)		Inner PU	External STF,STR terminals

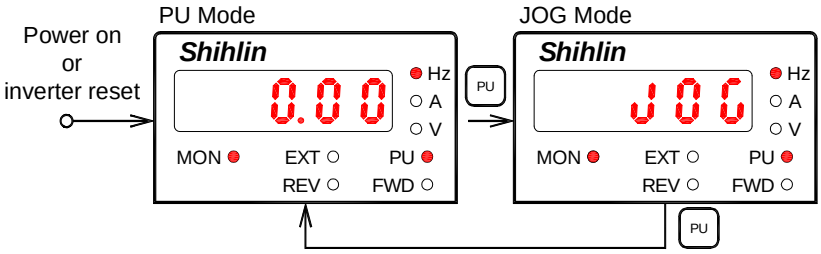
Pr79 setting value	Reference of rated frequency	Reference value for starting signal
4 (Combined Mode2)	External current, voltage signal or external multi-speed	Inner PU FWD, REV
5 (Combined Mode3)	Inner PU or external multi-speed	External STF,STR terminals
6 (Combined Mode4)	RS485 communication interface	RS485 communication interface activated, the motor rotate forward or reversely rotate
7 (Combined Mode5)	RS485 communication interface	External STF, STR terminals
8 (Combined Mode6)	External current, voltage signal or external multi-speed	RS485 communication interface activated, the motor rotate forward or reversely rotate

2-2 Flow chart of operation mode switchover

When Pr79=0:



When Pr79=1：



(Note 1)

1. In “PU Mode”, indicator of “PU” on Digital Unit is lit. Pr79=0.
2. In “External Mode”, indicator of “EXT” on Digital Unit is lit. Pr79=2.
3. In Combined Mode 1~6, indicator of “PU” and “EXT” on Digital Unit are lit. Pr79=3~8.
4. In “JOG Mode”, indicator of “PU” is lit, and the screen will display J06 when inverter is not in operation.Pr79=1.

2-3 Operation procedure

2-3-1 PU Mode, Operation Procedures (Pr79 = 0 or 1)

Procedures	Description
1	Switch operation mode to PU mode, indicator of PU is lit. (Note) 1.When Pr79=0, Inverter will be in external mode after turn on power or restart inverter. 2.When Pr79=1, Inverter will be continuously in PU mode after turn on power or restart the inverter.
2	Enter frequency setting mode, and enter desired frequency into CPU. (Note) Operation procedures of frequency setting model please refer to 2-4-3. 2-4-4 (page 36)
3	After pressing FWD or REV, motor starts to operate. At the same time indicator of FWD and REV is flickering, indicating motor in operation and it will enter "Monitoring Mode" automatically. (Note) During motor operation it is allowed to enter frequency setting mode to rewrite frequency into CPU and vary motor rotation speed on line.
4	After pressing STOP RESET, motor would decelerate until stop. The indicator FWD or REV would be turn off, after stop inputting voltage.

2-3-2 External Mode, Operation Procedure (Pr79 = 0 and 2)

Procedures	Description
1	Switchover operation mode to External Mode, at the same time EXT is lit. (Note)1.When Pr79=0, after start the power or retry the inverter, inverter is in external mode. 2.When Pr79=2, inverter will be continuously in external mode.
2	Rated frequency is entered into multi-speeded parameter or the voltage for rated frequency is set to 2-5 terminals or the current for rated frequency is set to 4-5 terminals.
3	Turn on STF or turn on STR is to activate motor operation. Indicator of FWD or REV will be flickering, it indicates the motor is in rotation.
4	After turn off STF and STR, motor would decelerate until stop. The indicator FWD or REV would be turn off, after stop inputting voltage.

2-3-3 Combined Mode 1, Operation Procedures (Pr79=3)

Procedures	Description
1	When Combined Mode 1 is in operation, indicator of PU and EXT are both lit.
2	Enter frequency setting mode, and write rated frequency into CPU. (Note) Operation procedure of frequency setting mode, please refer to 2-4-3. 2-4-4. (Page 36)
3	STF turn on and STR turn on, start motor rotation.. Indicator of FWD and REV is flickering, it indicates that motor is on rotation. (Note) During motor operation it is allowed to enter frequency setting mode to rewrite frequency into CPU and vary motor rotation speed on line.
4	After turn off STF and STR, motor would decelerate until stop. The indicator FWD or REV would be turn off, after stop inputting voltage.

2-3-4 Combined Mode 2, Operation Procedures (Pr79=4)

Procedures	Description
1	When Combined Mode 2 is in operation, indicator of PU and EXT are both lit.
2	Rated frequency is entered into multi-speeded parameter or the voltage for rated frequency is set to 2-5 terminals or the current for rated frequency is set to 4-5 terminals.
3	Pressing button of FWD or REV, the motor start rotation. In the meantime indicator of FWD or REV is flickering, it indicates the motor is in operation and operation panel is entered monitoring mode automatically.
4	After pressing STOP RESET, motor would decelerate until stop. The indicator FWD or REV would be turn off, after stop inputting voltage.

2-3-5 Combined Mode 3, Operation Procedures (Pr79=5)

Procedures	Description
1	When Combined Mode 3 is in operation, indicator of PU ● and EXT ● are both lit.
2	Enter Frequency Setting Mode, and write rated frequency into CPU. If rated frequency is referred to multi-speeded terminal, please set the frequency as Pr4~ Pr6、Pr24~ Pr27、Pr126~ Pr133(Page 46)
3	STF turn on and STR turn on, start motor rotation.. Indicator of FWD ● and REV ● is flickering, it indicates that motor is on rotation. (Note) The frequency setting mode is assessable during the rotation of motor, and the rated frequency is changeable in the CPU so that the speed of motor is changeable.
4	After turn off STF and STR, motor would decelerate until stop. The indicator FWD ● or REV ● would be turn off, after stop inputting voltage.

2-3-6 Combined mode 4，Basic operation procedure(Pr79=6)

Procedures	Description
1	Under Combined mode 4，indicator PU ● and EXT ●will be lit.
2	Utilize RS485 communication interface，input the rated frequency into CPU.
3	Under RS485 operation interface，input the order code of rotating forwards or backwards，motor begins to rotate。Meanwhile indicator FWD ●or REV ●will flickering，indicating motor is rotating. Operation panel will automatically switch into surveillance mode.
4	Under RS485 operation interface，input the order code of stop，then the motor decelerates until it stops. The indicator FWD ● or REV ●of inverter will be off after the electricity shuts down.

2-3-7 Combined mode 5，Basic operation procedure (Pr79=7)

Procedures	Description
1	Under Combined mode 5，indicator PU and EXT will be lit.
2	Utilize RS485 communication interface，input the rated frequency into CPU.
3	If STF turn on or STR turn on, the motor will begin to rotate. At the same time, indicator FWD or REV will flickering，which indicates the motor is working.
4	If STF turn off or STR turn off，motor will decelerate until stop. The indicator FWD or REV of inverter will be off after the electricity shuts down.

2-3-8 Combined mode 6，Basic operation procedure (Pr79=8)

Procedures	Description
1	Under Combined mode 6，indicator PU and EXT will be lit.
2	Input rated frequency into multi-speed parameter or into the counterpart voltage of rated frequency to terminals 2-5 or to 4-5.
3	Under RS485 operation interface，input forwards or backwards order code, the motor begins to rotate。Meanwhile indicator FWD or REV will flickering，which indicates motor is rotating。Operation panel will automatically switch into surveillance mode.
4	Under RS485 operation interface，input the order code of stop，then the motor decelerates until stop. The indicator FWD or REV of inverter will be off after the electricity shuts down.

2-3-9 JOG Mode, Operation Procedures (Pr 79 = 0 or 1)

Procedures	Description
1	Switch operation mode to JOG Mode, in the meantime indicator of PU is lit and monitor display JOG when motor is not rotating.
2	1. Press keys of REV or FWD, the motor start rotation. Indicator of FWD or REV is flickering, stands for motor is in rotation. 2. Lose keys of FWD or REV, motor will decelerate till stop. Indicator of FWD or REV will go off after stopping voltage output from inverter. (Note) In the JOG Mode, if the rated frequency is the value of Pr15, acceleration/deceleration time will be the value in Pr16. Please refer to Chapter 3 Pr15 and Pr16. (page 51)

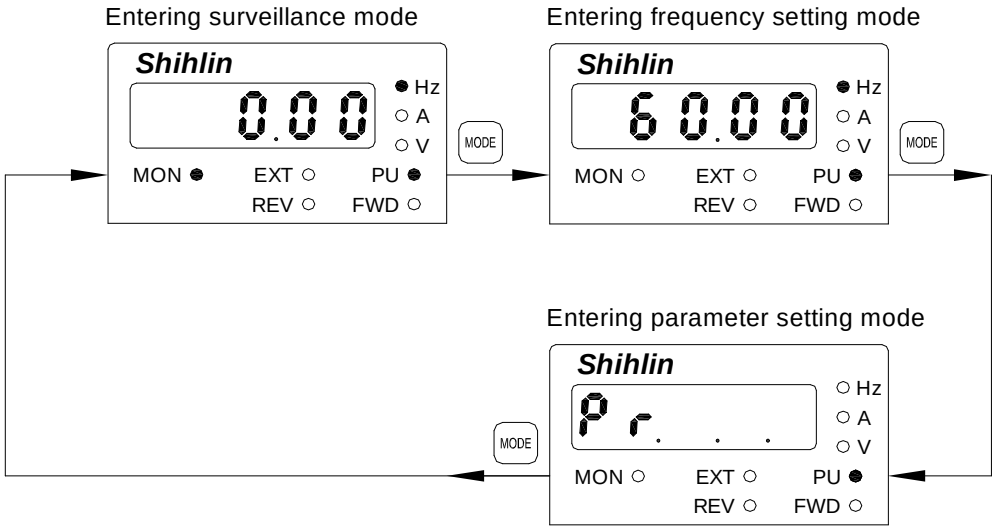
2-3-10 External JOG Mode, Operation Procedures (Pr79=2 or 3 or 5, multi-functional input terminal is set as JOG function)

Procedures	Description
1	When the operation of motor is stopped, chose one or more multi-function input terminals and set as JOG.(Refer to page 52, Pr59)
2	Turn on the input terminal, which named of JOG.
3	1. When STF terminal or terminal is in “Turn on”, motor starts to operate. This moment, indicator light FWD or REV would be glittered which means motor is on operation. 2. After turn off STF and STR, motor would decelerate until stop. The indicator FWD or REV of transformer would be turn off, after stop inputting voltage. (Note) In the mode of JOG, rated frequency is Pr15, acceleration time is Pr16 value.(page 51)

2-4 Operation mode of control panel

You may use operation panel to survey output frequency, output current, output voltage, and alarm message, parameter setting, operation frequency setting etc. Therefore, there are three operation modes for operation panel, Surveillance mode (surveillance figure), parameter setting mode (parameter setting), frequency setting mode (operation frequency setting).

2-4-1 Operation mode switching procedure drawing

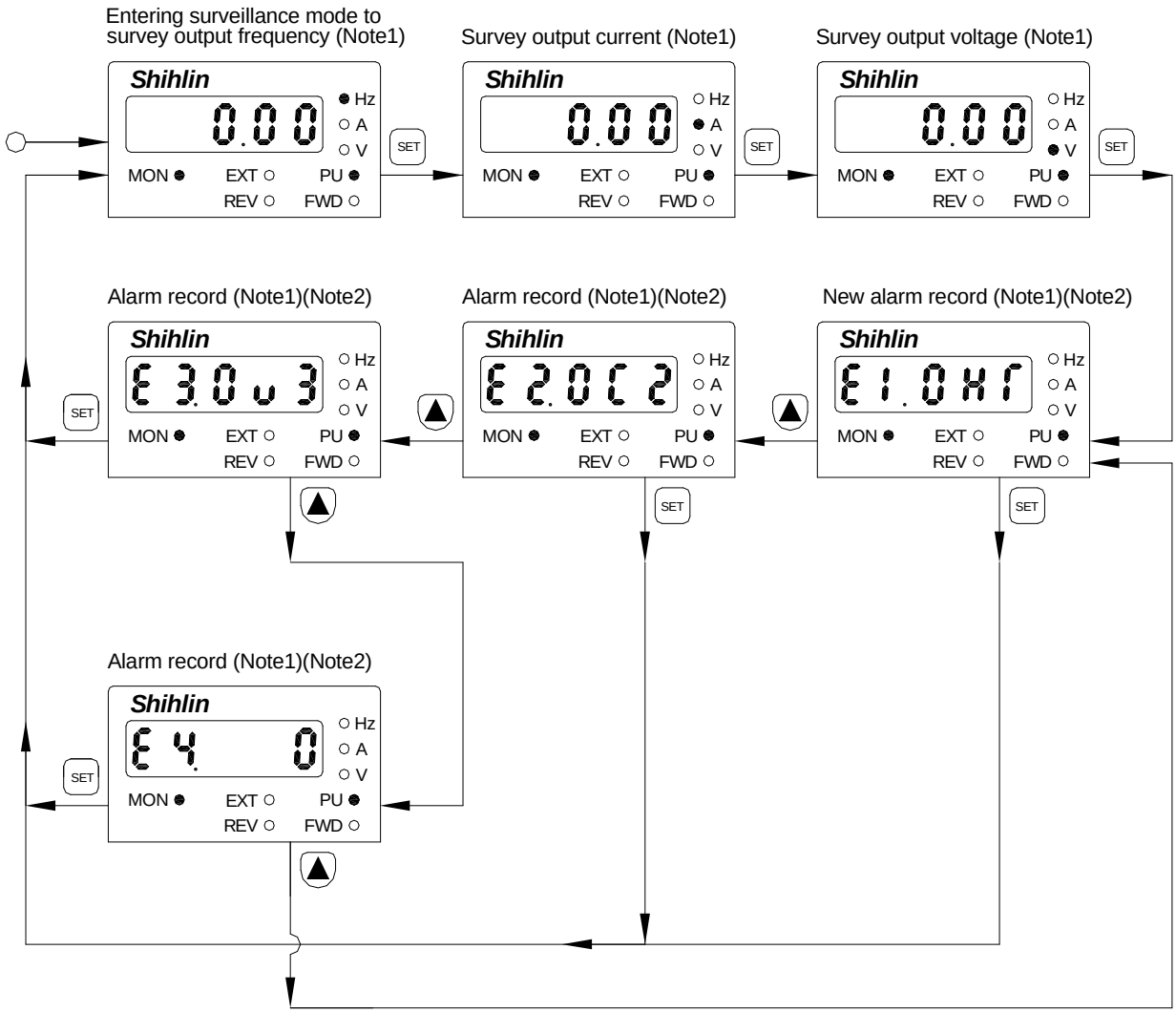


	Frequency setting mode	Parameter setting mode	Surveillance mode
PU Mode	Y	Y	Y
External mode	Y	Y	Y
JOG mode	N	Y	Y
Combined mode 1、3	Y	Y	Y
Combined mode 2	N	Y	Y
Combined mode 4	N	Y	Y
Combined mode 5	N	Y	Y
Combined mode 6	N	Y	Y

Note1: In the mode of external, combined mode 2 or JOG mode, the operation panel only can switch between parameter setting mode and surveillance mode.

Note2: Inverter in the external mode and the operation device in the frequency setting mode, the frequency set by an external terminal ,can not be set by the operation device, operation device only can display setting frequency (with Pr64 function used)

2-4-2 Operation mode switching procedure drawing

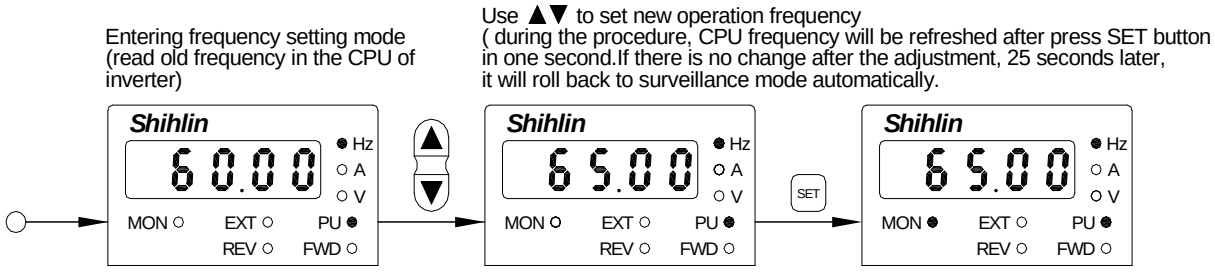


(Note1)

1. 「Surveillance output frequency」, indicator MON and Hz will be lit, the monitor will show the output frequency.
2. 「Surveillance output current」, indicator MON and A will be lit, the monitor will show the output current.
3. 「Surveillance output voltage」, indicator MON and V will be lit, the monitor will show the output voltage.
4. 「Browsing alarm record」, indicator MON will be lit, the monitor will show the alarm code record。Maximum record set is 4

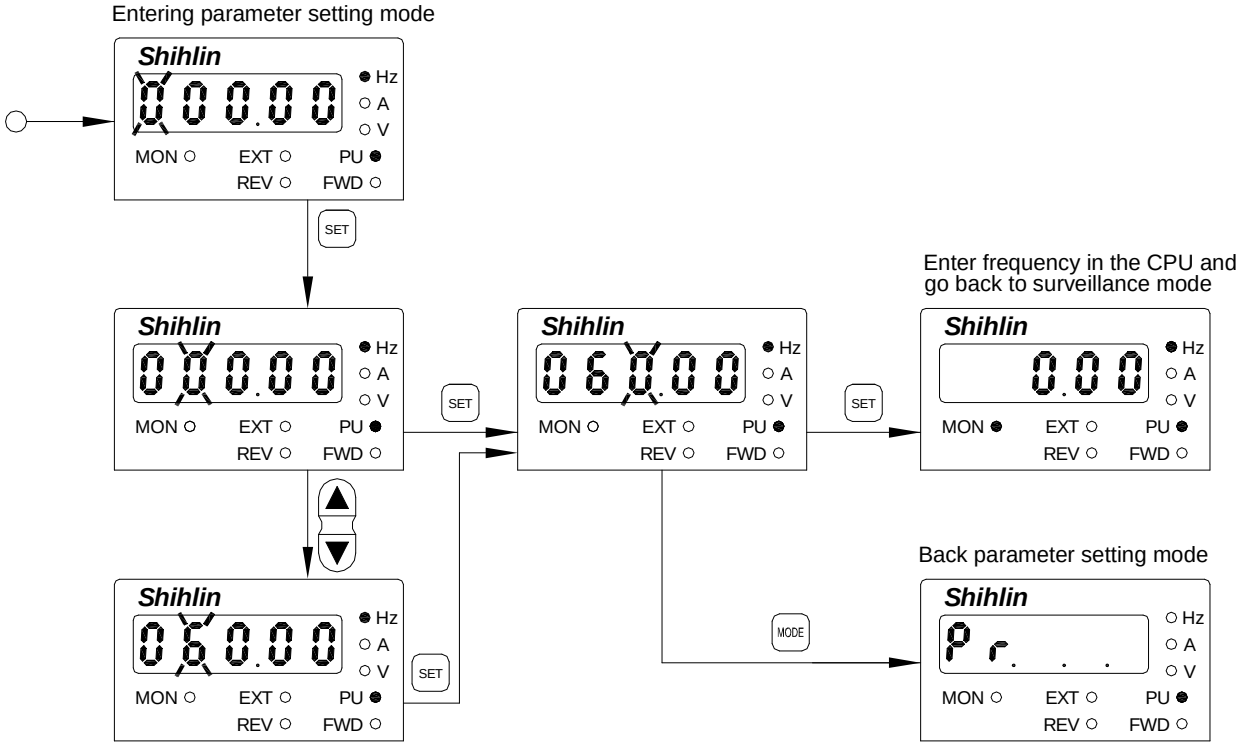
(Note 2) Alarm code, Refer to appendix 3.(page 118)

2-4-3 Frequency setting mode operation procedure drawing (▲▼Button to rated frequency)



(Note) Under the frequency setting mode，indicator Hz will lit，indicator MON will not lit.

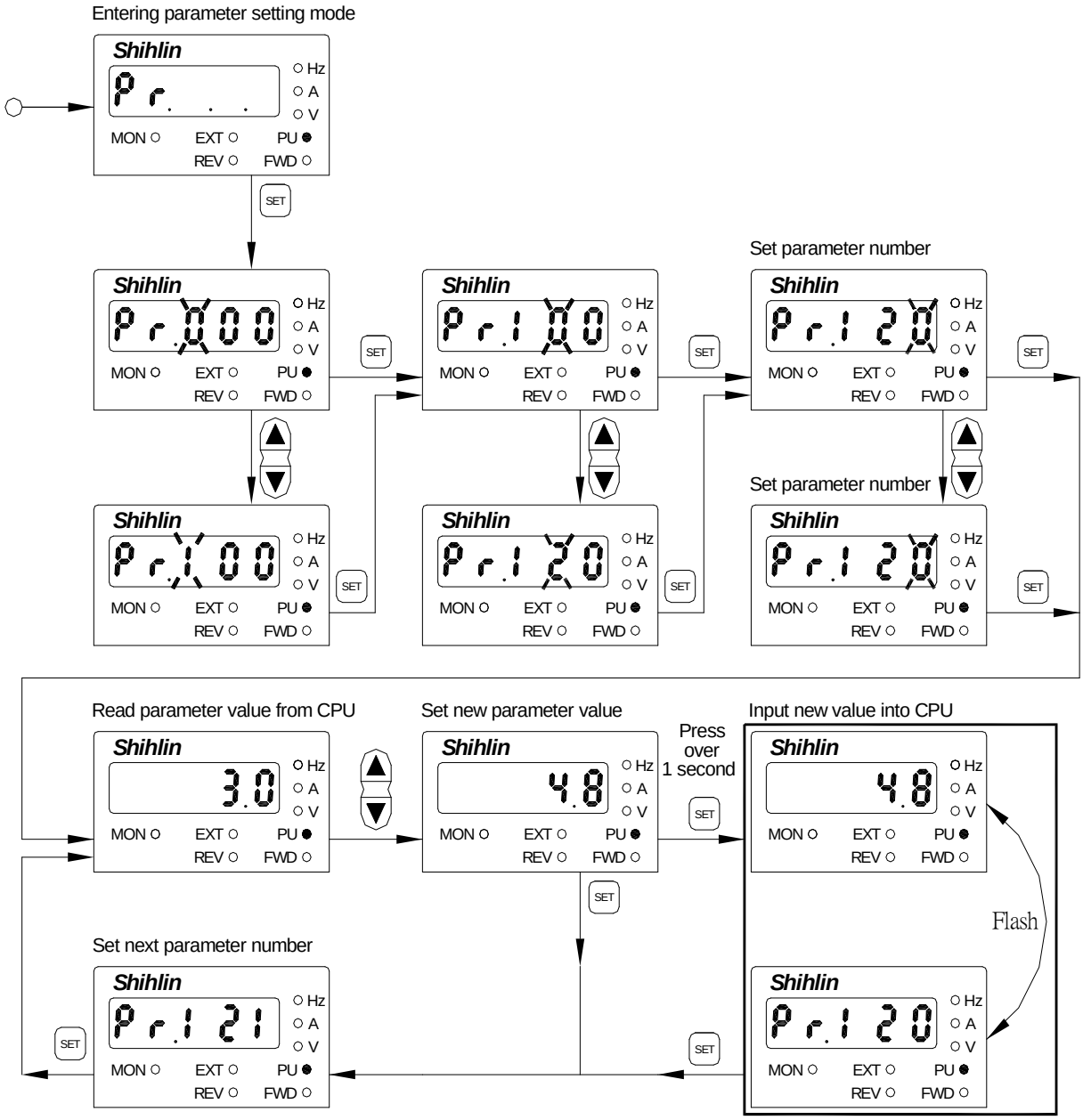
2-4-4 Frequency setting mode and operation procedure drawing (Pressing ,mode to enter frequency setting mode)



(Note 1) Under parameter setting mode，indicator Hz will lit，indicator MON will not lit.

(Note 2) If after setting frequency without pressing SET button for 1 second，operation panel will remain in the frequency setting mode, until pressing MODE button ,it will go back to parameter setting mode and surveillance mode.

2-4-5 Parameter setting mode operation procedure drawing



(Note1) Under parameter setting mode，indicator Hz and MON will not be lit.

(Note2) Parameter is set as 99999 and the actual counterpart of CPU value is 65535，therefore if setting the value below 99999，CPU value will drop from 65535 gradually，if so，the operation panel should show as 65534、65533…..。

(Note3) As setting the parameter，button▼▲ is used to select above or below option，When the parameter reaches 99999(0), the panel will stop at this figure，if there is a need to surpass this value，the user must press ▼▲button，and parameter value will go back to 0 or drop to 99999 gradually.

(Note4) When parameter setting is 9999，for SH-PU series operation panel, they will show “9999”，For DU series operation panel, it will show “99999”.

Chapter 3 Parameter

3-1 Parameter information

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
Basic function	Pr0	Manual Torque Boost	0~30%	0.1%	6%(Note7)		45
	Pr1	Maximum frequency	0~120Hz	0.01Hz	120Hz		46
	Pr2	Minimum frequency	0~120Hz	0.01Hz	0Hz		46
	Pr3	Base Frequency	0~400Hz	0.01Hz	60Hz		45
	Pr4	1(High Speed)	0~400Hz	0.01Hz	60Hz		46
	Pr5	2(middle speed)	0~400Hz	0.01Hz	30Hz		46
	Pr6	3(low speed)	0~400Hz	0.01Hz	10Hz		46
	Pr7	Acceleration Time	0~3600sec	0.1s	5sec (Note1)		48
	Pr8	Deceleration Time	0~3600sec	0.1s	5sec (Note1)		48
	Pr9	Electronic thermal O/L replay	0~300A	0.01A	Rated Output current		50
DC injection brake	Pr10	DC injection brake operation frequency	0~120Hz	0.01Hz	3Hz		50
	Pr11	DC injection brake operation time	0~10sec	0.1s	0.5sec		50
	Pr12	DC injection brake operation ability	0~30%	0.1%	6%(Note8)		50
Deceleration	Pr13	Starting Frequency	0~60Hz	0.01Hz	0.5Hz		51
---	Pr14	Load Pattern selection	0~3	1	0		45
JOG rotation	Pr15	JOG frequency	0~400Hz	0.01Hz	5Hz		51
	Pr16	JOG Acceleration/ Deceleration time	0~3600 sec	0.1s	(Note 2)		51
Basic function	Pr17	External electronic thermal replay selection	0~2	1	0		52
	Pr18	High speed maximum frequency	120~400Hz	0.01Hz	120Hz		46
	Pr19	Base frequency voltage	0~1000V、9999	0.1V	9999		45
Acceleration	Pr20	Acceleration/ Deceleration reference frequency	1~400Hz	0.01Hz	60Hz		48

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
Preventing lost speed	Pr21	Stall deceleration time during running	0~3600sec	0.1sec	2sec		54
	Pr22	Stall prevention operation level	0~200%	0.1%	185%		54
	Pr23	Stall prevention operation level compensation factor at double speed	0~200%	0.1%	200%		54
Multi-speed setting	Pr24	4th speed	0~400Hz、9999	0.01Hz	9999		46
	Pr25	5th speed	0~400Hz、9999	0.01Hz	9999		46
	Pr26	6th speed	0~400Hz、9999	0.01Hz	9999		46
	Pr27	7th speed	0~400Hz、9999	0.01Hz	9999		46
---	Pr28	Limitation for alarm reset times	0、1~10	1	3		55
AC/ Deceleration	Pr29	Acceleration/ Deceleration curve pattern selection	0、1、2	1	0		48
Regenerative brake	Pr30	Regenerative brake function selection	0、1	1	0		56
Shihlin Communication	Pr32	Communication speed (baud rate)	0、1、2 (Note 3)	1	1		56
	Pr36	Station number	0~31	1	0		56
---	Pr37	Speed Display	0、1~9998	1	0		58
---	Pr38	Frequency/5V(10V)	1~400Hz	0.01Hz	60Hz		59
---	Pr39	Frequency /20mA	1~400Hz	0.01Hz	60Hz		59
---	Pr40	Multifunction terminal selection	0~6666	1	5102		60
Output frequency detection	Pr41	Output frequency detection	0~100%	0.1%	10%		61
	Pr42	Output frequency detection for forward rotation	0~400Hz	0.01Hz	6Hz		61
Output frequency detection	Pr43	Output frequency detection for reverse rotation	0~400Hz、9999	0.01Hz	9999		61

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
Second function	Pr44	2nd acceleration time	0~3600sec、9999	0.1s	9999		62
	Pr45	2nd deceleration time	0~3600sec、9999	0.1s	9999		62
	Pr46	2nd torque boost	0~30%、9999	0.1%	9999		62
	Pr47	2nd base frequency	0~400Hz、9999	0.01Hz	9999		62
Shihlin Communication	Pr48	Data length	0、1	1	0		56
	Pr49	Stop bit length	0、1	1	0		56
	Pr50	Parity check presence/absence	0、1、2	1	2		56
	Pr51	CR、LF presence/absence	1、2	1	1		56
	Pr52	Number of communication retries	0~10	1	0		56
	Pr53	Communication check time interval	0、0.1~999.8、9999	0.1s	9999		56
Surveillance function	Pr54	FM/AM function selection	0~6	1	1		63
	Pr55	Frequency Monitoring reference	0~400Hz	0.01Hz	60Hz		63
	Pr56	Current monitoring reference	0~500A	0.01A	Rated Output Current		63
Reboot	Pr57	Restart coasting time	0~5sec、9999	0.1s	9999		65
	Pr58	Restart cushion time	0~60sec	0.1s	0.5sec		65
---	Pr59	Multifunction terminals selection	0~9999	1	9999		52
Wave filter Figure	Pr60	Input filter time constant	1~16	1	1		65
Tone change	Pr61	Key Tone Selection	0、1	1	0		65
Output frequency test	Pr62	Zero current detection level	0~200%、9999	0.1%	5%		61
	Pr63	Zero current detection time	0.05~1sec、9999	0.01s	0.5sec		61

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
---	Pr64	Remote function selection	0、1、2、3	1	0		66
Function recovery	Pr65	Retry Selection	0、1、2、3	1	0		67
Stall prevention	Pr66	Stall prevention operation reduction starting frequency	0~400Hz	0.01Hz	60Hz		54
Function recovery	Pr67	Number of retries at alarm occurrence	0、1~10、11~20	1	0		67
	Pr68	Retry waiting time	0~360sec	0.1s	1sec		67
	Pr69	Retry count display erase	0	1	0		67
Regenerative brake	Pr70	Special regenerative brake duty	0~30%	0.1%	0%		56
---	Pr71	Brake method selection	0、1	1	1		69
---	Pr72	Load Frequency	0.7~15kHz	0.1KHz	5kHz		69
---	Pr73	Voltage Signal Selection	0、1	1	0		59
---	Pr74	Starting terminal function selection	0、1	1	0		69
---	Pr75	Reset	0~7	1	4		70
---	Pr77	Parameter writing prevention selection	0、1、2	1	0		71
---	Pr78	Prevention forward/reverse rotation selection	0、1、2	1	0		71
---	Pr79	Operation Mode selection	0~8	1	0		71
---	Pr80	FM/AM output terminal selection	0、1	1	0		63
---	Pr81	AM Signal output magnification	0~20	0.01	1		63
---	Pr82	Set frequency gain	0、1~100%	1	0		72
---	Pr84	FU/10 times output terminals selection	0、1~10	1	0		75
---	Pr88	Auto voltage Boost selection	0, 1	1	0		76
---	Pr89	Slip Compensation	0~3%	0.1%	0%		76
---	Pr90	Grounding Leakage Selection	0、1	1	1		76

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
Avoid frequency	Pr91	Frequency Jump 1A	0~400Hz、9999	0.01Hz	9999		76
	Pr92	Frequency Jump 1B	0~400Hz、9999	0.01Hz	9999		76
	Pr93	Frequency Jump 2A	0~400Hz、9999	0.01Hz	9999		76
	Pr94	Frequency Jump 2B	0~400Hz、9999	0.01Hz	9999		76
	Pr95	Frequency Jump 3A	0~400Hz、9999	0.01Hz	9999		76
	Pr96	Frequency Jump 3B	0~400Hz、9999	0.01Hz	9999		76
---	Pr99	Motor operation mode selection	0~4	1	0		77
Motor constants	Pr100	Motor capacity	0~30KW	0.01	Depend on Capacity		78
	Pr101	Motor Pole number	2~12	1	4		78
	Pr102	Rated Motor Voltage	0~1000V	1V	220/440 V		78
	Pr103	Rated Motor frequency	0~ 400 Hz	0.01 Hz	60 Hz		78
	Pr105	Motor excitation current	0~150 A	0.01 A	Depend on Capacity		78
	Pr106	Motor constant R1	0.01~60Ω	0.01Ω	Depend on Capacity		78
	Pr107	Motor constant R2	0.01~60Ω	0.01Ω	Depend on Capacity		78
	Pr108	Motor constant L1	0.1~1500mH	0.1 mH	Depend on Capacity		78
	Pr109	Motor constant L2	0.1~1500mH	0.1 mH	Depend on Capacity		78
	Pr110	Motor constant Lm	0.1~1500mH	0.1 mH	Depend on Capacity		78
Protective function	Pr113	Overvoltage stall protection selection	0、1	1	0		79
	Pr114	Overvoltage stall protection voltage	110~140%	0.1%	120%		79
Torque control	Pr115	Torque command source selection	0~2	1	0		80
	Pr116	Speed limit selection	0~4	1	0		80
	Pr117	Torque command value	0~100%	0.1%	50%		80
	Pr118	Forward rotation speed limit	0~120Hz	0.01Hz	60Hz		80

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	User Setting	Refer to page
	Pr119	Reverse rotation speed limit	0~120Hz	0.01Hz	60Hz		80
	Pr120	Torque command gain	0~180%	0.1%	100%		80
---	Pr125	Digital Unit key tone selection	0、1	1	1		81
Multi-speed setting	Pr126	8th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr127	9th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr128	10th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr129	11th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr130	12th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr131	13th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr132	14th Speed	0~400Hz、9999	0.01Hz	9999		46
	Pr133	15th Speed	0~400Hz、9999	0.01Hz	9999		46
PID performance	Pr160	PID operation selection	0、1~8	1	0		81
	Pr161	PID ratio increase	0、0.1~600%	0.1%	90%		81
	Pr162	PID integral increase	0、0.1~600%	0.1%	10%		81
	Pr163	PID differential increase	0、0.1~600%	0.1%	0%		81
	Pr164	PID digital target value	0~100%	0.1%	0%		81
	Pr165	PID Output order limit	0~100%	0.1%	50%		81
	Pr166	PID Alert value limit	0、0.1~100%	0.1%	0%		81
	Pr167	PID Alarm detection time	0、0.1~3600s	0.1s	0s		81
	Pr168	PID Alarm solution	0~2	1	0		81
MODBUS Communication	Pr170	Communication Protocol	0、1	1	0		83
	Pr171	Communication Address	1~247	1	1		83
	Pr172	MODBUS Transmission Speed of the Communication	0、1、2	1	1		83
	Pr173	MODBUS Data Format	0~5	1	0		83
Vector Control	Pr180	Proportional Gain of Speed Controller	0~100%	1%	50%		94
	Pr181	Integral Gain of Speed Controller	0~100%	1%	50%		94
	Pr182	Slip Compensation	0~50%	0.1%	35%		95
	Pr183	Speed Compensation Coefficient	0~100%	0.1%	50%		95

Function	Pr Number	Name	Setting Range		Min Setting unit	Initial Value		User Setting	Refer to page
Vector Control	Pr184	Low Speed Excited Rate	0~100%		0.1%	50%			96
	Pr185	High Speed Exited Rate	0~100%		0.1%	100%			96
	Pr186	High Speed Exited Curve	0、1、2		1	1			96
	Pr187	Bandwidth of Speed Controller	20~120		1	60			94
---	Pr189	50Hz/60Hz system switchover	0、1		1	0			97
---	Pr191	AM terminal output revision	0~50		1	25			63
Calibration functions	Pr192	FM Terminal calibration	0~9998		1	166			63
	Pr194	Voltage setting Bias	0~10V	0~60Hz	0.01Hz	0V	0Hz		97
	Pr195	Voltage setting Gain	0~10V	1~400Hz	0.01Hz	5V	60Hz		97
	Pr196	Current setting Bias	0~20mA	0~60Hz	0.01Hz	4mA	0Hz		98
	Pr197	Current setting Gain	0~20mA	1~400Hz	0.01Hz	20mA	60Hz		98
---	Pr199	Software version	Viewing only		—	(Note 6)			98
Parameter copy	Pr994	Parameter copy/read	—		—	(Note 4)			98
	Pr995	Parameter copy/write	—		—	(Note 4)			98
Alert record clear	Pr996	Alarm history clear	—		—	—			99
Parameter reset	Pr997	Reset	—		—	—			99
Parameter recovery	Pr998	All parameter recover to initial value	—		—	—			99
	Pr999	Partial parameter recover to initial value	—		—	—			99

(Note1) Factory default value of Parameter Pr7、Pr8: 0.75K~7.5K (1HP~10HP) product series is 5sec , 11K~15K (15HP~20HP) product series is 10sec, 18.5K~22K (25HP~30HP) product series is 15sec.

(Note2) Factory default value of Parameter Pr16: 0.75K~3.7K (1HP~5HP) product series is 0.5sec , 5.5K~15K (7.5HP~20HP) product series is 1sec. 18.5K~22K (25HP~30HP) product Series is 1.5sec.

(Note3) When Pr32=0, the Baud Rate is 4800bps; when Pr32=1, the Baud Rate is 9600bps; whenPr32=2,the Baud Rate is 19200bps.

(Note 4) The function related to parameter copy in Pr994 and Pr995 is only available in Digital Unit of SH-PU.

(Note 5) When parameter value is 9999, the operation panel of SH-PU series shows as “9999”, but for DU series shows as “99999”.

(Note 6) For massive quantity manufacture versions are all standardized, parameter functions all apply to market demand. For the reason of special demand, other exclusive version will be made.

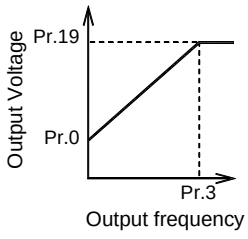
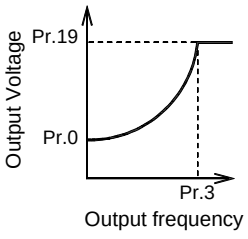
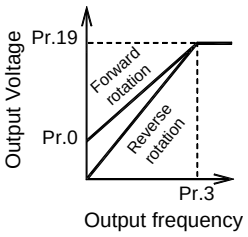
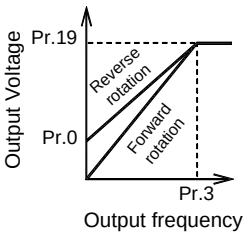
(Note7) Factory default value of Parameter Pr0: 0.75K(1HP) product series is 6%, 1.5K~3.7K (2HP~5HP) product series is 4%, 5.5K~7.5K (7.5HP~10HP) product series is 3%, 11K~22K (15HP~30HP) product series is 2%.

(Note8) Factory default value of Parameter Pr12: 0.75K~3.7K (1HP~5HP) product series is 6%, 5.5K~7.5K (7.5HP~10HP) product series is 4%, 11K~22K (15HP~30HP) product series is 2%.

3-2 Parameter function information

Pr0 Manual Torque Boost
Pr3 Base Frequency
Pr14 Load Pattern Selection
Pr19 Base Voltage

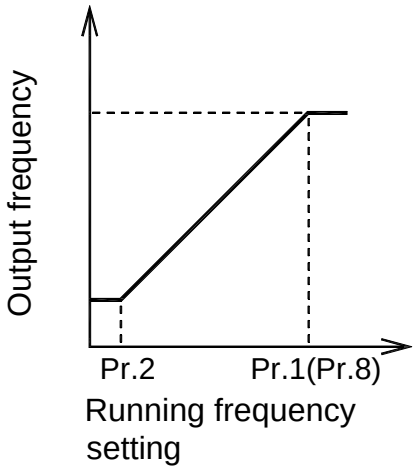
1. The maximum output voltage of inverter is Base Voltage which is determined by Pr19.
2. With V/F control, output voltage and output frequency is corresponding with each other positively, when the value of output frequency is lower than the value of base frequency (Pr3). Output voltage is also reaching base voltage when output frequency is reaching value of Pr3. If the output frequency exceeds the base frequency and increase continuously, the output voltage will be fixed to the base voltage. Please refer to the following figures for the V/F curves (output voltage vs. output frequency).
3. With V/F control, when in low frequency operation, but output frequency is 0, the Pr0 setting will be invalid due to under load of output voltage that caused low motor torque. Consider to adjust value of torque boost (Pr0) to increase the starting output voltage to obtain better motor torque.

Parameter Number	Pr14			
Setting	0	1	2	3
V/F Pattern				
Description	1. Constant-torque load. 2. Application for cart, Conveyor, etc.	1. Variable-torque load. 2. Application for fan, pump, etc.	Vertical lift loads.	Vertical lift loads.

(Note)

1. If set value of Pr0 is too high, it will caused over current when start the inverter, therefore inverter can not be started.
2. When Pr19=9999, the maximum output voltage of inverter is decided by the voltage of power supply.
3. When Pr99=3, Sensor-less vector control, the parameter setting value of Pr0 is invalid.

Pr1 Maximum Frequency
Pr2 Minimum Frequency
Pr18 High Speed Maximum Frequency



Maximum frequency is the highest frequency that inverter can run.

Minimum frequency is the lowest frequency that inverter can run.

Setting range of running frequency:

Pr2≦ running frequency ≦ Pr1 (Pr18).

1 “Maximum Frequency” and “High Speed Maximum Frequency” is corresponding with each other. When Pr1 is set, at the same time Pr18 is set. Vice Versa, when Pr18 is set, Pr1 is also set. Therefore Pr1 is equal to Pr18 forever.

2. When the maximum frequency is in the range of 0 to 120 Hz, Pr1 must be used.

   When maximum is in the range of 120 to 400 Hz, Pr18 must be used.

3. The running frequency write in will not allow when: (1) Running Frequency＜Pr2,

   (2) Running Frequency＞Pr1, or (3) Pr1＜Pr2.

Pr4 to Pr6 , Pr24 to Pr27, Pr126 to Pr133 Multi-speed

When inverter is in **External Mode** or **Combined Mode 2**, the running frequency can be set by the combination of input terminal. This function is Multi-speed operation.

Parameter Number	Description
Pr4 to Pr6	Pr4→speed 1(high speed), Pr5→speed 2 (middle speed), Pr6→speed 3 (low speed).
Pr24 to Pr27	Speed 4 to speed 7. When the value is 9999(default), speed setting is unavailable.
Pr126 to Pr133	Speed 8 to 15. When the value is 9999(default), speed setting is unavailable.

(Note)

1. When the initial value of Pr24 to Pr27 and Pr126 to Pr133 is 9999, it stands for 3 multi-speed operations. No matter what kind of combination among RL、RM、RH、REX, maximum multi-speed is 3. Please refer to following :

   1) When RL is ON, the initial value of Pr6 is frequency set.

   2) When RM is ON, the initial value of Pr5 is frequency set.

   3) When RH is ON, the initial value of Pr4 is frequency set.

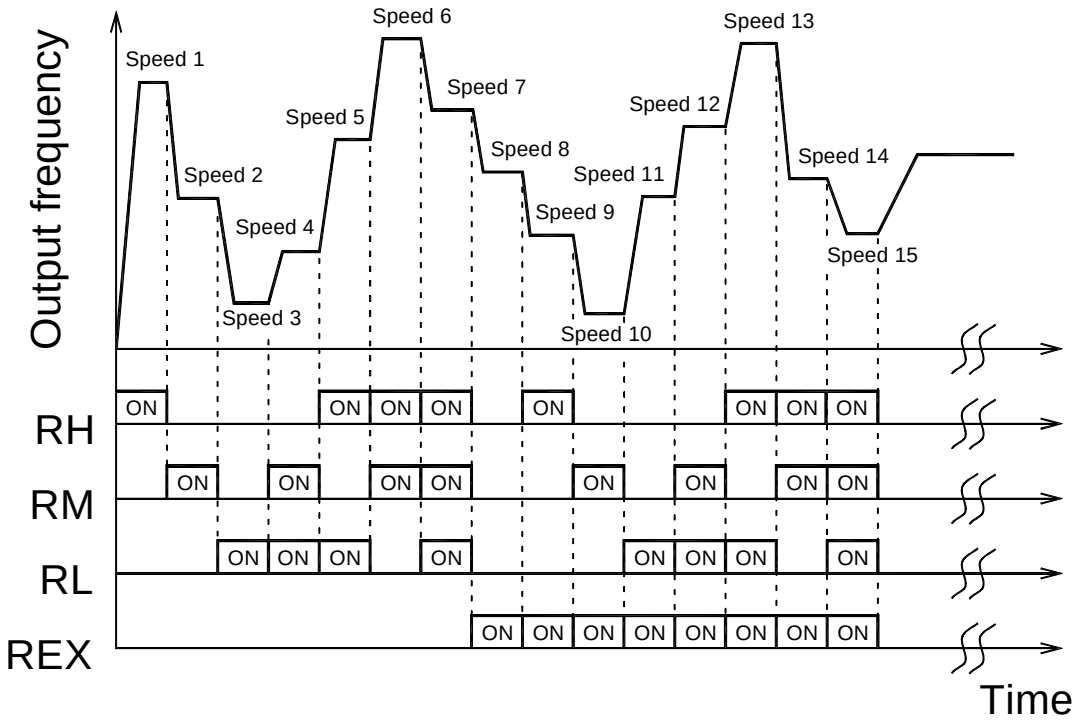
   4) When RL and RM are both ON, the initial value of Pr6 is frequency set (low speed prioritized).

5) When RL and RH are both ON, the initial value of Pr6 is frequency set (low speed prioritized).

6) When RM and RH are both ON, the initial value of Pr5 is frequency set (middle speed prioritized).

7) When RL, RM, and RH are both ON, the initial value of Pr6 is frequency set (low speed prioritized).

2. When the initial value of Pr24 to Pr27 and Pr126 to Pr133 is not 9999, it stands for multi-speed operation. There are 16 speed combinations of RL、RM、RH、REX and voltage, current.



3. When the partial value setting of Pr24 to Pr27 and Pr126 to Pr133 is 9999, for example if Pr27=9999(speed 7), then speed 7 is unavailable. Therefore, when feeding signal into RH, RM, RL, inverter is switchover to speed 3 and the value of Pr6 is setting frequency.

4. The terminals of RL、RM、RH、REX mentioned in this chapter, pleaser refer to Pr59 for function selection.(Page 52)

Pr7 Acceleration Time
Pr8 Deceleration Time
Pr20 Acceleration/Deceleration Reference Frequencies
Pr29 Acceleration/Deceleration Curve Pattern Selection

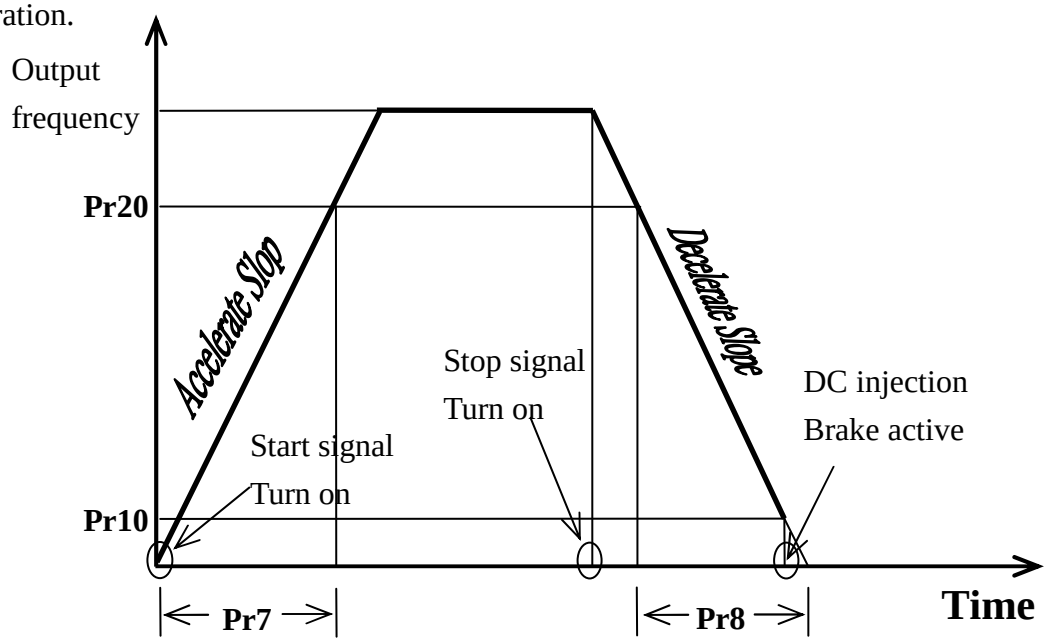
When Pr29=0: Linear Acceleration/Deceleration Pattern

The time for output frequency to accelerate from 0Hz to Pr20 is Acceleration Time (Pr7).
The time for output frequency to decelerate from Pr20 to 0Hz is Deceleration Time (Pr8).
The meantime to start motor is Starting Frequency.

Pr7、Pr20 are collocated and formed a acceleration slope. Pr8 and Pr20 are collated and formed a deceleration slope.

The output frequency is making linear increased based on acceleration slope during acceleration.

The output frequency is making linear decreased based on deceleration slope during deceleration.



(Note1) On above diagram it displayed the detail information of Linear Acceleration/Deceleration Pattern. It includes Acceleration Slope, Deceleration Slope, Starting Frequency (Pr13), DC Injection Brake (Pr10), etc. All these parameters should be considered to use together when it comes to perform parameter setting for inverter.

(Note 2) Please refer to Pr10 for DC Injection Brake.

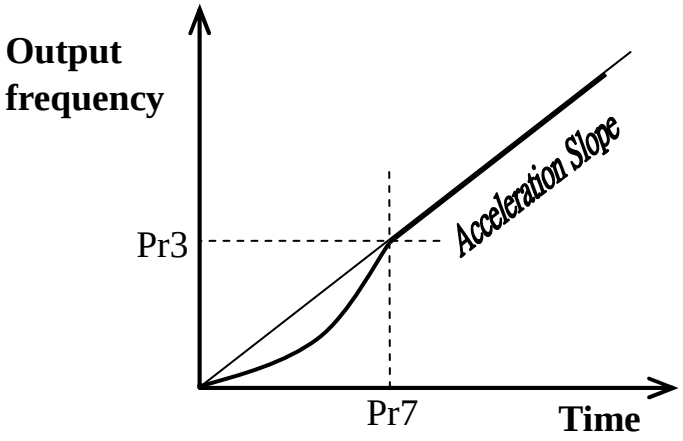
(Note 3) If the operation frequency of inverter is lower than initial value of Pr13, after motor start. The indicator of “FWD” or “REV” is flickering. But there is no voltage output and motor is not in operation.

When Pr29=1: S-Pattern Acceleration/Deceleration Curve

The special feature of this pattern is to accelerate from slow to high Speed, and is ramping up to high speed zone in a short period of time.

(Note 1)

Though in right-side diagram, there is no information about starting frequency (Pr13), and DC Injection Brake (Pr10), but in operation they are still valid for operation.



When Pr29=2: S-Pattern Acceleration/Deceleration Curve

Pr7 and Pr20 are collocated and making a acceleration slope.

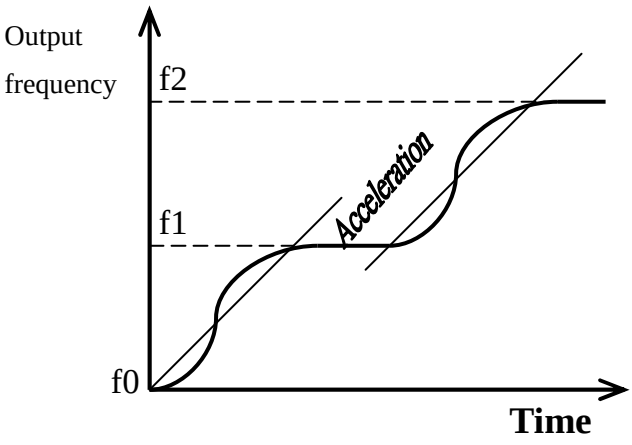
Pr8 and Pr20 are collocated and making a deceleration slope.

Whenever there is a change in rated frequency, acceleration curve is attached with acceleration slope to make S Pattern Ramp up. On the contrary, deceleration curve is attached with deceleration slope to make a S pattern ramp down.

As right sided diagram, rated frequency adjustment is from f0 to f1, one S shifting is made on S Acceleration Pattern. Again rated frequency adjustment from f1 to f2, again one S shifting is made.

(Note 1)This pattern is able to smooth the impact that generated by the phase of deceleration. It will prevent product dropping from conveyor.

(Note 2)Though Starting Frequency Pr13 and DC injection brake frequency Pr10 is not mentioned on right-sides diagram, but they are still functional during operation.



Pr9 Electronic thermal relay volume

1. “Electronic Thermal Relay” is to use inverter program to simulate if motor is overload (overheat) and to prevent motor from overheat.

2. If “mouse cage” mode sensor motor is used, the set value of Pr9 is as rated current when motor is operation at 60Hz.

3. When Pr9=0, the function of Electronic Thermal Relay is invalid.

4. When TH-RY calculates that there are too much heat accumulated during motor operation, inverter generates ALARM (indicator of ALARM is lit), inverter stop output and display on screen of Digital Unit.

5. After inverter reset for restart, the history of accumulated heat reading from TH-RY will be erased and reset it to “zero”. Please do take extra attention on this.

6. If multiple Motors are wired to inverter, TH-RY can not be used as overheat protection for motor. Please mount an external TH-RY for individual motor.

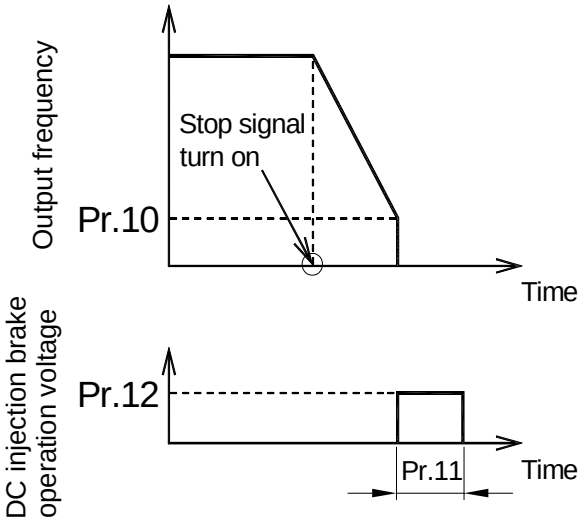
7. When a special motor is in use, do not use built-in TH-RY, please install external TH-RY. The operation and wiring method for external TH-RY, please refer to Pr59.(page 52)

Pr10 DC injection brake operation frequency
Pr11 DC injection brake operation time
Pr12 DC injection brake ability

1. When stop signal turns on, the output frequency of inverter is dropping gradually. When output frequency is lowered than DC injection brake frequency (Pr10), DC injection brake will active.

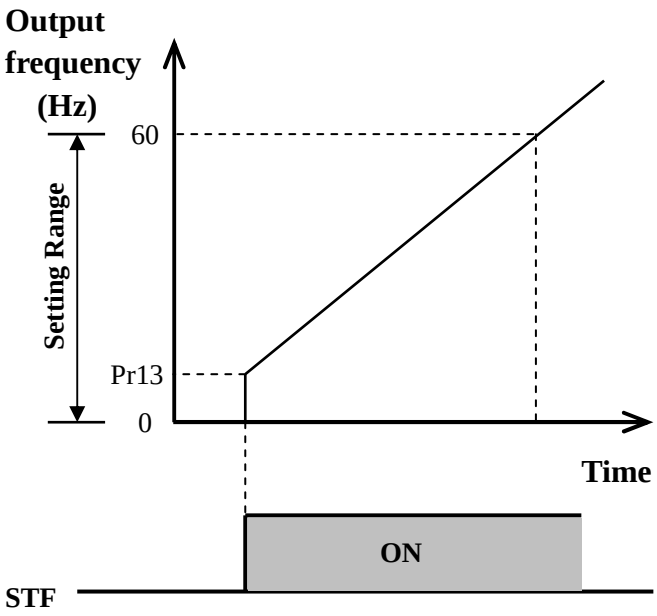
2. When DC injection brake is in operation, inverter will output DC voltage to lock the rotor. The larger value of Pr12 is, more the braking power is.

3. The operation of DC injection brake will last a short period of time (Pr11 setting value) to smooth away physics inertia of Motor rotation operation. User must set appreciate value setting for Pr11 & Pr12 in order to achieve proper holding torque attained.



Pr13 Starting Frequency

1. You can set the starting frequency at which the start signal is turned on.
2. Frequency at start can be set in the range 0 to 60Hz.



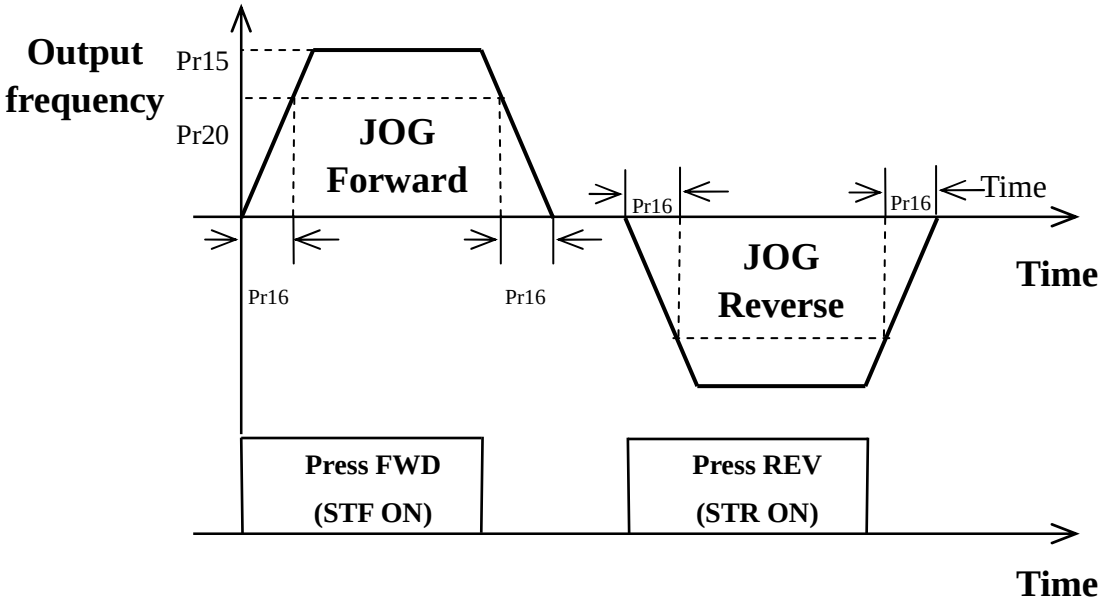
(note1)The inverter will not start if the frequency setting signal is less than the value set in Pr. 13.

For example, when 5Hz is set in Pr. 13, the motor will not start running until the frequency setting signal reaches 5Hz.

Pr15 JOG frequency

Pr16 JOG Acceleration/Deceleration time

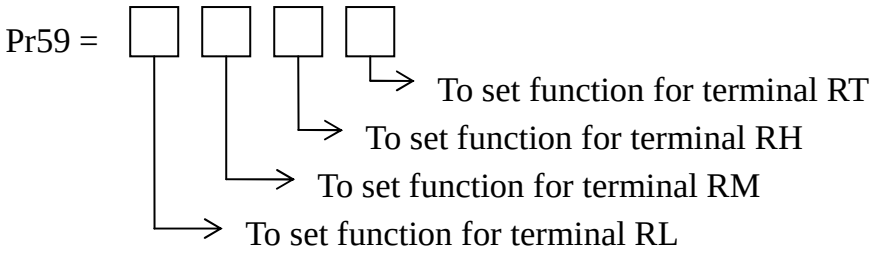
In JOG Mode, the rated frequency is the set value of Pr15.The initial value of Pr16 is Acceleration/Deceleration Time. And Pr20 is Acceleration/Deceleration reference frequency



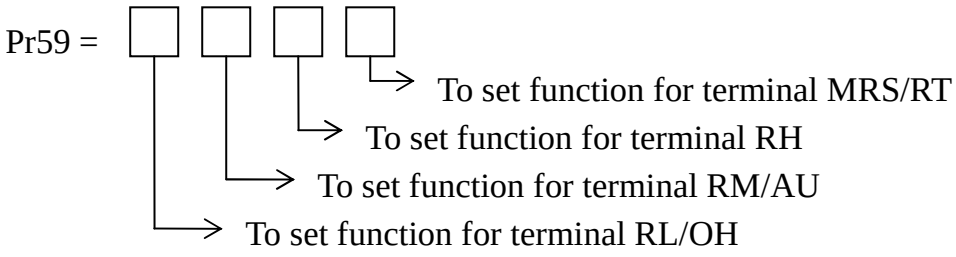
Pr17 External Thermal relay selection
Pr59 Multifunction input terminal function selection

In order to prevent motor overheat, motor wiring is added Thermal Relay. External Thermal Relay function selection must refer to Pr59 parameter, for instance Pr59=3459(5.5K~22K for example), means「terminal name RL correspond to RL function」, 「terminal name RM correspond to OH function」, 「terminal name RH correspond to STOP function 」,「terminal name RT correspond to REX function」.

Medium capacity inverter series of 5.5K to 22K (7.5HP to 30HP), there are 4 digits in Pr59, individual digit is stand for different function setup. Relevant positions as following :



Small capacity inverter series of 0.75K to 3.7K (1HP to 5HP), there are 4 digits in Pr59, individual digit is Stand for different function setup. Relevant positions as following :

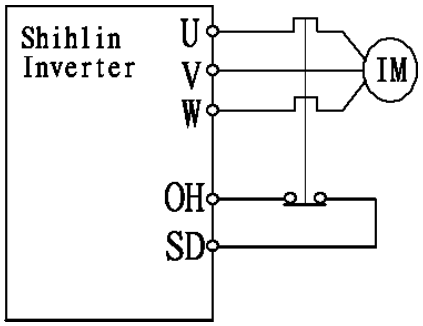


Parameter	Setting value	Function name	Description	
P59	0	AU	When in External Mode or Combined Mode 2, and AU is ON, the rated frequency is assigned by current signal.	Refer to Pr39 (page 59)
	1	RH	Multi-speed control(high speed)	Refer to Pr4 (page 46)
	2	RM	Multi-speed control(medium speed)	
	3	RL	Multi-speed control (low speed)	
	4	OH	External Thermal Relay(External TH-RY)	Refer to Note 1,4
	5	STOP	Self-Holding Function	Refer to Note 2
	6	MRS	Turn on MRS more than 20ms to stop the inverter output.	---

	7	RT	When RT is on to select 2nd functions.	Refer to Pr44 (page 62)
	8	JOG	Jog operate	Refer to Pr15, Pr16 (page 51)
	9	REX	Multi-speed control	Refer to Pr4 (page 46)

(Note 1) The wiring for External TH-RY:

The traditional motor wiring in the usual Condition , it is to mount a Thermal Relay during wiring to avoid motor rotates under overheat condition. When Shilin Inverter is in use, feature of an external Thermal Relay function is also provided (Illustrated only by Sink Input). When the External Thermal Relay is overload, Inverter is going to generate Overload Alarm. Monitor screen OHF is displayed.



(Note 2) Self-Holding Function Description:

"When in "External Mode" or "Combined Mode 1,3", STOP terminal is ON, and then Press STF or STR(switch "off" to "on" and then back to "off") one time. It will keep motor operation, if try to stop Motor Operation, Press STOP to turn off. STOP terminal is off. If you are trying to keep motor in operation, STF and STR terminal must be ON.

(Note 3) Inverter of 5.5K to 22K (7.5HP to 30HP) series:

1. When Pr59=9999 (initial value)「terminal name RL correspond to RL function」,「terminal name RM correspond to RM function」,「terminal name RH correspond to RH function」,「terminal name RT correspond to RT function」.
2. Inverter of 0.75K to 3.7(1HP to 5HP) series:
   WhenPr59=9999 (initial value) and Pr17=0(initial value)、Pr44=9999(initial value) 。「terminal name RL/OH correspond to RL function」,「terminal name RM/AU correspond to RM function」,「terminal name RH correspond to RH function」,「terminal name MRS/RT correspond to MRS function」.

3. When Pr59=9999 (initial value) , Pr44=9999(initial value), then「terminal name MRS/RT correspond to MRS function」.
   When Pr59=9999 (initial value) , Pr44≠9999(initial value), then「terminal name MRS/RT correspond to RT function」.

   Example:
   When Pr59≠9999 , Pr59=3459, then 「terminal name RL/OH correspond to RL function」,「terminal name RM/AU correspond to OH function」,「terminal name RH correspond to STOP function」,「terminal name MRS/RT correspond to REX function」.

(Note 4) Parameter of Pr59 and Pr17

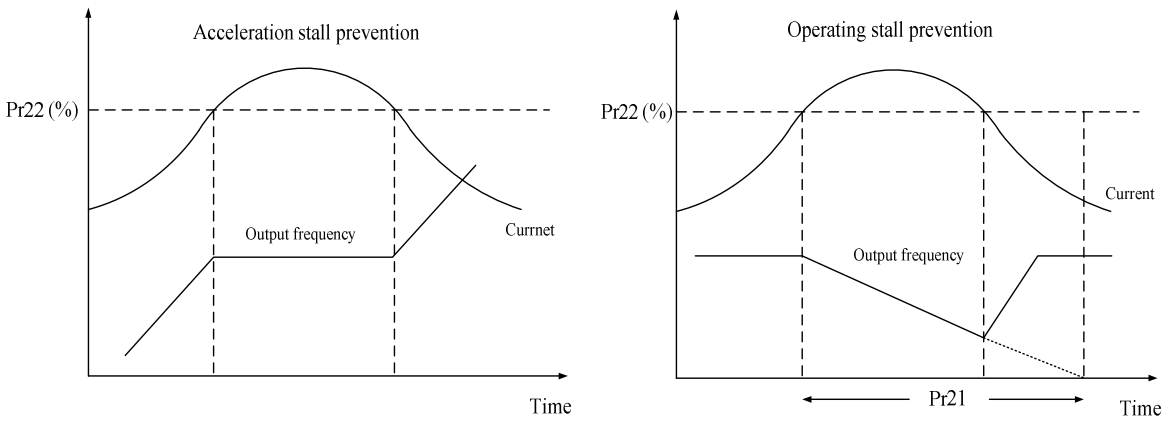
Necessary condition	Value	Description
Pr59=9999 (initial value)	Pr17=0	Terminal RL , Function RL.
	Pr17=1	Terminal RL , Function OH , NC status input.
	Pr17=2	Terminal RL , Function OH ,NO status input.
Pr59≠9999	Pr17=0	External Thermal relay functions as NC status input
	Pr17=1	
	Pr17=2	External Thermal relay functions as NO status input

Pr21 Stall deceleration time during running
Pr22 Stall prevention operation level
Pr66 Stall prevention level reduction starting frequency
Pr23 Stall prevention operation level compensation factor at double speed (offset coefficient)

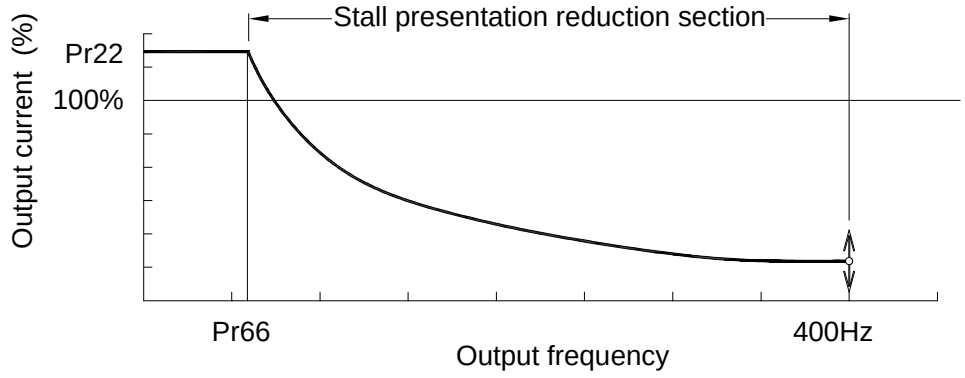
1.When Induction Motor is in reducing load state, its rotation speed is closed to synchronous speed; therefore its rotation torque is small. When the load is increased, rotation speed is dropping but the output rotation torque is higher (The output current from inverter is also making a direct Proportion increased), this is to smooth load. If input load is increased and makes the motor output rotation torque exceed Max. Rotation Torque, instead the increased load lowers motor rotation torque. The phenomenon is STALL.

2. Stall Prevention Function：

During acceleration of output frequency, motor rotation speed is slower than output frequency of inverter. In the meantime output current is increased, if output current is higher than pattern shown below. Inverter is automatically varies to reduce the output frequency in order to wait motor rotation speed to keep up with output frequency. (Output current will also slow down), and then to increase output frequency.



The inverter will start decreasing when the current reach the stall prevention level. The decreasing time will depend on Pr21 until the output current is lower than stall prevention level. After that the inverter will restart accelerating to the target frequency by acceleration time pr7.



3. When output frequency is lower than Pr66, Stall presentation Operation level is Pr22.
When output frequency is higher than Pr66, Enter stall prevention reduction section.
Stall prevention Operation Level is decided as the formula below:

$$\text{Stall presentation operation level} = A + B \times \frac{\text{Pr}\,22 - A}{\text{Pr}\,22 - B} \times \frac{\text{Pr}\,23 - 100}{100}$$

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

(Note 1) If stall prevention operation is performed a long period of time, the inverter is stopped because of ALARM. Display on Operation Panel show message of OLT.

(Note 2) When Pr22=0, stall prevention function is invalid.

Pr28 Alarm reset times limitation

Parameter value	Setting value	Description
Pr28	0	Unlimited for reset
	1-10	After maximally used the reset times, only reboot can make alarm status back to normal.

Pr30 Regenerative function selection
Pr70 Special regenerative brake duty

1. When the output frequency of inverter has shifted from high frequency to low frequency (during deceleration). Due to inertia load, a momentary motor torque is higher than output frequency of inverter, and caused generator effect, it also creates voltage regenerated between terminals of P-N in main circuit, the regenerative may caused possible damage to inverter. Therefore to install suitable brake resistor between terminals of P & PR. in order to consume regenerated voltage.

2. There is one transistor in inverter (called Brake transistor). Time ratio when transistor is on, called Regenerative Brake Duty). If regenerative brake setting value is higher, brake resistor is consumes more regenerative load, but actual brake resistor watt value must be considered.

Pr Number	Setting	Description
Pr30	0	Regeneration brake using rate 3%(Initial Value), Pr70 Invalid
	1	Regeneration brake using rate is Pr70 setting value
Pr70	0 to 30%	Regeneration brake using rate.

(Note 1)When often make starts/stops, must use the high-power brake resistor to increase the regenerative brake using rate

(Note 2)Please refer to 1-6-4 (page 26) as reference for purchasing brake resistor.

⚠ 5.5KW/7.5KW built-in brake resistor and it is only good for regeneration function 3% as factory default value. If higher regeneration function is desired, please remove built-in brake resistor and replace with high-power brake resistor.

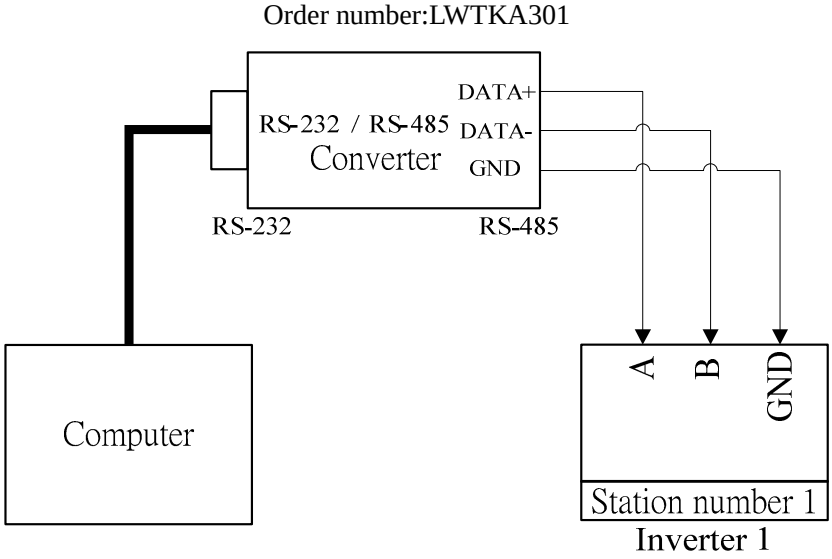
Pr32 Communication speed
Pr36 Station number
Pr48 Data length
Pr49 Stop bit length
Pr50 Parity check presence/absence
Pr51 CR、LF presence/absence
Pr52 Number of communication retries
Pr53 Communication check time interval

Through interface RS485, the required parameters that inverter needs to communicate can be obtained. Users can perform parameter setting and monitoring, etc, by using the Shihlin communication software, please refer to communication Protocol in appendix 1.(page102)

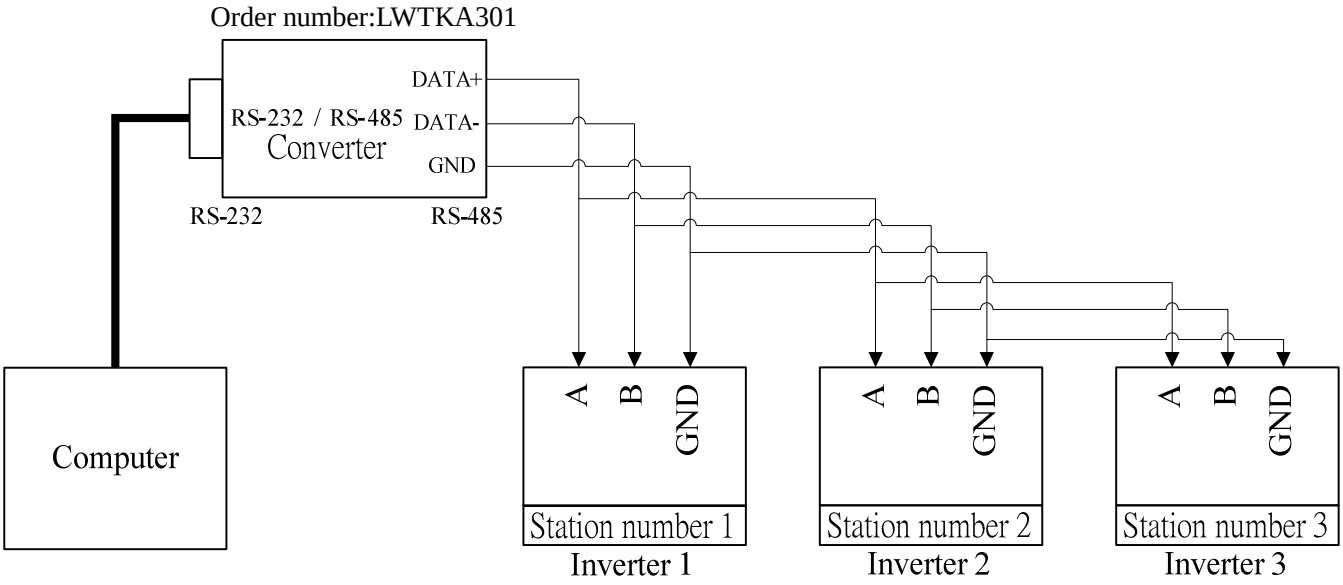
Pr Number	Setting	Description
Pr32	0	The Baud Rate is 4800 bps
	1	The Baud Rate is 9600 bps
	2	The Baud Rate is 19200 bps
Pr36	0 to 31	When several inverters connect to 1 PC, different station number is required.
Pr48	0	8 Data bit
	1	7 Data bit
Pr49	0	1 Stop bit
	1	2 Stop bit
Pr50	0	No parity check
	1	Odd parity check
	2	Even parity check
Pr51	1	Available only CR
	2	CR, LF available
Pr52	0 to 10	Allowable Number of Communication ALARM between PC or Control Panel
Pr53	0、0.1 to 999.8	After communication, and move to next communication time interval. Pr53=0, No communication
	9999	No Time Interval Setting

(Note) Communication connection graph:

For only one inverter connecting to computer



For multi-inverter connecting to computer



Pr37 Speed Display

Pr Number	Setting	Description
Pr37	0	Under monitoring output frequency mode in control panel, The display screen is display the value of output frequency of inverter.
	1 to 9998 (Actual linear speed unit)	DU Operator is in monitoring output frequency mode, the screen show the corresponding mechanical speed when inverter is in operation. The setting value of Pr37 is corresponding mechanical speed when set inverter's output frequency at **60Hz.** Propose Setting value could be presented as conversion formula $\frac{Pr37 \times Pr1}{60} \leq 9998$ Example: The rotation speed of conveyor is 950 meter/min when set inverter's output frequency at 60Hz, so set value in Pr37=950. The screen on digital unit is display the speed 950 meter/minute of conveyor belt under monitoring output frequency.

Pr38 Rated Frequency at 5V (10V)
Pr73 Voltage signal selection

When inverter is in External Mode or Combined Mode 2, in Analog input Terminals2-5, input voltage can be selected and set the rated frequency.

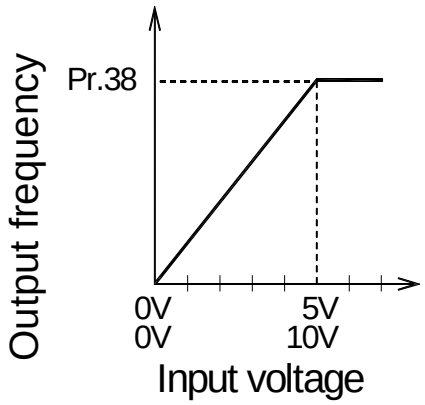
Pr Number	Setting	Description
Pr73	0	Input voltage valid range 0 to 5V.
	1	Input voltage valid range 0 to 10V.
Pr38	1 to 400Hz	The value of Pr38 is rated frequency of input voltage as 5V(10V)

(Note1)

When in External Mode or Combined Mode 2, AU terminal is “On”, and RL、RM、RH、REX are all in” off” status. Rated frequency of vector control is assigned by voltage signal.

(Note 2)

In this paragraph there are RL, RM, RL, RH, REX,AU mentioned as terminal function. The function and its selection, please refer to Pr59(page 52)



Pr39 Rated frequency at 20mA

When inverter is in External Mode or Combined Mode 2, in Analog input Terminals 4-5, input current can be selected and set the rated frequency.

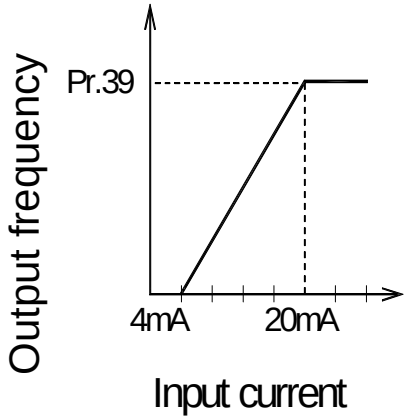
Pr Number	Setting	Description
Pr39	1 to 400Hz	Pr39 value setting is the rated frequency when current signal is 20mA.

(Note1)

When in External Mode or Combined Mode 2, AU terminal is “On”, and RL、RM、RH、REX are all in” off” status. Rated frequency of vector control is assigned by current signal.

(Note2)

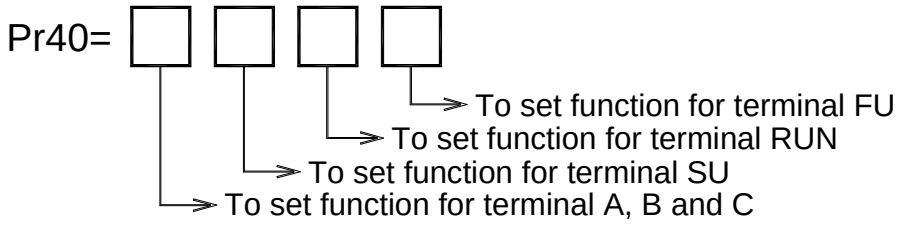
In this paragraph there are RL, RM, RH, REX, AU mentioned as terminal function. The function and its selection, please refer to Pr59 (page 52)



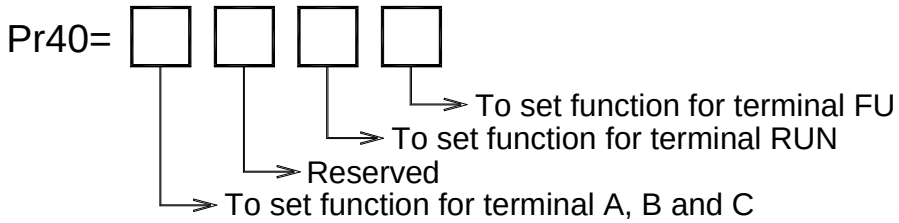
Pr40 Multifunction output terminals function selection

Medium capacity product series of 5.5K to 22K (7.5HP to 30HP), Pr40 has 4-digits.

Counterpart details as below :



Small capacity product series of 0.75K to 3.7K (1HP to 5HP), Pr40 has 4-digit and there will be 3 digit set for different function, Counterpart details as below :

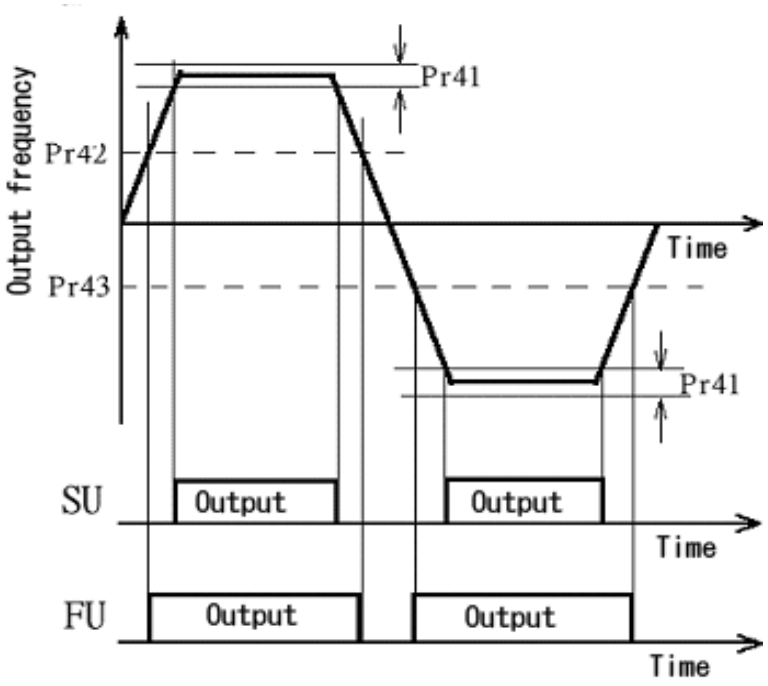


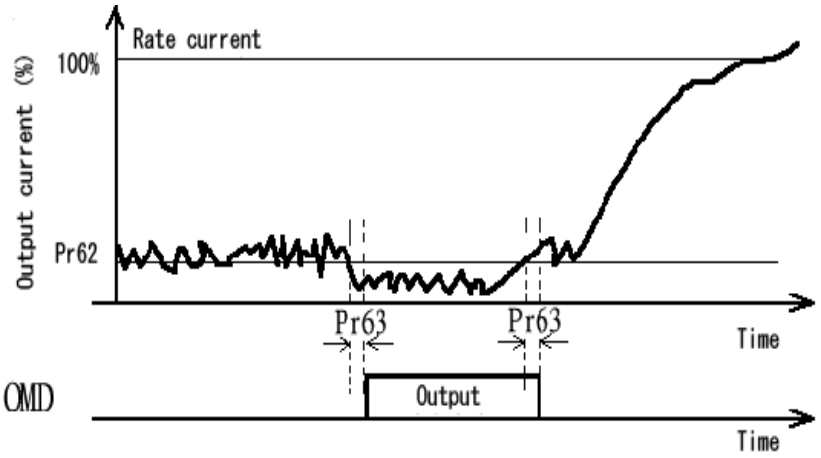
Parameter	Setting value	Function name	Description
Pr40	0	RUN Motor in operation	When there is voltage output, set “RUN” as “OUTPUT Terminal”. The output signals are given for indicating motor in operation.
	1	SU Frequency detection range	When output frequency reached closer range to rated frequency (range value is defined by Pr41),Output terminal ”SU” will transmit signal.
	2	FU Output frequency detection	When Forward rotation frequency output is higher than Pr42 setting, or reverse rotation frequency output is higher than Pr43, Output terminal ”FU” will transmit signal.
	3	OL Overload alert	When % of output current is higher than Pr22 setting, Output terminal ”OL” will transmit signal.
	4	OMD Zero current detection	When % of output current is lower than Pr62 setting for a period of time (the length of time is assigned thru Pr63 setting), Output terminal ”OMD” will transmit signal.
	5	ABC Alert output	Alarm Detection Faction. When operate normally, NO, point A-C, NC , point B-C. When malfunction occurs (Alarm Indicator is lit) NC point A-C, NO, point B-C.
	6	PID PID alert detection	Under control of PID mode，the inverter got feedback that alarm detective function is operating，and when feedback frequency is more than or equal to rated value (Pr166) and sustain for a while (Pr167), the terminal function name as PID will transmit signal。

(Note 1) Except ABC relay point, all other input terminals inner structure is Open Collector mode.

(Note 2) When unit’s , ten’s, hundred’s digit of Pr40 is set in “5”, when alarm occurs the alarm message will be output from open collector.

Pr41 Output frequency detection (SU terminal)
Pr42 Output frequency detection for forward rotation (FU terminal)
Pr43 Output frequency detection for reverse rotation (FU terminal)
Pr62 Zero current detection level
Pr63 Zero current detection time

<table>
<tr><th>Parameter</th><th>Setting Range</th><th>Description</th></tr>
<tr><td>Pr41</td><td>0 to 100%</td><td rowspan="3"> 
</td></tr>
<tr><td>Pr42</td><td>0 to 400Hz</td></tr>
<tr><td>Pr43</td><td>0 to 400Hz</td></tr>
<tr><td colspan="3">1. When Pr41=5%, and Output Frequency is ramping closer to “set frequency” in the range of 5%, SU is set as Output terminal and it will output signal. For example, if rated frequency at 60Hz, Pr41=5%, and output frequency is in the range of 60±60×5%=63Hz and 57Hz, SU terminal is going to output signal.
2. If Pr42=30 and Pr43=20, when the output frequency of forward rotation is exceeds 30Hz or output frequency of reverse rotation is exceeds 20Hz, FU terminal is set as output terminal and it will output signal.
3. If Pr42=30 andPr43=9999(factory default initial value), when the output frequency of forward or reverse rotation is exceeds 30Hz, FU terminal is set as output terminal and it will output signal.</td></tr>
</table>

<table>
<tr><td>Pr62</td><td>0-200%</td><td rowspan="2"> 
</td></tr>
<tr><td>Pr63</td><td>0.05-0.1 sec</td></tr>
<tr><td colspan="3">1. To presume the rated current of inverter is 20A, Pr62=5% and Pr63=0.5sec, when output current is smaller than 20*5%=1A and run over 0.5sec. OMD terminal is going to output signal as diagram below:
2.When the value of Pr62 or Pr63 is set at 9999, zero current detection function is invalid.</td></tr>
</table>

Pr44 Second acceleration/deceleration time
Pr45 Second deceleration time
Pr46 Second torque boost
Pr47 Second V/F (base frequency)

1. The terminals RT is on, 2nd function is valid. The feature of motor operation, please refer to 2nd function. The initial value of Pr44 is acceleration time , The initial value of Pr45 is deceleration Time. The initial value of Pr46 is torque boost and the initial value of Pr47 is base frequency.
2. If Pr44=9999 (initial value), all the 2nd function is invalid. Also when RT is on, acceleration time is the initial value of Pr7. Deceleration time is the initial value of Pr8. Initial value of Pr0 is torque boost. The initial value of Pr3 is base frequency.
3. When Pr44≠9999 and Pr45=9999, and when RT is on, deceleration time is as Pr44 initial value.
4. When Pr44≠9999 and Pr46=9999, and RT is on, torque boost is increased as Pr0 initial value.
5. When Pr44≠9999 and Pr47=9999, and RT is on, base frequency is as Pr3 initial value.

Pr80 FM/AM Output terminal selection (require hardware switch SW1)
Pr54 FM/AM Function selection
Pr55 Frequency display model
Pr56 Current display model
Pr81 AM Signal output magnification
Pr191 AM Output terminal revision
Pr192 FM Output terminal revision

When Pr80=0，External terminal 〝FM/AM〞 is AM，Terminal name FM/AM—5 could output 0~10 voltage，which is used to conduct to PLC A/D model or to provide Inverter 0~10V DC Input.

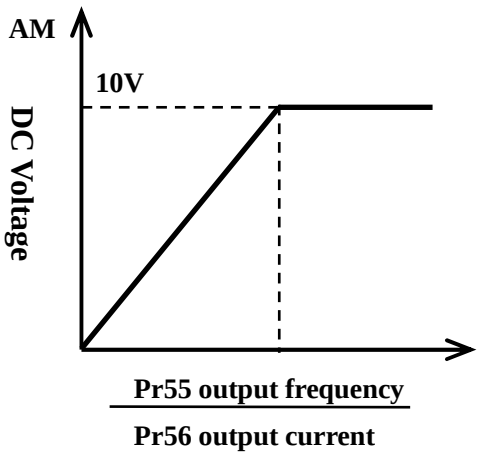
When Pr80=1，External terminal 〝FM/AM〞 is FM，Terminal name FM/AM—SD could be connected a current meter (The whole scale is current meter of 1mA or frequency meter)，which can indicate output frequency of or output current of inverter；Functions of FM and AM share the same terminal，if functions change (Value of Pr80 changes) meanwhile, SW1 on the control panel is switching，initial value is AM.

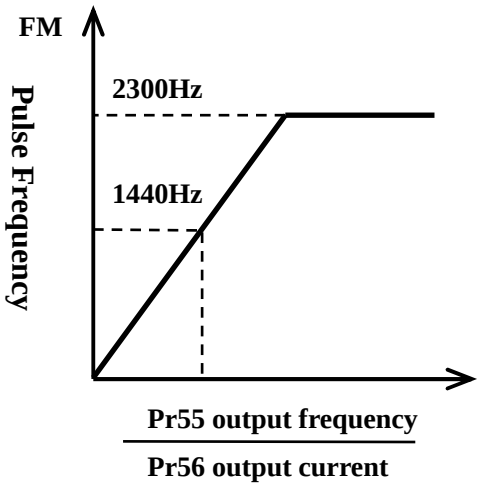
Parameter	Value	Description
Pr80	0	Analog output，FM/AM—5 terminal outputs 0~10V DC voltage.(Note2)
	1	Pulse output，FM/AM—SD terminal outputs pulse of 0~2300Hz.
Pr54	0	No output.
	1	Output frequency of inverter (relating to setting of Pr55).
	2	Output current of inverter (relating to setting of Pr56).
	3	DC voltage of DC Bus (1000V=10V).(Note 2)
	4	Heat sink temperature (25°C~100°C =0~10V).(Note 2、3)
	5	2-5 terminal could be input the switching voltage (0~10V=0~10V).(Note 2)
	6	4-5 terminal could be input the switching voltage (4~20mA=0~10V).(Note 2)

(Note) 1. Inverter's AM function of 0.75K~3.7K can only output 0~5V DC voltage.

2.When Pr80=0，functions of Pr54=1~6 are all valid，when Pr80=1，functions of Pr54=3~6 are invalid.

3.0.75K ~ 3.7K series inverter without the temperature feedback signal, therefore Pr54 = 4 is failure.

<table>
<tr><td>Parameter</td><td>Value</td><td colspan="3">Description</td></tr>
<tr><td rowspan="2">Pr55</td><td rowspan="2">0~400Hz</td><td>Pr80=0
Pr54=1</td><td>When the output frequency of inverter is value of Pr55, terminal name FM/AM will output 10V DC voltage.</td><td rowspan="3"> 



(Note) The max possible output pulse frequency for FM functions is 2300Hz.</td></tr>
<tr><td>Pr80=1
Pr54=1</td><td>When the output frequency of inverter is value of Pr55, terminal name FM/AM will output 1440Hz pulse.</td></tr>
<tr><td rowspan="2">Pr56</td><td rowspan="2">0~500A</td><td>Pr80=0
Pr54=2</td><td>When the output frequency of inverter is value of Pr56, terminal name FM/AM will output 10V DC voltage.</td></tr>
<tr><td>Pr80=1
Pr54=2</td><td>When the output frequency of inverter is value of Pr56, terminal name FM/AM will output 1440Hz pulse.</td></tr>
<tr><td>Pr81</td><td>0~20</td><td colspan="3">AM signal output magnification，Unit 0.01.
EX: Setting Pr54=1，Pr55=60Hz，Pr81=2.00，Make inverter runs as 30Hz, FM/AM-5 terminal outputs voltage from 5V to 10V.</td></tr>
<tr><td>Pr191</td><td>0~50</td><td colspan="3">Step1: Setting Pr80=0.
Step2: Setting Pr54=0.
Step3: Terminal FM/AM—5 externally connect to a multifunctional current meter.
Step4: Set Pr191until the voltage on the meter back to zero.</td></tr>
<tr><td>Pr192</td><td>0~9998</td><td colspan="3">Step1: Terminal FM/AM externally connect to「Current meter, scale as 1mA」，Set Pr54=0 (Extra external meters are used to indicate output frequency).
Step2: The rated frequency of the inverter is 60Hz, then start the motor.
Step3: After stabilization，Read setting value of Pr192，and the monitor displays the right revised constants.
Step4: Press ▲，the hand of the front of meter moves up，the revised constants on the monitor increases more and more.
Press ▼，the hand of the front of meter moves down，the revised constants on the monitor decreases more and more.</td></tr>
</table>

Pr57 Restart coasting time
Pr58 Restart cushion time

Parameter	Setting	Description
Pr57	9999	During operating, drive will stop output voltage after instantaneous power failure*1. There is NO RESTART after recovery.
	0 to 5sec	During operating, drive will stop output voltage after instantaneous power failure*1. Set the waiting time for drive-triggered restart after power failure. (Restart Coasting Time is set in Pr57). Inverter will restart automatically.
Pr58	0 to 60sec	Right after Motor Restart, output frequency is set running frequency but output voltage value is zero, then gradually ramp up to Proper voltage value. Time that required to ramp up is Restart Cushing time(Pr58).

*1: Momentary power outage is that the CPU still working , and the PN voltage lower than the inverter can be running the operation voltage, in this state for some time the display will show "UVT".

Pr60 Input signal filter constant

When reference of rated frequency is set from voltage signal or current signal, voltage/current must be converting by A/D to generate useful value. Due to above, Precision of components or signal interference influence, it results in external voltage or current signal furcating and it will also lead to rated frequency furcating. correspondingly, it will result unstable motor rotation.

For the parameter setting of Input Signal Filter Constant, its function is used to adjust and eliminate varying rated frequency that causes by component and the factor of interference. When the set value of Pr60 is higher, at the same time there will be better filtering ability and a bit of delay responding occurred.

Pr61 Motor noise modulation selection

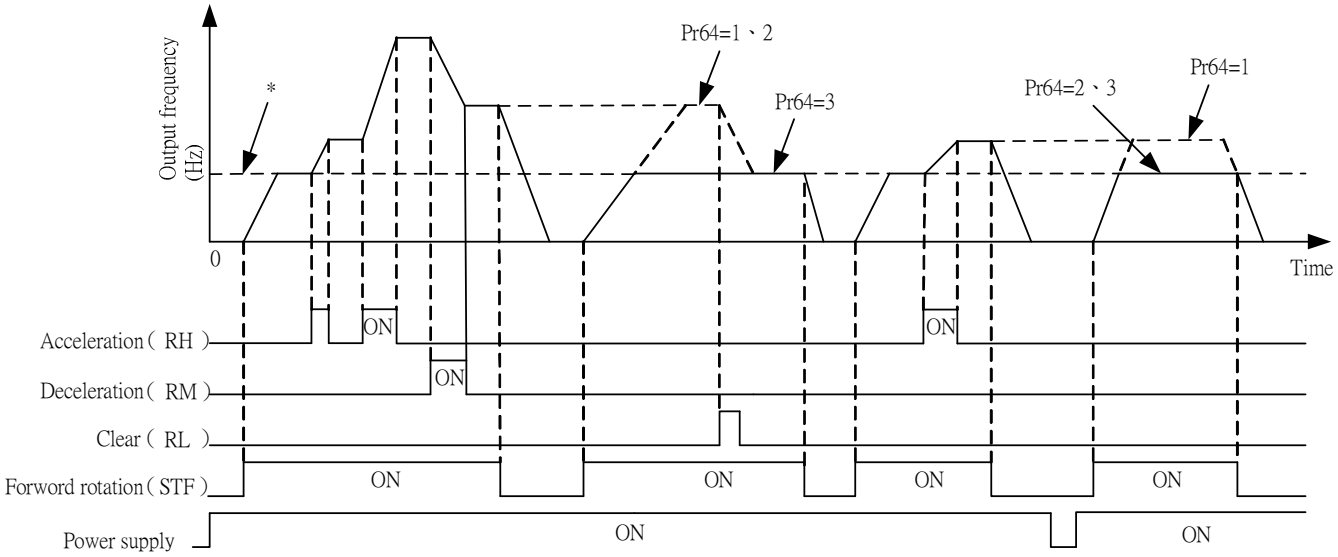
Motor noise modulation control is when the inverter varied its carrier frequency from time to time during operation, The metal noise that generates by motor is not a single frequency. This function selection is to improve the high peak single frequency noise.

Setting Value	Noise Modulation Selection
0	**NO modulation control** (Initial Value)
1	**With modulation control**

Pr64 Remote function selection

Even if the operation panel is located away from the enclosure, you can use contact signals to perform continuous variable-speed operation, without using analog signals.

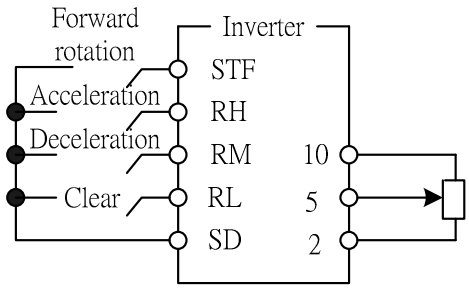
Parameter Number	Initial Value	Setting Range	Description		
			Setting Value	Remote function selection	Frequency setting storage function
Pr64	0	0~3	0	NO	---
			1	YES	YES
			2		NO
			3		NO (Turning STF/STR off clears remotely- set frequency.)



*External operation frequency (other than multi-speed) or PU running frequency

Remote setting function

1. Use Pr. 64 to select whether the remote setting function is used or not and whether the frequency setting storage function in the remote setting mode is used or not.
   When Pr. 64 is set to any of "1 to 3" (remote setting function valid), the functions of the RH, RM and RL signals are changed to acceleration (RH), deceleration (RM) and clear (RL).



Connection diagram for remote setting

2.When the remote function is used, the output frequency of the inverter can be compensated for as :
   External operation….Frequency set with RH and RM operation + external operation frequency other than multi-speed
   PU operation……. Frequency set by RH/RM operation + PU running frequency

Frequency setting storage

The frequency setting storage function stores the remotely-set frequency (frequency set by RH/RM operation) into the memory (EEPROM). When power is switched off once, then on, operation is resumed with that output frequency value. (Pr. 64 = 1)

Frequency setting storage conditions

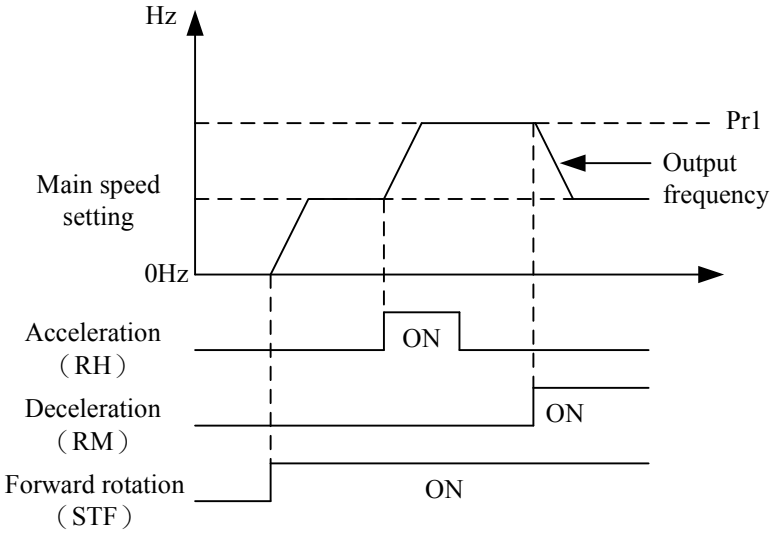
1.Frequency at the point when the start signal (STF or STR) turns off

2.The remotely-set frequency is stored every one minute after one minute has elapsed since turn off (on) of both the RH (acceleration) and RM (deceleration) signals. (The frequency is written if the present frequency setting compared with the past frequency setting every one minute is different. The state of the RL signal does not affect writing.)

Note1.The range of frequency changeable by RH(acceleration) and RM (deceleration) is 0 to (maximum frequency – main speed setting) . The output frequency is limted by Pr.1.

Note2. When the acceleration or deceleration signal switches on. acceleration/deceleration is made in the time set to Pr. 7 and Pr. 8

Note3. When the RT signal is on , Pr44≠9999 and Pr45≠9999. acceleration/deceleration is made in the time set to Pr. 44(2nd acceleration time) and Pr. 45(2nd deceleration time)



Pr65 Retry selection
Pr67 Number of retries at alarm occurrence
Pr68 Retry waiting time
Pr69 Retry count Display erases

1. If alarm occurs, the drive resets itself automatically to restart (retry). Restart function is only available for OLT overload Alarm, or P-N over voltage alarm.
2. The inverter can roll back to previous status conditionally during operation . For example if alarm occurs, inverter reset itself for restart but in 30sec another alarm occurs, this type of alarm is "**Continues ALARM.** If continues alarm is occurred several times in a short period of time and exceeded some number, it means a major failure is occurred. This failure must be eliminated and at the same time NO RETRY will be this function is number of retries at alarm occurrence, Pr67.

3 Either overload alarm or P-N over voltage is not continued alarm, therefore the number of retires at alarm occurrence is not limited it retry number when alarm occurs.

4. In between the time of alarm occurrence and Inverter Retry is Retry Waiting Time.

Parameter	Setting	Description
Pr65	0	**No Retry function**. When alarm occurred, inverter stop to output voltage. All function will be locked when Alarm Indicator is lit.
	1	When **Over voltage** is occurred between P-N, inverter stop to output voltage and after a short period of time(initial value in Pr68), inverter reset itself for retry.
	2	When **Overload OLT、THM** occurs, inverter stop to output voltage and after a short Period of time (initial value in Pr68), inverter reset itself for retry.
	3	When over voltage between **Over voltage、Overload OLT or THM** occurred, inverter stop itself to output voltage and after a short period of time (initial value in Pr68), inverter reset itself for retry.
Pr67	0	No Restart
	1 to 10 (1to10 times)	If Continues Alarm occurs, and number of alarm is less than value in Pr67, inverter will reset itself for retry. In case the number of alarm occurs is more than value in Pr67, inverter won't be able to reset for retry. During Retry Waiting Time, indicator alarm is off.
	11 to 20 (1to10 times)	All function as above. The only difference is in "Retry Waiting Time", Alarm indicator is lit. After restart, Alarm indicator is off.
Pr68	0 to 360sec	Retry Waiting Time
Pr69	---	Every time when Retry is made successfully, the value number is accumulated 1 automatically. Therefore the readout value is cumulative number of retry time made by retry. If write in Pr69=0, retry history counts in CPU will be erased.

After the time that parameter Pr68 need to prepare rollback, the inverter will begin to rollback. Therefore, when the function is chosen, action may cause the operator danger , please handle with cautions and carefulness.

Pr71 Brake option

Parameter	Setting value	Description
Pr71	0	After pressing the stop button, the inverter voltage stops at the same time, the motor coasts to a stop.
	1	After pressing the stop button, the motor will decelerate according to the curve to a stop.

Pr72 Carrier frequency

1. When carrier frequency is higher, the mechanical noise of motor is smaller, but if current leakage chance is higher, the interference that generates by motor is larger.
2. When carrier frequency is getting higher, inverter consumes more energy, and heat of inverter is getting higher.
3. If there is any mechanical resonance occurs, the value number of Pr72 can be used to improve such issue.
4. If value set in Pr99=3, sensorless vector control, the range of carrier frequency is 2k～10kHz.

(Note) The value of Load Frequency is better having 10 times value more than rated frequency.

Pr74 Starting terminals function selection

Input terminals of STF and STR is Starting Terminals. When inverter is in External Mode, or Combined Mode 1 and 3, there are different combination of START/STOP of Motor Rotation, detail as following chart:

Parameter	Pr74					
Setting	0			1		
Description	STF	STR	Motor Rotation	STF	STR	Motor Rotation
	off	off	STOP	off	off	STOP
	off	on	Start Reverse Rotation	off	on	STOP
	on	off	Start forward Rotation	on	off	Start forward rotation
	on	on	STOP	on	on	Start reverse rotation

Pr75 Reset Selection

Pr75 Setting	RESET Selection	Disconnected PU Detection	PU STOP Selection
0	Under any condition reset enables	If the PU is disconnected operation will be continued as-is.	Pressing STOP RESET decelerates the motor to a stop only in PU Mode and Combined Mode 2.
1	When alarm occurs reset enables		
2	Under any condition reset enables	When the PU is disconnected, the inverter is shut off.	
3	When alarm occurs reset enables		
4	Under any condition reset enables	If the PU is disconnected operation will be continued as-is.	Pressing STOP RESET decelerates the motor to a stop in any of operation mode. (Note 1)
5	When alarm occurs reset enables		
6	Under any condition reset enables	When the PU is disconnected, the inverter is shut off.	
7	When alarm occurs reset enables		

(Note 1) Pressing STOP RESET decelerates the motor to a stop in External Mode and Combined Mode 1 and 3. Operation Panel display E1. 0 and blocked all other function. Termination of Previous setting: Turn off STF or STR terminals, Press PU return to Previous operation mode.

(Note 2) 1. In normal condition, enables reset by Pr997 setting.

2. When alarm occurs, pressing STOP RESET to reset inverter.

(Note 3) Inside inverter there are 2 Program-simulated Thermal Relay, “Electronic type of Thermal Relay, and IGBT Modulated Thermal Relay. After inverter retry, the accumulated number of heat value of Electronic type Thermal Relay and IGBT Modulated Thermal Relay will be reset to “0”, please pay attention when in operation.

⚠ When Alarm occurs repeatedly, limit RESET number in Pr28 setting. If there is any other Alarm occurs, RESET will be invalid for operation. Please reboot the inverter and reset the ALARM, or contact certified technician for assistance.

Pr77 Selection of prevention of parameter rewrite

Parameter	Setting	Description
Pr77	0	Write is enable only during a stop (Note 1)
	1	Parameter write is not enabled (Note 2)
	2	Parameter write is enabled during motor operating. (Note 3)

(Note 1)When motor is operating , partial parameter write is enable , they are Pr4~Pr6, Pr24~Pr27, Pr54~Pr56 , Pr81~Pr82 ,Pr117~Pr120 , Pr126~Pr133 , Pr161~Pr164 , Pr192, Pr194~Pr197.

(Note 2)1.When motor is stop , partial parameter write is enable. they are Pr77 , Pr79 , Pr117~ Pr119 , Pr192 , Pr194~Pr197 , Pr996~Pr999.

2.When motor is operating , partial parameter write is enable. They are Pr117~Pr119 , Pr192 , Pr194~Pr197.

(Note 3)1.When motor is at a stop, all parameter write is enabled.

甲、When motor is in operating, partial parameter write is not enabled, they are Pr22, Pr23, Pr32, Pr33, Pr34, Pr36, Pr38, Pr39, Pr48~Pr53, Pr61, Pr77, Pr79, Pr80, Pr84 , Pr99~Pr103, Pr105~Pr111, Pr115~Pr116, Pr125 , Pr160 , Pr165~Pr168 , Pr189 , Pr191, Pr994~Pr999.

Pr78 Selection of prevention of reverse rotation of the motor

Parameter	Setting	Description
Pr78	0	Both forward and reverse rotations allowed
	1	Reverse rotation disabled
	2	Forward rotation disallowed

Pr79 Selection of operation mode

Relate Parameter	Setting Value	Description
Operation Mode Pr79	0	PU Mode, External Mode and JOG Mode enable switchover operation.
	1	PU Mode and JOG Mode enable switchover operation.
	2	External Mode.(external frequency and start up)
	3	Combined Mode 1. (inner PU frequency and external start up)
	4	Combined Mode 2. (external frequency and inner start up)
	5	Combined Mode 3 (inner PU frequency and external multi-speed frequency, external start up)
	6	Combined Mode 4 (RS485 Frequency and RS485 start up)
	7	Combined Mode 5 (RS485 Frequency and External start up)
	8	Combined Mode 6 (External Frequency or multi-speed and RS485 start up)

Pr79 setting value		Reference of rated frequency	Reference value for starting signal
0 (switchable PU,External, Jog,mode)	PU Mode	Inner PU	Inner PU FWD, REV
	External mode	External current, voltage signal or external multi-speed	External STF,STR terminals
	JOG Mode	Setting by parameter Pr15	Inner PU FWD, REV
1 (switchable PU,Jog,mode)	PU Mode	Inner PU	Inner PU FWD, REV
	JOG Mode	Setting by parameter Pr15	Inner PU FWD, REV
2 (External mode)		External current, voltage signal or external multi-speed	External STF,STR terminals
3 (Combined Mode 1)		Inner PU	External STF,STR terminals
4 (Combined Mode2)		External current, voltage signal or external multi-speed	Inner PU FWD, REV
5 (Combined Mode3)		Inner PU or external multi-speed	External STF,STR terminals
6 (Combined Mode4)		RS485 communication interface	RS485 communication interface activated, the motor rotate forward or reversely rotate
7 (Combined Mode5)		RS485 communication interface	External STF, STR terminals
8 (Combined Mode6)		External current, voltage signal or external multi-speed	RS485 communication interface activated, the motor rotate forward or reversely rotate

Pr82 Set Frequency Gain Function

Parameter Number	Setting value	Description
Pr82	0	Function disable.
	1~100%	The operating frequency corresponding to the external analog input is scaled by the setting value of Pr82.

(Note 1) When Pr82=0, this function is disabled. The operating frequency will return to the normal external voltage(current) signal operation: 0Hz~Pr38(Pr39) or Pr194~Pr195 (Pr196~Pr197).

(Note 2) To use Pr194~Pr197 to adjust user-defined frequency gain function curves, Pr82 must be set to 100%.

I. 2-5 Terminal Voltage Input Signal：

In the following description, V_{2-5} represents the external voltage input between 2-5 terminals.

I_{4-5} represents the external current input between 4-5 terminals. $V_{\max}$, $V_{\min}$, V_{mid} represent the maximum, minimum, and middle voltage input between 2-5 terminals respectively. $I_{\max}$, $I_{\min}$, I_{mid} represent the maximum, minimum, and middle current input between 4-5 terminals respectively.

a. Pr73=0 (External 0-5V Input)

$$f = \mathrm{Pr}\,38 - \left[5V - \left(2.5V + \left(V_{2-5} - 2.5V\right) \times \mathrm{Pr}\,82\right)\right] \times \frac{\mathrm{Pr}\,38}{5V}$$

b. Pr73=1 (External 0-10V Input)

$$f = \mathrm{Pr}\,38 - \left[10V - \left(5V + \left(V_{2-5} - 5V\right) \times \mathrm{Pr}\,82\right)\right] \times \frac{\mathrm{Pr}\,38}{10V}$$

II. 4-5 Terminal Current Input Signal：

$$f = \mathrm{Pr}\,39 - \left[20mA - \left(12mA + \left(I_{4-5} - 12\mathrm{mA}\right) \times \mathrm{Pr}\,82\right)\right] \times \frac{\mathrm{Pr}\,39}{16mA}$$

III. 2-5 Terminal Voltage Input Signal using Pr194, Pr195 to redefine the curve ：

a. Pr194 Frequency ≦ Pr195 Frequency

$$f = \mathrm{Pr}\,195 - \left[V_{\max} - \left(V_{\mathrm{mid}} + \left(V_{2-5} - V_{\mathrm{mid}}\right) \times \mathrm{Pr}\,82\right)\right] \times \frac{\mathrm{Pr}\,195 - \mathrm{Pr}\,194}{V_{\max} - V_{\min}}$$

b. Pr194 Frequency > Pr195 Frequency

$$f = \mathrm{Pr}\,194 - \left[\left(V_{\mathrm{mid}} + \left(V_{2\text{-}5} - V_{\mathrm{mid}}\right) \times \mathrm{Pr}\,82\right) - V_{\min}\right] \times \frac{\mathrm{Pr}\,194 - \mathrm{Pr}\,195}{V_{\max} - V_{\min}}$$

IV. 4-5 Terminal Current Input Signal using Pr196, Pr197 to redefine the curve：

a. Pr196 Frequency ≦ Pr197 Frequency

$$f = \mathrm{Pr}\,197 - \left[I_{\max} - \left(I_{\mathrm{mid}} + \left(I_{4-5} - I_{\mathrm{mid}}\right) \times \mathrm{Pr}\,82\right)\right] \times \frac{\mathrm{Pr}\,197 - \mathrm{Pr}\,196}{I_{\max} - I_{\min}}$$

b. Pr196 Frequency > Pr197 Frequency

$$f = \mathrm{Pr}\,196 - \left[\left(I_{\mathrm{mid}} + \left(I_{4\text{-}5} - I_{\mathrm{mid}}\right) \times \mathrm{Pr}\,82\right) - I_{\min}\right] \times \frac{\mathrm{Pr}\,196 - \mathrm{Pr}\,197}{I_{\max} - I_{\min}}$$

Example 1：

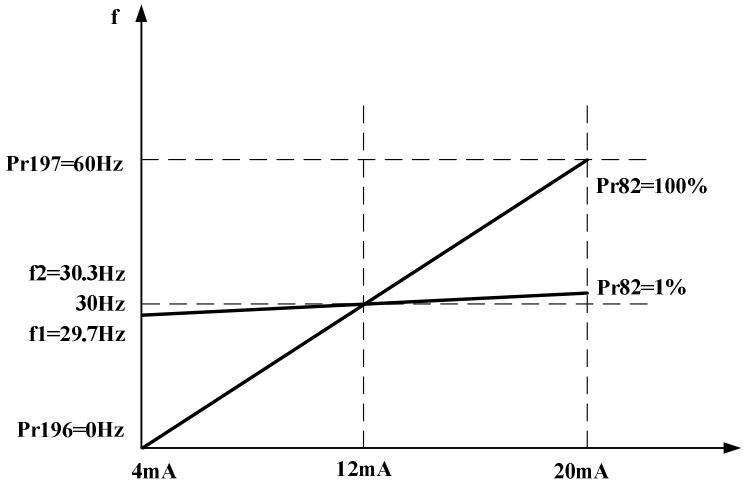
Terminal AU ON, Pr82=100%. Set Pr196=0 when 4mA is applied to the 4-5 terminals and then set Pr197=60 when 20mA is applied to the 4-5 terminals.

The frequency values corresponding to 4mA and 20mA input when Pr82=1% can be obtained from the equations listed last page:

$$f_1 = 60Hz - \left[20mA - \left(12mA + \left(4mA - 12mA\right)\times 1\%\right)\right]\times \frac{60Hz}{20mA - 4mA} = 29.7Hz$$

$$f_2 = 60Hz - \left[20mA - \left(12mA + \left(20mA - 12mA\right)\times 1\%\right)\right]\times \frac{60Hz}{20mA - 4mA} = 30.3Hz$$

The frequency gain function curves when Pr82=100% and Pr82=1% are shown as follow：



Example 2：

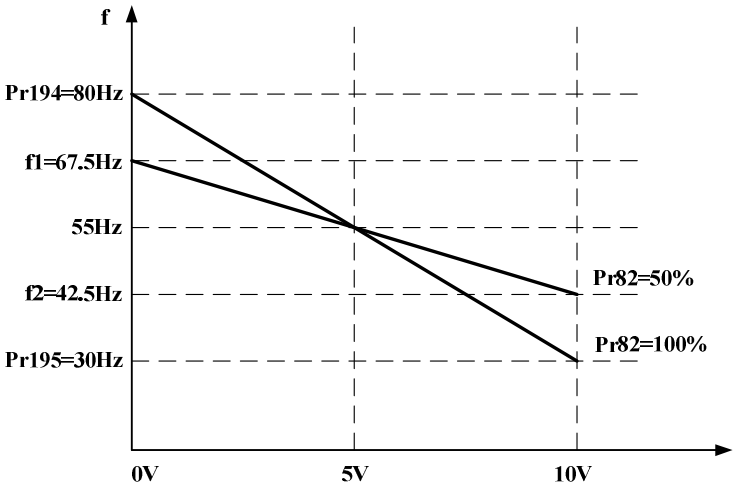
Pr73=1, Pr82=100%. Set Pr194=80 when 0V is applied to the 2-5 terminals and then set Pr195=30 when 10V is applied to the 2-5 terminals.

The frequency values corresponding to 0V and 10V input when Pr82=50% can be obtained from the equations listed last page:

$$f_1 = 80\text{Hz} - \left[\left(5V + \left(0V - 5V\right)\times 50\%\right) - 0V\right]\times \frac{80Hz - 30Hz}{10\text{V}} = 67.5Hz$$

$$f_2 = 80\text{Hz} - \left[\left(5V + \left(10V - 5V\right)\times 50\%\right) - 0V\right]\times \frac{80Hz - 30Hz}{10V} = 42.5Hz$$

The frequency gain function curves when Pr82=100% and Pr82=50% are shown as follow：



Pr84 FU/10 times frequency output terminal selection (requiring slot cover for switching)

Pr84 is the optional parameter when multi-functional output terminals and 10 times frequency function need to switch with each other. When Pr84 is zero, the output function of external terminal FU/10X is decided by Pr40 (refer to Pr40 function selection),

When Pr84 is not zero, the function of external terminal FU/10X is 10 times output function.

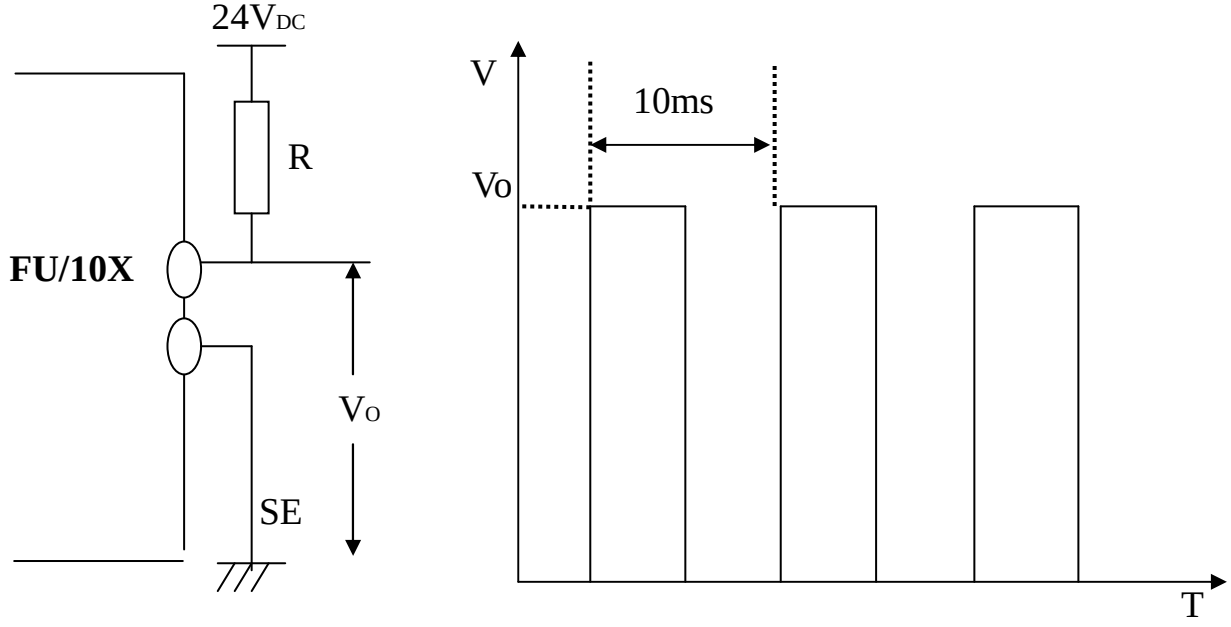
Parameter	Setting Value	Description
Pr84	0	Output function of terminal is determined by Pr40.
	1~10	Running frequency will output Duty 50% impulse output according to the value of Pr84.(note)

(Note)1. Function FU and 10X share the same hardware terminal, if they need to switch, 3 pin slot cover on the control board needs to switch at the same time. The initial position of the slot cover is at FU.

2. When setting Pr84 as non-zero value of 10 times frequency function, AM, FM functions are invalid.

Operation Example:

Setting Pr84=5 and temporary running frequency as 20 Hz, it can be detected that output impulse wave of terminal FU/10X and SE is like below:



(Note)1. Pr84= 1 is 1 times output, inverter can provide 1 ~ 400Hz output that accuracy is 1%

2. When Pr84 and operation frequency is setting greater and greater ,the accuracy will deteriorate.

3. Resistor R must be greater than 330Ω ,otherwise terminal FU/10X may be damaged.

Pr88 Auto Boost
Pr89 Slip Compensation

Parameter	Setting	Description
Pr88	0	Enable the Auto Boost function
	1	Disable the Auto Boost function
Pr89	0~3%	The percentage of the slip compensation in V/F mode.

(Note 1) Parameter Pr88、Pr89 are only valid at Pr99=0 under V/F mode.

(Note 2) Pr89 value is only valid at Pr88=1.

(Note 3) Properly adjust the motor torque boost so that the motor speed is more like setting speed.

Pr90 Ground Current Leakage function selection

The fault caused by unbalanced current of Three-Phase Power Supply in inverter, current leakage occurs or grounding fault is Grounding Current Leakage.

Parameter	Setting	Description
Pr90	0	Disable Grounding Current Leakage
	1	Enable Grounding Current Leakage

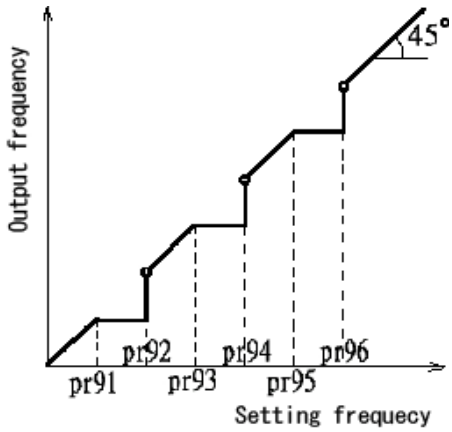
Pr91 to Pr96 Reshaping frequency

1. In order to avoid mechanical resonance during motor operation, there are 3 values setting of frequency jump is Provided.

   Pr91 & Pr92 is 1st pair of frequency jump.
   Pr93 & Pr94 is 2nd pair of frequency jump.
   Pr95 & Pr96is 3rd pair of frequency jump.

2. When Process setting, set

   Pr91<Pr92<Pr93<Pr94<Pr95<Pr96.



3. Examples :
   When Pr91=45 and Pr92=50
   If rated frequency≦ 45Hz, and then the stable output frequency=rated frequency
   If 45Hz < rated frequency≦ 50Hz and stable output frequency= 45Hz.
   If 50Hz < rated frequency and then stable output frequency=rated frequency
   Please see above right-sided diagram.

(Note 1)During deceleration phase, the output frequency of inverter will still perform through frequency jump.

(Note 2)When Pr91=9999 or Pr92=9999, 1st frequency jump is invalid.
When Pr93=9999 or Pr94=9999, 2nd frequency jump is invalid.
When Pr95=9999 or Pr96=9999, 3rd frequency is invalid.

Pr99 Motor Control Mode Selection

Parameter	Setting	Description
Pr99	0	V/F Control (Initial Value)
	1	Motor Parameter Auto-Tuning(Motor won't rotate during tuning)
	2	Motor Parameter Auto-Tuning(Motor is in rotation while tuning)
	3	Sensorless Vector Control
	4	Sensorless Torque Control

1. V/F Control:
There is no need for motor parameter auto-tuning, and the motor can work properly according to V/F curve.

2. Sensorless Vector Control:
By estimating the motor speed, use the closed-loop control method to achieve fast response and high-precision speed control. The motor parameters will affect the performance of sensorless vector control. Therefore recommend that before the sensorless vector control, first implementation motor parameters auto-tuning to increase control characteristics. Setting process please refer to Appendix 8

3. Sensorless Torque Control:
It is using the framework of sensorless vector control to carry out sensorless torque control. To be applied fixed torque control please set this control mode. Torque control parameters please refer to Pr115 ~ Pr120

4. Motor-parameter Auto-Tuning**:**
Motor parameter auto-tuning is divided into two kinds of tuning, one is static tuning (motor won't rotate during tuning) and the other is dynamic tuning (motor is in rotation while tuning). Before parameters auto-tuning, first should be enter the motor nameplate specification value: Motor capacity (Pr100), Motor pole number (Pr101), Motor rated voltage (Pr102), Motor rated frequency (Pr103)

a. Static tuning (Pr99=1):
When the motor has been hung in the belt, reducer, flywheel ... etc or in auto tuning didn't allow motor operation, please setting tuning mode as Static tuning. When using static tuning, first be setting the motor magnetic excited current (Pr105).General magnetic exciting current setting range is about 30 ~ 40% of motor rated current.

b. Dynamic tuning (Pr99=2):
In auto tuning if allow motor operation , please setting tuning as Dynamic tuning

When setting Pr99 = 1 or 2 to do motor parameter auto-tuning, after complete the tuning the Pr99 setting value will back to 0(V/F Control mode).If you need for high-precision sensorless vector control, please set Pr99 = 3. Setting process please refer to Appendix 2.(note)

5. For implementation of motor-parameter auto-tuning, only to set Pr99 = 1 or 2,and press the forward or the reverse button. Then the operation panel will display "TUN", if the measure fails, the operation panel flashes "FAL" ,and after three seconds return to normal display.

(note)
1. Motor capacity must be equal or less than inverter capacity.。
2. when set Pr99 = 2 to do motor parameters auto-tuning , 11kW or more series please pick braking resistor, in order to avoid deceleration overvoltage.

Pr100 Motor rated capacity
Pr101 Motor Pole number
Pr102 Motor rated voltage
Pr103 Motor rated frequency
Pr105 Motor exciting current
Pr106 Motor constant (R1)
Pr107 Motor constant (R2)
Pr108 Motor constant (L1)
Pr109 Motor constant (L2)
Pr110 Motor constant (Lm)

Parameter	Setting	Function Description
Pr100	Defined by Motor Specification	Motor rated Volume.
Pr101		Motor Pole number.
Pr102		Motor rated voltage.
Pr103		Motor rated frequency
Pr105	1. Pr99 = 1, To be manually set Pr105. 2. Pr99=2, Automatically detecting motor parameter.	Motor exciting current
Pr106		Motor Rs Ω.
Pr107		Motor Rr Ω.
Pr108		Motor Ls mH.
Pr109		Motor Lr mH.
Pr110		Motor magnetized inductor mH.

(note)

1. When inverter use different grades of motor, make sure to confirm Rated voltage (Pr102) and correctly set the motor capacity (Pr100)。
2. Whatever using the static (Pr99 = 1) or dynamic (Pr99 = 2) motor parameter auto-tuning, before implementation auto tuning ,should be first to adjustments Pr100 ~ Pr103 that based on motor nameplate, to ensure more accurate measurement of parameters
3. If the motor parameters are known, you can directly enter the actual parameters of Pr105 ~ Pr110, implementation the parameter reset function (Pr997), and setting the Pr99 = 3 for sensorless vector control.
4. When the Pr105 ~ Pr110 parameter values have been manually changed, please do parameter reset function (Pr997) to re-load the new parameter values.
5. 5kW or above models Pr106 and Pr107 motor resistance unit is mΩ。

Pr113 Overvoltage stall protection selection

Pr114 Overvoltage stall protection voltage

Parameter	Value	Description
Pr113	0	Without Overvoltage stall protection function.
	1	With Overvoltage stall protection A.
	2	With Overvoltage stall protection B.
	3	With Overvoltage stall protection C.
Pr114	110~140%	Setting Overvoltage stall protection voltage norm.

During deceleration, for inertia reason, instant motor speed is faster than output frequencies which functions as generator and makes main circuit terminal P-N generate regenerative voltage, if no action is taken, regenerative voltage can damage the inverter.

Overvoltage stall protection A:*1

Overvoltage stall protection function will detect voltage between P-N during running, when voltage is higher than preset Pr114 value, inverter will stop output frequency until voltage is lower than preset Pr114 norm, then the inverter will continue to work.

Overvoltage stall protection B:*2

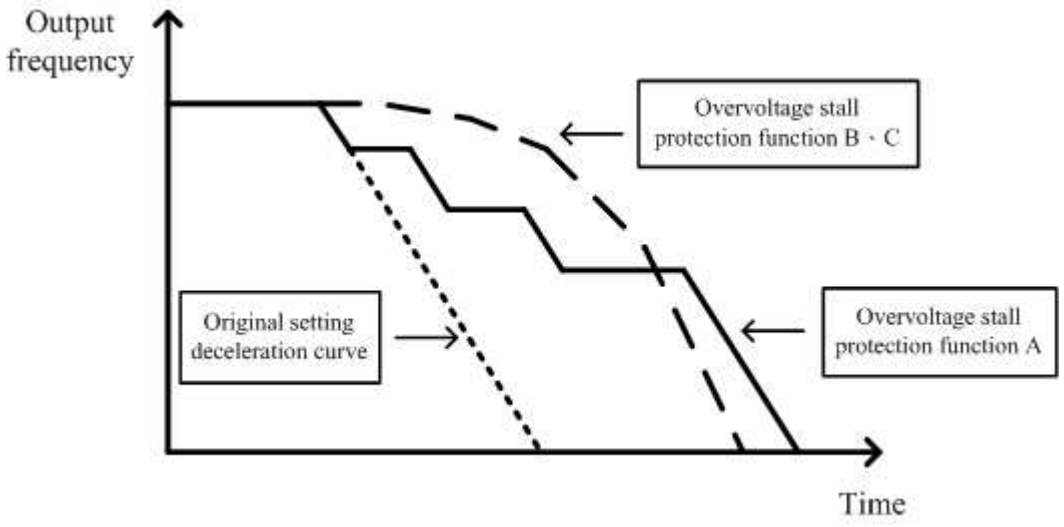
Overvoltage stall protection function will detect voltage between P-N during running, when voltage is higher than preset Pr114 value. inverter will be automatically calculated based on a suitable deceleration curve, to avoid the voltage between PN generate regenerative voltage

Overvoltage stall protection C:*2

Similar to Overvoltage stall protection B, applies to larger inertia systems, and can be greatly inhibited more effectively when P-N generate regenerative voltage is larger changes, But it will make the inverter output current severe. Long time continuous acceleration and deceleration will make motor overheat

*1:This function still has its limit, when regenerative power is too much in short time, inverter will not response in time, therefore, clients are suggested to prolong the deceleration time or increase the brake resistor volume(The resistance goes down, Watts and brake will more efficient.)

*2:In this function, inverter will automatically calculate the deceleration curve (see below), so that the original deceleration time Pr8 or Pr45 setting value will be invalid



Pr115 Torque command source selection

Pr116 Speed limit selection

Pr117 Torque command value

Pr118 Forward rotation speed limit

Pr119 Reverse rotation speed limit

Pr120 Torque command gain

※ Under mode of torque control (Pr99=4)，Pr115~Pr120 are valid.

Parameters	Value	Description
Pr115	0	Analog input voltage of terminal 2-5 is torque command.
	1	Analog input current of terminal 4-5 is torque command.
	2	Value of Pr117 is torque command.
Pr116	0	The rated frequency of operation panel is limit of rotating speed.
	1	Analog input voltage of terminal 2-5 is limit of speed. If Pr115=0, 3Hz is the constrain value.
	2	Analog input current of terminal 4-5 is limit of speed. If Pr115=1, 3Hz is the constrain value.
	3	Terminals 2-5, 4-5 multi-speed phase combination input is the speed limit. If Pr115=0 or 1, 3Hz is constrain value.
	4	Pr118 and Pr119 are speed limit.
Pr117	0~100%	Max output torque of inverter (Pr120=100%),Valid at Pr115=2.
Pr118	0~120Hz	Forward rotation speed limit, valid at Pr116=4.
Pr119	0~120Hz	Reverse rotation speed limit , valid at Pr116=4.
Pr120	0~180%	Reduce or add up max output torque of inverter.

(Note) Set terminals 2-5、4-5 as torque command，its analog input voltage is 0~5V(10V)，input current 4~20mA accords with output torque command 0~100%.
Example:

1. Pr115=0、Pr73=0、Pr120=120%，Max output torque=$\frac{V_{\text{terminal 2-5}}}{5\text{V}}\times 100\%\times \text{Pr120}$

   Therefore, the range of output torque is 0~120%(changing with terminal 2-5 input voltage).

2. Pr115=1、Pr120=80%，

   Max output torque =$\frac{I_{\text{terminal 4-5}}(\geq 4\text{mA})-4\text{mA}}{16\text{mA}}\times 100\%\times \text{Pr120}$，Therefore, the range of output torque is 0~80%(changing with terminal 4-5 input current).

3. Pr115=2、Pr117=90%、Pr120=100%，Max output torque = $\text{Pr117}\times \text{Pr120}=90\%$，Max output torque fixes at 90%。

Pr125 Digital Unit key tone selection

Parameter	Setting	Description
Pr125	0	Digital Unit without key tone
	1	Digital Unit with key tone.

(Note) Pr125 is only applicable to a special Digital Unit that built-in buzzer series, generally Universal Digital Unit is invalid of this function .

Pr160 PID operation selection

Pr161 PID ratio increase

Pr162 PID integral increase

Pr163 PID differential increase

Pr164 PID digital target value

Pr165 PID Output order limit

Pr166 PID Alert value limit

Pr167 PID Alarm detection time

Pr168 PID Alarm solution

(PID application, please refer to appendix 5,Page 122)

Pr160 setting	PID status	Origin of target value	Origin of feedback	Description
0	-	-	-	PID function Pr161~Pr168 invalid.
1	Negative action	2-5Terminal	4-5Terminal	-
2	Negative action	4-5Terminal	2-5Terminal	-
3	Negative action	Pr164 Setting value	4-5Terminal	Pr164 value 0~100% stands for 4mA~20mA.
4	Negative action	Pr164 Setting value	2-5Terminal	Pr164 value 0~100% stands for 0V~5V(10V).
5	Positive action	2-5Terminal	4-5Terminal	-
6	Positive action	4-5Terminal	2-5Terminal	-
7	Positive action	Pr164 Setting value	4-5Terminal	Pr164 value 0~100% stands for 4mA~20mA.
8	Positive action	Pr164 Setting value	2-5Terminal	Pr164 value 0~100% stands for 0V~5V(10V).

Parameter	Setting value	Function	
Pr161	0,0.1%~600%	PID ratio increase Setting value，If the setting is 0, there is no such function.	
Pr162	0,0.1%~600%	PID integral increase Setting value， If the setting is 0, there is no such function.	
Pr163	0,0.1%~600%	PID differential increase Setting value， If the setting is 0, there is no such function.	
Pr164	0~100%	PID digital target value，Only Pr160=3、4、7、8 is valid.	
Pr165	0~100%	Output order limit，Max frequency=$(Pr1\times Pr165)/100$.	
Pr166	0,0.1%~100%	If the setting is 0, there is no such function. Max abnormal frequency=$(Pr1\times Pr166)/100$.	
Pr167	0,0.1~3600s	If setting is 0, there will be no detection function. When operation frequency is equal to or more than Pr166 Max setting value for a while (Pr167)，PID alarms.	
Pr168	0~2	0:Terminal output alarms，motor will continue operating.	
		1: Terminal output alarms, motor will Decelerate.	During operation，Operation panel will show”E.0”
		2:Terminal output alarms, motor will stop.	
		Terminal output alarms，Set motor as Pr40.	

Pr170 Communication Protocol

Pr171 MODBUS Communication Address

Pr172 MODBUS Transmission Speed of the Communication

Pr173 MODBUS Data Format

Pr Number	Name	Setting Range	Description	Min Setting unit	Initial Value
Pr170	Communication Protocol	0~1	0：Shihlin Protocol 1：MODBUS Protocol	1	0
Pr171	Communication Address	1~247	Determine inverter communication address	1	1
Pr172	Transmission Speed of the Communication	0~2	0：4800 bps 1：9600 bps 2：19200 bps	1	1
Pr173	MODBUS Data Format	0~5	0：(7,N,2) for ASCII 1：(7,E,1) for ASCII 2：(7,O,1) for ASCII 3：(8,N,2) for RTU 4：(8,E,1) for RTU 5：(8,O,1) for RTU	1	0

●Computer Link:

when the RS-485 series connection communication interface is utilized, every inverter has to pre-determine the communication address at Pr. 171,and thereafter, the computer will proceed with the control based on respective addresses.

●MODBUS Communication Protocol:

The Communication Protocol can be divided into ASCII mode and RTU mode, ASCII mode: every byte is composed of 2 ASCII words，RTU mode: the byte is not required to conversion, direct transmission。

The following will illustrate ASCII coding。

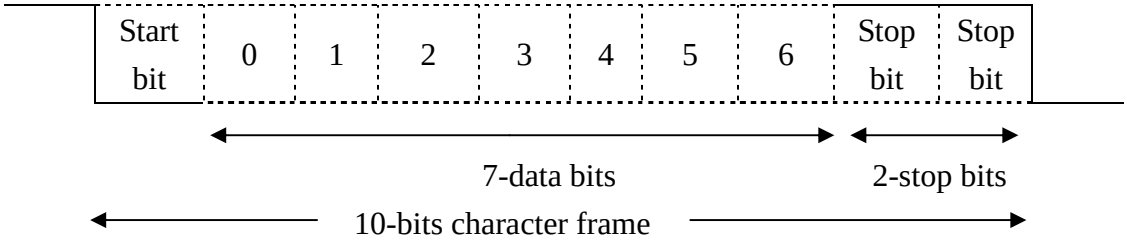
Example, if the numeric value is 73 Hex, the way to show it through the ASCII mode will be ”73”, which is composed respectively be ”7” (37Hex) and ”3” (33Hex).

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

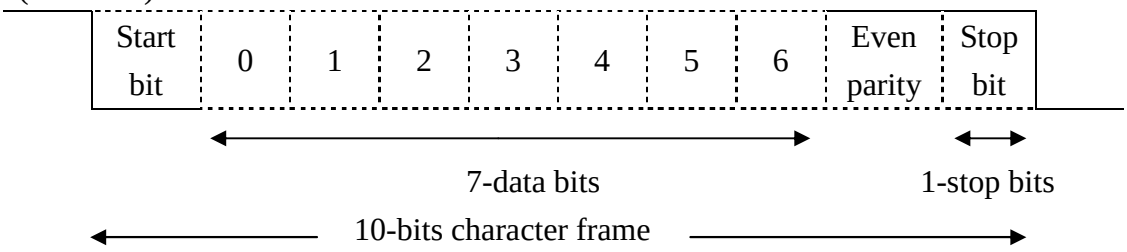
●Data Format:

10-bits character frame—For ASCII

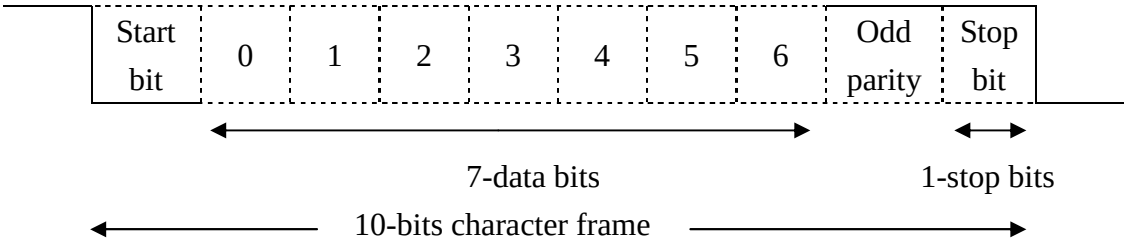
(7，N，2) Pr173=0



(7，E，1) Pr173=1

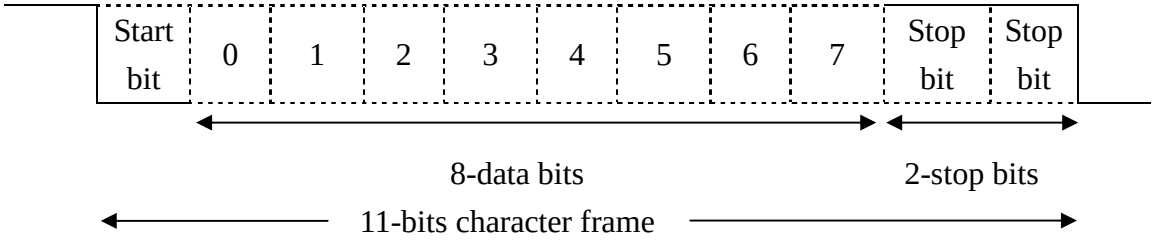


(7，O，1) Pr173=2

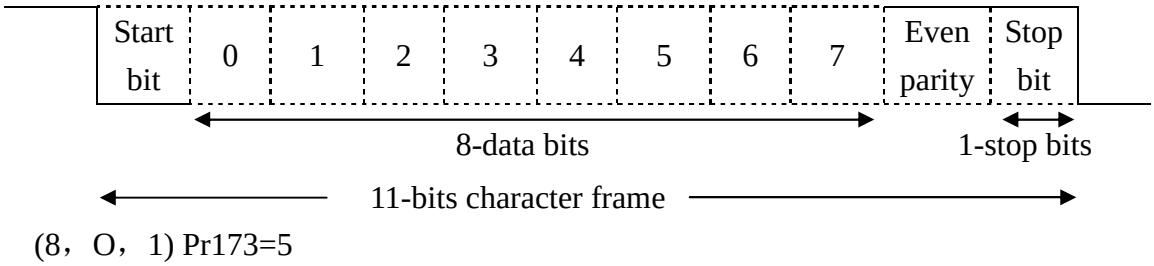


11-bit character frame—For RTU

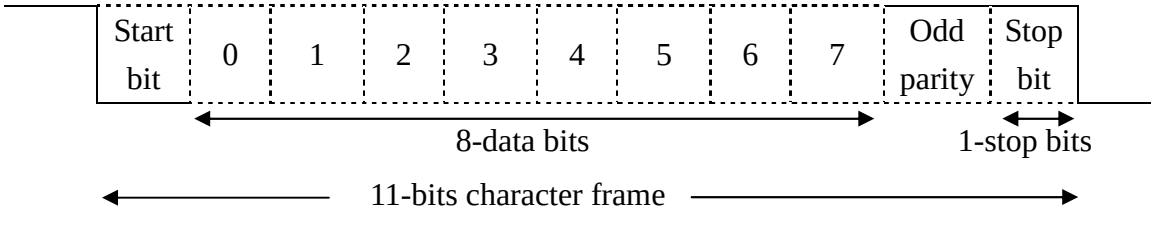
(8，N，2) Pr173=3



(8，E，1) Pr173=4



(8，O，1) Pr173=5



1. Communication Protocol:

1-1 Communication Data Frame

ASCII mode：

STX	Start character ”：”(3AH)
ADR1	Communication address: 8-bit address consists of 2 ASCII codes
ADR0	
CMD1	Command code: 8-bit command consists of 2 ASCII codes
CMD0	
DATA(n-1)	Contents of data： nx8-bit data consist of 2n ASCII codes n<=25, maximum of 50 ASCII codes
……	
DATA0	
LRC CHK 1	LRC check sum： 8-bit check sum consists of 2 ASCII codes
LRC CHK 0	
END 1	End characters： END 1=CR (0DH)，END 0=LF (0AH)
END 0	

RTU mode：

START	A silent interval of more than 10 ms
ADR	Communication address：
CMD	Command code：
DATA(n-1)	Contents of data: n × 8-bit data，N ≦ 25
……	
DATA0	
CRC CHK 0	CRC check sum： 16-bit check sum consists of 2 8-bit characters
CRC CHK 1	
END	A silent interval of more than 10 ms

1-2 Address (Communication Address)

01H：AC drive of address 01

02H：AC drive of address 02

32H：AC drive of address 50

:

:

F7H：AC drive of address 247

1-3 Command code and data characters

1-3-1 Command code

03H: Multi read, read data from registers
06H: Write Single Register
08H: Diagnostics
10H: Write multiple data to registers

Command code：H03，Multi read, read data from registers

Example：When the address of the drive is set as 01H, read 2 data contents that exist successively within the register, as shown follows: the address of the start register is 0000H.

ASCII mode：

Command message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘0’
CMD0	‘3’
Starting data address	‘0’
	‘0’
	‘0’
	‘0’
Number of data (count by word)	‘0’
	‘0’
	‘0’
	‘2’
LRC CHK1	‘F’
LRC CHK0	‘A’
END1	CR
END0	LF

Response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘0’
CMD0	‘3’
Number of data (count by word)	‘0’
	‘4’
Data address1 0000H	‘0’
	‘0’
	‘3’
	‘C’
Data address2 0001H	‘2’
	‘E’
	‘E’
	‘0’
LRC CHK1	‘A’
LRC CHK0	‘E’
END1	CR
END0	LF

Error response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘8’
CMD0	‘3’
Error code	‘0’
	‘1’
LRC CHK1	‘7’
LRC CHK0	‘B’
END1	CR

RTU mode：

Command message

ADR	01H
CMD	03H
Starting data address	00H
	00H
Number of data (count by word)	00H
	02H
CRC CHK0	C4H
CRC CHK1	0BH

Response message

ADR	01H
CMD	03H
Data	04H
Content of address 0000H	00H
	3CH
Count of address 0001H	2EH
	E0H
CRC CHK0	26H
CRC CHK1	17H

Error response message

ADR	01H
CMD	83H
Error code	01H
CRC CHK0	80H
CRC CHK1	F0H

Command code：06H，Write Single Register。

Example：Writing data 1770H to register 0001H. Starting data address is 01H。

ASCII mode：

Command message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘0’
CMD0	‘6’
Starting data address	‘0’
	‘0’
	‘0’
	‘1’
Number of data (count by word)	‘1’
	‘7’
	‘7’
	‘0’
LRC CHK1	‘7’
LRC CHK0	‘1’
END1	CR
END0	LF

Response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘0’
CMD0	‘6’
Starting data address	‘0’
	‘0’
	‘0’
	‘1’
Number of data (count by word)	‘1’
	‘7’
	‘7’
	‘0’
LRC CHK1	‘7’
LRC CHK0	‘1’
END1	CR
END0	LF

Error response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘8’
CMD0	‘6’
Error code	‘0’
	‘2’
LRC CHK1	‘7’
LRC CHK0	‘7’
END1	CR
END0	LF

RTU mode：

Command message

ADR	01H
CMD	06H
Starting data address	00H
	01H
Number of data (count by word)	17H
	70H
CRC CHK 0	D6H
CRC CHK 1	1EH

Response message

ADR	01H
CMD	06H
Starting data address	00H
	01H
Number of data (count by word)	17H
	70H
CRC CHK 0	D6H
CRC CHK 1	1EH

Error response message

ADR	01H
CMD	86H
Error code	02H
CRC CHK 0	C3H
CRC CHK 1	A1H

Command code：08H，Diagnostics，This command is used to detect if the communication between master device (PC or PLC) and inverter is normal. The inverter will send the received message to the master device.

Example：master device that address is 0001H send data 1770H to inverter. The inverter will send the received message to the master device.

ASCII mode：

Command message

STX	':'
ADR1	'0'
ADR0	'1'
CMD1	'0'
CMD0	'8'
Starting data address	'0'
	'0'
	'0'
	'0'
Number of data (count by word)	'1'
	'7'
	'7'
	'0'
LRC CHK1	'7'
LRC CHK0	'0'
END1	CR
END0	LF

Response message

STX	':'
ADR1	'0'
ADR0	'1'
CMD1	'0'
CMD0	'8'
Starting data address	'0'
	'0'
	'0'
	'0'
Number of data (count by word)	'1'
	'7'
	'7'
	'0'
LRC CHK1	'7'
LRC CHK0	'0'
END1	CR
END0	LF

Error response message

STX	':'
ADR1	'0'
ADR0	'1'
CMD1	'8'
CMD0	'8'
Error code	'0'
	'3'
LRC CHK1	'7'
LRC CHK0	'4'
END1	CR
END0	LF

RTU mode：

Command message

ADR	01H
CMD	08H
Starting data address	00H
	00H
Number of data (count by word)	17H
	70H
CRC CHK 0	EEH
CRC CHK 1	1FH

Response message

ADR	01H
CMD	08H
Starting data address	00H
	00H
Number of data (count by word)	17H
	70H
CRC CHK 0	EEH
CRC CHK 1	1FH

Error response message

ADR	01H
CMD	88H
Error code	03H
CRC CHK 0	06H
CRC CHK 1	01H

Command code：H10，Write multiple data to registers

Example：Write data 1388H、0FA0H to address 0005H to 0006H。

ASCII mode

Command message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘1’
CMD0	‘0’
Staring data address	‘0’
	‘0’
	‘0’
	‘5’
Number of data (count by word)	‘0’
	‘0’
	‘0’
	‘2’
Number of data (count by word)	‘0’
	‘4’
The first data content	‘1’
	‘3’
	‘8’
	‘8’
The second data content	‘0’
	‘F’
	‘A’
	‘0’
LRC CHK1	‘9’
LRC CHK0	‘A’
END1	CR
END0	LF

Response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘1’
CMD0	‘0’
Starting data address	‘0’
	‘0’
	‘0’
	‘5’
Number of data (count by word)	‘0’
	‘0’
	‘0’
	‘2’
LRC CHK1	‘E’
LRC CHK0	‘8’
END1	CR
END0	LF

Error response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘9’
CMD0	‘0’
Error code	‘0’
	‘4’
LRC CHK1	‘6’
LRC CHK0	‘B’
END1	CR
END0	LF

RTU mode

Command message

ADR	01H
CMD	10H
Starting data address	00H
	05H
Number of data (count by word)	00H
	02H
Number of data (count by word)	04H
The first data content	13H
	88H
The second data content	0FH
	A0H
CRC CHK 0	B2H
CRC CHK 1	B6H

Response message

ADR	01H
CMD	10H
Staring data address	00H
	05H
Number of data (count by word)	00H
	02H
CRC CHK0	51H
CRC CHK1	C9H

Error response message

ADR	01H
CMD	90H
Error code	04H
CRC CHK0	4DH
CRC CHK1	C3H

1-3-2 Check sum

LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, the values of the bytes from ADR1 to last data character then calculating the hexadecimal representation of the 2's-complement negation of the sum

Example：Reading 2 word from address 0000H of the inverter with address 01H.

STX	':'
ADR1	'0'
ADR0	'1'
CMD1	'0'
CMD0	'3'
Starting data address	'0'
	'0'
	'0'
	'0'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC CHK1	'F'
LRC CHK0	'A'
END1	CR
END0	LF

01H+03H+00H+00H+00H+02H=06H，the 2's-complement negation of 06H is FA H

RTU mode: Uusing the CRC check sum, from Address to Data Content ,CRC (Cyclical Redundancy Check) is calculated by the following steps:

Step 1: Load a 16-bit register (called CRC register) with FFFFH.

Step 2: Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.

Step 3: Examine the LSB of CRC register.

Step 4: If the LSB of CRC register is 0, shift the CRC register one bit to the right with MSB zero filling, then repeat step 3. If the LSB of CRC register is 1, shift the CRC register one bit to the right with MSB zero filling, Exclusive OR the CRC register with the polynomial value A001H, then repeat step 3.

Step 5: Repeat step 3 and 4 until eight shifts have been performed. When this is done, a complete 8-bit byte will have been processed.

Step 6: Repeat step 2 to 5 for the next 8-bit byte of the command message. Continue doing this until all bytes have been processed. The final contents of the CRC register are the CRC value. When transmitting the CRC value in the message, the upper and lower bytes of the CRC value must be swapped, i.e. the lower order byte will be transmitted first.

The following is an example of CRC generation using C language：

```
unsigned char* data // a pointer to the message buffer
unsigned char length // the quantity of bytes in the message buffer
unsigned int crc_chk(unsigned char* data, unsigned char length)
{
    int j;
    unsigned int reg_crc=0xffff;
    while(length--)
    {
        reg_crc^=*data++;
        for(j=0;j<8;j++)
        {
            if(reg_crc & 0x01)
              {
                /*LSB(b0)=1*/
                reg_crc=(reg_crc >>1) ^ 0xa001;
              }
              else
              {
                reg_crc=reg_crc >> 1;
              }
        }
    }
    return reg_crc;
}
```

1-4 Address list

Read / write states	Function	Address	Data Content
Read / write	Parameter	0000H-00C7H (0-199)	Pr0-Pr199 corresponds to address 0000H-00C7H (Please refer to appendix 7)
Read Only (03H)	Operation Mode	1000H (4096)	0000H:DU/PU Communication Operation
			0001H:EXT Communication Operation
			0002H:JOG Communication Operation
			0003H:Combined Operation 1
			0004H:Combined Operation 2
			0005H:Combined Operation 3
			0006H:Combined Operation 4
			0007H:Combined Operation 5
			0008H:Combined Operation 6
	Inverter States	1001H (4097)	b0:Operation
			b1:Forward Rotation
			b2:Reverese Rotation

			b3:Frequency Achieved		
			b4:Overload		
			b5:Key tone		
			b6:Frequency Detection		
			b7:Alarm Occurrence		
			b8:RES ON		
			b9:STF ON		
			b10:STR ON		
			b11:When is in external operation, Press STOP key on Control panel		
			b12~b15:Reserved		
	Frequency Setting	1002H(4098)	0000H~9C40H (0~400Hz)		
	Output Frequency	1003H(4099)	0000H~9C40H (0~400Hz)		
	Output Current	1004H(4100)	0000H~FFFFH		
	Output Voltage	1005H(4101)	0000H~FFFFH		
	Message	1006H (4102)	00H：No Display		
			10H：TUN		
			11H：FAL		
			12H：RET		
			13H：SL		
			14H：LV		
			15H：OV		
			16H：OL		
	Error Code	1007H (4103)	00H：No Err	32H：NTC	70H：BE
			10H：OC1	33H：SCR	80H：GF
			11H：OC2	40H：EEP	90H：OHT
			12H：OC3	41H：FAN	A0H：OPT
			20H：OV1	42H：PID	B0H：PE
			21H：OV2	50H：UVT	B1H：PUE
			22H：OV3	51H：OP1	B2H：RET
			30H：THT	52H：IPF	C0H：CPU
			31H：THM	60H：OLT	Other：SPE
Write Only (06H)	Operation Mode	1000H (4096)	0000H：DU/PU Communication Operation		
			0001H：EXT Communication Operation		
			0002H：JOG Communication Operation		
	Operation Command	1001H (4097)	b0: Inverter stop output (MRS)		
			b1:Forward Rotation (STF)		
			b2:Reverese Rotation (STR)		

			b3:Low Speed (RL)
			b4:Medium Speed (RM)
			b5:High Speed (RH)
			b6:Multi-Speed (REX)
			b7:2nd Functions (RT)
			b8~b15:Reserved
			(note) In the RS-485 communication mode, the external terminal MRS, RT function is still valid.
	Operation Frequency Write In	1002H(4098)	0000H~9C40H (0~400Hz)
	Inverter RESET	1101H(4353)	9696H：Pr997
	Parameter Error Code erased	1102H(4354)	A5A5H：Pr996
		1103H(4355)	9966H：Pr998
		1104H(4356)	5A5AH：Pr999
		1105H(4357)	55AAH:Except communication parameter ,all parameter must be back to initial value.

1-5 Exception response:

If errors occurred when the drive is conducting the communication connection, the drive will respond to this error and send the Command code to themaster control system so that the system will be informed of the error. In the exception response, the most significant bit of the original command code is set to 1, and an exception code which explains the condition that caused the exception is returned.

For example: Command code is 10H,if errors occurred the most significant bit of the original command code is set to 1 and become 90H.

ASCII Error response message

STX	‘:’
ADR1	‘0’
ADR0	‘1’
CMD1	‘9’
CMD0	‘0’
Error code	‘0’
	‘4’
LRC CHK1	‘6’
LRC CHK0	‘B’
END1	CR
END0	LF

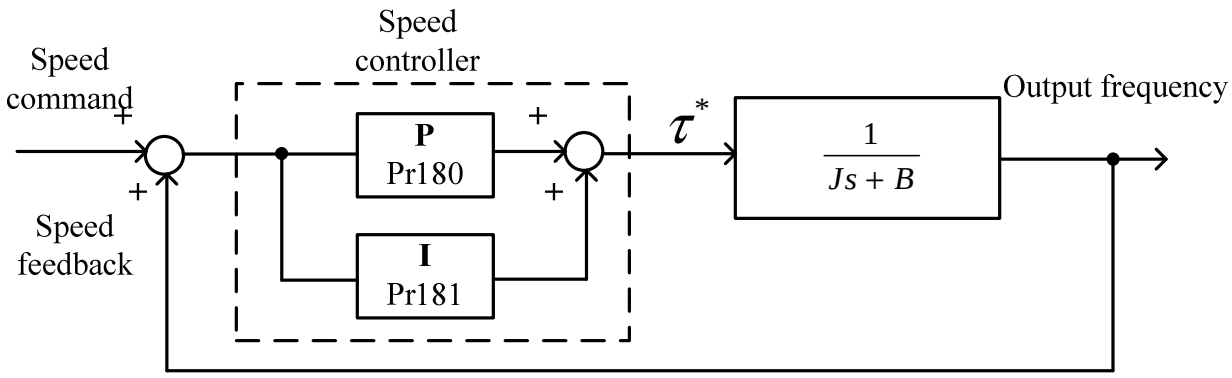
RTU Error response message

ADR	01H
CMD	90H
Error code	04H
CRC CHK 0	C3H
CRC CHK 1	4DH

1-5-1 The explanation of Error codes:

Error code	Name	Explanation
01	Data Contents Error	If the value of the data contents is great, it is then not recognizable by the drive.
02	Parameter Address Error	Parameter addresses not recognizable by the drive
03	Data value Error	The data value received in the command message is not available for the inverter.
04	Other errors	Other unexpected error occurred

Pr180 Proportional Gain of Speed Controller
Pr181 Integral Gain of Speed Controller
Pr187 Bandwidth of Speed Controller



Parameter	Control mode	Setting value	Function Description
Pr180	Pr99=3 Sensorless Vector Control	0～100%	Increase setting value will increase the speed response , and speed up the load-carrying ability
Pr181		0～100%	Decrease Setting value,will decrease the Steady-state error ,and reduce the recovery time when load-carrying
Pr187		20~120	Increase setting value will increase the speed response

Pr182 Slip Compensation

Slip is defined as the electrical rotor speed (ω_e) minus the rotor speed(ω_r),In sensorless vector control mode ,the rotor speed is obtained by the estimation method . Therefore, there is a modicum of estimation error . For this reason, the estimated rotor speed and actual rotor speed can compensated by Pr182.Let rotor speed be equal to electrical speed.

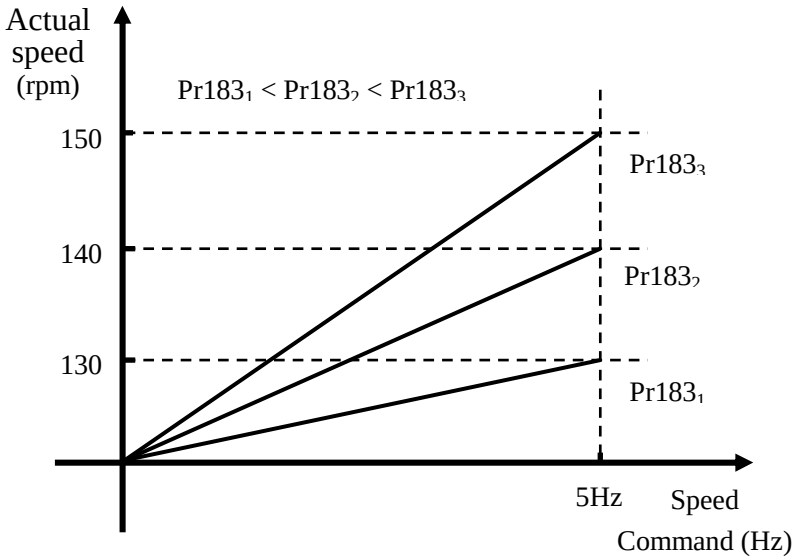
Parameter	Control mode	Setting value	Function Description
Pr182	Pr99=3 Sensorless Vector Control	0～50%	Increase setting value will decrease the slip .

Pr183 Speed Compensation Coefficient

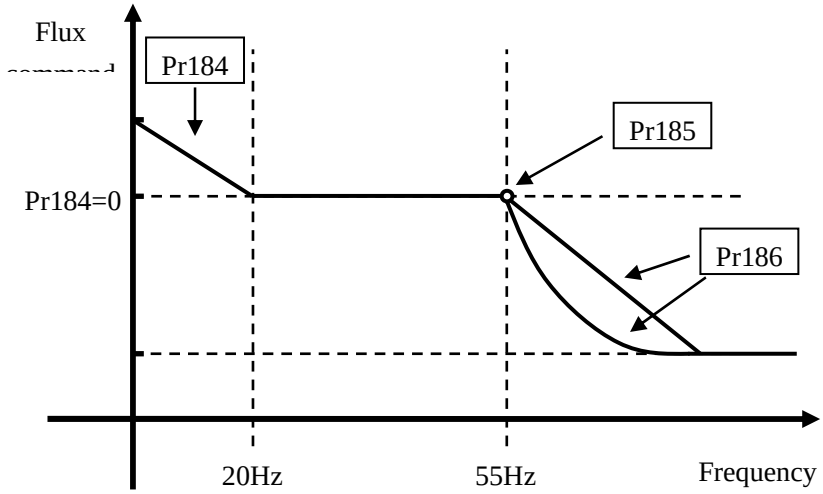
It is used to compensate for no-load， speed estimation error that caused by sensorless vector control.

Parameter	Control mode	Setting value	Function Description
Pr183	Pr99=3 Sensorless Vector Control	0～100%	Increase setting value will increase the compensation speed error

For example: For 4-pole motor. When the target frequency is 5Hz but the actual speed was at 140 rpm,you can increase the Pr183 settings value to change the speed command and let speed reach 150 rpm. On the contrary, if the speed is over 150 rpm you can reduce Pr183 settings value to lower the speed command Pr183 Setting method as follows Figure



Pr184 Low Speed Excited Rate
Pr185 High Speed Exited Rate
Pr186 High Speed Exited Curve



Pr184 ~ Pr185 is magnetic flux parameters of sensorless vector control, On above diagram it displayed the relation of flux command. Pr184 is the low speed excited rate between 0 ~ 20Hz. Pr185 is high speed exited rate when motor is in 55Hz. Pr186 is different kinds of exited curve.

Parameter	Control mode	Setting value	Function Description
Pr184	Pr99=3 Sensorless Vector Control	0～100%	Increase Setting value will increase the load carrying ability but it also increase no-load current in low speed range
Pr185		0～100%	Decrease setting value will avoid the exception occurred but it will decrease load-carrying ability at high speed
Pr186		0、1、2	Increase setting value will promote the field-weakening response and it can avoid the exception occurred at high speed acceleration or deceleration

Pr189 50Hz/60Hz system switchover

Parameter	Setting Value	Description
Pr189	0	60Hz system (initial value)
	1	50Hz system

(Note) Clients can set the parameter by motor operation frequency. This parameter has to follow the function Pr998 after its setting up, then it is able to reload counterpart parameter initial value to new frequency system. Pr3,Pr20,Pr38,Pr39,Pr55,Pr66,Pr103,Pr118,Pr119,Pr195,Pr197.

Pr194 Frequency Setting Voltage Bias
Pr195 Frequency Setting Voltage Gain

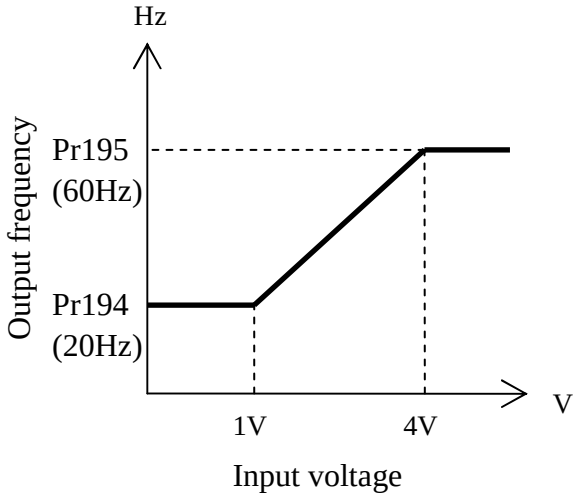
When inverter is in Pr79=2 External Mode or Pr79=4 Combined Mode 2, it is allowed to add voltage signal 0-5V or 0-10V among analog input terminal 2-5. So make the frequency adjust by the changing of voltage signal to revise the corresponding value of frequency and voltage signal. Procedures of Calibration:

Step1.Make sure current signal is wired with terminal 2-5.

Step2.If preset condition is “when voltage signal is 1V, Expected start frequency is 20 Hz” , and write value of 20 into Pr194.

Step3.If Preset condition is “when voltage signal is 4V, Expected rated frequency is 60 Hz” , and write value 60 into Pr195.

Step4.After finishing step 1-3, When the voltage changes among 1-4V, The frequency will fluctuate among 20 to 60 Hz.



(Note)1.After rewrite parameter values into Pr194 and Pr195, the curve of Pr38 will be invalid.
2.Voltage signal value ≦1V(≧4V)，but will be stable at Pr194(Pr195) Setting value, as above graph.

Pr196 Frequency setting current bias
Pr197 Frequency setting current gain

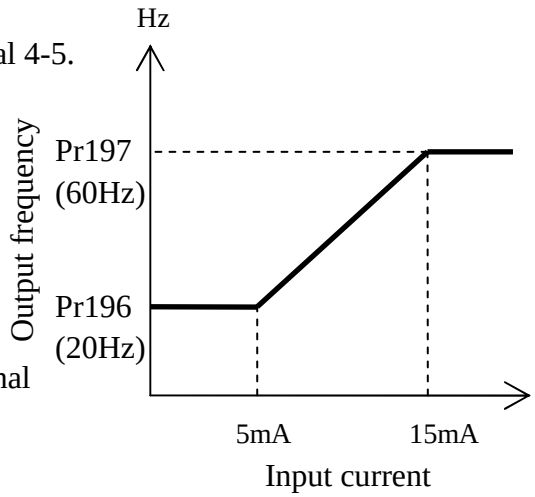
When inverter is in Pr79=2 External Mode or Pr79=4 Combined Mode 2, it is allowed to add current signal 4-20mA among analog input terminal 4-5. So make the frequency adjust by the changing of current signal to revise the corresponding value of frequency and current signal.
Procedures of Calibration:

Step1.Make sure current signal is wired with terminal 4-5.

Step2.If preset condition is “when current signal is 5mA, expected start frequency is 20Hz” , and write value of 20 into Pr196.

Step3.If Preset condition is “when current signal is 15mA, expected rated frequency is 60Hz” , and write value 60 into Pr197.

Step4.After finishing step 1-3, When the current signal changes among 5-15mA, The frequency will fluctuate among 20 to 60 Hz.



(Note)1. After Pr196 and Pr197 reset, the curve of Pr39 will be invalid.
2. Current signal value ≦5mA(≧15mA)， but will be stable at Pr196(Pr197) Setting value, as above graph.

Pr199 Software edition

Parameter is not writable and only readable.

Pr994 Parameter copy readout
Pr995 Parameter copy write-in

When set value into Pr994, Pr995, Motor rotation must be in a stop, this parameter value is only valid when Pr77=0 and in PU mode. When using same parameters for several inverter value setting. Use Pr994 and Pr995 to perform duplication value to other inverter rapidly.

Procedures of parameter copy:

Step1. When 1st inverter is in PU mode, the value of Pr994 is readout (the monitor displayed PrCP) and then press “Write”, at the same time monitor screen is flickering, it means that the parameter copy from inverter to control panel is in process. When no more flickering on monitor screen is means the parameter copy is done.

Step2. When 2nd inverter is in PU mode, the value of Pr995 is readout (the monitor displays PrCA) and then press “write” at the same time , then the monitor is flickering it means the parameter copy from Digital Unit to inverter EEPROM is in process. When the screen is no more flickering, the parameter copy is done.

(Note 1) Regarding parameter copy function in Pr994 and Pr995, it is only available on SH-PU series of Inverters.

(Note 2) When parameter copy is in process, the value of Pr0 to Pr190 will be copied and duplicate into Digital Unit and inverter.

Pr996 Alarm histories erase

Readout Pr996 value, Er.CL is displays on the screen of Digital Unit, and then press “Write” key to erase all ALARM History record.

Pr997 Inverter Reset

When the value of Pr997 is read out, rESr is display on screen of Digital Unit, then press “Write” key for inverter reset. After inverter reset, The record in thermal relay, and IGBT modulated thermal relay will be reset to zero.

Pr998 All Parameters Restore to initial Value

When value of Pr998 is readout, ALLC is display on screen of Digital Unit and then press “Write” key to restore factory default value.(Except Pr189)

Pr999 Partial Parameters Restore to initial value

When value of Pr999 is readout, Pr.Cr is display on screen, and then press “Write”, all parameters will be restored to factory default initial value, except Pr32 to Pr36 , Pr48 to Pr53, Pr189 , Pr192 , Pr194 to Pr197.

Chapter 4 Maintenance and Troubleshooting

Environmental factors of temperature, oil mist, dust, vibration, humidity may cause component aging and component aging may lead to inverter malfunction and public security incident. When inverter is in operation, penetrative maintenance of Daily Inspection and Periodical should be carried out routinely.

(Note) Only certified technician is allowed to perform installation, wiring, disassembly, and maintenance.

4-1 Daily Inspection Items

1. Make sure if the surrounding of installation location is normal environment (Temperature around inverter, humidity, dust, etc.
2. Make sure the voltage of power supply is normal during operation.
3. Make sure all wiring is secured.
4. Check for irregular cooling system during operation.(check if any irregular fan noise during operation)
5. Check if LED is normal during operation. (Check if LED on Digital Unit, LED Indicator on Digital Unit, LED Screen on Digital Unit is normal.)
6. Make sure the operation as expected.
7. Check if any irregular vibration, sounds, peculiar smell during operation.
8. Check if any leakage on filter capacitor on PCB board.

4-2 Regular Inspection (Off-line inspection) Items:

1. Check if connector and cable for wiring is correct? (Check if any damage or the connector and wire are firmly secured between Main Circuit and Control Panel)
2. Make sure to clean the dust and unclean objects in inverter.
3. Inspection on insulated resistors.
4. Check if cooling system is normal. (All wiring secured? Please do clean air filter and wind tunnel)
5. Check if device is fixed and make sure to fix screw tightly.
6. Check if external cable and terminal receptacle is broken.

4-3 Periodic Parts Replacement

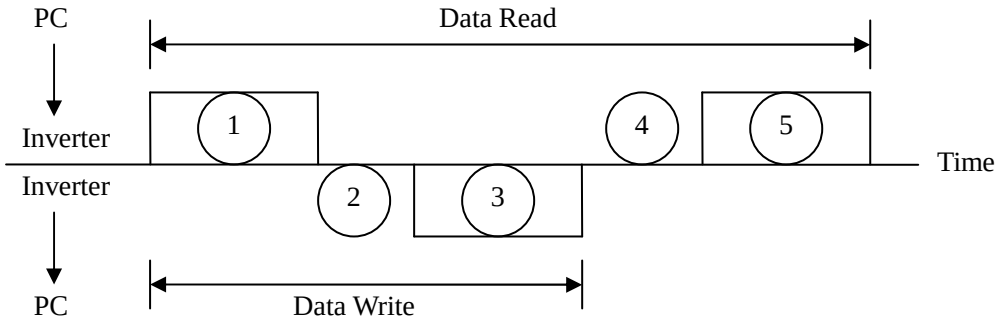
Part Name	Standard replacement Interval	Description
Cooling Fan	2 years	The life of the cooling fan bearing is usually 10,000-35000 hours. If operation is 24 hours then the cooling fan must be replaced every 2 years.
Filter Capacitor	5 years	Filter Capacitor is type of electrolytic capacitors, the physical characteristics of capacitor may deteriorated after continuously use. The deterioration is decides by operation environment. In general, change the capacitors every 5 years.
Relays	---	Any contact fault occurs, relays must be replaced.

(Note) When there is a need to replace parts, please send back to factory for replacement.

APPENDIX

Appendix 1 Communication Protocol〈Communication sequence〉

1. Communication sequence as following:



1 PC Communication Request

2 Inverter Processing

3 Inverter Responding

4 PC Processing Time

5 PC Responding Time

Note： 2 Should more than500μs

2. Communication type with or without data format:

Item No.	Description		Operation Command	Operation Frequency	Write Parameter	Restart	Monitoring	Read Out Parameter
①	Computer send out communication request to inverter		A	A	A	A	B	B
②	Inverter Data Processing time		yes	yes	yes	NA	yes	yes
③	Data responded From inverter	No error (request accepted)	C	C	C	NA	E	E
		Error (request rejected)	D	D	D	NA	F	F
④	Computer data processing time		NA	NA	NA	NA	G	G
⑤	About ③, Data Responded from PC	No error (no process)	NA	NA	NA	NA	G	G
		Error (output ③)	NA	NA	NA	NA	H	H

3. Communication format: (note: CR, LF Setting by Pr51)

(a) Communication Request from PC to Inverter

Format A：(Write data to Inverter)

ENQ	Station Number	Command Code	Waiting Time	Data	SUM CHECK	CR	(LF)
1	2 3	4 5	6	7 8 9 10	11 12	13	14

Format B：(Read data from Inverter)

ENQ	Station Number	Command code	Waiting Time	SUM CHECK	CR	(LF)
1	2 3	4 5	6	7 8	9	10

(b) Computer transmit data to inverter, inverter response data

Format C：(Data W/O Error)

ACK	Station Number	CR	(LF)
1	2 3	4	5

Format D：(Data Error)

NAK	Station Number	Error Code	CR	(LF)
1	2 3	4	5	6

(c) Computer readout data from Inverter, inverter response data

Format E：(Data W/O Error)

STX	Station number	Readout Data	Unit *Note 1	ETX	SUM CHECK	CR	(LF)
1	2 3	4 5 6 7	8	9	10 11	12	13

Format F：(Data Error)

NAK	Station Number	Error Code	CR	(LF)
1	2 3	4	5	6

【Note 1】

Single Digit	0	1	2	3
Min. Unit	1	0.1	0.01	0.001

(d)When computer is in data reading, responding data after data receipt from inverter.

Format G：(Data W/O Error)

ACK	Station Number	CR	(LF)
1	2 3	4	5

Format H：(Data Error)

NAK	Station Number	CR	(LF)
1	2 3	4	5

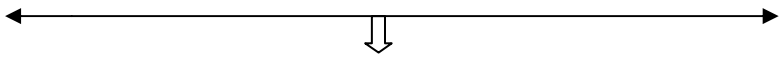
(1). Description of Control Code(ASCII CODE)

Control Code	ASCII Code	Description
STX	H02	Starting Data Transmission
ETX	H03	End Data Transmission
ENQ	H05	Communicating Request
ACK	H06	Accuracy Check
LF	H0A	Line sent out
CR	H0D	Line change
NAK	H15	Error data

(2). SUM CHECK Description

(Example 1)

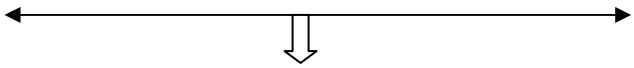
ENQ	Station Number		Command Code		Waiting Time	Data				SUM CHECK	
	0	1	E	1	1	0	7	A	D	F	4
H05	H30	H31	H45	H31	H31	H30	H37	H41	H44	H46	H34



H30+H31+H45+H31+H31+H30+H37+H41+H44=H1F4

(Example 2)

STX	Station Number		Readout Data				Unit	ETX	SUM CHECK	
	0	1	1	7	7	0			6	0
H02	H30	H31	H31	H37	H37	H30	H30	H03	H36	H30



H30+H31+H31+H37+H37+H30+H30=H160

(3). Error Code

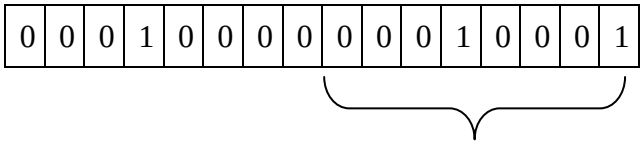
Code	Error Content	Code	Error Content	Code	Error Content
H0	Operator NAK Error	H1	Parity Error	H2	SUM CHECK error
H3	Protocol error	H4	Frame Error	H5	Over run error
H6	reserved	H7	Character Error	H8	reserved
H9	reserved	HA	Mode Error	HB	Command Error
HC	Data Range Error	HD	reserved	HE	reserved
HF	reserved				

〈Setting Item and data〉

<table>
<tr><th>No</th><th colspan="2">Item</th><th>Command</th><th>Data Content</th><th>Byte Number</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Operation Mode</td><td>Read Out</td><td>H7B</td><td>H0000：DU/PU communication operation
H0001：EXT communication operation
H0002：JOG communication operation
H0003~ H0008：Combined operation 1~6</td><td>4Bytes</td></tr>
<tr><td>Write</td><td>HFB</td><td>H0000：DU/PU communication operation
H0001：EXT communication operation
H0002：JOG communication operation</td><td>4Bytes</td></tr>
<tr><td rowspan="6">2</td><td rowspan="6">Monitoring</td><td>Output Frequency</td><td>H6F</td><td>H0000~H9C40</td><td>4Bytes</td></tr>
<tr><td>Rated frequency</td><td>H73</td><td>H0000~H9C40</td><td>4Bytes</td></tr>
<tr><td>Output current</td><td>H70</td><td>H0000~HFFFF</td><td>4Bytes</td></tr>
<tr><td>Output voltage</td><td>H71</td><td>H0000~HFFFF</td><td>4Bytes</td></tr>
<tr><td>Alarm item</td><td>H74
|
H77</td><td>H0000~HFFFF：Last 2 alarm code

ex：Alarm Code of H74 as follow
0 1 0 0 0 0 0 1 | 1 0 1 0 0 0 0 0
Last Alarm Code (FAN) | Recent Alarm Code (OPT)

<table>
<tr><th>Data</th><th>Content</th><th>Data</th><th>Content</th></tr>
<tr><td>H00</td><td>No Fault</td><td>H51</td><td>OP1</td></tr>
<tr><td>H10</td><td>OC1</td><td>H52</td><td>IPF</td></tr>
<tr><td>H11</td><td>OC2</td><td>H60</td><td>OLT</td></tr>
<tr><td>H12</td><td>OC3</td><td>H70</td><td>BE</td></tr>
<tr><td>H20</td><td>OV1</td><td>H80</td><td>GF</td></tr>
<tr><td>H21</td><td>OV2</td><td>H90</td><td>OHT</td></tr>
<tr><td>H22</td><td>OV3</td><td>HA0</td><td>OPT</td></tr>
<tr><td>H30</td><td>THT</td><td>HB0</td><td>PE</td></tr>
<tr><td>H31</td><td>THM</td><td>HB1</td><td>PUE</td></tr>
<tr><td>H32</td><td>NTC</td><td>HB2</td><td>RET</td></tr>
<tr><td>H33</td><td>SCR</td><td>HC0</td><td>CPU</td></tr>
<tr><td>H40</td><td>EEP</td><td></td><td></td></tr>
<tr><td>H41</td><td>FAN</td><td colspan="2"></td></tr>
<tr><td>H42</td><td>PID</td><td colspan="2"></td></tr>
<tr><td>H50</td><td>UVT</td><td colspan="2">Other error code SPE</td></tr>
</table></td><td>4Bytes</td></tr>
</table>

<table>
<tr><th>No</th><th colspan="2">Item</th><th>Command</th><th>Data Content</th><th>Byte Number</th></tr>
<tr><td>3</td><td colspan="2">Message display</td><td>H78</td><td>H0000~HFFFF
 

Message Code (TUN)
<table><tr><td>Data</td><td>content</td><td>Data</td><td>content</td></tr><tr><td>H00</td><td>No display</td><td>H13</td><td>SL</td></tr><tr><td>H10</td><td>TUN</td><td>H14</td><td>LV</td></tr><tr><td>H11</td><td>FAL</td><td>H15</td><td>OV</td></tr><tr><td>H12</td><td>RET</td><td>H16</td><td>OL</td></tr></table></td><td>4Bytes</td></tr>
<tr><td>4</td><td colspan="2">Operation Command</td><td>HFA</td><td>H0000~HFFFF
b0:Output ceased b1:FWD Rotation(STF)
b2:REV Rotation(STR) b3:Low Speed(RL)
b4:Mid Speed(RM) b5:High Speed (RH)
b6:multi-speed (REX)
b7:2nd Acceleration/Declaration Selection(RT)
b8~b15:reserved
(Note) In the communication mode RS485, functions of external terminal MRS、RT is still available.</td><td>4Bytes</td></tr>
<tr><td>5</td><td colspan="2">Inverter State</td><td>H7A</td><td>H0000~HFFFF
b0:Operation b1:Forward rotation b2:reverese rotation
b3:Frequency achieved b4:Overload b5:Key tone
b6:Frequency detection b7:Alarm Occurrence
b8:RES ON b9:STF ON b10:STR ON
b11:When is in external operation, Press STOP key on Control panel
b12~b15:reserved</td><td>4Bytes</td></tr>
<tr><td>6</td><td colspan="2">Operation Frequency Write In</td><td>HEE</td><td>H0000~H9C40</td><td>4Bytes</td></tr>
<tr><td>7</td><td colspan="2">Inverter Reset</td><td>HFD</td><td>H9696</td><td>4Bytes</td></tr>
<tr><td>8</td><td colspan="2">Inverter Parameter and error code erased.</td><td>HFC</td><td>H5A5A----Pr999
H9966----Pr998
HA5A5----Pr996
H55AA----Except communication parameter ,all parameter must be back to initial value.</td><td>4Bytes</td></tr>
<tr><td>9</td><td colspan="2">Parameter Read Out</td><td>H00~H63</td><td rowspan="2">Data Length: Please refer to <Communication Parameter Codes List></td><td>4Bytes</td></tr>
<tr><td>10</td><td colspan="2">Parameter Write In</td><td>H80~HE3</td><td>4Bytes</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Write/Read Parameter/ page change</td><td>Read Out</td><td>H7F</td><td rowspan="2">H00~H63，H80~HE3 shift
H0000----Pr0~Pr99 Read/Write
H0001----Pr100~Pr199 Read/Write</td><td rowspan="2">4Bytes</td></tr>
<tr><td>Write In</td><td>HFF</td></tr>
</table>

<Communication Parameter Codes List>

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Basic function	Pr0	Manual Torque Boost	0~30%	0.1%	6%(Note7)	H00	H80
	Pr1	Maximum frequency	0~120Hz	0.01Hz	120Hz	H01	H81
	Pr2	Minimum frequency	0~120Hz	0.01Hz	0Hz	H02	H82
	Pr3	Base Frequency	0~400Hz	0.01Hz	60Hz	H03	H83
	Pr4	1(High Speed)	0~400Hz	0.01Hz	60Hz	H04	H84
	Pr5	2(middle speed)	0~400Hz	0.01Hz	30Hz	H05	H85
	Pr6	3(low speed)	0~400Hz	0.01Hz	10Hz	H06	H86
	Pr7	Acceleration Time	0~3600sec	0.1sec	5sec (Note1)	H07	H87
	Pr8	Deceleration Time	0~3600sec	0.1sec	5sec (Note1)	H08	H88
	Pr9	Electronic thermal O/L replay	0~300A	0.01A	Rated Output current	H09	H89
DC injection brake	Pr10	DC injection brake operation frequency	0~120Hz	0.01Hz	3Hz	H0A	H8A
	Pr11	DC injection brake operation time	0~10sec	0.1sec	0.5sec	H0B	H8B
	Pr12	DC injection brake operation ability	0~30%	0.1%	6%(Note8)	H0C	H8C
Deceleration	Pr13	Starting Frequency	0~60Hz	0.01Hz	0.5Hz	H0D	H8D
---	Pr14	Load Pattern selection	0、1、2、3	1	0	H0E	H8E
JOG rotation	Pr15	JOG frequency	0~400Hz	0.01Hz	5Hz	H0F	H8F
JOG rotation	Pr16	JOG Acceleration/ Deceleration time	0~3600 sec	0.1sec	(Note 2)	H10	H90
Basic function	Pr17	External electronic thermal replay selection	0~2	1	0	H11	H91
	Pr18	High speed maximum frequency	120~400Hz	0.01Hz	120Hz	H12	H92
	Pr19	Base frequency voltage	0~1000V、9999	0.1V	9999	H13	H93
Acceleration	Pr20	Acceleration/ Deceleration reference frequency	1~400Hz	0.01Hz	60Hz	H14	H94

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Preventing lost speed	Pr21	Stall deceleration time during running	0~3600sec	0.1sec	2Sec	H15	H95
	Pr22	Stall prevention operation level	0~200%	0.1%	185%	H16	H96
	Pr23	Stall prevention operation level compensation factor at double speed	0~200%	0.1%	200%	H17	H97
Multi-speed setting	Pr24	4th speed	0~400Hz、9999	0.01Hz	9999	H18	H98
	Pr25	5th speed	0~400Hz、9999	0.01Hz	9999	H19	H99
	Pr26	6th speed	0~400Hz、9999	0.01Hz	9999	H1A	H9A
	Pr27	7th speed	0~400Hz、9999	0.01Hz	9999	H1B	H9B
---	Pr28	Limitation for alarm reset times	0、1~10	1	3	H1C	H9C
AC/Deceleration	Pr29	Acceleration/ Deceleration curve pattern selection	0、1、2	1	0	H1D	H9D
Regenerative brake	Pr30	Regenerative brake function selection	0、1	1	0	H1E	H9E
Shihlin Communication	Pr32	Communication speed (baud rate)	0、1、2 (Note 3)	1	1	H20	HA0
	Pr36	Station number	0~31	1	0	H24	HA4
---	Pr37	Speed Display	0、1~9998	1	0	H25	HA5
---	Pr38	Frequency/5V(10V)	1~400Hz	0.01Hz	60Hz	H26	HA6
---	Pr39	Frequency /20mA	1~400Hz	0.01Hz	60Hz	H27	HA7
---	Pr40	Multifunction terminal selection	0~6666	1	5102	H28	HA8
Output frequency detection	Pr41	Output frequency detection	0~100%	0.1%	10%	H29	HA9
	Pr42	Output frequency detection for forward rotation	0~400Hz	0.01Hz	6Hz	H2A	HAA
	Pr43	Output frequency detection for reverse rotation	0~400Hz、9999	0.01Hz	9999	H2B	HAB
Second function	Pr44	2nd acceleration time	0~3600sec、9999	0.1sec	9999	H2C	HAC
	Pr45	2nd deceleration time	0~3600sec、9999	0.1sec	9999	H2D	HAD
	Pr46	2nd torque boost	0~30%、9999	0.1%	9999	H2E	HAE
	Pr47	2nd base frequency	0~400Hz、9999	0.01Hz	9999	H2F	HAF

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Shihlin Communication	Pr48	Data length	0、1	1	0	H30	HB0
	Pr49	Stop bit length	0、1	1	0	H31	HB1
	Pr50	Parity check presence/absence	0、1、2	1	2	H32	HB2
	Pr51	CR、LF presence/absence	1、2	1	1	H33	HB3
	Pr52	Number of communication retries	0~10	1	0	H34	HB4
	Pr53	Communication check time interval	0、0.1~999.8、9999	0.1sec	9999	H35	HB5
Surveillance function	Pr54	FM/AM function selection	0~6	1	1	H36	HB6
	Pr55	Frequency Monitoring reference	0~400Hz	0.01Hz	60Hz	H37	HB7
	Pr56	Current monitoring reference	0~500A	0.01A	Rated Output Current	H38	HB8
Reboot	Pr57	Restart coasting time	0~5sec、9999	0.1sec	9999	H39	HB9
	Pr58	Restart cushion time	0~60sec	0.1sec	0.5sec	H3A	HBA
---	Pr59	Multifunction terminals selection	0~9999	1	9999	H3B	HBB
Wave filter Figure	Pr60	Input filter time constant	1~16	1	1	H3C	HBC
Tone change	Pr61	Key Tone Selection	0、1	1	0	H3D	HBD
Output frequency test	Pr62	Zero current detection level	0~200%、9999	0.1%	5%	H3E	HBE
	Pr63	Zero current detection time	0.05~1sec、9999	0.01sec	0.5sec	H3F	HBF
---	Pr64	Remote function selection	0、1、2、3	1	0		
Function recovery	Pr65	Retry Selection	0、1、2、3	1	0	H41	HC1
Stall prevention	Pr66	Stall prevention operation reduction starting frequency	0~400Hz	0.01Hz	60Hz	H42	HC2
Function recovery	Pr67	Number of retries at alarm occurrence	0、1~10、11~20	1	0	H43	HC3
	Pr68	Retry waiting time	0~360sec	0.1sec	1sec	H44	HC4
	Pr69	Retry count display erase	0	1	0	H45	HC5

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Regenerative brake	Pr70	Special regenerative brake duty	0~30%	0.1%	0%	H46	HC6
---	Pr71	Brake method selection	0、1	1	1	H47	HC7
---	Pr72	Load Frequency	0.7~15kHz	0.1KHz	5kHz	H48	HC8
---	Pr73	Voltage Signal Selection	0、1	1	0	H49	HC9
---	Pr74	Starting terminal function selection	0、1	1	0	H4A	HCA
---	Pr75	Reset	0~7	1	4	H4B	HCB
---	Pr77	Parameter writing prevention selection	0、1、2	1	0	H4D	HCD
---	Pr78	Prevention forward/reverse rotation selection	0、1、2	1	0	H4E	HCE
---	Pr79	Operation Mode selection	0~8	1	0	H4F	HCF
---	Pr80	FM/AM output terminal selection	0、1	1	0	H50	HD0
---	Pr81	AM Signal output magnification	0~20	0.01	1	H51	HD1
---	Pr82	Set frequency gain	0、1~100%	1	0	H52	HD2
---	Pr84	FU/10 times output terminals selection	0、1~10	1	0	H54	HD4
---	Pr88	Auto voltage Boost selection	0、1	1	0	H58	HD8
---	Pr89	Slip Compensation	0~3%	0.1%	0%	H59	HD9
---	Pr90	Grounding Leakage Selection	0、1	1	1	H5A	HDA
Avoid frequency	Pr91	Frequency Jump 1A	0~400Hz、9999	0.01Hz	9999	H5B	HDB
	Pr92	Frequency Jump 1B	0~400Hz、9999	0.01Hz	9999	H5C	HDC
	Pr93	Frequency Jump 2A	0~400Hz、9999	0.01Hz	9999	H5D	HDD
	Pr94	Frequency Jump 2B	0~400Hz、9999	0.01Hz	9999	H5E	HDE
	Pr95	Frequency Jump 3A	0~400Hz、9999	0.01Hz	9999	H5F	HDF
	Pr96	Frequency Jump 3B	0~400Hz、9999	0.01Hz	9999	H60	HE0
---	Pr99	Motor operation mode selection	0~4	1	0	H63	HE3
Motor constants	Pr100	Motor capacity	0~30KW	0.01	Depend on Capacity	H00	H80
	Pr101	Motor Pole number	2~12	1	4	H01	H81
	Pr102	Rated Motor Voltage	0~1000V	1V	220/440 V	H02	H82
	Pr103	Rated Motor frequency	0~ 400 Hz	0.01 Hz	60 Hz	H03	H83

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Motor constants	Pr105	Motor excitation current	0~150 A	0.01 A	Depend on Capacity	H05	H85
	Pr106	Motor constant R1	0.01~60Ω	0.01Ω	Depend on Capacity	H06	H86
	Pr107	Motor constant R2	0.01~60Ω	0.01Ω	Depend on Capacity	H07	H87
	Pr108	Motor constant L1	0.1~1500mH	0.1 mH	Depend on Capacity	H08	H88
	Pr109	Motor constant L2	0.1~1500mH	0.1 mH	Depend on Capacity	H09	H89
	Pr110	Motor constant Lm	0.1~1500mH	0.1 mH	Depend on Capacity	H0A	H8A
Protective function	Pr113	Overvoltage stall protection selection	0、1	1	0	H0D	H8D
	Pr114	Overvoltage stall protection voltage	110~140%	0.1%	120%	H0E	H8E
Torque control	Pr115	Torque command source selection	0~2	1	0	H0F	H8F
	Pr116	Speed limit selection	0~4	1	0	H10	H90
	Pr117	Torque command value	0~100%	0.1%	50%	H11	H91
	Pr118	Forward rotation speed limit	0~120Hz	0.01Hz	60Hz	H12	H92
	Pr119	Reverse rotation speed limit	0~120Hz	0.01Hz	60Hz	H13	H93
Torque control	Pr120	Torque command gain	0~180%	0.1%	100%	H14	H94
---	Pr125	Digital Unit key tone selection	0、1	1	1	H19	H99
Multi-speed setting	Pr126	8th Speed	0~400Hz、9999	0.01Hz	9999	H1A	H9A
	Pr127	9th Speed	0~400Hz、9999	0.01Hz	9999	H1B	H9B
	Pr128	10th Speed	0~400Hz、9999	0.01Hz	9999	H1C	H9C
	Pr129	11th Speed	0~400Hz、9999	0.01Hz	9999	H1D	H9D
	Pr130	12th Speed	0~400Hz、9999	0.01Hz	9999	H1E	H9E

Function	Pr Number	Name	Setting Range	Min Setting unit	Initial Value	Parameter Codes	
						Read	Write
Multi-speed setting	Pr131	13th Speed	0~400Hz、9999	0.01Hz	9999	H1F	H9F
	Pr132	14th Speed	0~400Hz、9999	0.01Hz	9999	H20	HA0
	Pr133	15th Speed	0~400Hz、9999	0.01Hz	9999	H21	HA1
PID performance	Pr160	PID operation selection	0、1~8	1	0	H3C	HBC
	Pr161	PID ratio increase	0、0.1~600%	0.1%	90%	H3D	HBD
	Pr162	PID integral increase	0、0.1~600%	0.1%	10%	H3E	HBE
	Pr163	PID differential increase	0、0.1~600%	0.1%	0%	H3F	HBF
	Pr164	PID digital target value	0~100%	0.1%	0%	H40	HC0
	Pr165	PID Output order limit	0~100%	0.1%	50%	H41	HC1
	Pr166	PID Alert value limit	0、0.1~100%	0.1%	0%	H42	HC2
	Pr167	PID Alarm detection time	0、0.1~3600s	0.1s	0s	H43	HC3
	Pr168	PID Alarm solution	0~2	1	0	H44	HC4
Vector Control	Pr180	Proportional Gain of Speed Controller	0~100%	1%	50%	H50	HD0
	Pr181	Integral Gain of Speed Controller	0~100%	1%	50%	H51	HD1
	Pr182	Slip Compensation	0~50%	0.1%	35%	H52	HD2
	Pr183	Speed Compensation Coefficient	0~100%	0.1%	50%	H53	HD3
	Pr184	Low Speed Excited Rate	0~100%	0.1%	50%	H54	HD4
	Pr185	High Speed Exited Rate	0~100%	0.1%	100%	H55	HD5
	Pr186	High Speed Exited Curve	0、1、2	1	1	H56	HD6
	Pr187	Bandwidth of Speed Controller	20~120	1	60	H57	HD7
---	Pr189	50Hz/60Hz system switchover	0、1	1	0	H59	HD9
---	Pr191	FM terminal output revision	0~50	1	25	H5B	HDB

Function	Pr Number	Name	Setting Range		Min Setting unit	Initial Value		Parameter Codes	
								Read	Write
Calibration functions	Pr192	FM Terminal calibration	0~9998		1	166		H5C	HDC
	Pr194	Voltage setting Bias	0~10V	0~60Hz	0.01Hz	0V	0Hz	H5E	HDE
	Pr195	Voltage setting Gain	0~10V	1~400Hz	0.01Hz	5V	60Hz	H5F	HDF
	Pr196	Current setting Bias	0~20mA	0~60Hz	0.01Hz	4mA	0Hz	H60	HE0
	Pr197	Current setting Gain	0~20mA	1~400Hz	0.01Hz	20mA	60Hz	H61	HE1
---	Pr199	Software version	Viewing only		—	(Note 6)		H63	—
Parameter copy	Pr994	Parameter copy/read	—		—	(Note 4)		—	—
	Pr995	Parameter copy/write	—		—	(Note 4)		—	—
Alert record clear	Pr996	Alarm history clear	—		—	—		—	—
Parameter reset	Pr997	Reset	—		—	—		—	—
Parameter recovery	Pr998	All parameter recover to initial value	—		—	—		—	—
	Pr999	Partial parameter recover to initial value	—		—	—		—	—

(Note1) Factory default value of Parameter Pr7、Pr8: 0.75K~7.5K (1HP~10HP) product series is 5sec , 11K~15K (15HP~20HP) product series is 10sec, 18.5K~22K (25HP~30HP) product series is 15sec.

(Note2) Factory default value of Parameter Pr16: 0.75K~3.7K (1HP~5HP) product series is 0.5sec , 5.5K~15K (7.5HP~20HP) product series is 1sec. 18.5K~22K (25HP~30HP) product Series is 1.5sec.

(Note3) When Pr32=0, the Baud Rate is 4800bps; when Pr32=1, the Baud Rate is 9600bps; whenPr32=2, the Baud Rate is 19200bps.

(Note 4) The function related to parameter copy in Pr994 and Pr995 is only available in Digital Unit of SH-PU.

(Note 5) When parameter value is 9999, the operation panel of SH-PU series shows as “9999”, but for DU series shows as “99999”.

(Note 6) For massive quantity manufacture versions are all standardized, parameter functions all apply to market demand. For the reason of special demand, other exclusive version will be made.

(Note7) Factory default value of Parameter Pr0: 0.75K(1HP) product series is 6%, 1.5K~3.7K (2HP~5HP) product series is 4%, 5.5K~7.5K (7.5HP~10HP) product series is 3%, 11K~22K (15HP~30HP) product series is 2%.

(Note8) Factory default value of Parameter Pr12: 0.75K~3.7K (1HP~5HP) product series is 6%, 5.5K~7.5K (7.5HP~10HP) product series is 4%, 11K~22K (15HP~30HP) product series is 2%.

Examples:

Example 1: Computer communication to read Pr126
Step 1. Inputting page changing into computer, applying Format A:

ENQ	Station number 0 0	Instruction code HFF	Waiting time	Data H0001	Sum check	CR
H05	H30 H30	H46 H46	H30	H30 H30 H30 H31	H44 H44	H0D

Pr.126 is in Page 1

Step 2. After inverter receives the information and processes without error, and then it replies, applying Format C:

ACK	Station number 0 0	CR
H06	H30 H30	H0D

Step 3. Refering to Whether or not computer runs inverter page changing value correctly, applying Format B:

ENQ	Station number 0 0	Instruction code H7F	Waiting time	Sum check	CR
H05	H30 H30	H37 H46	H30	H30 H44	H0D

Step 4. After inverter receives the information and processes without error, then it transfers the value of page changing to computer, applying Format E:

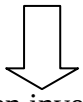
STX	Station number 0 0	Read data H0001	Unit	ETX	Sum check	CR
H02	H30 H30	H30 H30 H30 H31	H30	H03	H36 H31	H0D

Step 5. After computer receives the above step information and process without error, then it replies to inverter, applying Format G:

ACK	Station number 0 0	CR
H06	H30 H30	H0D

Step 6. Computer sends information to inverter and requires value of Pr126,
Applying Format B:

ENQ	Station number 0 0	Instruction code H1A	Waiting time	Sum check	CR
H05	H30 H30	H31 H41	H30	H30 H32	H0D



126 minus 100 equals 26, then invert 26 to hexadecimal H1A, and convert 1、A to ASCII CODE H31、H41.

Step 7. After inverter receives the information and processes without error, it sends value of Pr126 to computer, applying Format E:

STX	Station number 0 0	Read data H1770(60Hz)	Unit	ETX	Sum check	CR
H02	H30 H30	H31 H37 H37 H30	H32	H03	H36 H34	H0D

Step 8. After inverter receives the information and processes without error, it replies to inverter, applying Format G:

ACK	Station number 0 0	CR
H06	H30 H30	H0D

Example 2: Change value of Pr126 to 50(initial value is 60)
Step 1. After completing all steps of example 1

Step 2. Inputting 50 into inverter by computer, applying format A:

ENQ	Station number 0 0	Instruction code H9A	Waiting time	Data H1388	Sum check	CR
H05	H30 H30	H39 H41	H30	H31 H33 H38 H38	H44 H45	H0D

126 minus 100 equal 26, then convert 26 to hexadecimal H1A, H1A+H80=H9A.

Minimum unit of Pr126 is 0.01, therefore 50*100=5000, then convert 5000 to hexadecimal H1388, and convert 1,3,8,8 to ASCII CODE to send out.

Step 3. After inverter receives the information and processes without error, it replies to computer, applying Format C:

ACK	Station number 0 0	CR
H06	H30 H30	H0D

Example 3: Input 500 as the value of Pr126 (Parameter range 0~400)

Step 1. After completing all steps of example 1

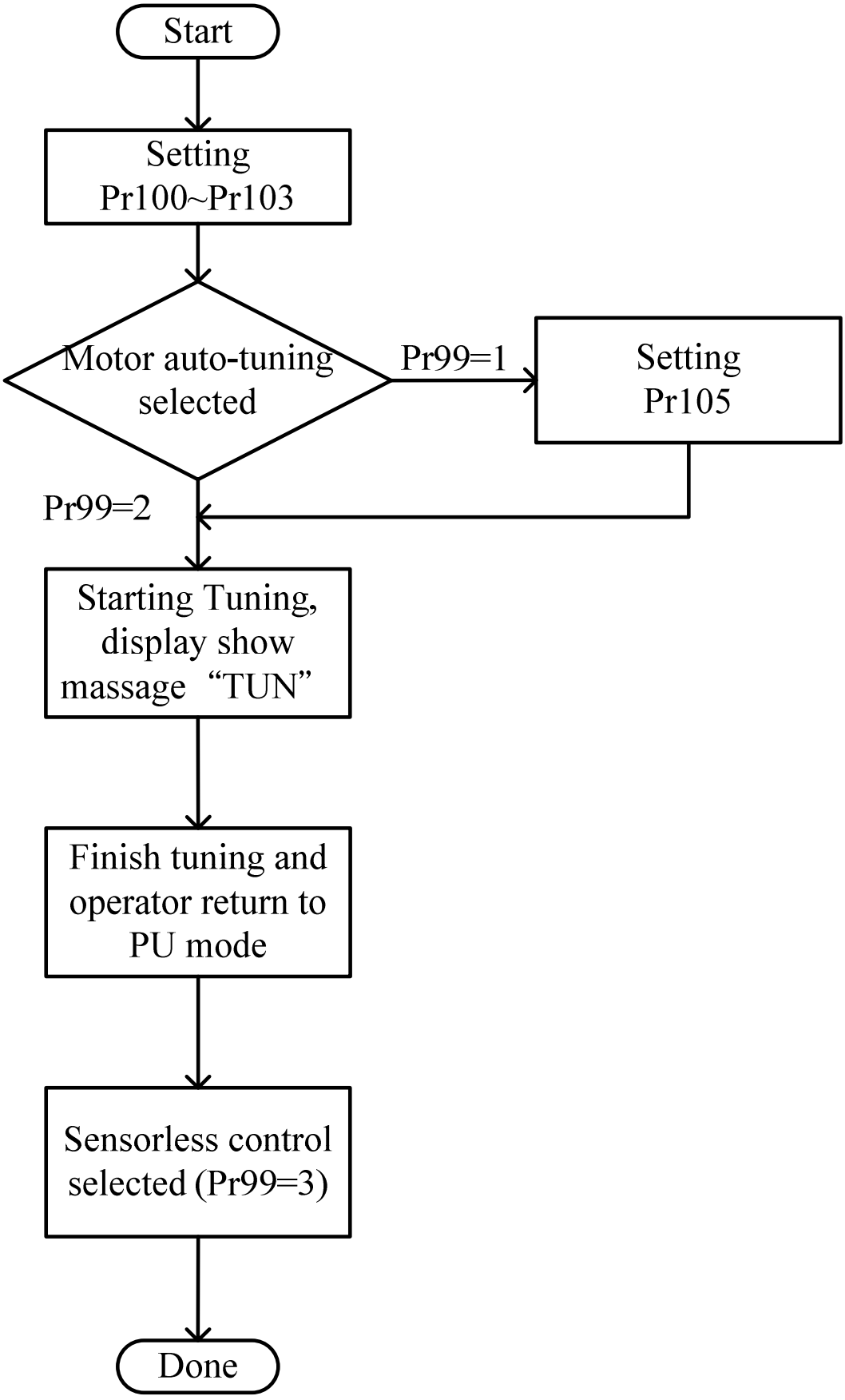
Step 2. Inputting 500 into inverter by computer, applying Format A:

ENQ	Station number 0 0	Instruction code H9A	Waiting time	Data HC350	Sum check	CR
H05	H30 H30	H39 H41	H30	H43 H33 H35 H30	H45 H35	H0D

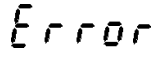
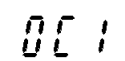
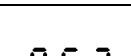
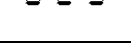
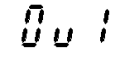
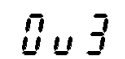
Step 3. After processing, for information out of range, inverter replies to computer that this information is incorrect, applying Format F:

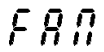
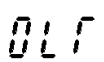
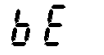
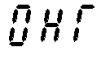
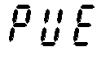
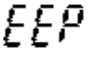
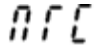
NAK	Station number 0 0	Error code HC	CR
H15	H30 H30	H43	H0D

Appendix 2 Motor Parameter Auto-Tuning Procedures



Appendix 3 Alarm Code

Code	Operation Panel Display	Description	Corrective action
ERROR		• RESET Terminal is setting On. • Contactor failure between operation panel and inverter • Internal circuit malfunction • CPU Failure.	• Switch off the Restart switch. • Make sure if operation panel is connected with inverter. • Replace Inverter. • Restart Inverter.
0		• Wrong operation procedures	• Follow standard operation procedures
OC1 Overcurrent shut-off during acceleration		• Output current exceeds its maximum allowable level.	• Increases acceleration time if there is rapid fast/slow acceleration. • Prevention load increases rapidly. • Check if any short circuit on UVW terminals.
OC2 Overcurrent shut-off during constant speed			
OC3 Overcurrent shut-off during deceleration or stop			
OV1 Regenerative overvoltage shut-off during acceleration		• DC bus voltage exceeds its maximum allowable value.	• If there is rapid acceleration /deceleration, please extend the acceleration/deceleration time. • Check if brake resistor is detached between main circuit terminals of P-PR. • Check the setting value of Pr30 and Pr70 . • Check the setting value of Pr113 and Pr114 .
OV2 Regenerative overvoltage shut-off during constant speed			
OV3 Regenerative overvoltage shut-off during deceleration or stop			
THT IGBT Module Over temperature		• Inverter overload shut-off • IGBT Module Over Current	• To prevent long-time overload operation of Inverter. • Reduced carrier frequency.
THM Overload		• Electronic thermal relay function	• Check setting value of Pr9. • Decreased load or increased combined the capability of Inverter and Motor.

Code	Operation Panel Display	Description	Corrective action
FAN Cooling Fan Alarm		• Cooling Fan Failure	• Cooling fan damaged, please replace a new fan. • If fan is blocked by any objects, please remove it. • Check if Fan wiring is broken /loose, or need to replace new fan.
OLT Overload		• Stall prevention for long time operation	• Check the setting value of Pr22. • Decreased load. • Increased capacity of inverter and motor.
BE Brake transistor alarm detection		• Brake transistor alarm	• Send back for Repair.
OHT External thermal relay operation		• Operation of External Thermal Relay	• Check external thermal relay and motor capacity. • Decreased load
PUE Operation Panel is detached		• Operation Panel is detached	• Make sure operation panel is firmly connected with inverter.
GF Grounding Failure Protection		• Over current between inverter output side with grounding wire	• Check if motor insulation resistance is too low. • Check if any short-circuit between motor wiring. • Check if any mistake on wiring
OPT Communication option alarm		• Communication Alarm. Retry count excess. • Communication disconnection, the communication interval exceeded the permissible time.	• Make sure communication parameter setting value.
EEP EEPROM alarm		• EEPROM failure	• Send back for repair.
NTC Overheat		• Fan cooling failure. • Installation location cooling failure.	• Check air flow. • Please check ventilation condition of installation location.

Code	Operation Panel Display	Description	Corrective action
UVT Undervoltage		• Input voltage is too low	• Check the power supply system equipment such as the power supply.
IPF Instantaneous power failure		• Instant stop is too long • Abnormal power supply	• Please check power supply system
CPU CPU alarm		• CPU failure	• Send back for repair.
PID PID malfunctions		• PID feedback signal error	• Check the feedback terminal connection • Make sure the voltage or current transforming ratio for external signal transformer.
RET Retry count excess		• Retry count exceeded Pr67 continuously	• Check setting value of Pr67.

Appendix 4 Troubleshooting and Solution

Alarm	Content of Confirmation	
Motor Won't Rotate	Main Circuit	• Check the voltage between terminals R-S-T if correct? • Check if POWER indicator is lit? • Check If wiring between Inverter and Motor is correct?
	Overload	• Overload too heavy? • Check if Motor Rotator is locked?
	Pr Setting	• Check if set value of Starting Frequency is too high?(Pr13) • Check if Operation Mode(Pr17) is correct? • Check if set value of Max Frequency value(Pr10) is Zero? • Check if Reverse Rotation(Pr78) is limited? • Check if signal bias and gain(Pr194~Pr197)is correct? • Check if frequency jump is correct (Pr91~Pr96) is correct?
	Control Circuit	• Check if there is signal feed into MRS terminal? • Check if there is signal feed into RES terminal? • Check if external Thermal Relay is tripping? • Check if Alarm Occurrence (ALARM indicator is lit) but no reset for retry. • Check if wiring of voltage/current signal is current? • Check if input terminal STF and STR is correct?(Pr74) • Check if control circuit wiring is tripping or not or loose contact?
Motor Rotation in appositive direction	• Check if wiring UVW is correct? • Check if STF and STR wring is correct?	
Motor Torque can not be ramping up	• Check if load is too heavy? • Check if stall prevention level is correct (Pr22)? • Check if Torque Boost (Pr0) is too high? • Check if it is limited by Max Frequency (Pr1)?	
Unsteady Acceleration/Deceleration	• Check if acceleration/deceleration (Pr7, Pr8) is correct? • Check if acceleration/deceleration pattern (Pr29) is correct? • Check if fluctuation of voltage/current signal is influenced by interference?	
Motor Overcorrect	• If load is too heavy? • If capacity matching for Inverter and Motor? • Check if Torque Boost (Pr0) is too high?	
Torque is shifting during rotation	• Check if any fluctuation occurs by the interference of voltage/current signal? • Check if there is any load change in motor? • Check if main circuit wiring is too long?	

Appendix 5 PID Parameter adjustment Principle

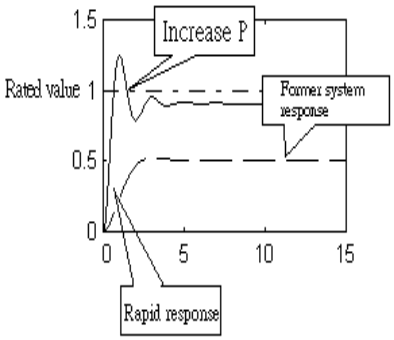
The matching of three parameter PID affects a lot to precision which clients demand. Therefore, brief methods of adjustment is introduced so that clients can be familiar with the operation.

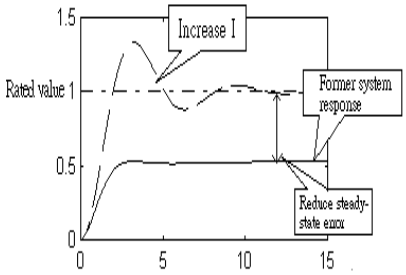
1.Any parameter of PID changes, do not let output curve wary from symmetry, stop output first to secure it.

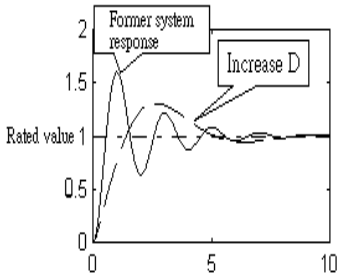
2.Set proportional gain P: Increase value P to the rapid responding time you want, but overshoot will be more.

3.Set I: Increase value I, until no error, However, the overshoot and fluctuation may be increased.

4.Set D: Increase value D, reduce overshoot in acceptable range, but climbing time will increase.





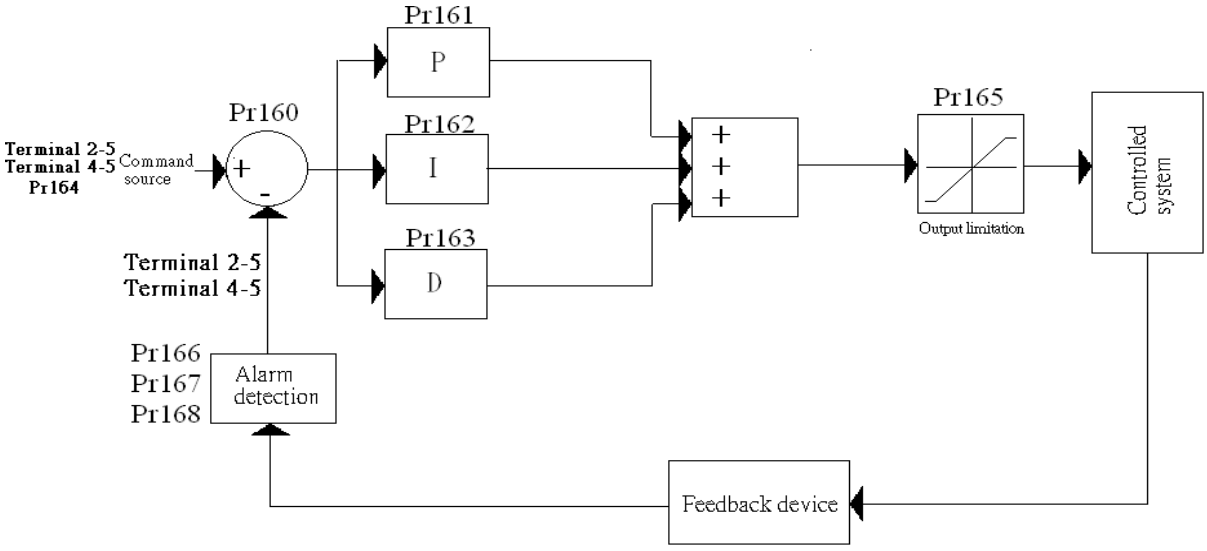


5.According to the above procedure, if any adjustment needed, follow the below instruction.

Parameter adjustment	Reducing overshoot	Reducing Error	Rapidly obtain response	Reducing fast vibration
P	Decrease	Increase	Increase	Decrease
I	Decrease	Increase	Increase	Decrease
D	Increase	N/A	Decrease	Increase

(Note) When D reaches critical level, overshoot will increase, hence the value can not be enhanced without limitation.

6.Whole system drawing below :



Appendix 6 European Standardized compatibility introduction

(This inverter with CE logo complies with the requirement of LVD 73/23/EEC,93/68/EEC and EMC 2004/108/EC)

A. Electromagnetic compatible order(EMC):

(1).EMC compatible description

For the whole system, inverter is not dependent functioning device, it is usually one part of the control trunk and cooperate with other devices to control machines, therefore, Our company does not agree that all EMC orders need to apply to inverter directly, For above reasons, Logo CE has no extension of its meaning.

(2).Compatibility

Not all EMC orders apply to inverter, but for some devices which cooperate with inverter and apply to EMC orders, these devices must have CE logo, Our company has EMC qualified certificate and operation manual so that the machines including inverter can achieve the requested EMC standard with precise accessories.

(3).Installation instruction

Follow the reminders below to install inverters.

1. Use noise filter which accords to European standard(CE).
2. For wiring between motor and inverter, please store with shield line or metal inductive wire, and grounding the common terminal of motor and inverter.
3. Please install inverter in a grounding metal trunk to isolate radiation.
4. Power supply terminal applies wire to wire noise filter and control lines applies magnetic metal core to suppress noise.

All information and the specification of European standardized filter is introduced in the manual. Please contact your agent.

B. Low voltage demand(LVD) :

(1) LVD compatibility description

The inverter is compatible to LVD.

(2) Compatibility

The company self-announces that inverter complies with LVD standard.

(3) Description

1. Do not use leakage protector to prevent electric shock only, do make the grounding.
2. For individual inverter, make the individual grounding,(No more than 2 grounding line)
3. Use NFB and MRC that complied with EN or IEC standard.
4. Use our inverter under condition of over voltage level 2 and contamination level 2 or better condition.
5. About wires size of input and output sides ,please apply the recommended specification that is in manual.

CE DECLARATION

CE EU Declaration of Conformity CE

The product herewith complies with the requirement of the Low Voltage Directive 73/23/EEC , 93/68/EEC、the EMC Directive 2004/108/EC and the CE marking accordingly.

Declares that the product described :

Product Name : AC Motor Drives

Model :

SH020-0.75K	SH020-1.5K	SH020-2.2K	SH020-3.7K
SH020-5.5K	SH020-7.5K	SH020-11K	SH020-15K
SH020-18.5K	SH020-22K	SH040-0.75K	SH040-1.5K
SH040-2.2K	SH040-3.7K	SH040-5.5K	SH040-7.5K
SH040-11K	SH040-15K	SH040-18.5K	SH040-22K

Conforms to the following Product Specification :

EMC :

IEC 61800-3(Second edition 2004-8)
Adjustable speed electrical power drive systems
Part3 : EMC product standard including specific test methods

Safety :

IEC 61800-5-1(First edition 2003-02)
Adjustable speed electrical power drive systems
Part 5-1 : Safety requirements-Electrical,thermal and energy

Manufacturer Name :

Shihlin Electric & Engineering Corporation Automation Division

Manufacturer Address :

No.234, ChungLun, HsinFun, HsinChu, Taiwan 304

Signature of representative for the Manufacturer :

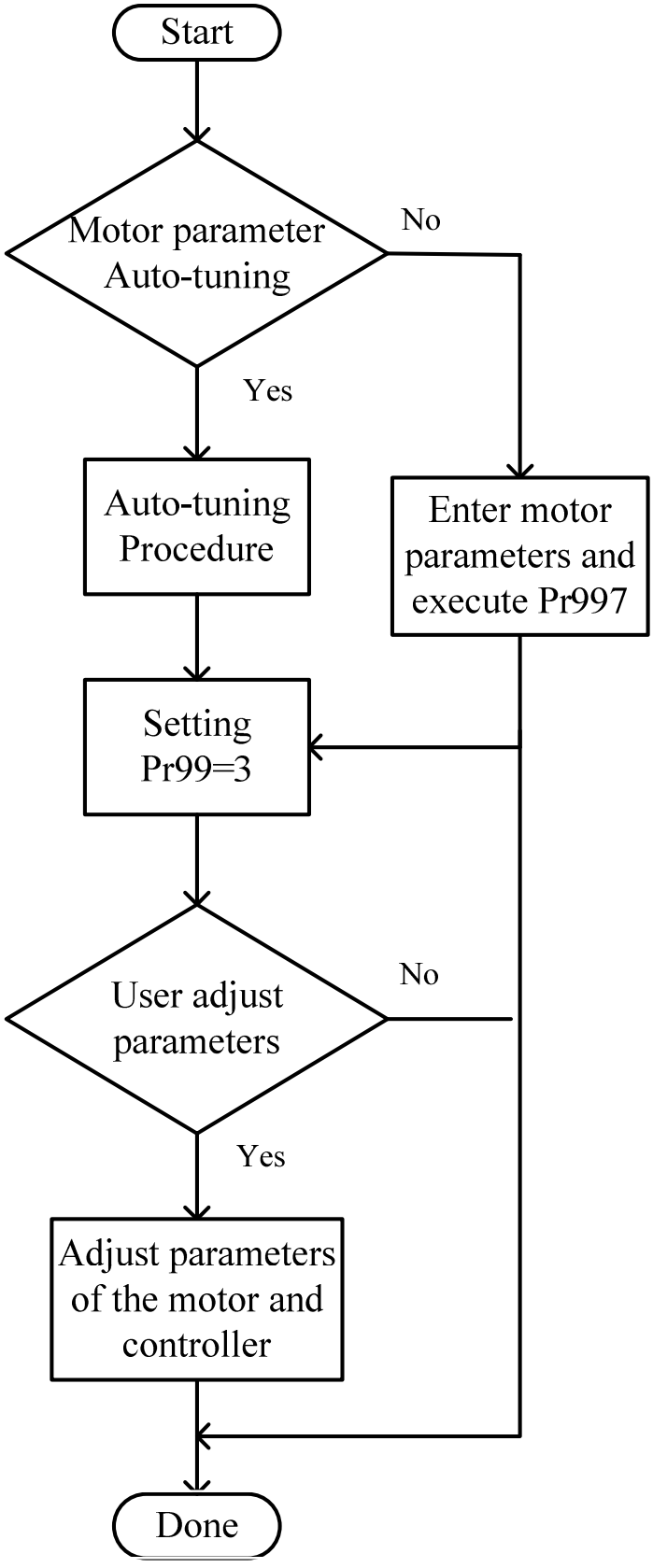
Pai-Sung Wang Pai-Sung Wang 王 95.9.28 百淞
(Automation Division Development Dept. Manager)
Date : September 2006

Shihlin

APPENDIX 7 MODBUS Parameter list

Parameter list							
Decimal	**Hex**	**Decimal**	**Hex**	**Decimal**	**Hex**	**Decimal**	**Hex**
Pr[000]	0000	Pr[050]	0032	Pr[100]	0064	Pr[150]	0096
Pr[001]	0001	Pr[051]	0033	Pr[101]	0065	Pr[151]	0097
Pr[002]	0002	Pr[052]	0034	Pr[102]	0066	Pr[152]	0098
Pr[003]	0003	Pr[053]	0035	Pr[103]	0067	Pr[153]	0099
Pr[004]	0004	Pr[054]	0036	Pr[104]	0068	Pr[154]	009A
Pr[005]	0005	Pr[055]	0037	Pr[105]	0069	Pr[155]	009B
Pr[006]	0006	Pr[056]	0038	Pr[106]	006A	Pr[156]	009C
Pr[007]	0007	Pr[057]	0039	Pr[107]	006B	Pr[157]	009D
Pr[008]	0008	Pr[058]	003A	Pr[108]	006C	Pr[158]	009E
Pr[009]	0009	Pr[059]	003B	Pr[109]	006D	Pr[159]	009F
Pr[010]	000A	Pr[060]	003C	Pr[110]	006E	Pr[160]	00A0
Pr[011]	000B	Pr[061]	003D	Pr[111]	006F	Pr[161]	00A1
Pr[012]	000C	Pr[062]	003E	Pr[112]	0070	Pr[162]	00A2
Pr[013]	000D	Pr[063]	003F	Pr[113]	0071	Pr[163]	00A3
Pr[014]	000E	Pr[064]	0040	Pr[114]	0072	Pr[164]	00A4
Pr[015]	000F	Pr[065]	0041	Pr[115]	0073	Pr[165]	00A5
Pr[016]	0010	Pr[066]	0042	Pr[116]	0074	Pr[166]	00A6
Pr[017]	0011	Pr[067]	0043	Pr[117]	0075	Pr[167]	00A7
Pr[018]	0012	Pr[068]	0044	Pr[118]	0076	Pr[168]	00A8
Pr[019]	0013	Pr[069]	0045	Pr[119]	0077	Pr[169]	00A9
Pr[020]	0014	Pr[070]	0046	Pr[120]	0078	Pr[170]	00AA
Pr[021]	0015	Pr[071]	0047	Pr[121]	0079	Pr[171]	00AB
Pr[022]	0016	Pr[072]	0048	Pr[122]	007A	Pr[172]	00AC
Pr[023]	0017	Pr[073]	0049	Pr[123]	007B	Pr[173]	00AD
Pr[024]	0018	Pr[074]	004A	Pr[124]	007C	Pr[174]	00AE
Pr[025]	0019	Pr[075]	004B	Pr[125]	007D	Pr[175]	00AF
Pr[026]	001A	Pr[076]	004C	Pr[126]	007E	Pr[176]	00B0
Pr[027]	001B	Pr[077]	004D	Pr[127]	007F	Pr[177]	00B1
Pr[028]	001C	Pr[078]	004E	Pr[128]	0080	Pr[178]	00B2
Pr[029]	001D	Pr[079]	004F	Pr[129]	0081	Pr[179]	00B3
Pr[030]	001E	Pr[080]	0050	Pr[130]	0082	Pr[180]	00B4
Pr[031]	001F	Pr[081]	0051	Pr[131]	0083	Pr[181]	00B5
Pr[032]	0020	Pr[082]	0052	Pr[132]	0084	Pr[182]	00B6
Pr[033]	0021	Pr[083]	0053	Pr[133]	0085	Pr[183]	00B7
Pr[034]	0022	Pr[084]	0054	Pr[134]	0086	Pr[184]	00B8
Pr[035]	0023	Pr[085]	0055	Pr[135]	0087	Pr[185]	00B9
Pr[036]	0024	Pr[086]	0056	Pr[136]	0088	Pr[186]	00BA
Pr[037]	0025	Pr[087]	0057	Pr[137]	0089	Pr[187]	00BB
Pr[038]	0026	Pr[088]	0058	Pr[138]	008A	Pr[188]	00BC
Pr[039]	0027	Pr[089]	0059	Pr[139]	008B	Pr[189]	00BD
Pr[040]	0028	Pr[090]	005A	Pr[140]	008C	Pr[190]	00BE
Pr[041]	0029	Pr[091]	005B	Pr[141]	008D	Pr[191]	00BF
Pr[042]	002A	Pr[092]	005C	Pr[142]	008E	Pr[192]	00C0
Pr[043]	002B	Pr[093]	005D	Pr[143]	008F	Pr[193]	00C1
Pr[044]	002C	Pr[094]	005E	Pr[144]	0090	Pr[194]	00C2
Pr[045]	002D	Pr[095]	005F	Pr[145]	0091	Pr[195]	00C3
Pr[046]	002E	Pr[096]	0060	Pr[146]	0092	Pr[196]	00C4
Pr[047]	002F	Pr[097]	0061	Pr[147]	0093	Pr[197]	00C5
Pr[048]	0030	Pr[098]	0062	Pr[148]	0094	Pr[198]	00C6
Pr[049]	0031	Pr[099]	0063	Pr[149]	0095	Pr[199]	00C7

Appendix 8 Sensorless Vector Control Setting Procedures



Appendix 9 Manual change record list

Release date	Version	Content change
January,2006	SH020/040 V1.01	First edition
February, 2007	SH020/040 V1.02	Add 18.5k/22k specification
June, 2007	SH020/040 V1.03	Add up functions of AM、10 times、Set frequency gain and torque control description.
February, 2008	SH020/040 V1.04	Add up description of Pr21、communication parameter codes list and the correction of Pr80、Pr82 description and the correction of Pr0、Pr12、Pr22 initial value.
June,2009	SH020/040 V1.05 Unissued	1.Graphics and descriptions amendments 2.Add up Pr.64.
October,2009	SH020/040 V1.06	Add up MODBUS Communication
November,2009	SH020/040 V1.07	Add up Sensorless Function

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