

Shihlin Electric General Inverters

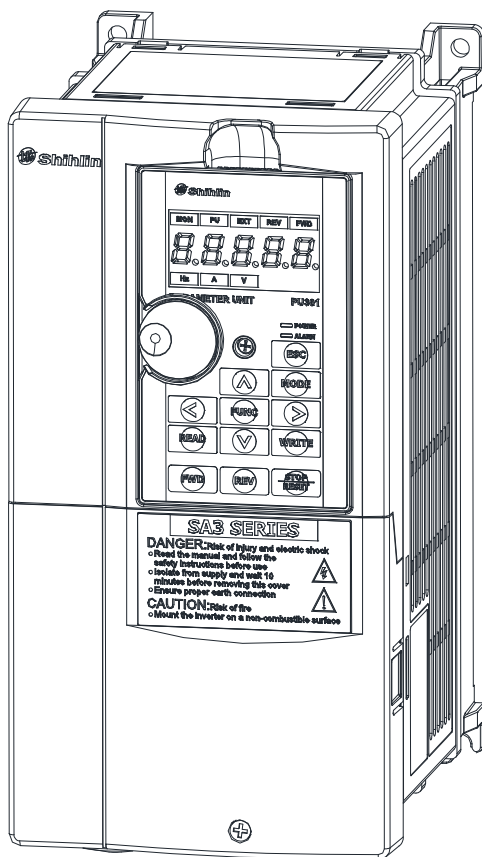
SA3 Series

User Manual

High Functioning&High Performance

SA3-023-0.75K/1.5KF ~ 110K/132KF

SA3-043-0.75K/1.5KF ~ 315K/355KF



MANUAL GUIDE	1
DELIVERY AND INSPECTION	2
INVERTER INTRODUCTION	3
PRIMARY OPERATION	4
PARAMETER DESCRIPTION	5
INSPECTION AND MAINTENANCE	6
APPENDIX	7

1. MANUAL GUIDE

1.1 Safety instructions

Thank you for choosing Shihlin inverters of SA3 series. This instruction introduces how to correctly use this inverter. Before using this inverter, always carefully read this User Manual and moreover, please understand the safety instructions.

Safety Instructions

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

⚠ Warning

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

⚠ Caution

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

1.2 Contents

User Manual	- 1 -
1. MANUAL GUIDE	1
1.1 Safety instructions.....	1
1.2 Contents	2
1.3 Definitions of terminologies.....	15
2. DELIVERY CHECK.....	16
2.1 Nameplate instruction.....	16
2.2 Type instruction	16
2.3 Order code description	16
3. INVERTER INTRODUCTION.....	17
3.1 Electric specification	17
3.1.1 440V series three-phase.....	17
3.1.2 220Vseries three-phase.....	19
3.2 General specification	21
3.3 Appearance and dimensions.....	23
3.3.1 Frame A.....	23
3.3.2 Frame B.....	24
3.3.3 Frame C.....	25
3.3.4 Frame D.....	26
3.3.5 Frame E.....	27
3.3.6 Frame F	28
3.3.7 Frame G	29

3.3.8 Frame H.....	30
3.4 Name of each component.....	31
3.4.1 Frame A/B/C.....	31
3.4.2 Frame D/E.....	31
3.4.3 Frame F.....	32
3.4.4 Frame G/H.....	32
3.4.5 Protection level and operation temperature.....	32
3.5 Installation and wiring.....	33
3.5.1 Transportation.....	33
3.5.2 Stockpile.....	33
3.5.3 Installation notice.....	33
3.5.4 EMC installation instructions.....	35
3.5.5 Removal of the wiring front cover.....	36
3.6 Peripheral devices.....	38
3.6.1 System Wire Arrangement.....	38
3.6.2 No-fuse switch and magnetic contactor.....	39
3.6.3 Retrograde Brake Resistor.....	40
3.6.4 Reactor.....	41
3.6.5 Filter.....	44
3.7 Terminal wire arrangement.....	45
3.7.1 Maincircuit Terminals.....	46
3.7.2 Main circuit wiring and terminal specification.....	48
3.7.3 Ground.....	49
3.7.4 RFI filter.....	50

3.7.5 DC bus power supply	52
3.7.6 Control circuit.....	53
3.8 Flange mounting kit.....	57
3.8.1 Frame A.....	57
3.8.2 Frame B.....	58
3.8.3 Frame C.....	60
3.8.4 Frame D/E/F/G/H.....	61
3.9 Conduit box kit.....	63
3.9.1 Frame D conduit box appearance	63
3.9.2 Frame E/F conduit box appearance.....	63
3.9.3 Frame G/H conduit box appearance.....	63
3.10 Replacement procedure of fan.....	64
3.10.1 Frame A.....	64
3.10.2 Frame B.....	64
3.10.3 Frame C	65
3.10.4 Frame D/E.....	65
3.10.5 Frame F.....	65
3.10.6 Frame G/H.....	66
3.11 Floor mounting kit	66
4. PRIMARY OPERATION.....	67
4.1 Component name of parameter unit (PU301).....	67
4.2 Operation modes of the inverter	69
4.2.1 The flow chart for switching the operation mode	70
4.2.2 The flow chart for switching the working mode with PU301 parameter unit.....	70

4.2.3	The operation flow charts for monitoring mode with PU301	70
4.2.4	Operation flow charts for frequency setting mode withPU301	71
4.2.5	Operation flow charts for parameter setting mode withPU301	71
4.3	Basic operation procedures for different modes.....	72
4.3.1	Basic operation procedures for PU mode (00-16(P.79) = 0 or 1)	72
4.3.2	Basic operation procedures for external mode (00-16(P.79) = 0 or 2).....	72
4.3.3	Basic operation procedures for JOG mode (00-16(P.79) = 0 or 1).....	73
4.3.4	Basic operation procedures for communication mode (00-16(P.79) = 3).....	73
4.3.5	Basic operation procedures for combined mode 1 (00-16(P.79) = 4)	73
4.3.6	Basic operation procedures for combined mode 2 (00-16(P.79) = 5)	73
4.3.7	Basic operation procedures for combined mode 3(00-16(P.79) = 6)	74
4.3.8	Basic operation procedures for combined mode 4(00-16(P.79) = 7)	74
4.3.9	Basic operation procedures for combined mode 5(00-16(P.79) = 8)	75
4.3.10	Basic operation procedures for the second operation mode(00-16(P.79) = 99999).....	75
4.4	Operation.....	76
4.4.1	Pre-operation checks and preparation	76
4.4.2	Operation methods	76
4.4.3	Trial run	77
5.	PARAMETER DESCRIPTION	78
5.1	System parameter group00.....	78
5.1.1	Inverter information.....	82
5.1.2	Parameter restoration.....	83
5.1.3	Parameter protection.....	85
5.1.4	Monitoring function	88

5.1.5 Speed display	90
5.1.6 PWMcarrier frequency	91
5.1.7 Stop operation selection	91
5.1.8 Forward/reverse rotation prevention selection	92
5.1.9 Operation mode selection.....	93
5.1.10 Control mode selection	94
5.1.11 Motor control mode selection.....	94
5.1.12 Motor types selection	95
5.1.13 50/60Hz switch selection.....	96
5.1.14 Parameter mode setting	96
5.1.15 Expansion card type display	97
5.2 Basic parameter group01.....	98
5.2.1 Limiting the output frequency	101
5.2.2 Base frequency, basefrequency voltage	101
5.2.3 Acceleration/deceleration time setting.....	102
5.2.4 Torque boost V/F	104
5.2.5 Starting frequency.....	105
5.2.6 Load pattern selection V/F	105
5.2.7 JOG operation	108
5.2.8 Output frequency filter time	109
5.2.9 Fequency jump.....	109
5.2.10 The second function.....	110
5.2.11 Middle frequency, output voltage of middle frequency V/F	111
5.2.12 S pattern time.....	112

5.3 Analog input and output parameter group 02	114
5.3.1 Function selection of analog terminal and HDI terminal	120
5.3.2 Function selection of analog output terminal AM	121
5.3.3 Proportion linkage gain	122
5.3.4 Auxiliary frequency	123
5.3.5 Selection and handling of input terminal 2-5.....	124
5.3.6 Selection and handling of input terminal 4-5.....	130
5.3.7 Selection and handling of input terminal 3-5.....	132
5.3.8 Selection and handling of input terminal HDI	133
5.3.9 HDO frequency multiplication coefficient	134
5.3.10 Function selection of FM output	135
5.3.11 Selection and handling of output terminal AM1	135
5.3.12 Selection and handling of output terminalAM2.....	137
5.3.13 Display referenceat the analog output.....	137
5.3.14 AM/FM fixed output level.....	138
5.3.15 PT100 level setting.....	138
5.3.16 FM calibration parameter.....	139
5.4 Digital input/ output parameter group03	140
5.4.1 Function selection of digital input	145
5.4.2 Function selection of digital output.....	150
5.4.3 Terminal logic selection	153
5.4.4 Output signal delay	154
5.4.5 Digital input terminal filter	154
5.4.6 Digital input terminal power enable.....	155

5.4.7 Output frequency detection	155
5.4.8 Zero current detection	156
5.4.9 Function selection of expanded digital input terminal SLOT3.....	157
5.4.10 Function selection of expanded digital input terminalSLOT2.....	157
5.4.11 Expanded digital input terminal logic selection	158
5.4.12 Function selection of expanded digital output terminalSLOT3	158
5.4.13 Function selection of expanded digital output terminal SLOT3	159
5.4.14 Expanded digital output terminal logic selection.....	159
5.4.15 Digital input / output terminal monitor	160
5.5 Multi-speed parameter group 04.....	162
5.5.1 16 speeds.....	164
5.5.2 Programmed operation mode	166
5.6 Motor parameter group 05	170
5.6.1 Motor parameter auto-tuning function selection.....	173
5.6.2 Motor parameter.....	176
5.6.3 Motor inertia auto-tuning.....	178
5.6.4 The second motor parameter.....	178
5.7 Protection parameter group 06	180
5.7.1 Electronic thermal relay capacity.....	184
5.7.2 Current stalling protection.....	185
5.7.3 Regenerative brake	186
5.7.4 Decrease carrier protection setting	187
5.7.5 Over torque detection.....	189
5.7.6 Stall level when restart.....	190

5.7.7 Cooling fan operation	190
5.7.8 Input phase failure protection.....	191
5.7.9 SCP Short circuit protection function	191
5.7.10 PTC protection selection	192
5.7.11 Maintenance alarm function.....	193
5.7.12 Short circuit protection	194
5.7.13 Output phase failure protection	194
5.7.14 Low voltage protection	195
5.7.15 Regenerative brake operation level.....	195
5.7.16 Voltage stall level.....	195
5.7.17 Capacitor lifetime detection.....	196
5.7.18 Time record function.....	197
5.7.19 Alarm query function	197
5.7.20 Alarm code query.....	199
5.7.21 The latest alarm message (E1)	200
5.7.22 The second alarm message (E2)	201
5.8 Communication parameter group 07.....	202
5.8.1 Shihlin protocol and Modbusprotocol.....	205
5.8.2 Communication EEPROM write selection.....	223
5.8.3 Canopen protocol.....	223
5.8.4 Communication expansion card version number.....	224
5.8.5 Ethernet communication	224
5.9 PID parameter group08.....	225
5.9.1 PID function selection.....	227

5.9.2 PID parameter group 1.....	228
5.9.3 PID parameter group2.....	232
5.9.4 PID filter setting.....	233
5.9.5 PID deviation control limit.....	233
5.9.6 PID integral property.....	234
5.9.7 PID differential limit.....	234
5.9.8 PID outputdeviation limit.....	234
5.9.9 PID parameter switchover.....	235
5.9.10 PIDmalfunction selection.....	235
5.9.11 PID reverse run operation selection.....	236
5.10 PG feedback parameter group 09.....	237
5.10.1 PG type selection.....	239
5.10.2 PG1 parameter.....	239
5.10.3 PG abnormality detection.....	241
5.10.4 PG2 parameter.....	241
5.10.5 Dividing frequency output function.....	242
5.10.6 Electronic gear ratio.....	243
5.10.7 Reverse rotation detection.....	243
5.10.8 Expansion card version information.....	244
5.10.9 PG card phaseZadjust degrees.....	244
5.10.10 PG card phase ZDV1/DV2 alarm-enabled.....	244
5.11 Application parameter group 10.....	245
5.11.1 DC injection brake.....	250
5.11.2 Zero-speed/zero-servo control.....	251

5.11.3 DC injection brake before start	252
5.11.4 Restart mode selection	253
5.11.5 Remote setting function selection	255
5.11.6 Retry selection.....	257
5.11.7 The dead time of positive and reverse rotation.....	258
5.11.8 Energy-saving control function V/F	258
5.11.9 Dwell function V/F	259
5.11.10 Triangular wave function V/F	261
5.11.11 Commercial power supply frequency operation function.....	262
5.11.12 Power failure stopfunction.....	265
5.11.13 VF complete separation.....	266
5.11.14 Regeneration and avoidance function.....	267
5.11.15 Overexcitation deceleration function	268
5.11.16 Short-circuit brakefunctionat PM motor start.....	269
5.11.17 Built-in PLC.....	270
5.12 Speed and torque control parameter group 11	272
5.12.1 Control parameter.....	274
5.12.2 PM motor setting.....	275
5.12.3 Torque control parameter.....	276
5.12.4 Torque limit.....	278
5.12.5 The second motor control parameter	279
5.12.6 The second PM motor setting.....	280
5.12.7 PM motor speed estimation observer parameters.....	281
5.12.8 PM Motor current loop controller parameters.....	281

5.13 Position control parameter 12	282
5.13.1 Homing mode	284
5.13.2 Position control parameter	287
5.13.3 Zero servo	289
5.13.4 Single point positioning function	289
5.13.5 Position command	290
5.14 Special adjustment parameter group13	293
5.14.1 Slip compensation V/F	294
5.14.2 Modulation coefficient	294
5.14.3 Vibration inhibition	294
5.15 Tension control parameter group 14	296
5.15.1 Tension control mode selection	299
5.15.2 Tension setting	300
5.15.3 Curling radius calculation	301
5.15.4 Line speed input	304
5.15.5 Tension compensation	305
5.15.6 Material supply interrupt detection	306
5.15.7 Pre-drive control	307
5.15.8 Constant line speed mode	309
5.15.9 Tension closed-loop limiter	309
5.16 User parameter group15	310
5.16.1 User registered parameter	311
6. INSPECTION AND MAINTENANCE	313
6.1 Inspection item	313

6.1.1 Daily inspection item.....	313
6.1.2 Periodical inspection items.....	313
6.1.3 Checking the converter and inverter modules.....	314
6.1.4 Cleaning	314
6.1.5 Replacement of parts	315
6.2 Measurement of main circuit voltages, currents and powers	316
6.2.1 Selection of instruments for measurement	316
6.2.2 Measurement of voltages	316
6.2.3 Measurement of currents.....	317
6.2.4 Measurement of power	317
6.2.5 Measurement of frequency.....	317
6.2.6 Measurement of insulation resistance	318
6.2.7 Hi-pot test.....	318
7. APPENDIX	319
7.1 Appendix 1 Parameter table.....	319
7.2 Appendix 2 Alarm code list	361
7.3 Appendix 3 Troubles and solutions	366
7.4 Appendix 4 Optional equipment.....	367
7.4.1 Communication card.....	367
7.4.2 I/Ocard	370
7.4.3 PGcard.....	372
7.4.4 Parameter unit.....	375
7.4.5 Data transmission line	377
7.4.6 Snap mountingkit	377

Contents

7.4.7 BKU Brake unit.....	378
7.5 Appendix 5 European Specification Compatibility Description.....	379
8. REVISION RECORD	382
Modify 3.7 Terminal wire arrangement content.....	382

1.3 Definitions of terminologies

✓ Output frequency, target frequency, steady output frequency

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

✓ Parameter settings

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

✓ The “operation mode” and “working mode” of the parameter unit

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

✓ The difference between “terminal name” and “function name”:

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

✓ The difference between “on” and “turn on”:

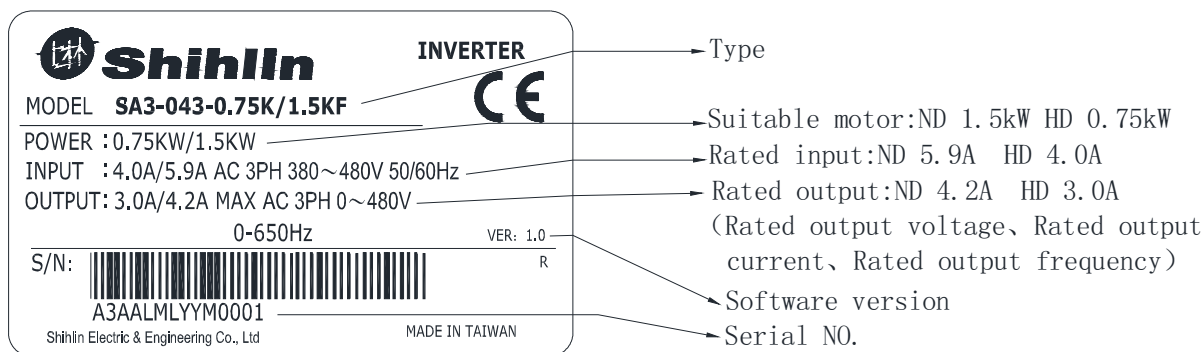
- When explaining the function for the “multi-function control terminal”, two words “on” and “turn on” are often used:
- The word “on” is used to indicate that the external switch of the terminal is in close state, and thus it belongs to the description of the state.
- The word “turn on” is used to describe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

2. DELIVERY CHECK

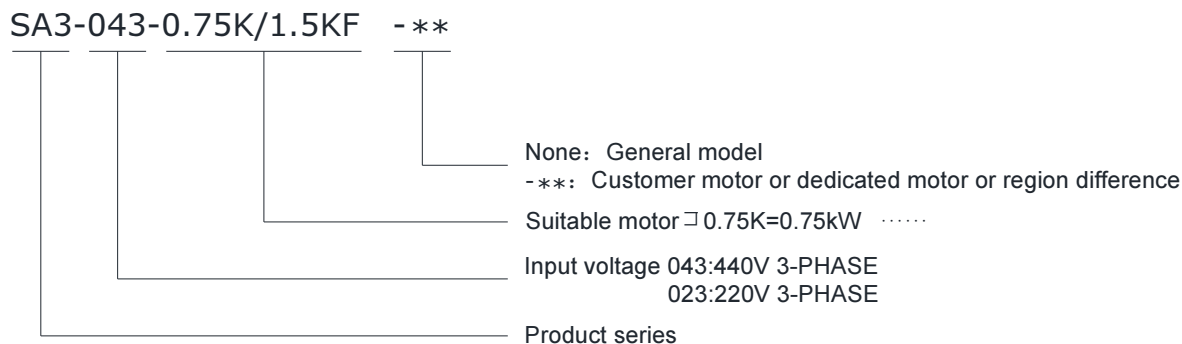
Each SA3-TYPE inverter has been checked thoroughly before delivery, and is carefully packed to prevent any mechanical damage. Please check for the following when opening the package.

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

2.1 Nameplate instruction



2.2 Type instruction



2.3 Order code description

Example:

Inverter specification	Specificationdescription	Order code
SA3-043-1.5K/2.2KF	SA3 series440V 1.5KW inverter	LNKSA30431R5K
SA3-043-7.5K/11KF	SA3 series440V 7.5KW inverter	LNKSA30437R5K
SA3-043-15K/18.5KF	SA3 series440V 15KW inverter	LNKSA304315K

3. INVERTER INTRODUCTION

3.1 Electric specification

3.1.1 440V series three-phase

Frame		A					B			C			D	
Model SA3-043-□□□K□-□□		0.75K/ 1.5KF	1.5K/ 2.2KF	2.2K/ 3.7KF	3.7K/ 5.5KF	5.5K/ 7.5KF	7.5K/ 11KF	11K/ 15KF	15K/ 18.5KF	18.5K/ 22KF	22K/ 30KF	30K/ 37KF	37K/ 45KF	
Output	HD	Rated output capacity (kVA)	2	3	4.6	6.9	10	14	18	25	29	34	46	56
		Rated output current (A)	3.0	4.2	6	9	12	17	24	32	38	45	60	73
		Applicable motor capacity (HP)	1	2	3	5	7.5	10	15	20	25	30	40	50
		Applicable motor capacity (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37
		Overload current rating	150% 60 seconds 200% 3 seconds (inverse time characteristics)											
		Carrier frequency (kHz)	1~15kHz											
	ND	Rated output capacity (kVA)	3	4.6	6.9	10	14	18	25	29	34	46	56	69
		Rated output current (A)	4.2	6	9	12	17	24	32	38	45	60	73	91
		Applicable motor capacity (HP)	2	3	5	7.5	10	15	20	25	30	40	50	60
		Applicable motor capacity (kW)	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
		Overload current rating	120% 60 seconds (inverse time characteristics)											
		Carrier frequency (kHz)	1 ~ 15kHz											
Maximum output voltage		Three-phase 380-480V												
Power supply	Rated power voltage	Three-phase 380-480V 50Hz / 60Hz												
	Power voltage permissible fluctuation	Three-phase 323-528V 50Hz / 60Hz												
	Power frequency permissible fluctuation	±5%												
	Power source capacity (kVA)	2.5	4.5	6.9	10.4	11.5	16	20	27	32	41	52	65	
Cooling method		Self cooling	Forced air cooling											
Inverter weight (kg)		3.15	3.15	3.15	3.15	3.15	6	6	6	9.8	9.8	9.8	33	

Electric specification

Frame		D			E		F	G				H			
Model SA3-043-□□□□K□-□□		45K/ 55KF	55K/ 75KF	75K/ 90KF	90K/ 110KF	110K/ 132KF	132K/ 160KF	160K/ 185KF	185K/ 220KF	220K/ 250KF	250K/ 280KF	280K/ 315KF	315K/ 355KF		
Output	HD	Rated output capacity (kVA)		69	84	114	137	168	198	236	295	367	402	438	491
		Rated output current (A)		91	110	150	180	220	260	310	340	425	480	530	620
		Applicable motor capacity (HP)		60	75	100	120	150	175	215	250	300	335	375	420
		Applicable motor capacity (kW)		45	55	75	90	110	132	160	185	220	250	280	315
		Overload current rating		150% 60 seconds 200% 3seconds (inverse time characteristics)											
		Carrier frequency (kHz)		1~9kHz											1~3kHz
	ND	Rated output capacity (kVA)		84	114	137	168	198	236	295	367	402	438	491	544
		Rated output current (A)		110	150	180	220	260	310	340	425	480	530	620	683
		Applicable motor capacity (HP)		75	100	120	150	175	215	250	300	335	375	420	475
		Applicable motor capacity (kW)		55	75	90	110	132	160	185	220	250	280	315	355
		Overload current rating		120% 60seconds (inverse time characteristics)											
		Carrier frequency (kHz)		1~9kHz											1~6kHz
Maximum output voltage		Three-phase 380-480V													
Power supply	Rated power voltage		Three-phase 380-480V 50Hz / 60Hz												
	Power voltage permissible fluctuation		Three-phase 323-528V 50Hz / 60Hz												
	Power frequency permissible fluctuation		±5%												
	Power source capacity (kVA)		79	100	110	137	165	198	247	295	367	402	438	491	
Cooling method		Forced air cooling													
Inverter weight (kg)		33	33	33	42.7	42.7	56.5	84	84	84	84	123	123		

Note: The test conditions of rated output current, rated output capacity and frequency converter inverter power consumption are: the carrier frequency (P.72) is at the set value; the frequency converter/inverter output voltage is at 440V; the output frequency is at 60Hz, and the ambient temperature is 40°C.

3.1.2 220Vseries three-phase

Frame		A				B			C		D			
ModelSA3-023-□□□K□-□□		0.75K/ 1.5KF	1.5K/ 2.2KF	2.2K/ 3.7KF	3.7K/ 5.5KF	5.5K/ 7.5KF	7.5K/ 11KF	11K/ 15KF	15K/ 18.5KF	18.5K/ 22KF	22K/ 30KF	30K/ 37KF	37K/ 45KF	
Output	HD	Rated output capacity (kVA)	2	3.2	4.2	6.7	9.5	12.5	18.3	24.7	28.6	34.3	45.7	55
		Rated output current (A)	5	8	11	17.5	25	33	49	65	75	90	120	145
		Applicable motor capacity (HP)	1	2	3	5	7.5	10	15	20	25	30	40	50
		Applicable motor capacity (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37
		Overload current rating	150% 60 seconds 200% 3seconds (inverse time characteristics)											
		Carrier frequency (kHz)	1~15KHz									1~9kHz		
	ND	Rated output capacity (kVA)	3.2	4.2	6.7	9.5	12.5	18.3	24.7	28.6	34.3	45.7	55	65
		Rated output current (A)	8	11	17.5	25	33	49	65	75	90	120	145	170
		Applicable motor capacity (HP)	2	3	5	7.5	10	15	20	25	30	40	50	60
		Applicable motor capacity (kW)	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
		Overload current rating	120% 60seconds (inverse time characteristics)											
		Carrier frequency (kHz)	1~15KHz									1~9kHz		
Maximum output voltage		Three-phase 200-240V												
Power supply	Rated power voltage	Three-phase 200-240V									50Hz / 60Hz			
	Power voltage permissible fluctuation	Three-phase 170-264V									50Hz / 60Hz			
	Power frequency permissible fluctuation	±5%												
	Power source capacity (kVA)	2.5	4.5	6.4	10	12	17	20	28	34	41	52	65	
Cooling method		Self cooling	Forced air cooling											
Inverter weight (kg)		3.15	3.15	3.15	3.15	6	6	6	10.6	10.6	33	33	33	

Electric specification

Frame		E		F	G								
Model SA3-023-□□□K□-□□		45K/ 55KF	55K/ 75KF	75K/ 90KF	90K/ 110K F	110K/ 132K F							
Output	HD	Rated output capacity (kVA)	65	82	110	132	165						
		Rated output current (A)	170	215	288	346	432						
		Applicable motor capacity (HP)	60	75	100	120	145						
		Applicable motor capacity (kW)	45	55	75	90	110						
		Overload current rating	150% 60 seconds 200% 3seconds (inverse time characteristics)										
		Carrier frequency (kHz)	1~9kHz										
	ND	Rated output capacity (kVA)	82	110	132	165	193						
		Rated output current (A)	215	288	346	432	506						
		Applicable motor capacity (HP)	75	100	120	145	175						
		Applicable motor capacity (kW)	55	75	90	110	132						
		Overload current rating	120% 60seconds (inverse time characteristics)										
		Carrier frequency (kHz)	1~9kHz										
Maximum output voltage		Three-phase 200-240V											
Power supply	Rated power voltage	Three-phase 200-240V 50Hz / 60Hz											
	Power voltage permissible fluctuation	Three-phase 170-264V 50Hz / 60Hz											
	Power frequency permissible fluctuation	±5%											
	Power source capacity (kVA)	79	100	110	132	165							
Cooling method		Forced air cooling											
Inverter weight (kg)		42.7	42.7	56.5	89.2	90.2							

Note: The test conditions of rated output current, rated output capacity and frequency converter inverter power consumption are: the carrier frequency (P.72) is at the set value; the frequency converter/inverter output voltage is at 220V; the output frequency is at 60Hz, and the ambient temperature is 40°C.

3.2 General specification

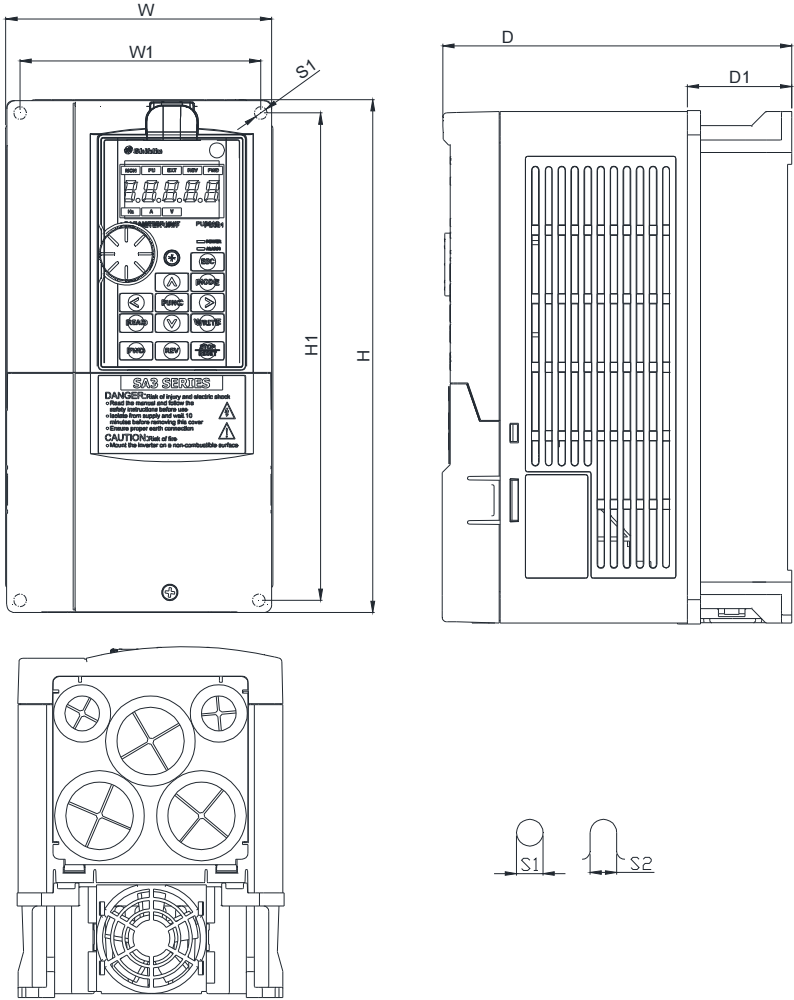
Control method		SVPWM control, V/F control, close-loop V/F control (VF+PG), general flux vector control, sensorless vector control (SVC), close-loop vector control (FOC+PG), torque control (TQC+PG).
Output frequency range		0~650.00Hz
Frequency setting resolution	Digital setting	The resolution is 0.01Hz.
	Analog setting	0.01Hz/60Hz(terminal 2: -10 ~ +10V / 13bit) 0.015Hz/60Hz(terminal 2: 0 ~ ±10V / 12bit; terminal 3: 0~10V, 4-20mA / 12bit) 0.03Hz/60Hz(terminal 2, 3; 0 ~ 5V / 11bit) 0.06Hz/60Hz(terminal 4: 0~10V, 4-20mA / 10bit) 0.12Hz/60Hz(terminal 4: 0 ~ 5V / 9bit)
Output frequency accuracy	Digital setting	Maximum target frequency±0.01%.
	Analog setting	Maximum target frequency±0.1%.
Speed control range		IM: WhenSVC, 1:200; when FOC+PG, 1:1000. PM: When SVC,1:20; when FOC+PG, 1:1000.
Start torque		150% 0.3Hz (SVC),180% 0Hz (FOC+PG).
V/Fcharacteristics		Constant torque curve, variable torque curve, five-point curve, VF separation
Acceleration / deceleration curve characteristics		Linear acceleration /deceleration curve, S pattern acceleration /deceleration curve1 & 2 & 3
Drive motor		Induction motor(IM), permanent magnet motor(SPM, IPM)
Stalling protection		The stalling protection level can be set to 0~400%(06-01(P.22)). The default value is 150%.
Target frequency setting		Parameter unit setting, DC 0~5V/10V signal, DC -10~+10V signal, DC 4~20 mA signal, multiple speed stage level setting, communication setting, HDI setting.
PID control		Please refer to 08-00~08-01、08-04~08-14 / P.170~P.182 in chapter 4.
Built-in simple PLC		Supports 21 basic instructions and 14 application instructions, including PC editing software;
Operation Panel	Operation monitoring	Output frequency, output current, output voltage, PN voltage, output torque, electronic thermal accumulation rate, temperature rising accumulation rate, output power, Analog value input signal, digital input and output terminal status...; alarm history 12 groups at most, the last group of alarm message is recorded.
	LED indication lamp (10)	Forward rotation indication lamp, reverse rotation indication lamp, frequency monitoring indication lamp, voltage monitoring indication lamp, current monitoring indication lamp,NETindication lamp,PUcontrolindication lamp,EXTindication lamp, PLCindication lamp and MONmonitoring indication lamp.
Communication function		RS-485 communication, can select Shihlin/Modbus communication protocol, communication speed38400bps or below, built-in CanOpenprotocol(SA3-CP301 expanded board can be optional), double RJ-45 connectors(the connector can also be connected to parameter unit)
Protection mechanism / alarm function		Output short circuit protection, Over-current protection, over-voltage protection, under-voltage protection, motor over-heat protection (06-00(P.9)), IGBT module over-heat protection, communication abnormality protection, PTC temperature protection etc, electrolytic capacitor overheat, input and output phase failure, to-earth (ground) leakage currents protection, circuit error detection...

General specification

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

3.3 Appearance and dimensions

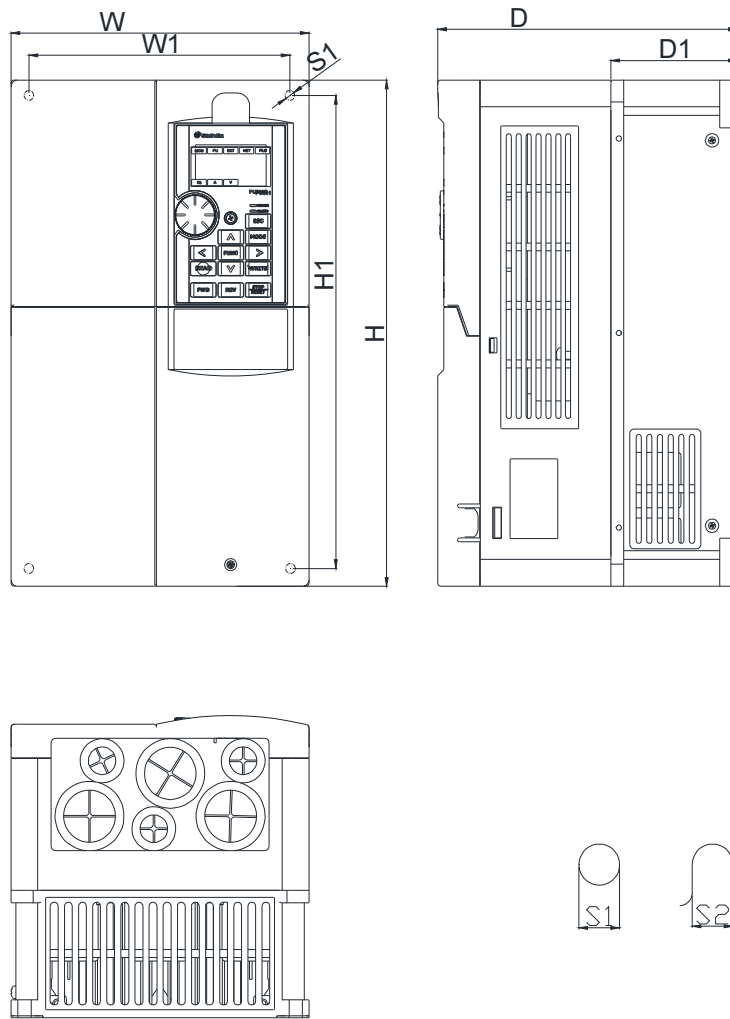
3.3.1 Frame A



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-0.75K/1.5KF	130.0	116.0	250.0	236.0	170.0	51.3	6.2	6.2
SA3-043-1.5K/2.2KF								
SA3-043-2.2K/3.7KF								
SA3-043-3.7K/5.5KF								
SA3-043-5.5K/7.5KF								
SA3-023-0.75K/1.5KF								
SA3-023-1.5K/2.2KF								
SA3-023-2.2K/3.7KF								
SA3-023-3.7K/5.5KF								

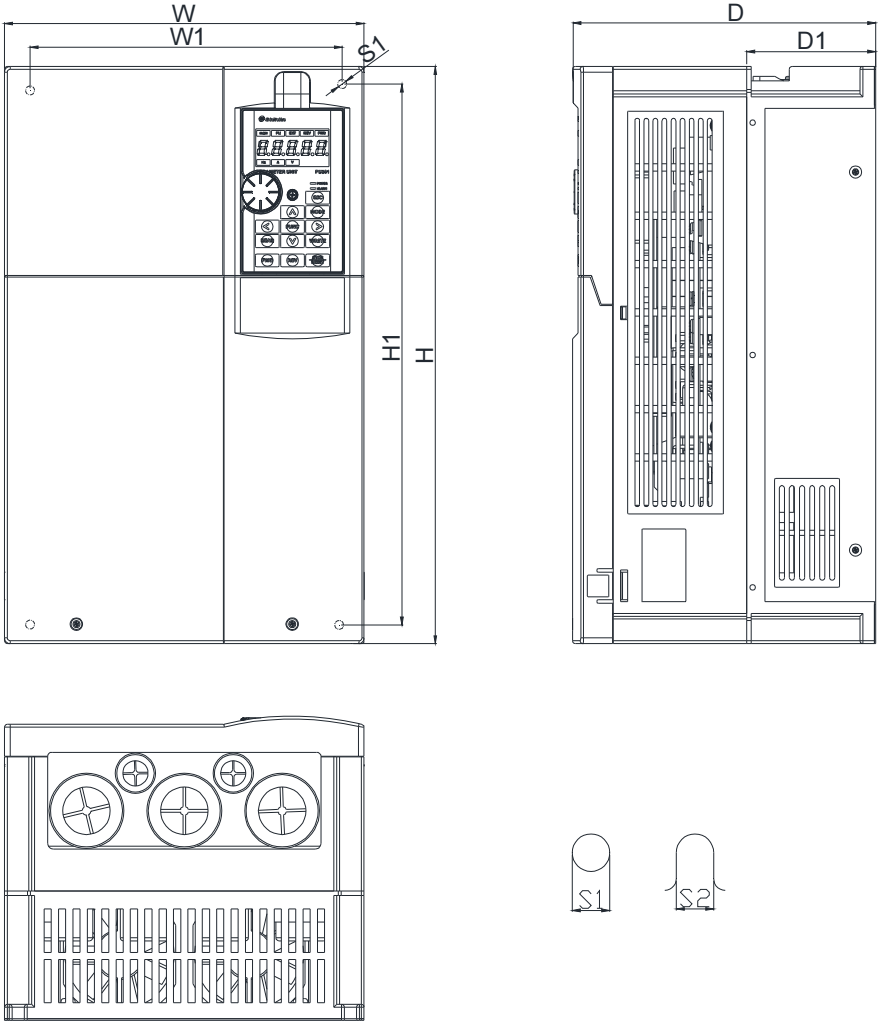
3.3.2 Frame B



Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-7.5K/11KF	190.0	173.0	320.0	303.0	190.0	80.5	8.5	8.5
SA3-043-11K/15KF								
SA3-043-15K/18.5KF								
SA3-023-5.5K/7.5KF								
SA3-023-7.5K/11KF								
SA3-023-11K/15KF								

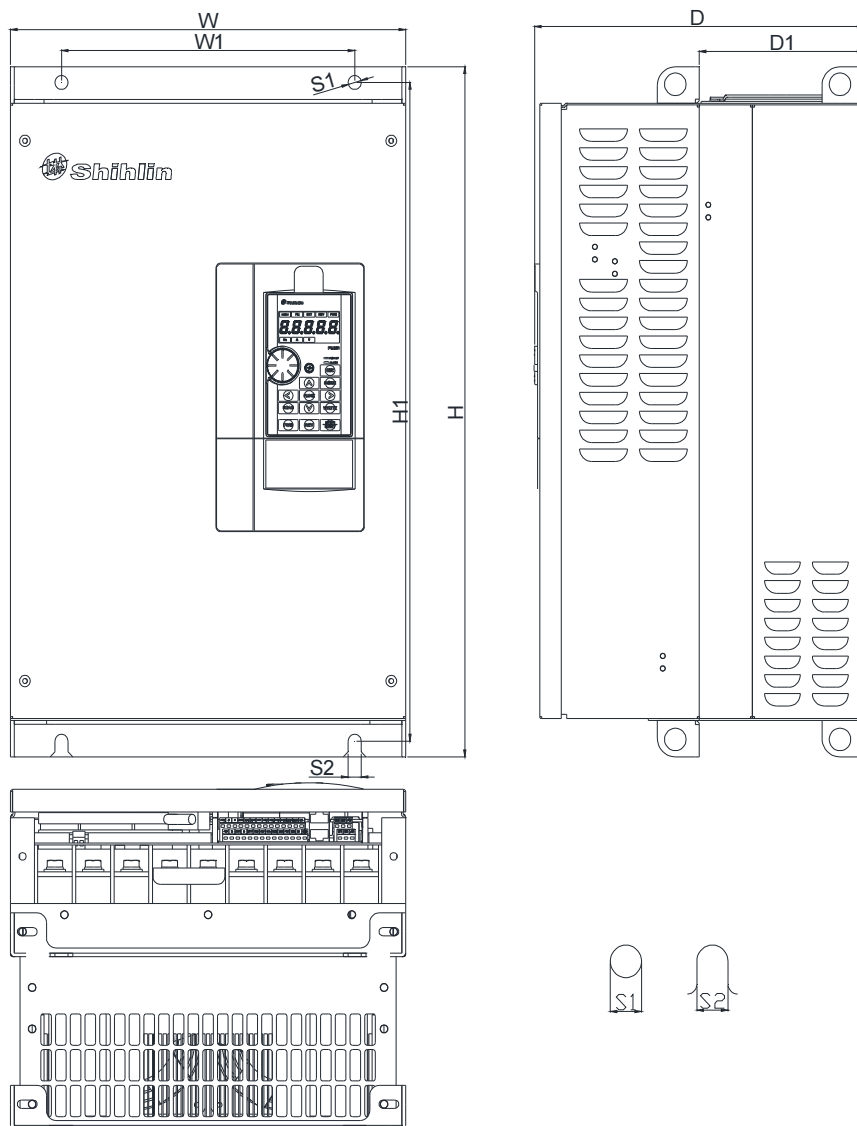
3.3.3 Frame C



Unit:mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-18.5K/22KF	250.0	231.0	400.0	381.0	210.0	89.5	8.5	8.5
SA3-043-22K/30KF								
SA3-043-30K/37KF								
SA3-023-15K/18.5KF								
SA3-023-18.5K/22KF								

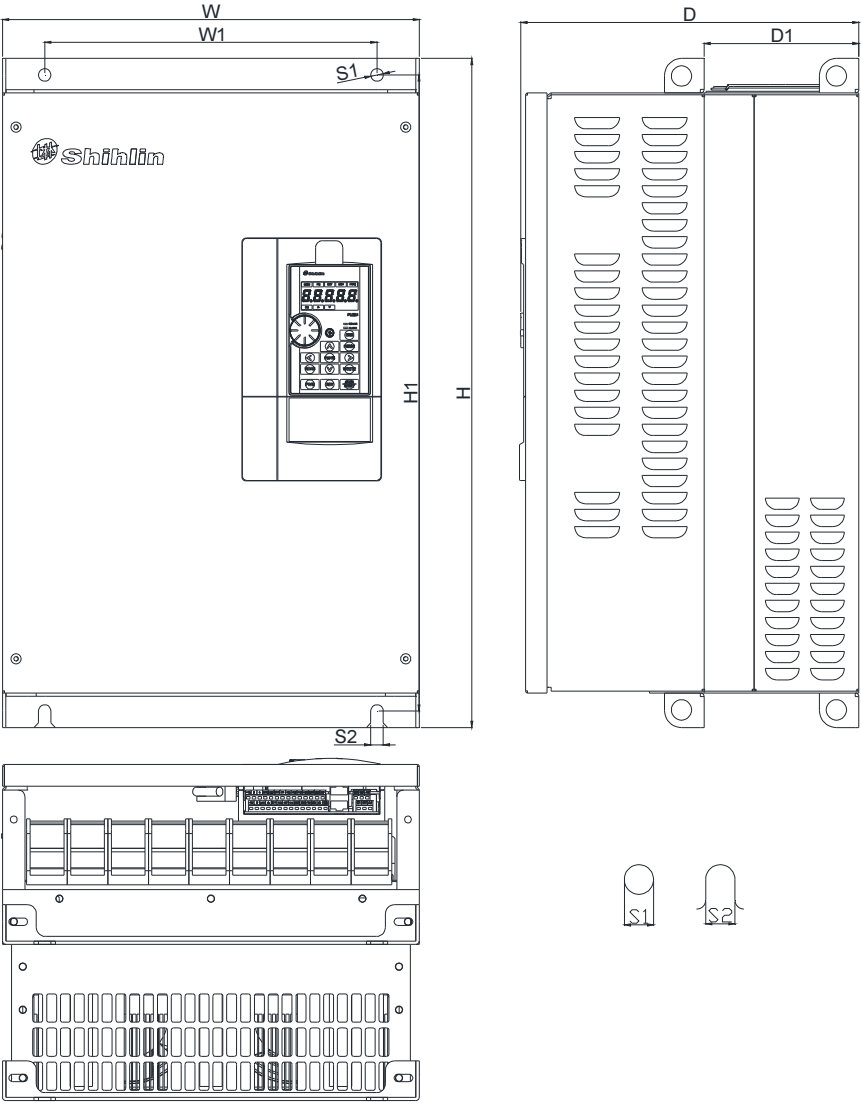
3.3.4 Frame D



Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-37K/45KF	330.0	245.0	550.0	525.0	275.0	137.5	11.0	11.0
SA3-043-45K/55KF								
SA3-043-55K/75KF								
SA3-043-75K/90KF								
SA3-023-22K/30KF								
SA3-023-30K/37KF								
SA3-023-37K/45KF								

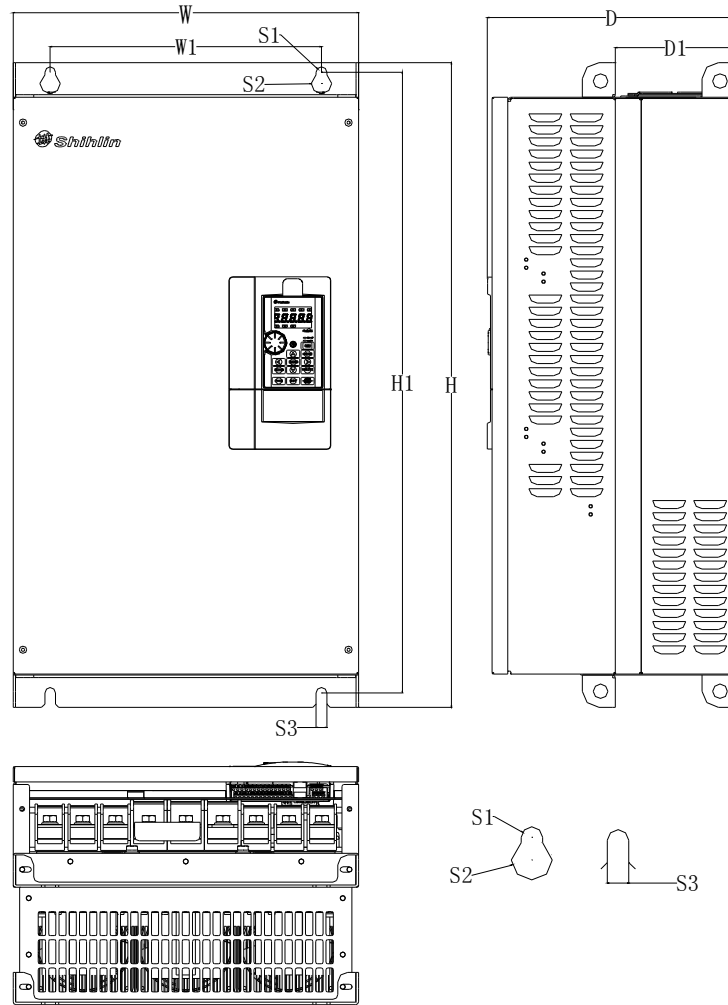
3.3.5 Frame E



Unit: mm

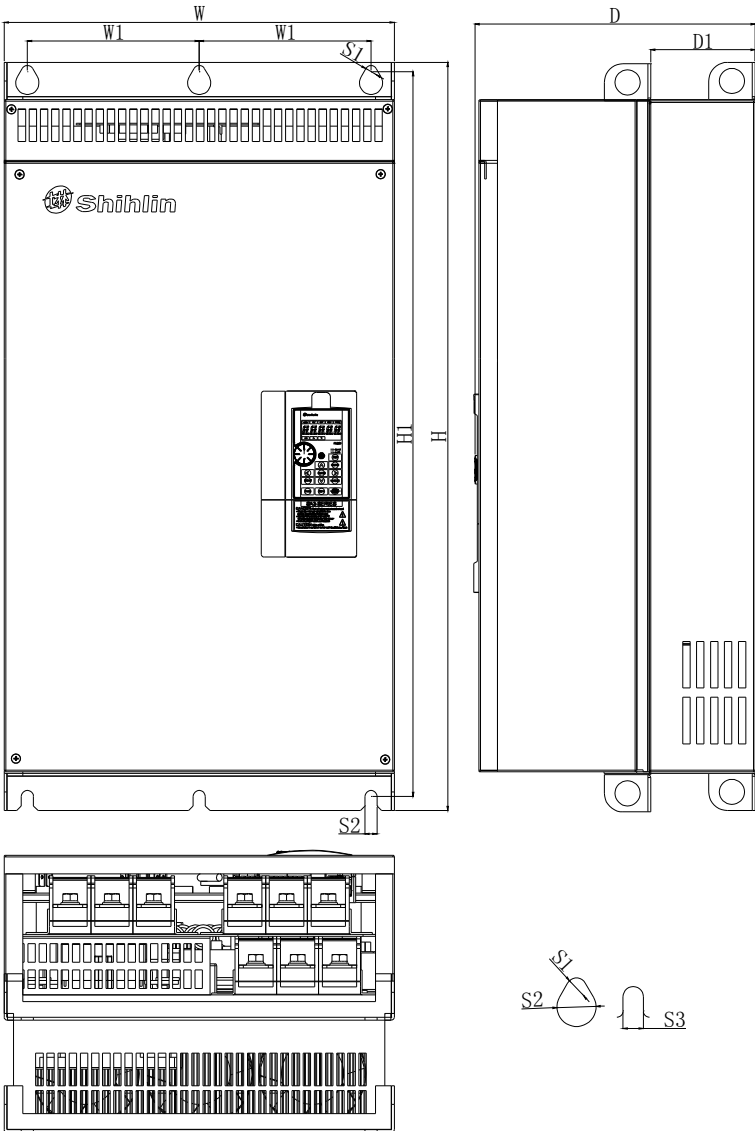
Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-90K/110KF	370.0	295.0	589.0	560.0	300.0	137.5	11.0	11.0
SA3-043-110K/132KF								
SA3-023-45K/55KF								
SA3-023-55K/75KF								

3.3.6 Frame F



Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-132K/160KF	420.0	340.0	800.0	770.0	300.0	145.5	13.0	25.0	13.0
SA3-023-75K/90KF									

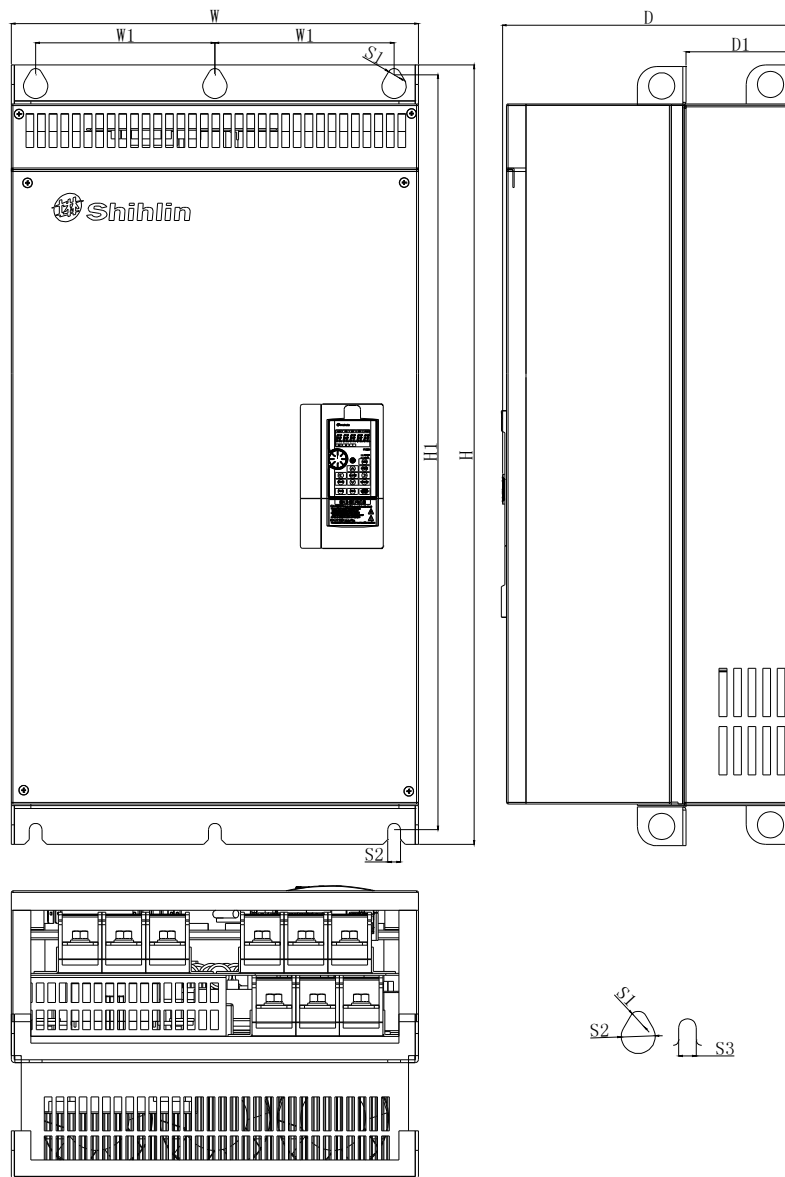
3.3.7 Frame G



Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-160K/185KF	500.0	180.0	870.0	850.0	360.0	150.0	13.0	25.0	13.0
SA3-043-185K/220KF									
SA3-043-220K/250KF									
SA3-043-250K/280KF									
SA3-023-90K/110KF									
SA3-023-110K/132KF									

3.3.8 Frame H

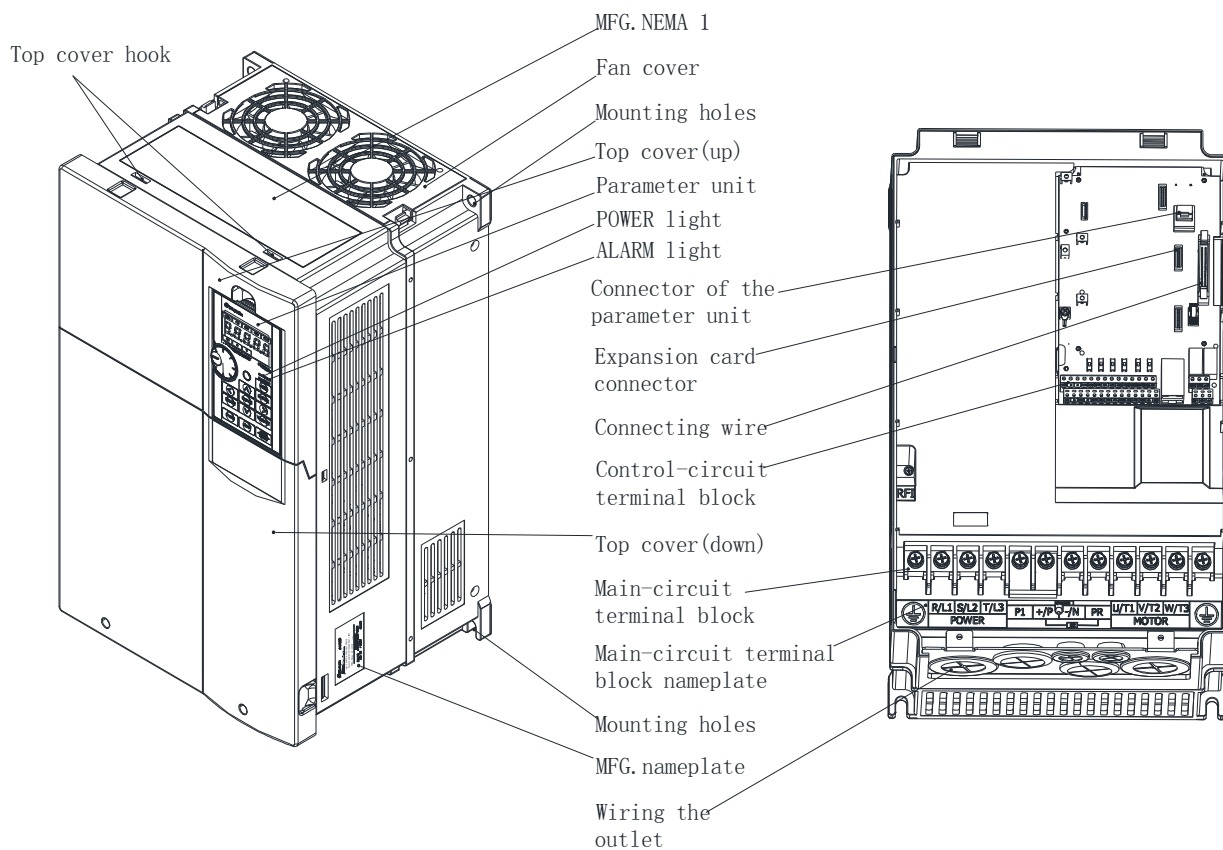


Unit: mm

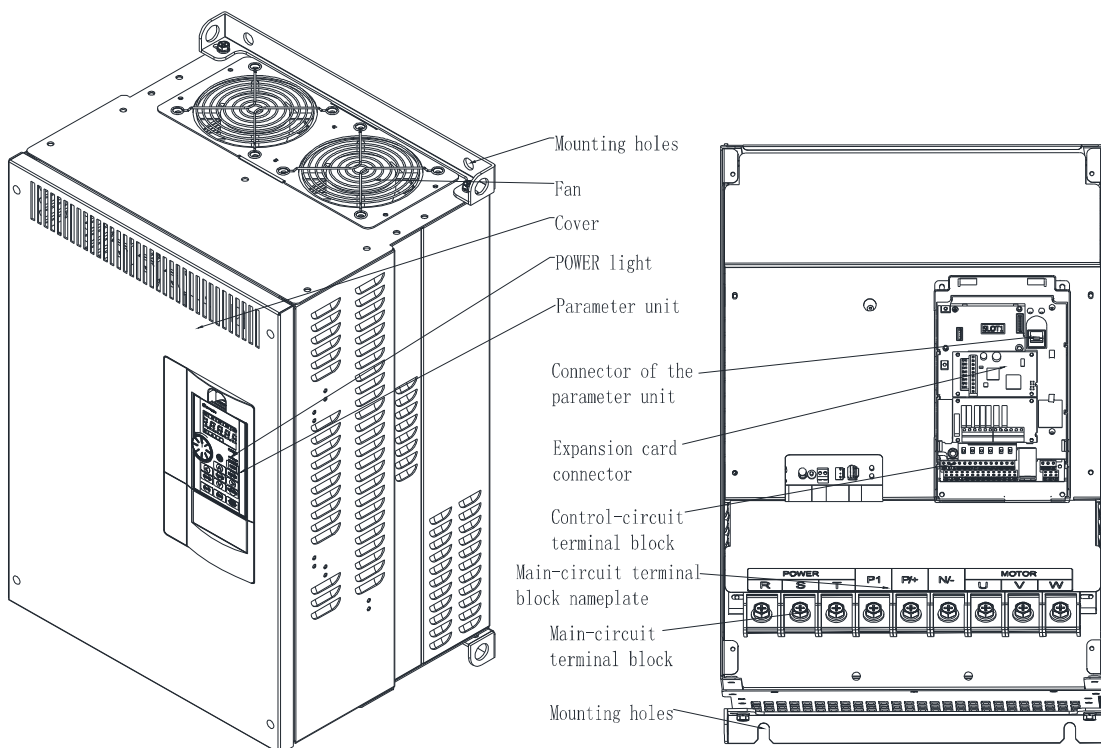
Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-280K/315KF	600.0	230.0	1000.0	980.0	400.0	181.5	13.0	25.0	13.0
SA3-043-315K/355KF									

3.4 Name of each component

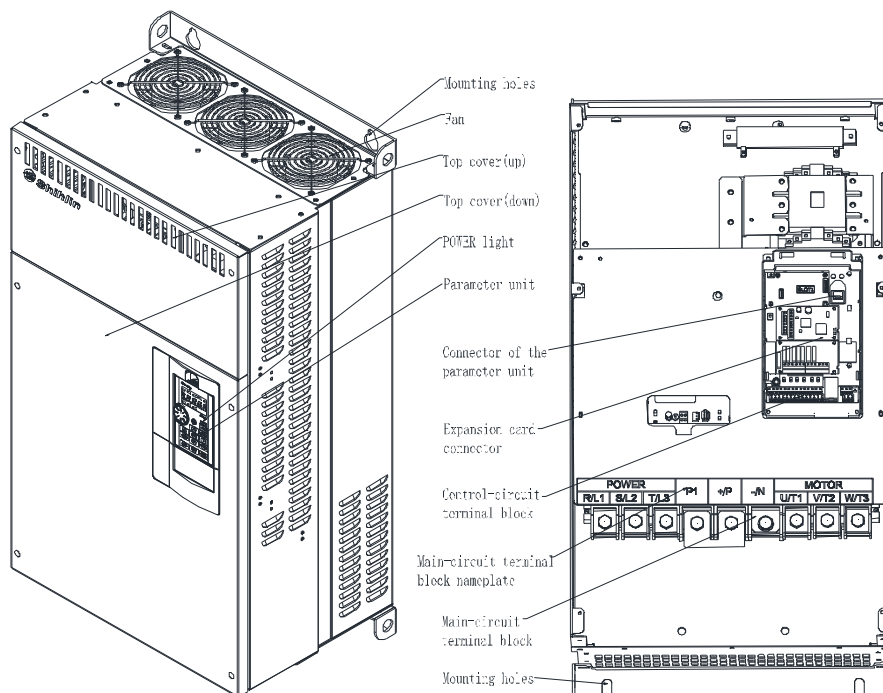
3.4.1 Frame A/B/C



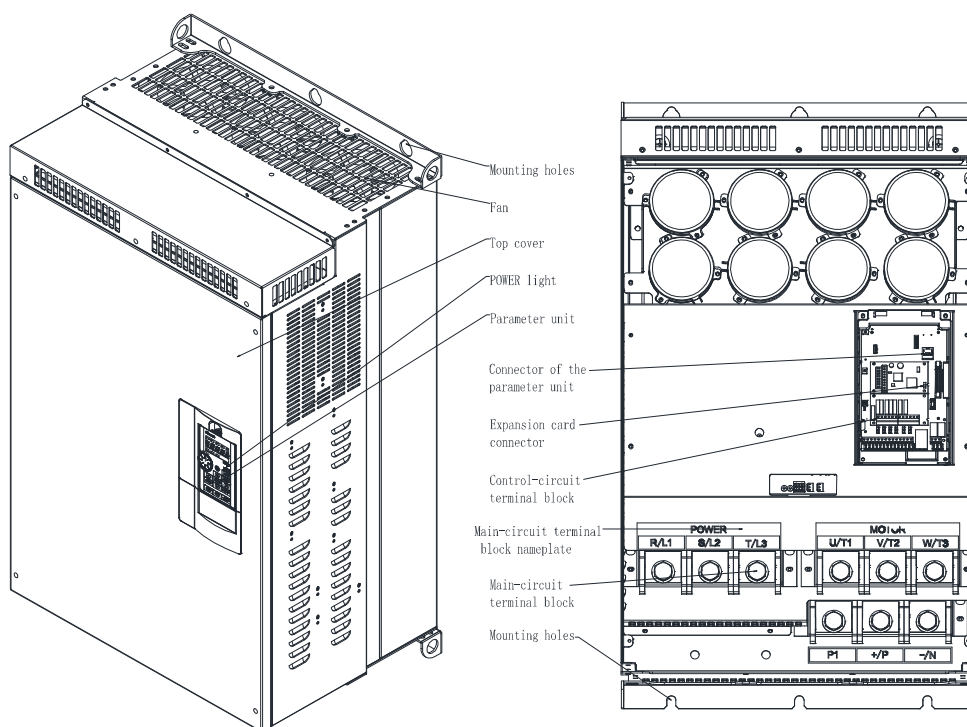
3.4.2 Frame D/E



3.4.3 Frame F



3.4.4 Frame G/H



3.4.5 Protection level and operation temperature

Frame	NEMA 1 label	Conduit box	Protection level	Operation temperature
A~C	Standard with NEMA 1 label	Installation	IP20/NEMA TYPE 1	-10 ~ +40°C
	NEMA 1 label removed		IP20/NEMA OPEN TYPE	-10 ~ +50°C
D~H	N/A	No installation	IP00/NEMA OPEN TYPE	-10 ~ +50°C
	N/A	Installation	IP20/NEMA TYPE 1	-10 ~ +40°C

3.5 Installation and wiring

3.5.1 Transportation

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

3.5.2 Stockpile

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

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

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

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

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

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

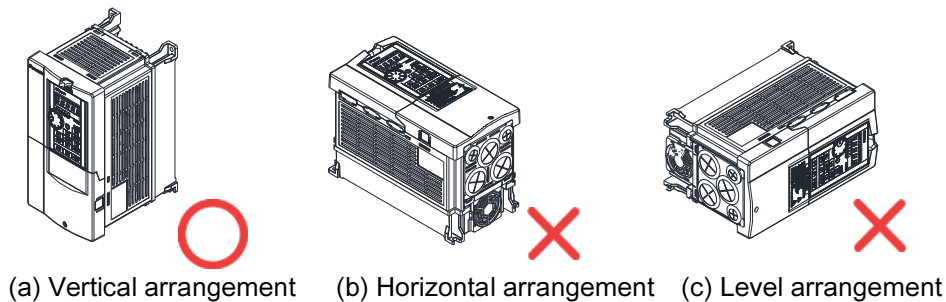
5. If the electrolytic capacitors are long-term no electricity, the character will degrade. Do not place it in the state of no electricity for more than one year.

3.5.3 Installation notice

✓ Before installing, please confirm whether meet the conditions listed in the table below:

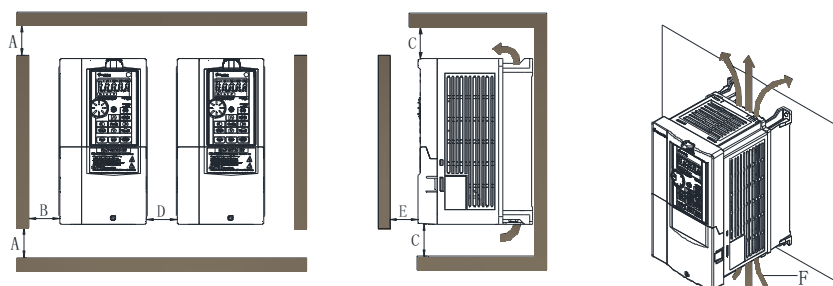
Ambient temperature	Heavy load : -10 ~ +50°C (non-freezing) , Light load : -10 ~ +40°C (non-freezing), please refer to 3.4.5 Class of protection and operation temperature for details.
Ambient humidity	90%Rh 以下(non-condensing).
Storage temperature	-20 ~ +65°C.
Surrounding environment	Indoor, no corrosive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

✓ Please ensure vertical arrangement to keep the cooling effect:



✓ Please comply with installation conditions shown below to ensure enough ventilation space and wiring space for inverter cooling:

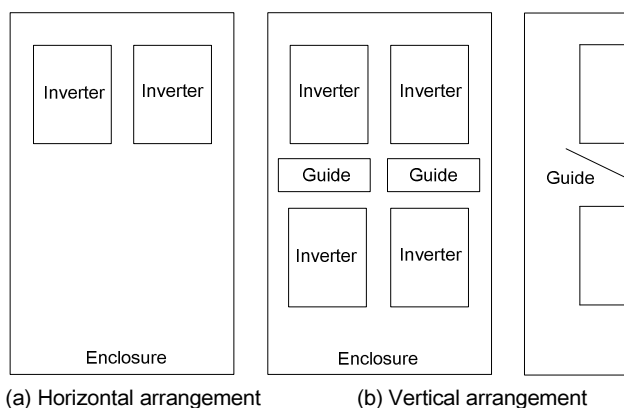
• Arrangement of single or paralleling inverter:



Unit:mm

尺寸	Frame A	Frame B ~ C	Frame D ~ H
A	50	50	100
B	10	50	100
C	100	100	200
D	10	50	100
E	10	50	50
F	Ventilation direction		

• Arrangement of multiple inverters:



Note1. When mounting inverters of different sizes in parallel, please align the clearance above each inverter to install, which is easy to change the cooling fan

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

3.5.4 EMC installation instructions

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

✓ Field wiring

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

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

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

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

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

✓ Shielding

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

✓ Grounding

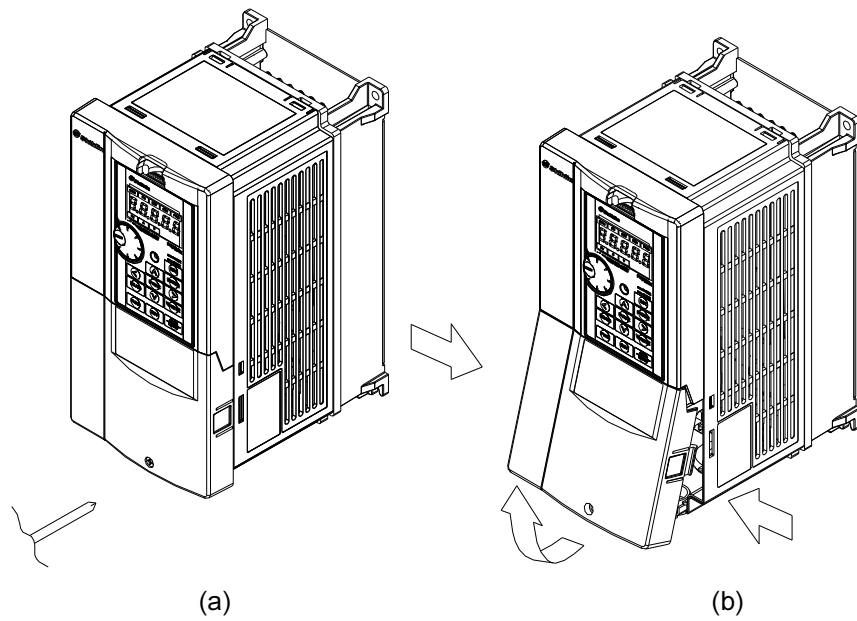
The inverter must be connected to the ground safely and reliably. Grounding is not only for equipment and personal safety, but also the simplest, the most efficient and the lowest cost method to solving the EMC problem, so it should be prioritized. Please refer to the section of "3.7 Terminal wiring".

✓ Carrier wave

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

3.5.5 Removal of the wiring front cover

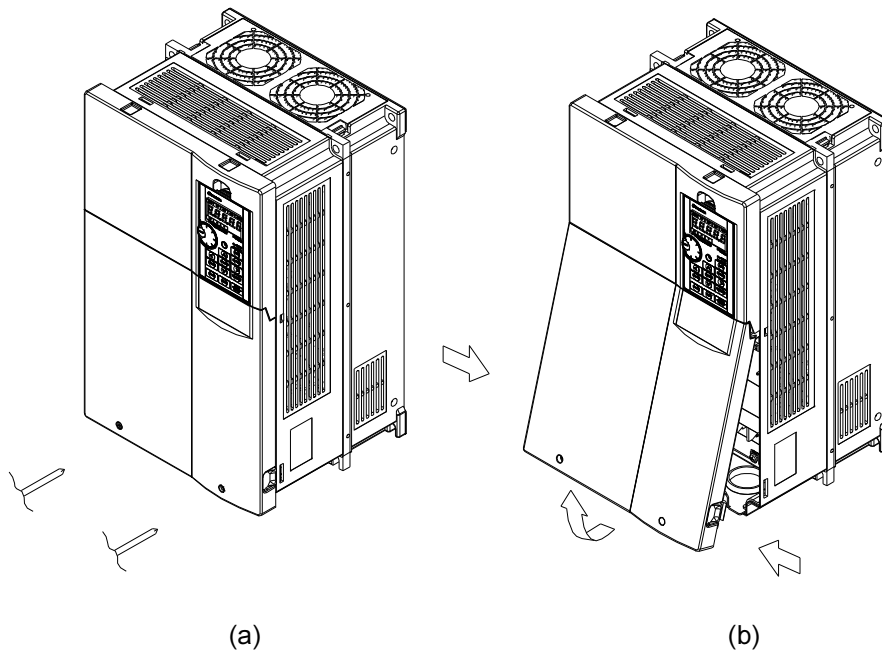
✓ Frame A/B



(a) Loosen the screws on the wiring front cover.

(b) While holding the areas around the installation hooks on the sides of the wiring front cover, pull out the wiring front cover using its upper side as a support.

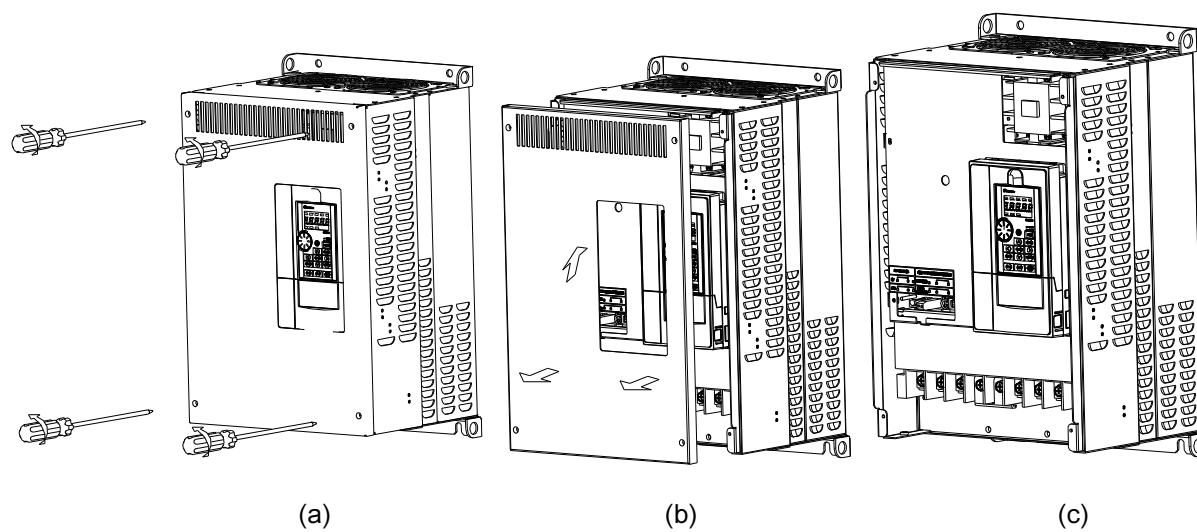
✓ Frame C



(a) Loosen the screws on the wiring front cover.

(b) While holding the areas around the installation hooks on the sides of the wiring front cover, pull out the wiring front cover using its upper side as a support.

✓ Frame D/E

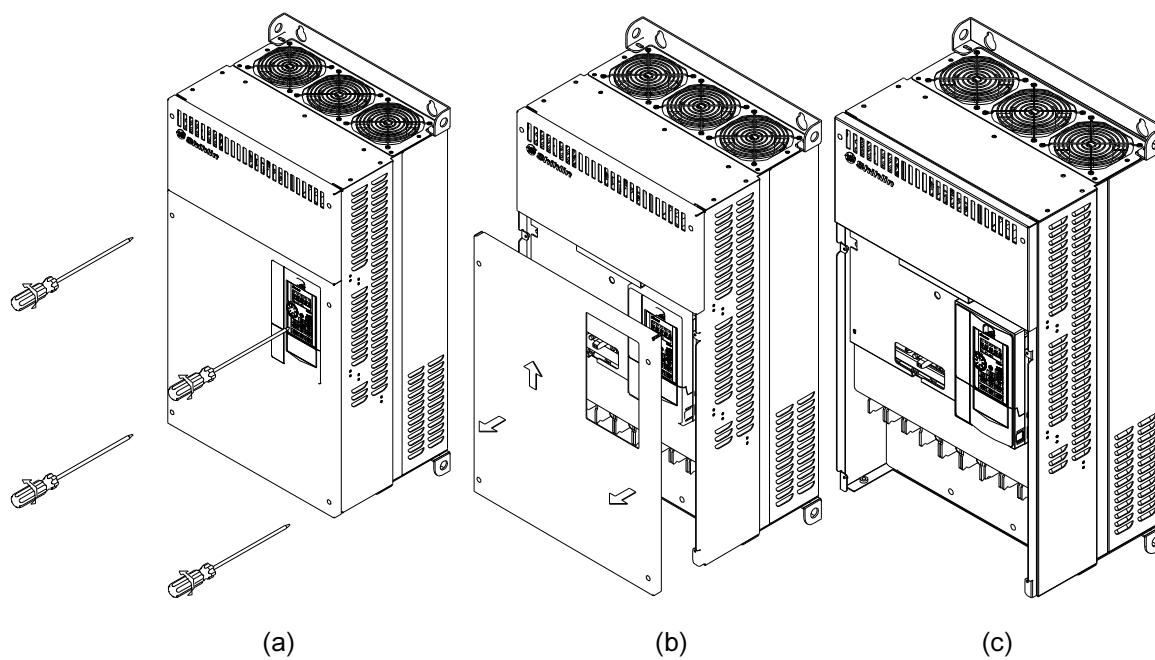


(a) Loosen the screws on the wiring front cover.

(b) Pull up the front cover and then pull it out.

(c) Removal is finished.

✓ Frame F/G/H



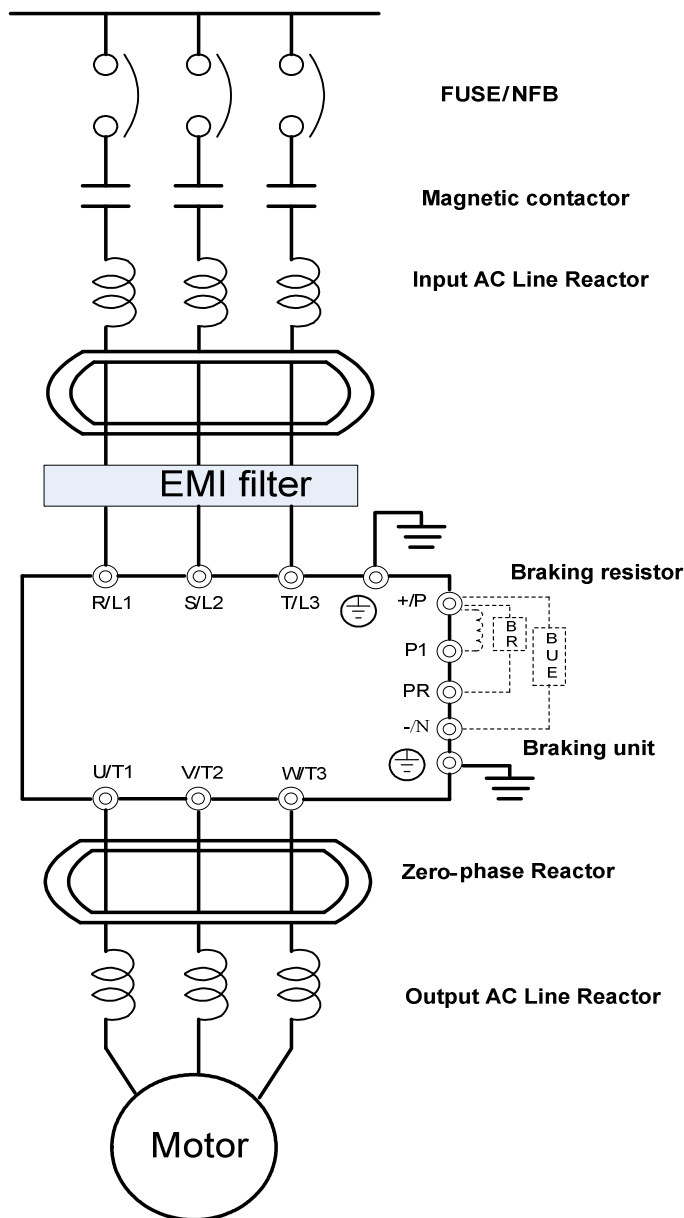
(a) Loosen the screws on the wiring front cover.

(b) Pull up the front cover and then pull it out.

(c) Removal is finished.

3.6 Peripheral devices

3.6.1 System Wire Arrangement



Power supply	Please follow the specific power supply requirement shown in this manual.
Fuse/NFB	There may be an inrush current during power up. Please refer to 3.7.1 and select the correct fuse /NFB.
Magnetic contactor	Please do not use a Magnetic contactor as the I/O switch of the inverter, as it will reduce the operating life cycle of the inverter.
Input AC Line Reactor	AC line reactor should be installed to improve the input power factor. The wiring distance should be less than 10m. Please refer to 3.7.6.
Zero-phase Reactor	Zero-phase reactors are used to reduce radio noise especially when audio equipment installed near the inverter. Effective for noise reduction on both the input and output sides. The frequency band effective range is from 1MHz to 10 MHz. Please refer to 3.7.5.
EMI filter	Used to reduce electromagnetic interference.
Braking unit	Used to reduce stopping time of the motor.
Output AC Line Reactor	Motor surge voltage amplitudes depending on motor cable length. The output AC line reactor is necessary to install on the inverter output side. Please refer to 3.7.6.

3.6.2 No-fuse switch and magnetic contactor

Inverter model	Motor capacity	Power source capacity	Applicable no-fuse switch (NFB/MCCB) type (Shihlin Electric)	Applicable electromagnetic contactor (MC) type (Shihlin Electric)
SA3-043-0.75K/1.5KF	440V 1HP	2.5 kVA	BM30SN3P5A	S-P11
SA3-043-1.5K/2.2KF	440V 2HP	4.8kVA	BM30SN3P10A	S-P11
SA3-043-2.2K/3.7KF	440V 3HP	6.9kVA	BM30SN3P15A	S-P21
SA3-043-3.7K/5.5KF	440V 5HP	10.4kVA	BM30SN3P20A	S-P21
SA3-043-5.5K/7.5KF	440V 7.5HP	11.5 kVA	BM30SN3P30A	S-P21
SA3-043-7.5K/11KF	440V 10HP	16 kVA	BM30SN3P30A	S-P21
SA3-043-11K/15KF	440V 15HP	20 kVA	BM60SN3P50A	S-P30T
SA3-043-15K/18.5KF	440V 20HP	27 kVA	BM60SN3P60A	S-P40T
SA3-043-18.5K/22KF	440V 25HP	32 kVA	BM100SN3P75A	S-P40T
SA3-043-22K/30KF	440V 30HP	41 kVA	BM100SN3P100A	S-P50T
SA3-043-30K/37KF	440V 40HP	52 kVA	BM160SN3P125A	S-P50T
SA3-043-37K/45KF	440V 50HP	65 kVA	BM160SN3P160A	S-P60T
SA3-043-45K/55KF	440V 60HP	79 kVA	BM250SN3P175A	S-P80T
SA3-043-55K/75KF	440V 75HP	100kVA	BM250SN3P175A	S-P80T
SA3-043-75K/90KF	440V 100HP	110KVA	BM250SN3P250A	S-P100T
SA3-043-90K/110KF	440V 120HP	137KVA	BM250SN3P250A	S-P150T
SA3-043-110K/132KF	440V 150HP	165kVA	BM250SN3P250A	S-P200T
SA3-043-132K/160KF	440V 215HP	247kVA	BM400SN3P400A	S-P300T
SA3-043-160K/185KF	440V 250HP	295kVA	BM400SN3P400A	S-P300T
SA3-043-185K/220KF	440V 300HP	367kVA	BM600SN3P500A	S-P400T
SA3-043-220K/250KF	440V 335HP	402kVA	BM600SN3P630A	M-600C
SA3-043-250K/280KF	440V 375HP	438kVA	BM600SN3P630A	M-600C
SA3-043-280K/315KF	440V 420HP	491kVA	BM800SN3P700A	M-600C
SA3-043-315K/355KF	440V 475HP	438kVA	BM800SN3P800A	M-600C
SA3-023-0.75K/1.5KF	220V 1HP	2.5kVA	BM30SN3P10A	S-P11
SA3-023-1.5K/2.2KF	220V 2HP	4.5kVA	BM30SN3P15A	S-P11
SA3-023-2.2K/3.7KF	220V 3HP	6.4kVA	BM30SN3P20A	S-P11/S-P12
SA3-023-3.7K/5.5KF	220V 5HP	10kVA	BM30SN3P30A	S-P21
SA3-023-5.5K/7.5KF	220V 7.5HP	12kVA	BM60SN3P50A	S-P25
SA3-023-7.5K/11KF	220V 15HP	20 kVA	BM100SN3P100A	S-P35T
SA3-023-11K/15KF	220V 20HP	28 kVA	BM160SN3P125A	S-P50T
SA3-023-15K/18.5KF	220V 25HP	34 kVA	BM160SN3P160A	S-P60T
SA3-023-18.5K/22KF	220V 30HP	41 kVA	BM250SN3P175A	S-P80T
SA3-023-22K/30KF	220V 40HP	52 kVA	BM250SN3P225A	S-P100T
SA3-023-30K/37KF	220V 50HP	65 kVA	BM250SN3P250A	S-P150T
SA3-023-37K/45KF	220V 60HP	79 kVA	BM400SN3P300A	S-P200T
SA3-023-45K/55KF	220V 75HP	99 kVA	BM400SN3P350A	S-P220T
SA3-023-55K/75KF	220V 100HP	110KVA	BM400SN3P400A	S-P300T
SA3-023-75K/90KF	220V 120HP	137KVA	BM400SN3P400A	S-P300T
SA3-023-90K/110KF	220V 300HP	180KVA	BM600SN3P500A	S-P400T
SA3-023-110K/132KF	220V 335HP	201KVA	BM600SN3P630A	M-600C

3.6.3 Retrograde Brake Resistor

Inverter model	Retrograde brake resistor specification
SA3-043-0.75K/1.5KF	100W 800Ω or above
SA3-043-1.5K/2.2KF	200W 320Ω or above
SA3-043-2.2K/3.7KF	300W 160Ω or above
SA3-043-3.7K/5.5KF	500W 120Ω or above
SA3-043-5.5K/7.5KF	1000W 75Ω or above
SA3-043-7.5K/11KF	1200W 75Ω or above
SA3-043-11K/15KF	2400W 50Ω or above
SA3-043-15K/18.5KF	3000W 40Ω or above
SA3-043-18.5K/22KF	4800W 32Ω or above
SA3-043-22K/30KF	4800W 27.2Ω or above
SA3-043-30K/37KF	6000W 16Ω or above

Inverter model	Retrograde brake resistor specification
SA3-023-0.75K/1.5KF	150W 120Ω or above
SA3-023-1.5K/2.2KF	300W 60Ω or above
SA3-023-2.2K/3.7KF	300W 60Ω or above
SA3-023-3.7K/5.5KF	400W 40Ω or above
SA3-023-5.5K/7.5KF	500W 30Ω or above
SA3-023-7.5K/11KF	1000W 20Ω or above
SA3-023-11K/15KF	2400W 13.6Ω or above
SA3-023-15K/18.5KF	3000W 10Ω or above
SA3-023-18.5K/22KF	4800W 8Ω or above

Note: 1. For brake resistor whose built-in brake unit offers model options, the capacity of the regenerative brake is based on the condition that the regenerative brake duty is 10% (when braking lasts for 5 seconds, the machine has to be stopped for another 45 seconds must be stopped for heat dissipation). For models without a built-in brake unit, the capacity of the regenerative brake is based on the brake duty of the selected brake unit. The regenerative brake resistor wattage can be reduced according to the user's application (quantity of heat) and the regenerative brake duty. But the resistance must be larger than the value (ohms) listed in the above table (otherwise the inverter will be damaged).

2. In case frequent start and stop operations are required, a larger regenerative brake duty should be set. Meanwhile, a large brake resistor should be employed correspondingly. Please feel free to contact us if there is any problem regarding the selection of brake resistors.
3. Frame D, E, F, G and H corresponded inverters have no built-in brake unit. Please select and purchase an external brake unit according to the brake unit section in the manual.

3.6.4 Reactor

✓ AC input reactor

Inverter model	Recommended reactor		
	Shihlin Type	Rated current (A)	Inductance(mH)
SA3-043-0.75K/1.5KF	BALH-0.75K	4	5.35
SA3-043-1.5K/2.2KF	BALH-1.5K	6	3.71
SA3-043-2.2K/3.7KF	BALH-2.2K	10	2.26
SA3-043-3.7K/5.5KF	BALH-3.7K	13	1.54
SA3-043-5.5K/7.5KF	BALH-5.5K	19	1.15
SA3-043-7.5K/11KF	BALH-7.5K	26	0.79
SA3-043-11K/15KF	BALH-11K	34	0.59
SA3-043-15K/18.5KF	BALH-15K	43	0.48
SA3-043-18.5K/22KF	BALH-18.5K	48	0.4
SA3-043-22K/30KF	BALH-22K	64	0.3
SA3-043-30K/37KF	BALH-30K	79	0.24
SA3-043-37K/45KF	BALH-37K	97	0.2
SA3-043-45K/55KF	BALH-45K	123	0.16
SA3-043-55K/75KF	BALH-55K	164	0.12
SA3-043-75K/90KF	BALH-75K	180	0.1
SA3-043-90K/110KF	BALH-90K	216	0.1
SA3-043-110K/132KF	BALH-110K	260	0.071
SA3-043-132K/160KF	BALH-132K	310	0.071
SA3-043-160K/185KF	BALH-160K	361	0.071
SA3-043-185K/220KF	BALH-185K	425	0.043
SA3-043-220K/250KF	BALH-220K	480	0.043
SA3-043-250K/280KF	BALH-250K	547	0.030
SA3-043-280K/315KF	BALH-280K	620	0.030
SA3-043-315K/355KF	BALH-315K	683	0.030

SA3-023-0.75K/1.5KF	BAL-0.75K	7	1.340
SA3-023-1.5K/2.2KF	BAL-1.5K	9	0.930
SA3-023-2.2K/3.7KF	BAL-2.2K	16	0.570
SA3-023-3.7K/5.5KF	BAL-3.7K	22	0.380
SA3-023-5.5K/7.5KF	BAL-5.5K	30	0.290
SA3-023-7.5K/11KF	BAL-7.5K	43	0.200
SA3-023-11K/15KF	BAL-11K	59	0.150
SA3-023-15K/18.5KF	BAL-15K	72	0.120
SA3-023-18.5K/22KF	BAL-18.5K	85	0.100
SA3-023-22K/30KF	BAL-22K	115	0.075
SA3-023-30K/37KF	BAL-30K	141	0.061
SA3-023-37K/45KF	BAL-37K	173	0.050
SA3-023-45K/55KF	BAL-45K	211	0.041
SA3-023-55K/75KF	BAL-55K	317	0.029
SA3-023-75K/90KF	BAL-75K	440	0.026
SA3-023-90K/110KF	BAL-90K	475	0.024
SA3-023-110K/132KF	BAL-110K	520	0.023

✓ AC output reactor

Inverter model	Recommended reactor		
	Shihlin Type	Rated current (A)	Inductance(mH)
SA3-043-0.75K/1.5KF	BAOH-0.75K	5	1.394
SA3-043-1.5K/2.2KF	BAOH-1.5K	7	1.000
SA3-043-2.2K/3.7KF	BAOH-2.2K	10	0.700
SA3-043-3.7K/5.5KF	BAOH-3.7K	15	0.465
SA3-043-5.5K/7.5KF	BAOH-5.5K	20	0.350
SA3-043-7.5K/11KF	BAOH-7.5K	30	0.230
SA3-043-11K/15KF	BAOH-11K	40	0.180
SA3-043-15K/18.5KF	BAOH-15K	50	0.140
SA3-043-18.5K/22KF	BAOH-18.5K	60	0.120
SA3-043-22K/30KF	BAOH-22K	80	0.090
SA3-043-30K/37KF	BAOH-30K	90	0.078
SA3-043-37K/45KF	BAOH-37K	120	0.060
SA3-043-45K/55KF	BAOH-45K	150	0.047
SA3-043-55K/75KF	BAOH-55K	200	0.035
SA3-043-75K/90KF	BAOH-75K	250	0.028
SA3-043-90K/110KF	BAOH-90K	250	0.028
SA3-043-110K/132KF	BAOH-110K	290	0.024
SA3-043-132K/160KF	BAOH-132K	330	0.021
SA3-043-160K/185KF	BAOH-160K	390	0.018
SA3-043-185K/220KF	BAOH-185K	490	0.014
SA3-043-220K/250KF	BAOH-220K	530	0.013
SA3-043-250K/280KF	BAOH-250K	600	0.012
SA3-043-280K/315KF	BAOH-280K	660	0.011
SA3-043-315K/355KF	BAOH-315K	800	0.009

SA3-023-0.75K/1.5KF	BAO-0.75K	10	0.07
SA3-023-1.5K/2.2KF	BAO-1.5K	15	0.465
SA3-023-2.2K/3.7KF	BAO-2.2K	20	0.35
SA3-023-3.7K/5.5KF	BAO-3.7K	30	0.23
SA3-023-5.5K/7.5KF	BAO-5.5K	40	0.18
SA3-023-7.5K/11KF	BAO-7.5K	60	0.12
SA3-023-11K/15KF	BAO-11K	80	0.087
SA3-023-15K/18.5KF	BAO-15K	90	0.078
SA3-023-18.5K/22KF	BAO-18.5K	120	0.058
SA3-023-22K/30KF	BAO-22K	150	0.047
SA3-023-30K/37KF	BAO-30K	200	0.035
SA3-023-37K/45KF	BAO-37K	250	0.028
SA3-023-45K/55KF	BAO-45K	250	0.028
SA3-023-55K/75KF	BAO-55K	390	0.018
SA3-023-75K/90KF	BAO-75K	490	0.014
SA3-023-90K/110KF	BAO-90K	530	0.013
SA3-023-110K/132KF	BAO-110K	600	0.012

✓ DC reactor

Inverter model	Recommended reactor		
	Shihlin Type	Rated current (A)	Inductance (mH)
SA3-043-0.75K/1.5KF	BELH-0.75K	4.4	11.14
SA3-043-1.5K/2.2KF	BELH-1.5K	7.1	6.79
SA3-043-2.2K/3.7KF	BELH-2.2K	10.5	4.62
SA3-043-3.7K/5.5KF	BELH-3.7K	14.0	3.45
SA3-043-5.5K/7.5KF	BELH-5.5K	20.4	2.38
SA3-043-7.5K/11KF	BELH-7.5K	27.5	1.77
SA3-043-11K/15KF	BELH-11K	33.9	1.44
SA3-043-15K/18.5KF	BELH-15K	40.3	1.21
SA3-043-18.5K/22KF	BELH-18.5K	55.0	0.90
SA3-043-22K/30KF	BELH-22K	67.5	0.73
SA3-043-30K/37KF	BELH-30K	81.9	0.60
SA3-043-37K/45KF	BELH-37K	98.7	0.49
SA3-043-45K/55KF	BELH-45K	160	0.359
SA3-043-55K/75KF	BELH-55K	191	0.300
SA3-043-75K/90KF	BELH-75K	233	0.246
SA3-043-90K/110KF	BELH-90K	281	0.204
SA3-043-110K/132KF	BELH-110K	335	0.171
SA3-043-132K/160KF	BELH-132K	389	0.148
SA3-043-160K/185KF	BELH-160K	462	0.124
SA3-043-185K/220KF	BELH-185K	524	0.109
SA3-043-220K/250KF	BELH-220K	585	0.098
SA3-043-250K/280KF	BELH-250K	658	0.087
SA3-043-280K/315KF	BELH-280K	754	0.077
SA3-043-315K/355KF	BELH-315K	836	0.069

SA3-023-0.75K/1.5KF	BEL-0.75K	10.5	2.78
SA3-023-1.5K/2.2KF	BEL-1.5K	17.0	1.70
SA3-023-2.2K/3.7KF	BEL-2.2K	25.0	1.16
SA3-023-3.7K/5.5KF	BEL-3.7K	33.4	0.86
SA3-023-5.5K/7.5KF	BEL-5.5K	48.1	0.60
SA3-023-7.5K/11KF	BEL-7.5K	64.7	0.45
SA3-023-11K/15KF	BEL-11K	79.9	0.36
SA3-023-15K/18.5KF	BEL-15K	95.1	0.30
SA3-023-18.5K/22KF	BEL-18.5K	128.4	0.23
SA3-023-22K/30KF	BEL-22K	157.4	0.19
SA3-023-30K/37KF	BEL-30K	189.5	0.15
SA3-023-37K/45KF	BEL-37K	232.6	0.13
SA3-023-45K/55KF	BEL-45K	351	0.09
SA3-023-55K/75KF	BEL-55K	419	0.075
SA3-023-75K/90KF	BEL-75K	510	0.062
SA3-023-90K/110KF	BEL-90K	541	0.0059
SA3-023-110K/132KF	BEL-110K	640	0.0049

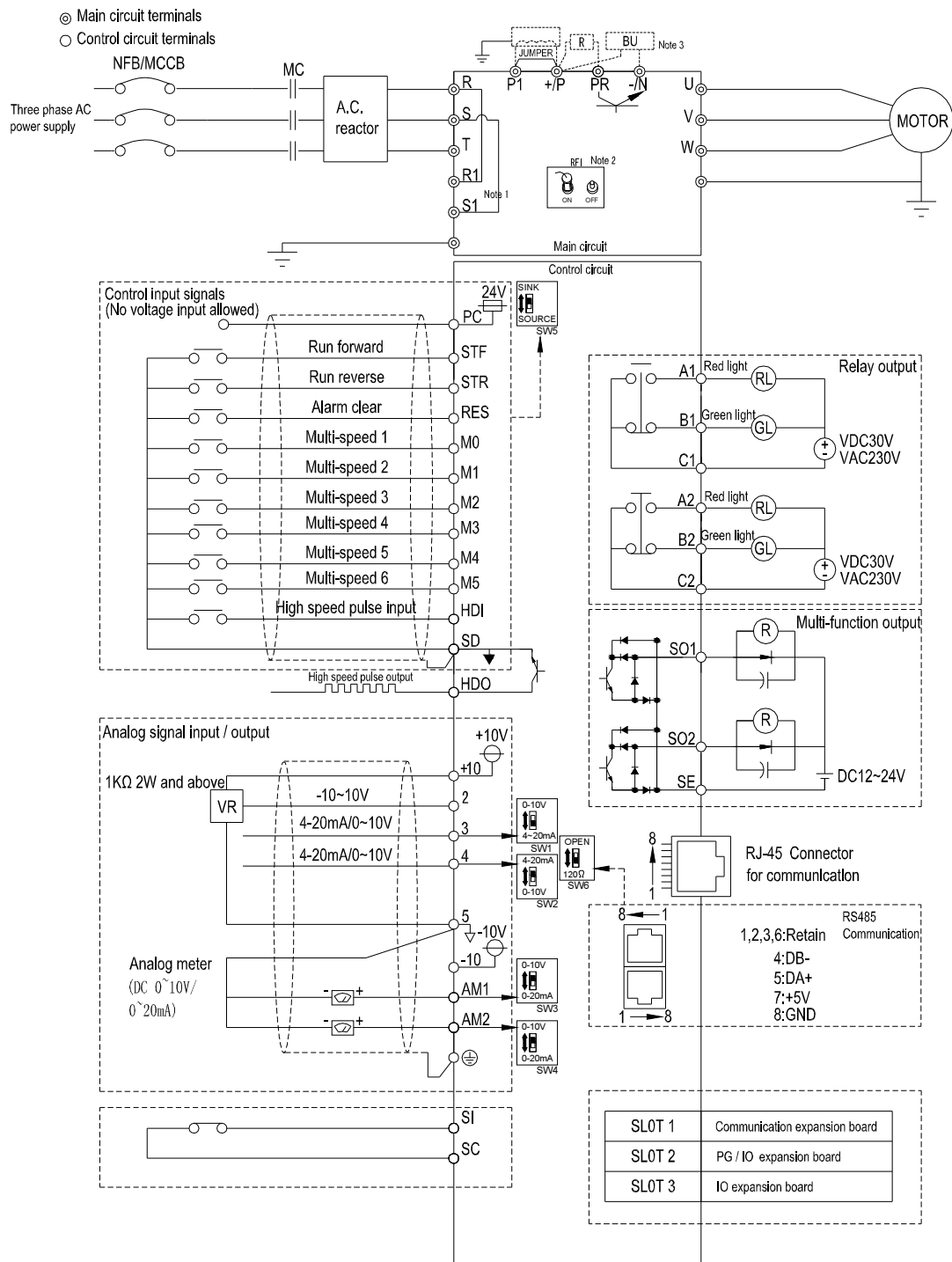
3.6.5 Filter

Inverter model	kW	HP	Rated Amps of reactor	Types of filter
SA3-043-0.75K/1.5KF	0.75	1	3.0	NF040-3.7K
SA3-043-1.5K/2.2KF	1.5	2	4.2	NF040-3.7K
SA3-043-2.2K/3.7KF	2.2	3	6	NF040-3.7K
SA3-043-3.7K/5.5KF	3.7	5	9	NF040-3.7K
SA3-043-5.5K/7.5KF	5.5	7.5	12	NF040-7.5K
SA3-043-7.5K/11KF	7.5	10	17	NF040-7.5K
SA3-043-11K/15KF	11	15	24	NF040-15K
SA3-043-15K/18.5KF	15	20	32	NF040-15K
SA3-043-18.5K/22KF	18.5	25	38	NF040-22K
SA3-043-22K/30KF	22	30	45	NF040-22K
SA3-043-30K/37KF	30	40	60	NF040-37K
SA3-043-37K/45KF	37	50	73	NF040-37K
SA3-043-45K/55KF	45	60	91	NF040-55K
SA3-043-55K/75KF	55	75	110	NF040-55K
SA3-043-75K/90KF	75	100	150	NF040-75K
SA3-043-90K/110KF	90	120	180	NF040-90K
SA3-043-110K/132KF	110	150	220	NF040-110K
SA3-043-132K/160KF	132	175	260	NF040-132K
SA3-043-160K/185KF	160	215	310	NF040-160K
SA3-043-185K/220KF	185	250	340	NF040-185K
SA3-043-220K/250KF	220	300	425	NF040-220K
SA3-043-250K/280KF	250	335	480	NF040-250K
SA3-043-280K/315KF	280	375	530	NF040-280K
SA3-043-315K/355KF	315	420	620	NF040-315K

SA3-023-0.75K/1.5KF	0.75	1	5	NF020-1.5K
SA3-023-1.5K/2.2KF	1.5	2	8	NF020-1.5K
SA3-023-2.2K/3.7KF	2.2	3	11	NF020-3.7K
SA3-023-3.7K/5.5KF	3.7	5	17.5	NF020-3.7K
SA3-023-5.5K/7.5KF	5.5	7.5	25	NF020-5.5K
SA3-023-7.5K/11KF	7.5	10	33	NF020-11K
SA3-023-11K/15KF	11	15	49	NF020-11K
SA3-023-15K/18.5KF	15	20	65	NF020-18.5K
SA3-023-18.5K/22KF	18.5	25	75	NF020-18.5K
SA3-023-22K/30KF	22	30	90	NF020-22K
SA3-023-30K/37KF	30	40	120	NF020-37K
SA3-023-37K/45KF	37	50	145	NF020-37K
SA3-023-45K/55KF	45	60	170	NF020-45K
SA3-023-55K/75KF	55	75	215	NF020-55K
SA3-043-75K/90KF	75	100	288	NF020-75K

Note: Products of CHANGZHOU DUOJI EME TECHNICAL CO., LTD are recommended for the filter used here.

3.7 Terminal wire arrangement



Note:1. R1, S1 terminal is only D ~ H framework, specific wiring please refer to the section 3.7.5.

2. RFI filter Settings, please refer to section 3.7.4.

3. The brake resistor (DC) connection approach between +/P and PR is for Frame A, B and C only. For connecting the brake unit of Frame D, E, F, G and H to between +/P and -/N, please refer to the Section 3.7.1 for details.


4. The DC resistor between +/P and P1 is optional. Please short +/P and P1 when AC reactor is not used.

5. When adding DC reactors, please remove the short circuit piece between P1 and +/P. Please refer to the Section 3.6.4 for the reactor type.

6. Please refer to the Section 5.3.9 for wiring of HDO.

3.7.1 Maincircuit Terminals

✓ Description

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

Note: 1. For SA3 series of inverters, brake resistor is not included. For information related to braking resistor, please refer to Section 3.6.3 and 3.7.1.

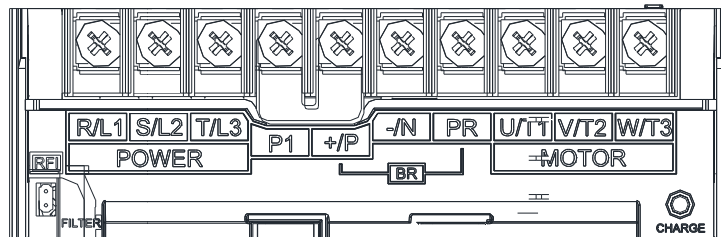
2. For information related to regenerative voltage, please refer to 06-05 and 06-06 in Section 5.7.3.

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

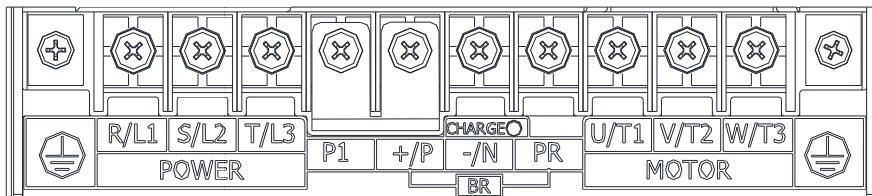
4. In case there is any problem on purchasing the “brake unit,” please feel free to contact us.

✓ Terminal layout of the main circuit terminals

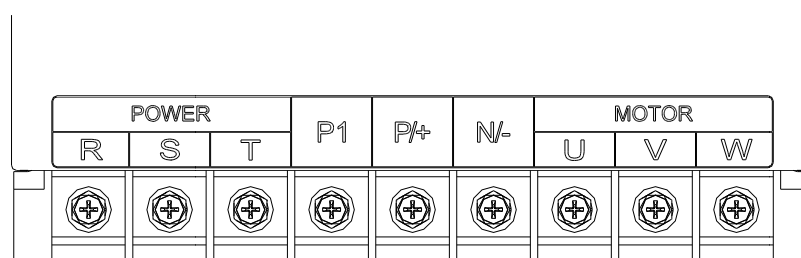
- Frame A



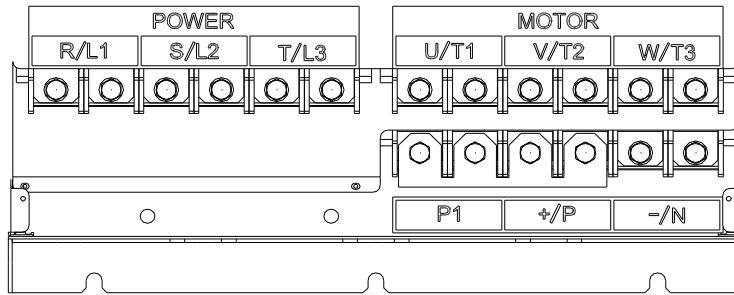
- Frame B/C



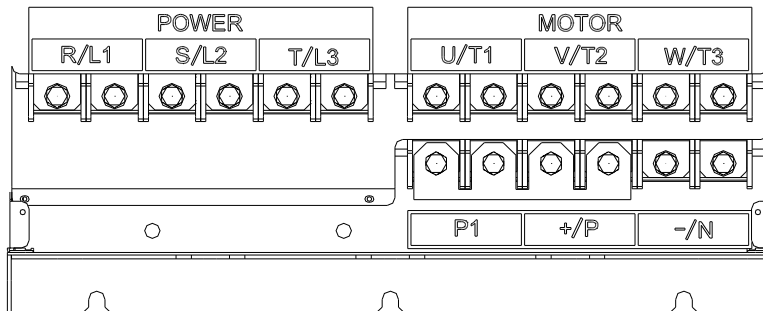
- Frame D/E/F



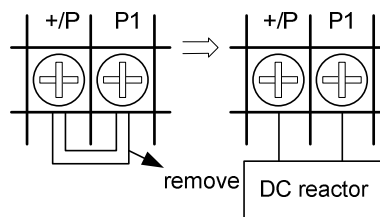
- Frame G



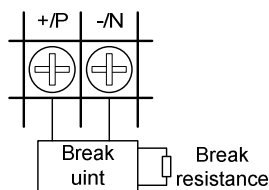
- Frame H



- ✓ DC reactor connection

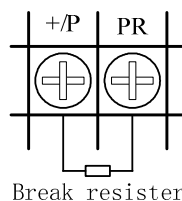


- ✓ Brake unit connection



Note: Frame D, E, F, G and H corresponded inverters have no built-in brake unit. Brake units and brake resistors can be selected for use. The built-in brake unit of Frame A, B and C corresponded inverters can have brake resistors. Please refer to Section 3.3 for instruction on the frames.

- ✓ Brake unit connection



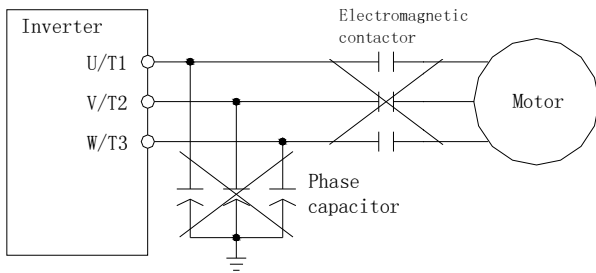
Note: It is only suitable for frame A, B and C corresponded inverters. Please refer to Section 3.3 for instruction on the frames.

3.7.2 Main circuit wiring and terminal specification

Inverter model	Terminal screw specifications	Tightening torque (Kgf.cm)	Recommended wiring specification (mm ²)				Recommended wiring specification (AWG)			
			R,S,T	U,V,W	+P, P1	Grounding Cable	R,S,T	U,V,W	+P, P1	Grounding Cable
SA3-023-0.75K/1.5KF	M4	12~15	2.5	2.5	2.5	2.5	14	14	14	14
SA3-023-1.5K/2.2KF			4	4	4	4	12	12	12	12
SA3-023-2.2K/3.7KF			6	6	6	6	10	10	10	10
SA3-023-3.7K/5.5KF			10	10	10	10	8	8	8	8
SA3-043-0.75K/1.5KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-1.5K/2.2KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-2.2K/3.7KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-3.7K/5.5KF			6	6	6	6	10	10	10	10
SA3-043-5.5K/7.5KF			6	6	6	6	10	10	10	10
SA3-023-5.5K/7.5KF	M5	20~25	10	10	10	10	8	8	8	8
SA3-023-7.5K/11KF			16	16	16	16	6	6	6	6
SA3-023-11K/15KF			25	25	25	16	4	4	4	4
SA3-043-7.5K/11KF			6	6	6	6	10	10	10	10
SA3-043-11K/15KF			10	10	10	10	8	8	8	8
SA3-043-15K/18.5KF			16	16	16	16	6	6	6	6
SA3-023-15K/18.5KF	M6	40~60	35	35	35	16	2	2	2	4
SA3-023-18.5K/22KF			50	50	50	25	1/0	1/0	1/0	2
SA3-043-18.5K/22KF			25	25	25	16	4	4	4	4
SA3-043-22K/30KF			25	25	25	16	4	4	4	4
SA3-043-30K/37KF			35	35	35	35	2	2	2	4
SA3-023-22K/30KF	M8	90~110	70	70	70	35	3/0	3/0	3/0	2
SA3-023-30K/37KF			95	95	95	50	4/0	4/0	4/0	1/0
SA3-023-37K/45KF			120	120	120	70	250	250	250	3/0
SA3-043-37K/45KF			70	70	70	35	3/0	3/0	3/0	1/0
SA3-043-45K/55KF			70	70	70	35	3/0	3/0	3/0	2
SA3-043-55K/75KF			95	95	95	50	4/0	4/0	4/0	1/0
SA3-043-75K/90KF			120	120	120	70	250	250	250	3/0
SA3-023-45K/55KF	M10	180~230	120	120	120	70	250	250	250	3/0
SA3-023-55K/75KF			185	185	185	95	500	500	500	4/0
SA3-043-90K/110KF			120	120	120	70	250	250	250	3/0
SA3-043-110K/132KF			185	185	185	95	500	500	500	3/0
SA3-023-75K/90KF			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-132K/160KF			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-160K/185KF	M12	320~400	240	240	240	120	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-185K/220KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-023-90K/110KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-043-220K/250KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-023-110K/132KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-043-250K/280KF			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
SA3-043-280K/315KF			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
SA3-043-315K/355KF			95×4P	95×4P	95×4P	95×2P	4/0x4P	4/0x4P	4/0x4P	4/0

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

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



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

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


5. The specifications of the no-fuse switch and the electromagnetic contactor, please refer to the section 3.6.2.

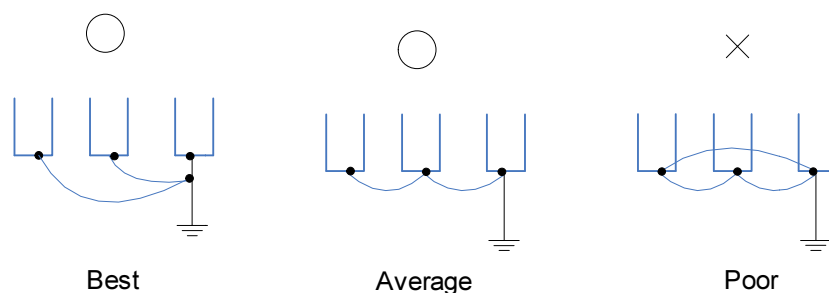
6. If the distance between the inverter and motor is longer, please use thick wires, make sure wire pressure dropping under 2V (wire length below 500 meters).

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

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

3.7.3 Ground

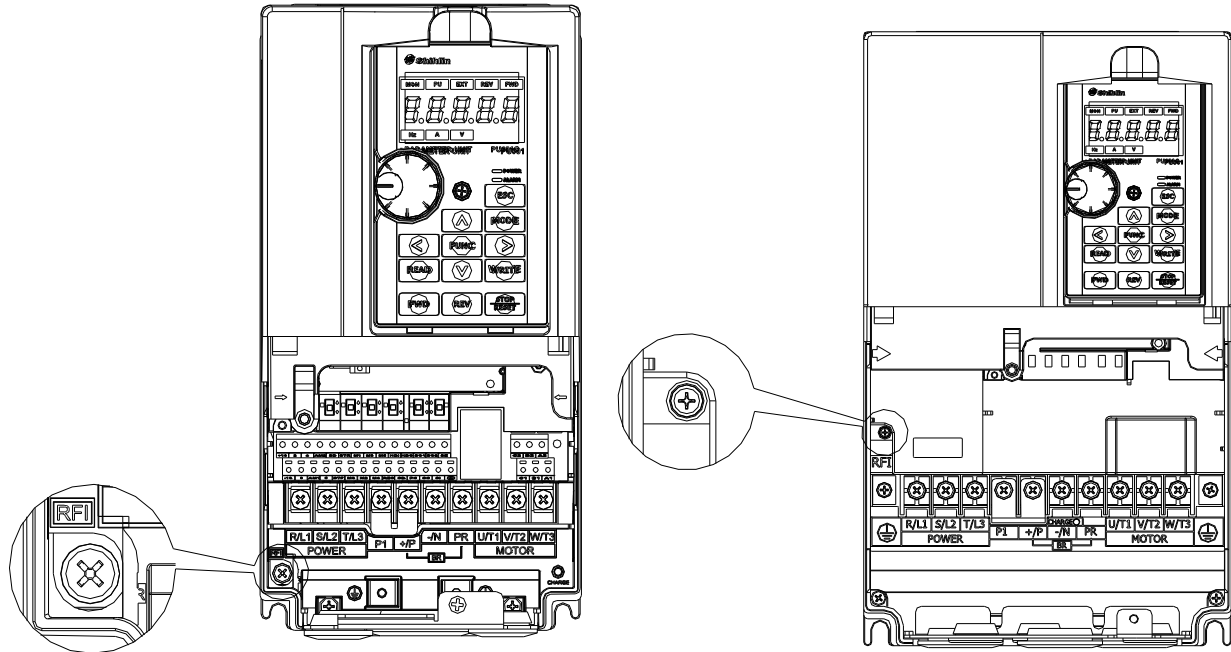
For safety and to reduce noise, the grounding terminal  of the inverter must be well grounded. To avoid electric shocks and fire accident, external metal wire of electrical equipment should be short and thick, and should be connected to special grounding terminals of an inverter. If several inverters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



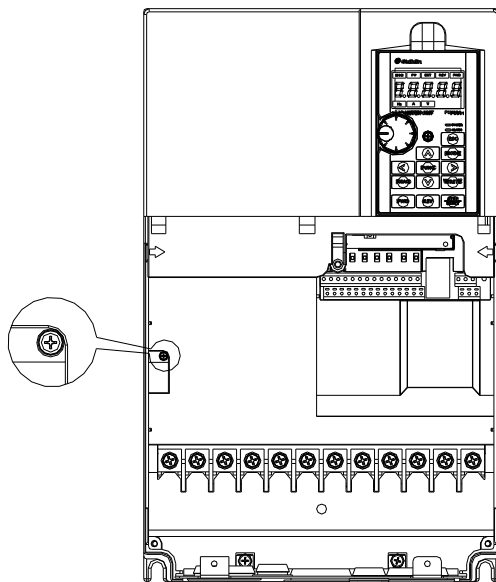
3.7.4 RFI filter

The inverters of SA3 series are equipped with built-in RFI filters. These filters are effective in reducing electromagnetic interference, but if in line with CE standard, please refer to Section 3.5.4 for installation and wiring.

✓ Frame A/B/C



Frame A Frame B

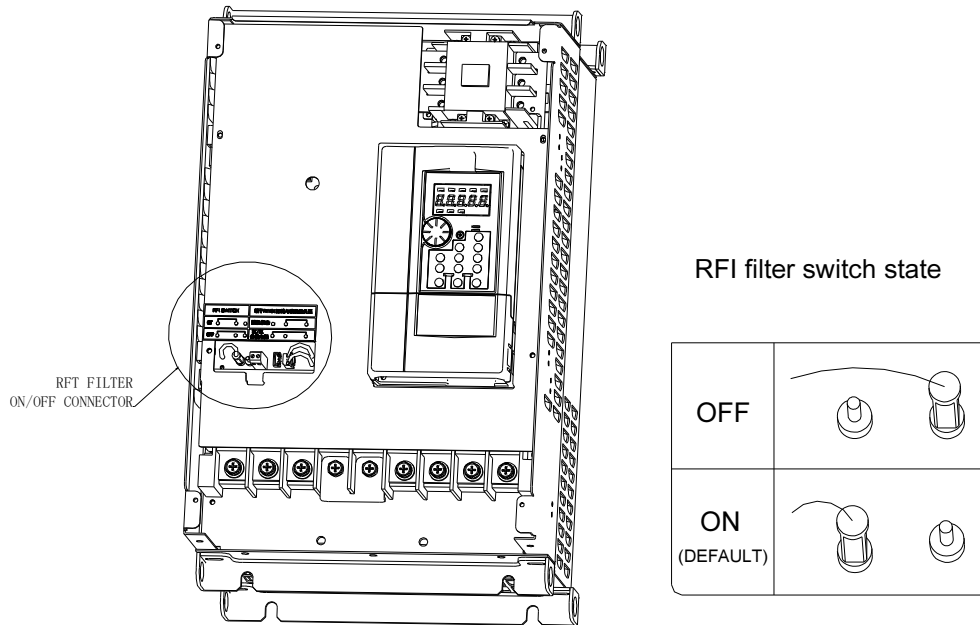


Frame C

RFI filter ON: screws fastened tightly (default status)

RFI filter OFF: screws loosened

✓ Frame D/E/F/G/H

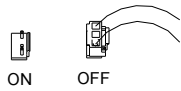


- Note: 1. Do not cut off the RFI filter state after applying power to the inverter. Please make sure that the main power has been switched off before cutting of RFI filter state.
2. Electric conductivity of the capacitor will be cut off by cutting off the RFI filter. Moreover, the electromagnetic capacitance of the inverter will be reduced by cutting of the RFI filter.
3. Do not switch off the RFI filter state when the main power is a grounded power system. To prevent machine damage, the RFI filter shall be cut off if the inverter is installed on an ungrounded power system, a high resistance-grounded (over 30 ohms) power system, or a corner grounded TN system.
4. The RFI filter cannot be cut off when performing the Hi-pot tests.

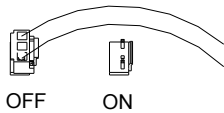
3.7.5 DC bus power supply

✓ Operation specification for Frame D~H

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



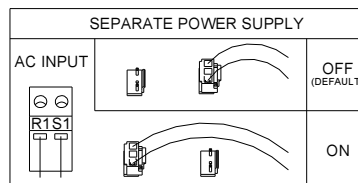
2. When the inverter is driven by DC bus power supply(+P,-N), the state of separate power supply should be set to ON(as the following diagram setting), meanwhile, input 220Vac(220V model)/440Vac(440V model) to the terminal R1, S1. When the inverter DC is power on,[no input 220Vac(220V model)/440Vac(440V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



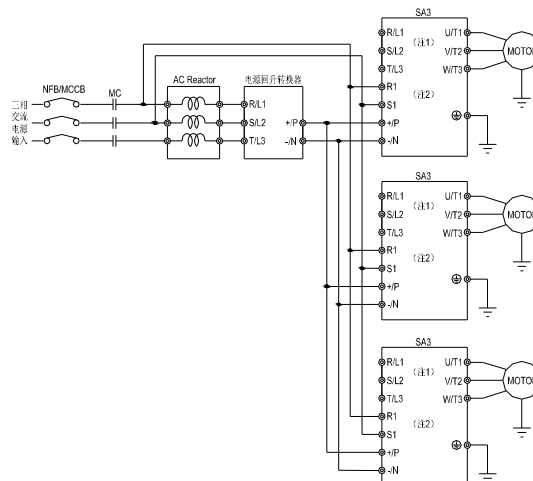
3. When as common DC bus(continuous power supply to terminal R/L1,S/L2,T/L3), separate power supply should be maintained the factory default state OFF.

✓ NOTE

Common DC bus application for driver power values are the same. If common DC bus application for different driver power values is demanded, please call us.



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



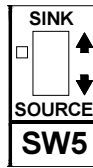
3.7.6 Control circuit

✓ Control terminal name

Terminal type	Terminal name	Function instructions	Terminal specifications
Switch signal input	STF	There are totally 10 multi-function control terminals, which can switch mode of SINK/SOURCE.	Input impedance: 4.7kΩ Action current: 5mA(24VDC) Voltage range: 10~28VDC Maximum frequency: 1kHz
	STR		
	RES		
	M0		
	M1		
	M2		
	M3		
	M4		
	M5		
	HDI		Maximum frequency:100kHz
Analog signal input	10	+10.5±0.5V	Maximum current:10mA
	-10	-10.5±0.5V	Maximum current:10mA
	2	-10~10V/0~10V	Input impedance:10kΩ
	3	4~20mA/0~10V	When current is input into, the input impedance is 235Ω.
	4		When voltage is input into, the input impedance is 24kΩ.
Relay output	A1	Multi-function relay output terminals. A-C is the normally open contact, B-C is the normally closed contact, C is common terminal.	Maximum voltage: 30VDC or 250VAC Maximum current: Resistor load 5A NO/3A NC Inductance load 2A NO/1.2A NC (cosΦ=0.4)
	B1		
	C1		
	A2		
	B2		
	C2		
Open collector output	SO1	Multi-function open collector output terminal	Maximum voltage: 48VDC Maximum current:50mA
	SO2		
Analog signal output	AM1	0~10V/0~20mA	Output voltage: 0~10VDC Maximum current: 3mA; Output current: 0~20mA Maximum load: 500Ω
	AM2		
Pulse output	HDO	Multi-function pulse output terminal, FM and 10X are compatible.	Minimum load:4.7kΩ Maximum current: 50mA Maximum voltage: 48VDC Maximum frequency: 100kHz
Safe terminal	SI	Factory with a short circuit	
	SC		
Communication terminal	RJ45×2	RS-485, optical isolation	Highest rate: 115200bps Longest distance: 500m
Common terminal	SD	The public terminal of STF, STR, RES, M0, M1, M2, M3, M4, HDI, HDO (SINK).	---
	SE	The public terminal of SO1, SO2 collector output terminal.	---
	5	The public terminal of terminal 10, -10, 2, 3, 4, AM1, AM2.	---
	PC	The public terminal of terminal STF, STR, RES, M0, M1, M2, M3, HDI(SOURCE).	Output voltage: 24VDC±20% Maximum current: 200mA

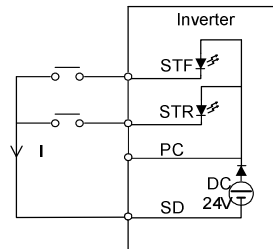
✓ Control logic (SINK/SOURCE) change

The multi-function control terminal of SA3 series inverter can select the sink input approach or the source input approach via the toggle switch SW5. The diagram is as follows

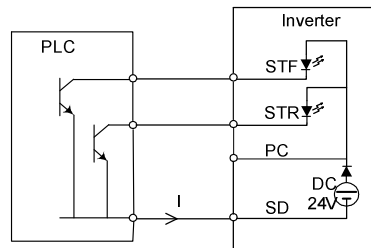


No matter what kind of multi-function control terminal is, all of its outside wire arrangement can be considered as a simple switch. If the switch is "on," the control signal will be put into the terminal. If the switch is "off," the control signal is shut off.

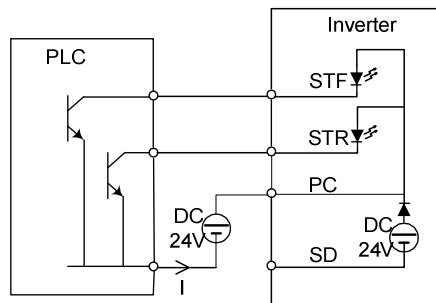
If "Sink Input" mode is selected, the function of the terminal is active when it is shorted with SD or connected with the external PLC. In this mode, the current flows out of the corresponding terminal when it is "on". Terminal "SD" is common to the contact input signals. When using an external power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



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

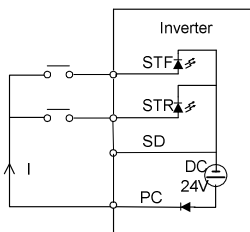


Sink Input: the multi-function control terminal is connected directly with open-collector PLC

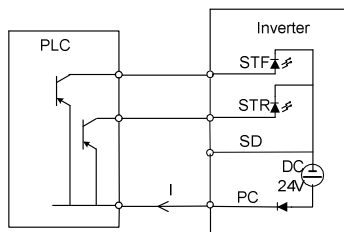


Sink Input: the multi-function control terminal is connected with open-collector PLC and external power supply

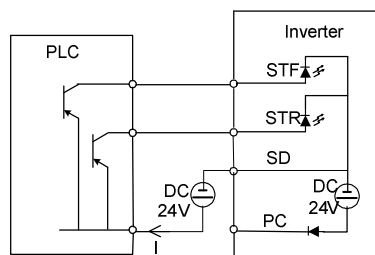
If "Source Input" mode is selected, the function of the terminal is active when it is shorted with PC or connected with the external PLC. In this mode, the current flows into the corresponding terminal when it is "on". Terminal PC is common to the contact input signals. When using an external power supply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



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

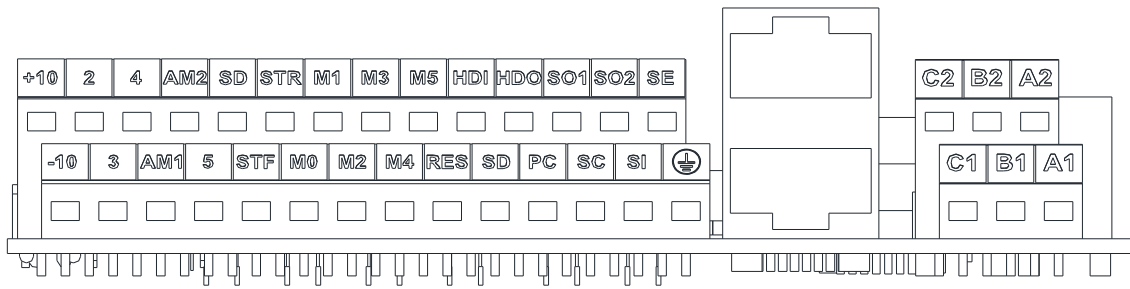


Source Input: the multi-function control terminal is connected directly with open-emitter PLC



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

✓ Arrangement of control terminal



● Power supply connection

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

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

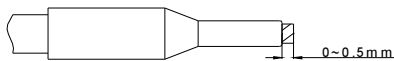
Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.



- (2) Crimp the blade terminal.

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

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



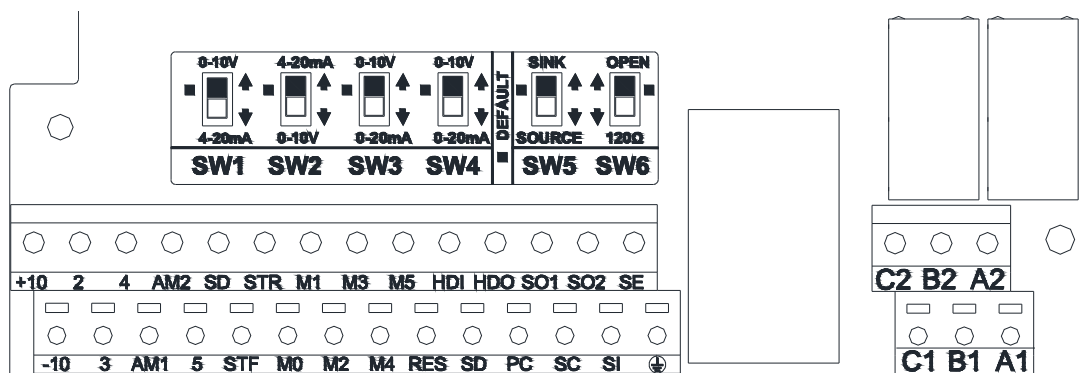
- Please do use blade terminals with insulation sleeve. Blade terminals commercially available:

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

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

2. Tightening torque is 2.12~3.18kgf.cm, too large tightening torque can cause screw slippage, too little tightening torque can cause a short circuit or malfunction.

✓ Toggle switch



Switch number	Switch state	Explanation	Remarks
SW1	*	Input 0~10V voltage signal into terminal 3-5	Cooperating with 02-29, please refer to Section 5.3.7.
		Input 4~20mA current signal into terminal 3-5	
SW2	*	Input 4~20mA current signal into terminal 4-5	Cooperating with 02-20, please refer to Section 5.3.6.
		Input 0~10V voltage signal into terminal 4-5	
SW3	*	Output 0~10V voltage from terminal AM1	Cooperating with 02-45, please refer to Section 5.3.11.
		Output 0~20mA/4~20mA current from terminal AM1	
SW4	*	Output 0~10V voltage from terminal AM2	Cooperating with 02-48, please refer to Section 5.3.12.
		Output 0~20mA/4~20mA current from terminal AM2	
SW5	*	Select the method of Sink Input	please refer to Section 3.7.6 Control logic change.
		Select the method of Source Input	
SW6	*	Communication terminal resistor Open	Set the terminal resistor switch SW6 on the farthest inverter at "120Ω", please refer to Section 5.8.1.
		Inserting 120Ω communication terminal resistor	

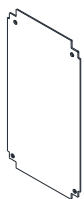
Note: 1. The state with "*" is the default state of switch.

2. The parts in black stand for switch handle.

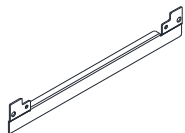
3.8 Flange mounting kit

3.8.1 Frame A

✓ Model name: FMK301 Order code: LNKFMK301



Accessories 1*1



Accessories 2*2



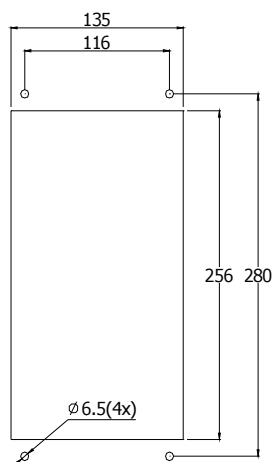
Accessories 3*1



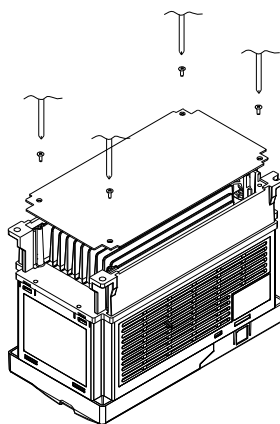
Accessories 4*1

Screw 1*4-M3*8
Screw 2*4-M6*15
Screw 3*8-M4*8

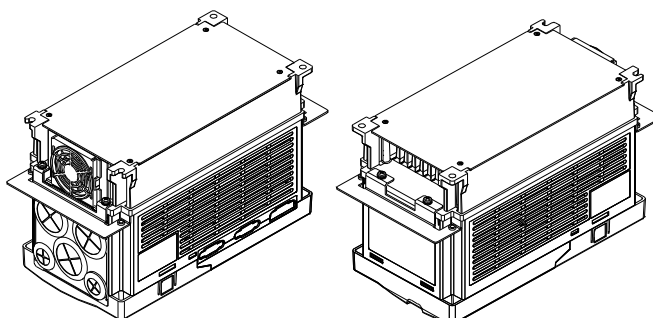
✓ Cutout dimension



1. Install Accessory 1 by fastening 4 of the screw 1(M3*8).(as the following figure shows).『Screw torque:20~25kg-cm』

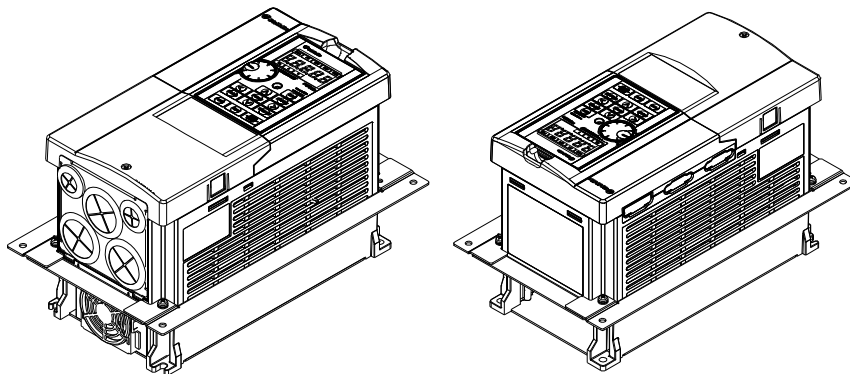


2. Install Accessories3&4 by fastening 3 of the screw 4(M4*8) (as the following figure shows). 『Screw torque:20~25kg-cm』

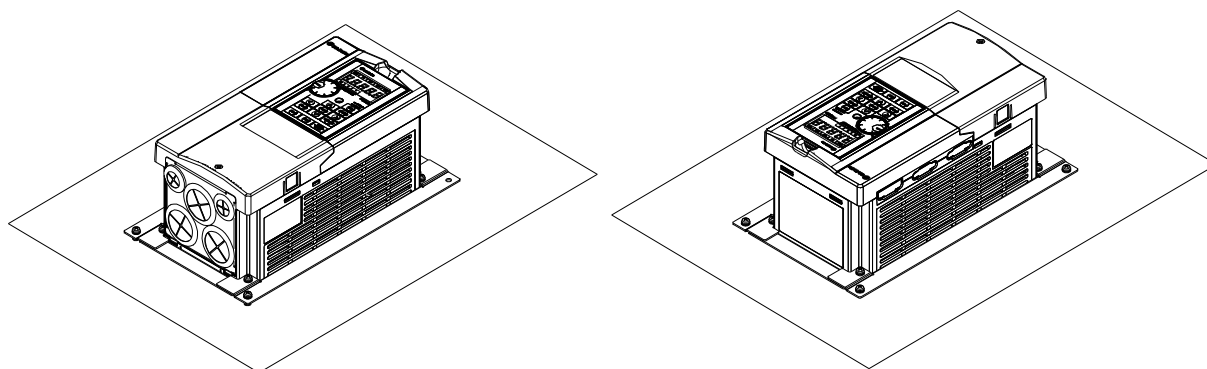


Flange mounting kit

3. Install Accessories 2&3&4 by fastening 3 of the screw 4(M4*8) (as the following figure shows). 『Screw torque:20~25kg-cm』

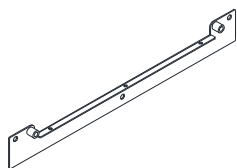


4. Plate installation, place 4 of the screw 2 (M6*15) through Accessories 2&3&4 and the plate then fasten the screws (as the following figure shows). 『Screw torque:65~75K/90KFg-cm』

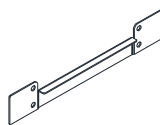


3.8.2 Frame B

✓ Model name: FMK302 Order code: LNKFMK302



Accessories 1*2

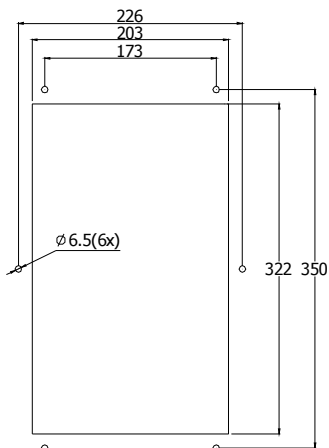


Accessories 2*2

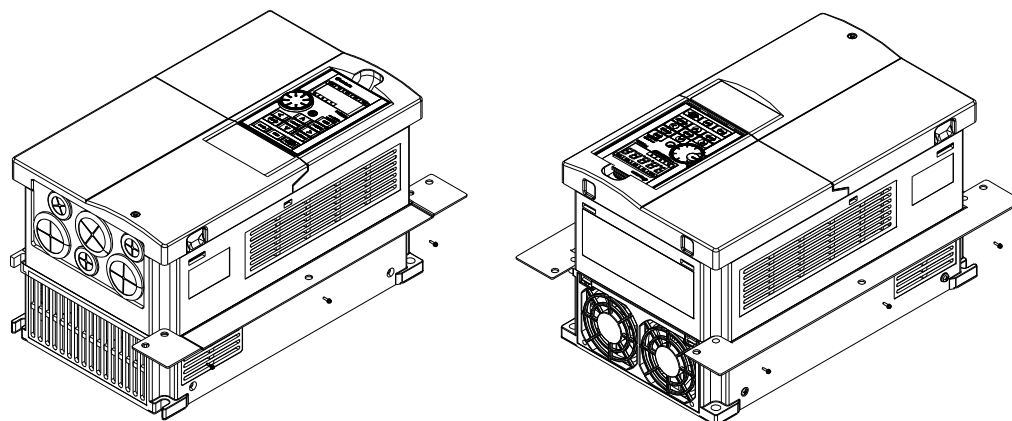
Screw 1*10-M6*15

Screw 2*6-M4*10

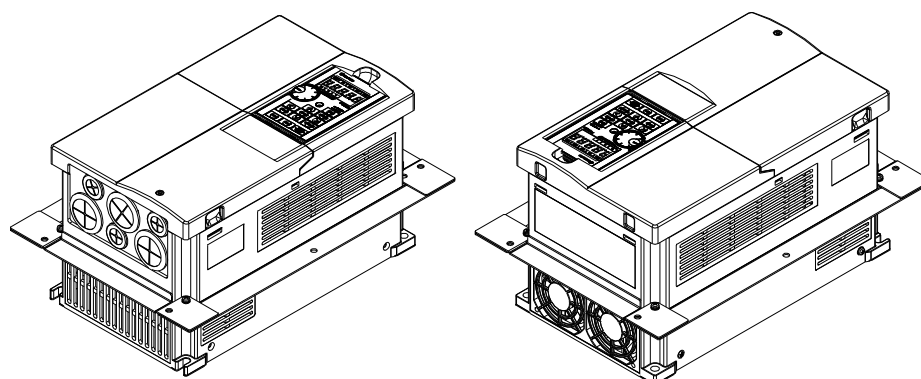
✓ Cutout dimension



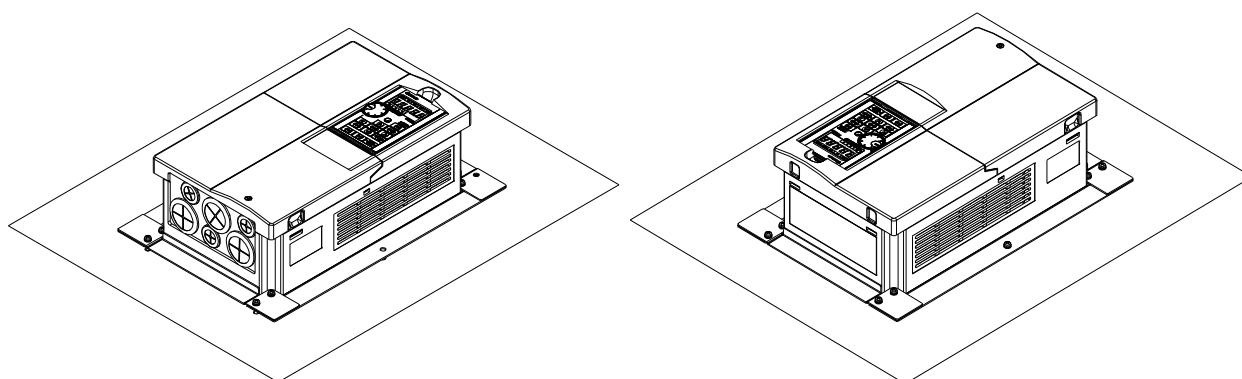
1. Place 2 of the screw 6 (M4) through Accessory1 and the inverter then fasten the screws(as the following figure shows). 『Screw torque:8~10kg-cm』



2. Install Accessories 1&2 by fastening 1 of the screw 4(M6) (as the following figure shows). 『Screw torque: 65~75K/90KFg-cm』

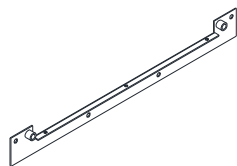


3. Place 1 of the screw 6 (M6) through Accessories 1&2and the plate then fasten the screws (as the following figure shows). 『Screw torque:65~75K/90KFg-cm』

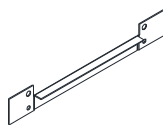


3.8.3 Frame C

✓ Model name: FMK303 Order code: LNKFMK303



Accessories 1*2

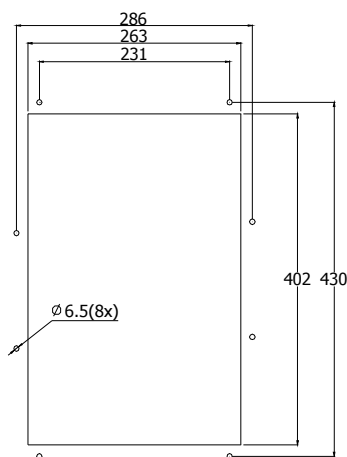


Accessories 2*2

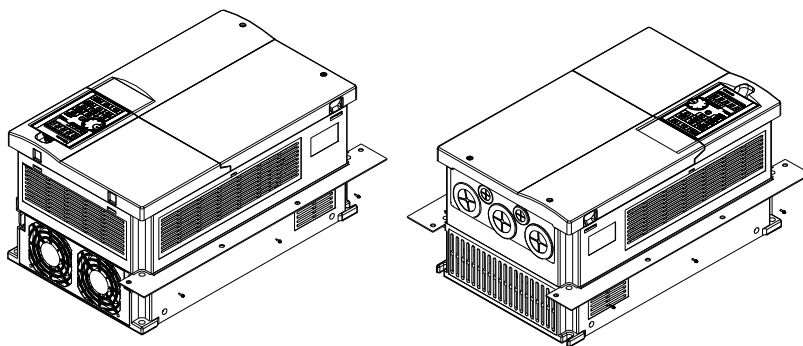
Screw 1*12-M6*15

Screw 2*6-M4*10

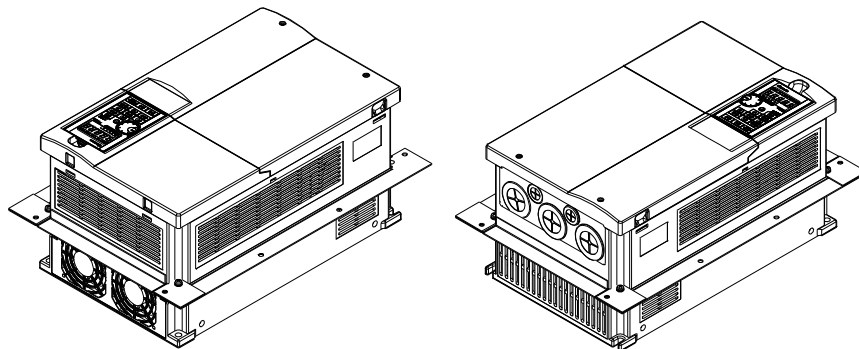
✓ Cutout dimension



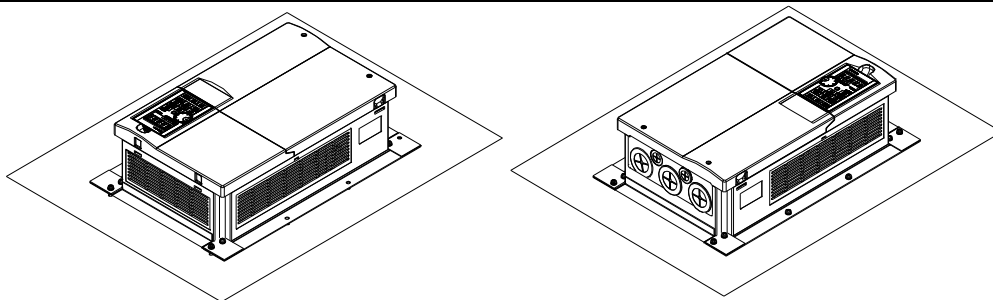
1. Place 2 of the screw 6 (M4) through Accessory 1 and the inverter then fasten the screws (as the following figure shows). 『Screw torque:8~10kg-cm』



2. Install Accessories 1&2 by fastening 1 of the screw 4(M6) (as the following figure shows). 『Screw torque:65~75K/90KFg-cm』

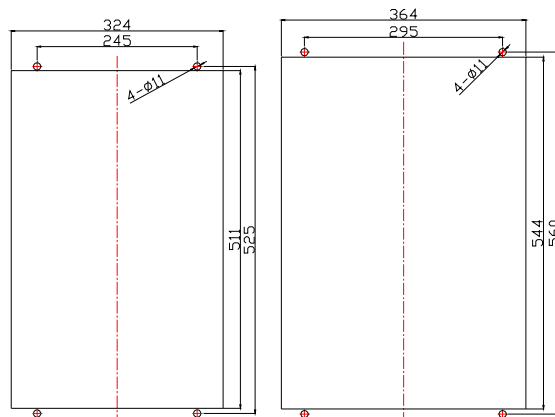


3. Place 1 of the screw 8 (M6) through Accessories 1&2 and the plate then fasten the screws (as the following figure shows). 『Screw torque:65~75K/90KFg-cm』



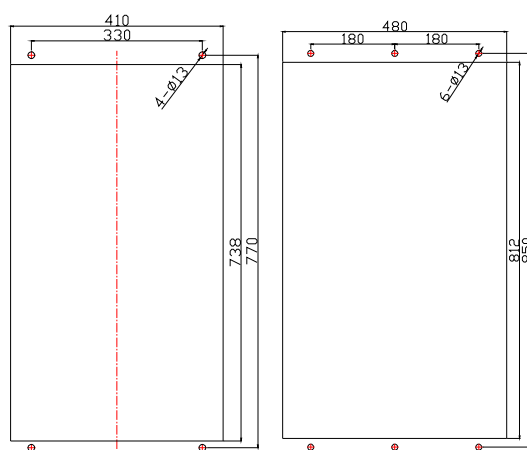
3.8.4 Frame D/E/F/G/H

✓ Cutout dimension



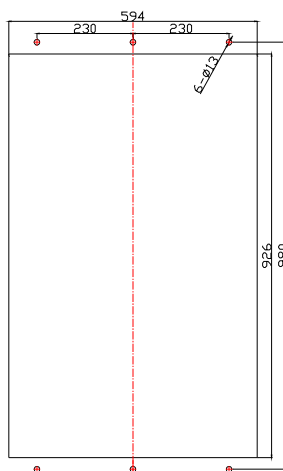
Frame D

Frame E



Frame F

Frame G

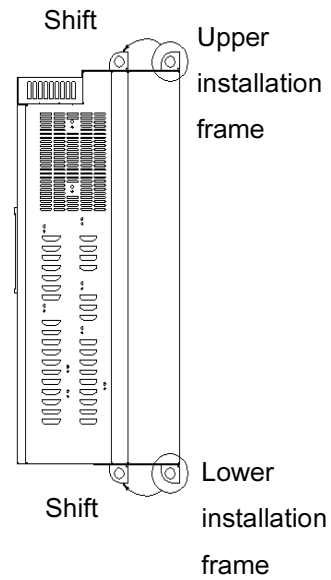


Frame H

✓ Installation flow chart

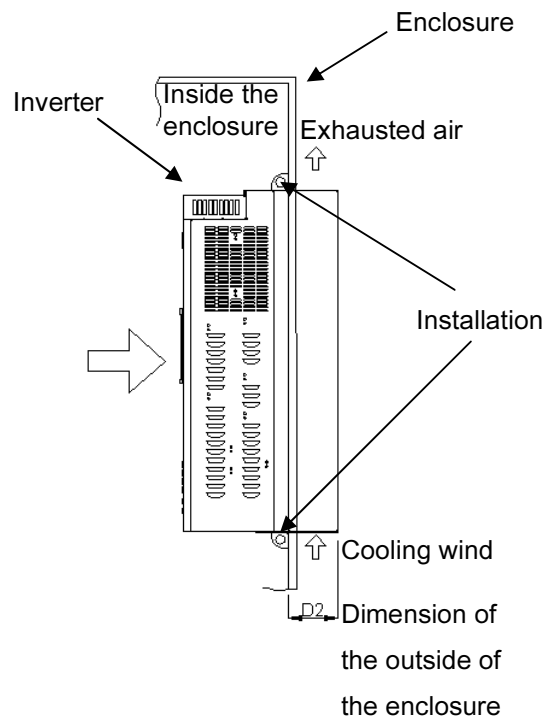
◆ Shift and removal of a rear side installation frame

One installation frame is attached to each of the upper and lower parts of the inverter. Change the position of the rear side installation frame on the upper and lower sides of the inverter to the front side as shown on the right. When changing the installation frames, make sure that the installation orientation is correct.



◆ Installation of the inverter

As shown on the right, push the inverter heatsink portion outside the enclosure and fix the enclosure and inverter with upper and lower installation frame.



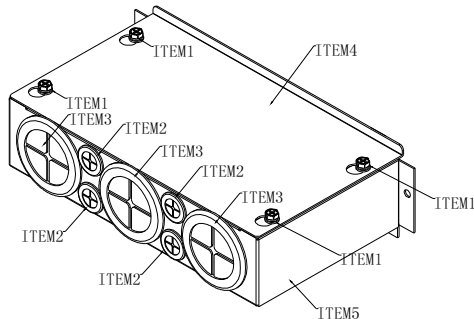
Model	D2(mm)
SA3-043-37K/45KF	137.5
SA3-043-45K/55KF	
SA3-043-55K/75KF	
SA3-043-75K/90KF	
SA3-023-22K/30KF	
SA3-023-30K/37KF	
SA3-023-37K/45KF	137.5
SA3-043-90K/110KF	
SA3-043-110K/132KF	
SA3-023-45K/55KF	
SA3-023-55K/75KF	145.5
SA3-043-132K/160KF	
SA3-023-75K/90KF	
SA3-043-160K/185KF	150.0
SA3-043-185K/220KF	
SA3-043-220K/250KF	
SA3-043-250K/280KF	
SA3-023-90K/110KF	
SA3-023-110K/132KF	
SA3-043-280K/315K	181.5
SA3-043-315K/355KF	

3.9 Conduit boxkit

3.9.1 Frame Dconduit box appearance

✓ Type name: WBK301

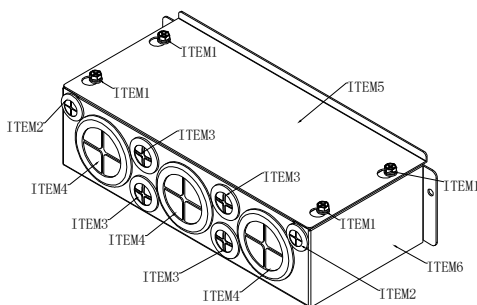
Order code: LNKWBK301



ITEM	Description	Qty.
1	Screw M6*15	4
2	Rubber 22	6
3	Rubber 60	3
4	Conduit box cover	1
5	Conduit box base	1

3.9.2 Frame E/Fconduit box appearance

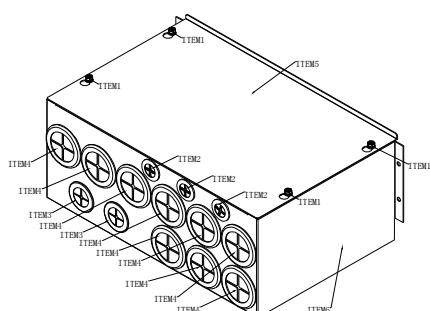
Frame	Type name	Order code
E	WBK302	LNKWBK302
F	WBK303	LNKWBK303



ITEM	Description	Qty.
1	Screw M6*15	4
2	Rubber 22	2
3	Rubber 28	4
4	Rubber 60	3
5	Conduit box cover	1
6	Conduit box base	1

3.9.3 Frame G/Hconduit box appearance

Frame	Type name	Order code
G	WBK304	LNKWBK304
H	WBK305	LNKWBK305

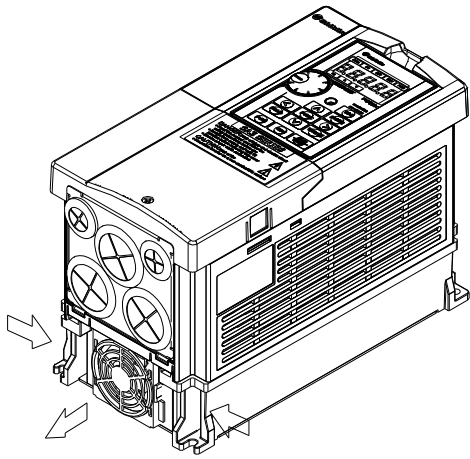


ITEM	Description	Qty.
1	Screw M6*15	4
2	Rubber 28	3
3	Rubber 42	2
4	Rubber 60	9
5	Conduit box cover	1
6	Conduit box base	1

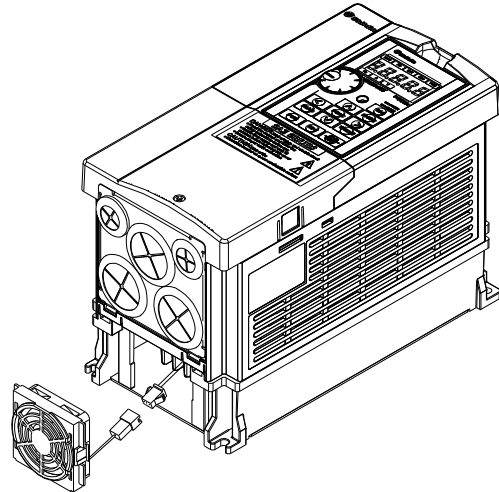
3.10 Replacement procedure of fan

3.10.1 Frame A

1. Press the hooks on both side of the fan to remove the fan. (As shown below.)

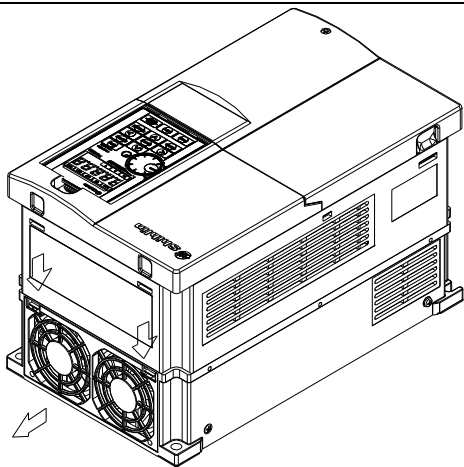


2. Disconnect the power terminal, and then remove the fan. (As shown below.)

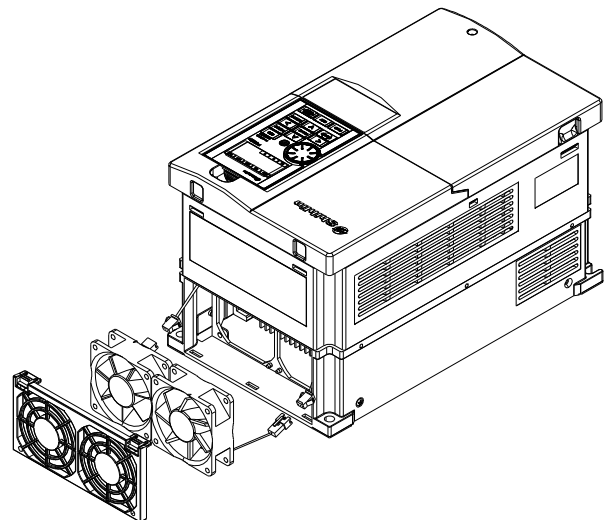


3.10.2 Frame B

1. Press the hooks on both side of the fan to remove the fan. (As shown below.)

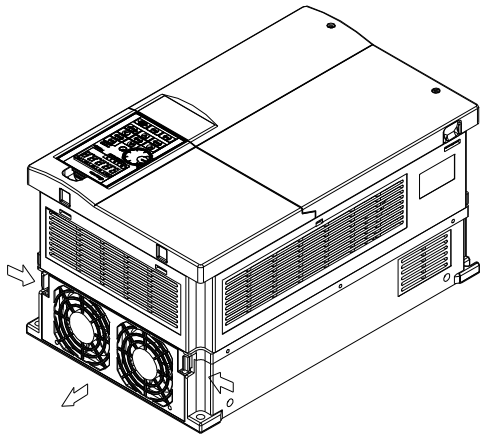


2. Disconnect the power terminal, and then remove the fan. (As shown below.)

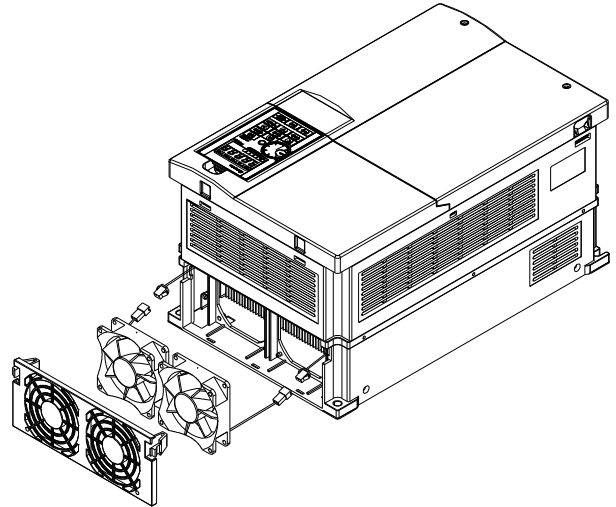


3.10.3 Frame C

1. Press the hooks on both side of the fan to remove the fan. (As shown below.)

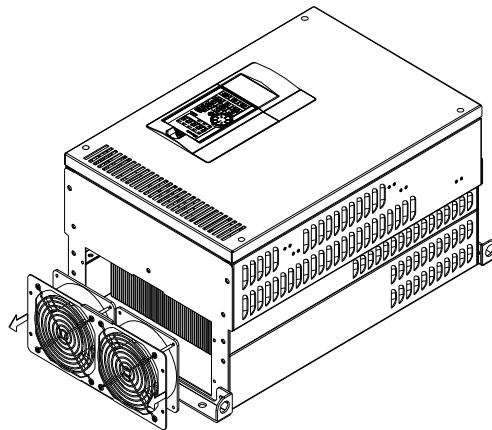


2. Disconnect the power terminal, and then remove the fan. (As shown below.)



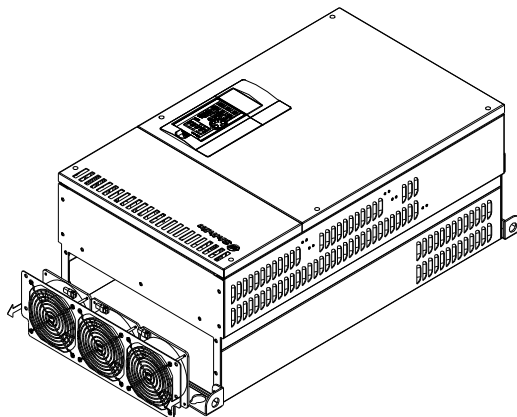
3.10.4 Frame D/E

Loosen and remove screw and disconnect the fan power to successfully remove the fan. Screw torque: 24~26kgf-cm(20.8~25.6in-ibf)



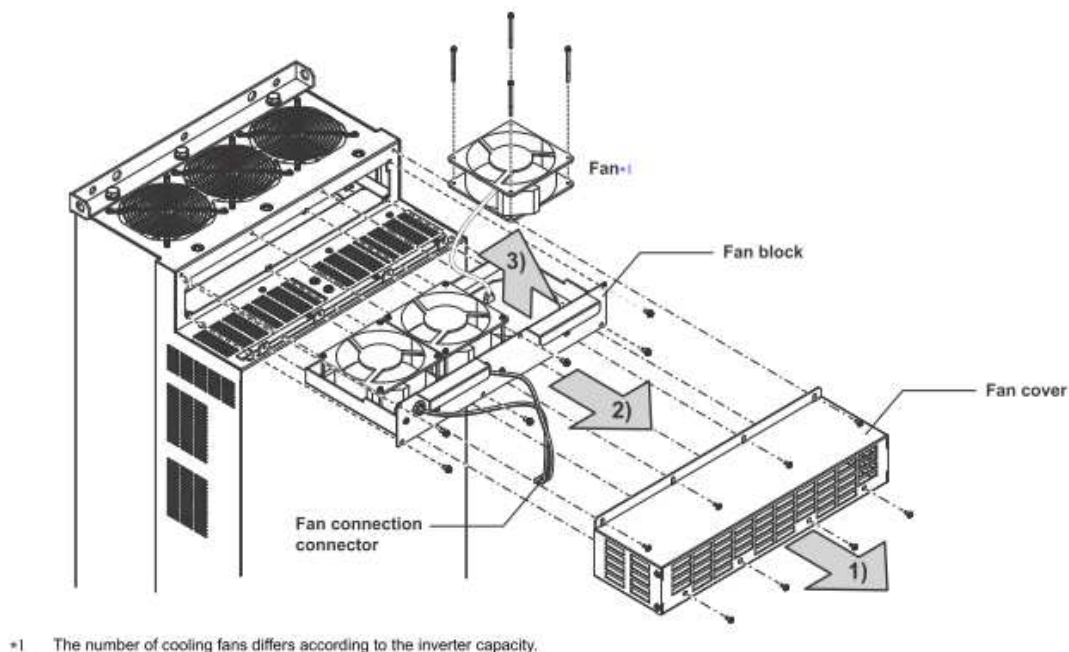
3.10.5 Frame F

Loosen and remove screw and disconnect the fan power to successfully remove the fan. Screw torque: 24~26kgf-cm(20.8~25.6in-ibf)



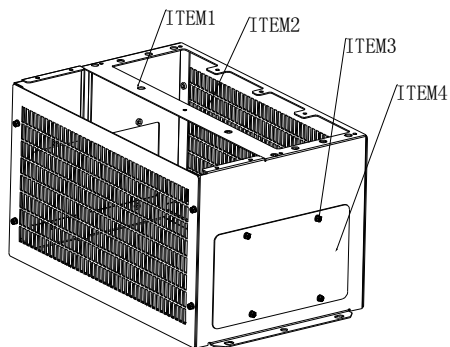
3.10.6 Frame G/H

- 1) Remove the fan cover fixing screws, and remove the fan cover.
- 2) Disconnect the fan connector and remove the fan block.
- 3) Remove the fan fixing screws, and remove the fan.



3.11 Floor mounting kit

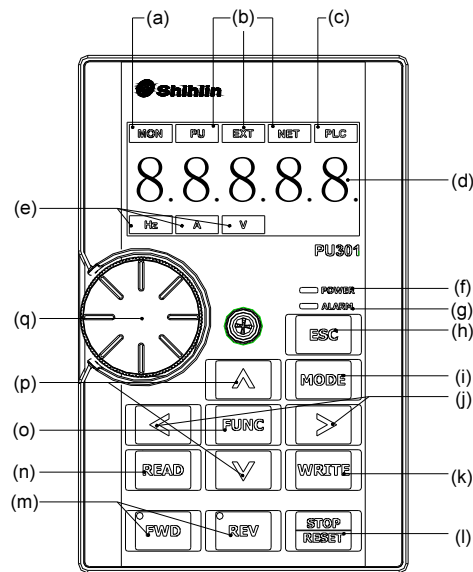
✓ Type name:CTK301Order code: LNKCTK301





ITEM	Description	Qty.
1	Base	1
2	Ventilating plate	2
3	Screw M6*1.0*15	16
4	Side plate	2

4. PRIMARY OPERATION

4.1 Component name of parameter unit (PU301)



NO.	Operation parts	Name	Content
(a)		Parameter unit status indicator	MON: ON to indicate the monitoring mode.
(b)		Operation mode indicator	PU: ON to indicate the PU operation mode, flickers in the H1~H5 operation mode. EXT: ON to indicate the External operation mode. NET: ON to indicate the Communication operation mode.
(c)		PLCfunction indicator	ON to indicate the PLC function valid.
(d)		Monitor (5-digit LED)	Shows the frequency, parameter number, and parameter value, etc.
(e)		Unit indicator	Hz: ON to indicate the frequency. A: ON to indicate the output frequency. V: ON to indicate the selected monitoring item.
(f)		Indicating lamp of power	ON to indicate the panel power on.
(g)		Indicating lamp of alarm	ON to indicate the inverter alarm.
(h)		ESC button	Escape from the current interface.
(i)		MODE button	Switches to different modes.
(j)		Left button, Right button	When setting value digit, choose the target digit.
(k)		WRITE button	Writes parameter value, frequency, etc.
(l)		STOP/RESET button	Stops the operation commands. Resets the inverter for alarm.
(m)		FWD button REV button	FWD: Starts forward rotation. The LED is on during forward operation. REV: Starts reverse rotation. The LED is on during reverse operation.
(n)		READ button	Read the parameter. Enter into the next menu.
(o)		FUNC button	Enter into the special operation menu. (Note)

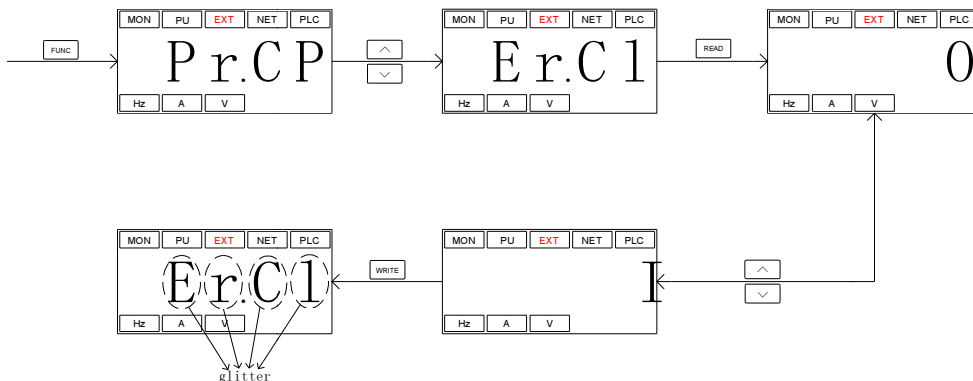
NO.	Operation parts	Name	Content
(p)		UPbutton DOWNbutton	UP: Increase the value. Switch the option. DOWN:Decrease the value. Switch the option.
(q)		MSetting dial	The function of clockwise rotation equals to UP button. The function of anticlockwise rotation equals to DOWN button.

Note:

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







Menu	Name	Press READ button to enter into next to realize the corresponding function description
<i>Pr.CP</i>	Parameter copy	0: No action. 1: Copy the inverter parameter values into the parameter unit.
<i>Pr.CA</i>	Parameter paste	0: No action. 1: Paste the copied parameter values in parameter unit into the inverter. (Please first restore the inverter parameters to the factory setting, and then paste the parameter. This action is only valid in the same series and types.)
<i>Er.CL</i>	Alarm clear	0: No action. 1: Clear all alarm and alarm information.
<i>r.ESt</i>	Inverter reset	0: No action. 1: Reset the inverter.
<i>ALLC</i>	Parameter restored to the factory setting	0: No action. 1: The inverter parameters are restored to the factory setting.
<i>Pr.Cr</i>	Part of parameters restored to the factory setting	0: No action. 1: Part of inverter parameters are restored to the factory setting.
<i>Pr.Gr</i>	Parameter mode	0: P parameter mode 1: Parameter group mode
<i>PU.F</i>	Auto write frequency selection	0: After the frequency changes, the frequency will not auto write into the inverter. 1: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s, write into the inverter EEPROM after10s. 2: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s,write into the inverter EEPROM after 30s.
<i>Er.HIS</i>	Alarm record	Display the recent four alarm codes. (Read)
<i>Sn</i>	Inverter version	Display the version number of the inverter. (Read)
<i>PU5n</i>	Parameter unit version	Display the version number ofPU301. (Read)

For example:FromFUNC to Alarm clear *Er.CL* menu, the operation flow chart is as follows:



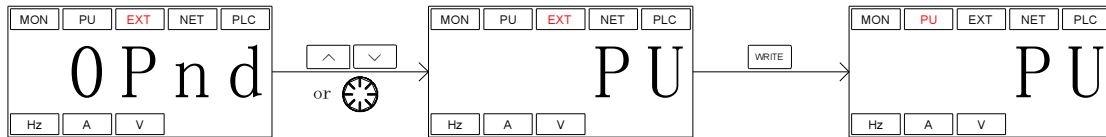
4.2 Operation modes of the inverter

- The operation modes are related to the reference source of the target frequency and the signal source of the motor starting. The Shihlin SA3 inverter has a total of ten kinds of operation modes, namely, "PU mode **PU**", "JOG mode **JOG**", "external mode **OPnd**", "communication mode **CU**", "combined mode **1H1**", "combined mode **2H2**", "combined mode **3H3**", "combined mode **4H4**" and "combined mode **5H5**" and the second operation mode.
- You can use parameter unit to monitor the output frequency, the output voltage and the output current, as well as to view the alarm message, the parameter setting and the frequency setting. The operator has four work modes, namely, "operation mode", "monitoring mode", "frequency setting mode" and "parameter setting mode".

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

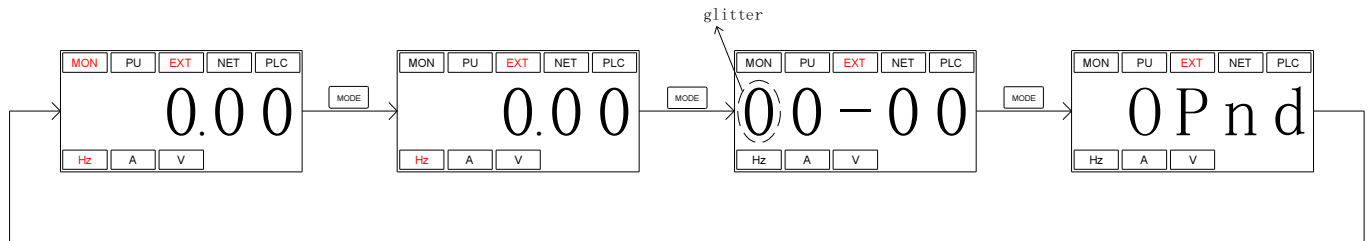
- When 00-16(P.79) = 0, the external mode (**OPnd**) is the default mode after the inverter is turned on. Use 00-16(P.79) to switch the operation mode.

4.2.1 The flow chart for switching the operation mode



- Note:
1. In "PU mode", parameter unit screen displays **PU**, and the indicating lamp **PU** will light up.
 2. In "external mode," parameter unit screen displays **OPnd**, and the indicating lamp **EXT** will light up on the parameter unit.
 3. In "combined mode 1, 2, 3, 4, or 5", the indicating lamp **PU** will glitter on the parameter unit screen.
 4. In "JOG mode", the indicating lamp **PU** will light up.
 5. When 00-16(P.79)=3, the indicating lamp **NET** will light up.
 6. No flow chart when 00-16(P.79)=2, 3, 4, 5, 6, 7 or 8 because the operation mode will be constant.

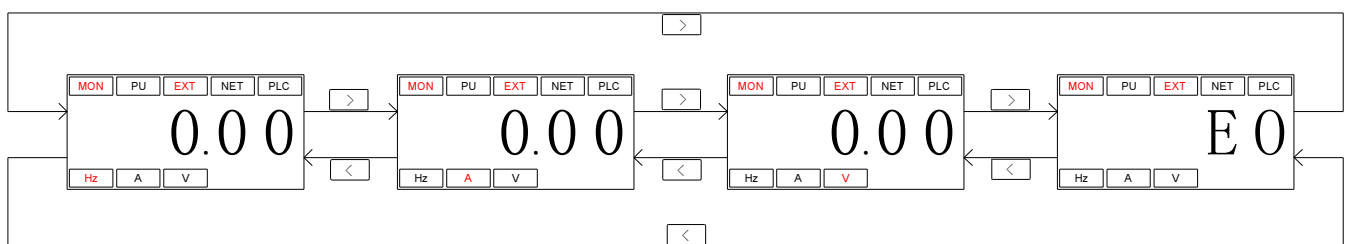
4.2.2 The flow chart for switching the working mode with PU301 parameter unit



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

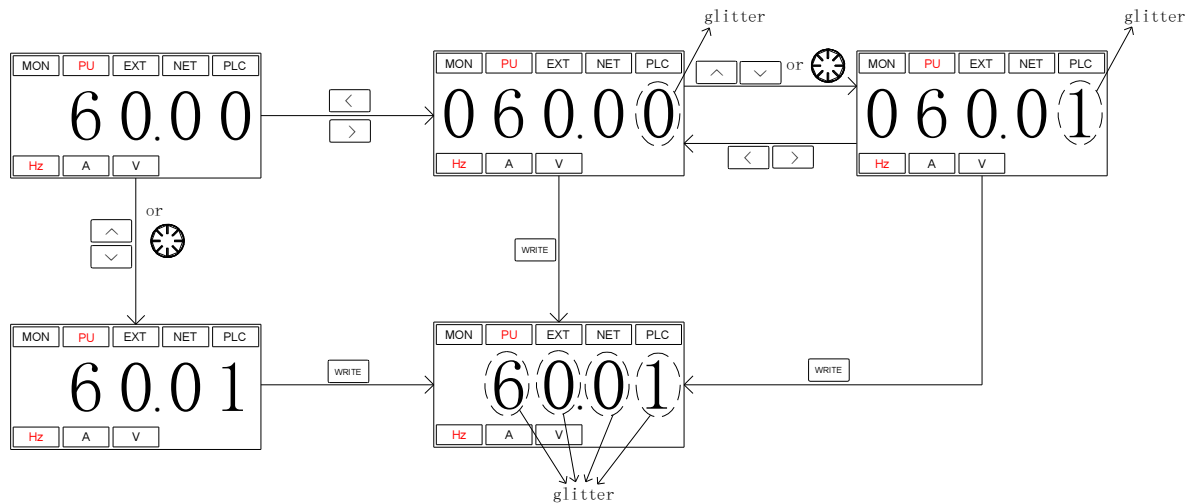
4.2.3 The operation flow charts for monitoring mode with PU301


•Take PU mode for example:



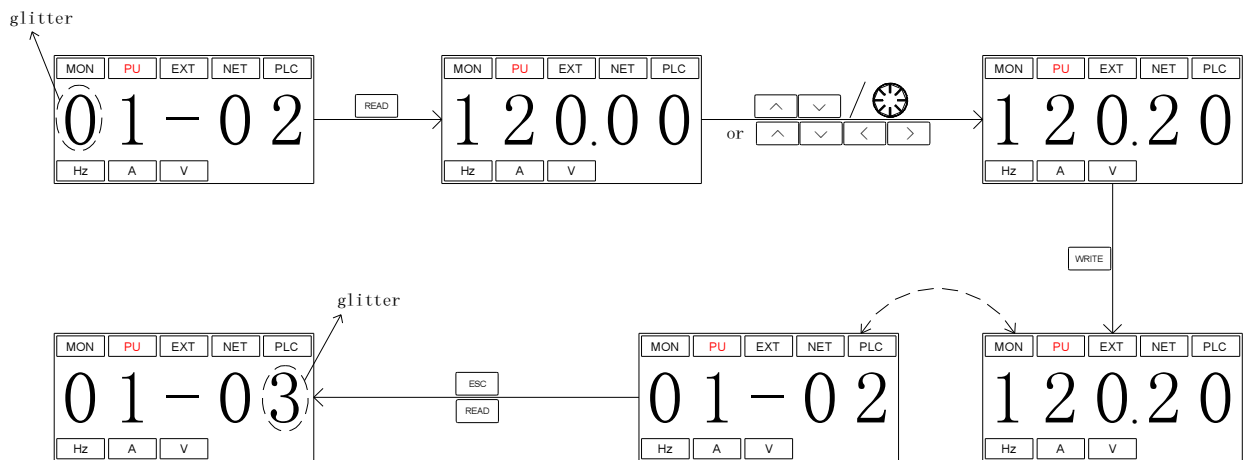
- Note:
1. In the "monitoring output frequency mode", indicating lamp **MON** and **Hz** will light up, and the screen will display the current output frequency.
 2. In the "monitoring output voltage mode", indicating lamp **MON** and **V** will light up, and the screen will display the current output voltage.
 3. In the "monitoring output current mode", indicating lamp **MON** and **A** will light up, and the screen will display the current output current.
 4. When in the "browsing alarm record mode," indicating lamp **MON** will light up, and the screen will display the current alarm code.
 5. For alarm codes, please refer to Appendix 2.

4.2.4 Operation flow charts for frequency setting mode with PU301



Note: 1. Use  to change the frequency when the inverter is running.
 2. Indicating lamp **Hz** will light up, but not **MON** under the frequency setting mode.
 3. When setting the frequency under the PU mode, the set value can not exceed the upper frequency. When high frequency is needed, the upper frequency should be changed first.









4.2.5 Operation flow charts for parameter setting mode with PU301












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

4.3 Basic operation procedures for different modes


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

Step	Description
1	<ul style="list-style-type: none"> Change the operation mode to PU mode, and indicating lamp  will light up. <p>Note: 1. When 00-16(P.79) =0, the inverter will first go into the external mode after the power is switched on or the inverter is reset. 2. For selecting and switching the operation mode, please refer to Section4.2.</p>
2	<ul style="list-style-type: none"> Enter into the frequency setting mode and write the target frequency into memory. <p>Note: For detailed setting procedures, please refer to Section4.2.4.</p>
3	<ul style="list-style-type: none"> Press  or  to run the motor. At this point, indicating lamp  or  will light up, indicating that the motor is running. The PU301parameter unit will automatically go into the monitor mode and display the current stable output frequency. <p>Note: 1. For detailed operation flow for the monitoring mode, please refer to Section4.2.3. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.</p>
4	<ul style="list-style-type: none"> Press  and the motor will begin to decelerate until it comes to a full stop. Indicating lamp  or  will not turn off until the inverter stops the output voltage.

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

Step	Description
1	<ul style="list-style-type: none"> Change the operation mode to external mode, the screen will display <i>OPnd</i> and indicating lamp  will light up. <p>Note: 1. When 00-16(P.79) =0, after the power is switched on or the inverter is reset, press  to switch to operation mode, the inverter will first go into the external mode, and then use  or  or  to switch to PU mode. 2. When 00-16(P.79) =2, external mode will be the default for the inverter. 3. For selecting and switching the operation mode, please refer to Section4.2.</p>
2	<ul style="list-style-type: none"> The target frequency is set by external terminals (the default priority is from high to low): If the programmable operating mode is chosen, please refer to Section 5.4.1Function selection of digital input and 5.5.2Programmed operation mode. If the target frequency is set by multi-speed stage levels, please refer to 04-00(P.4) in Chapter 5. If the target frequency is set by the input signal of terminal A2/B2 on PG board, please refer to 09-07(P.356) in Chapter 5. If the target frequency is set by PWM input pulse, please refer to Chapter 5.4.1. If the target frequency is set by the input signal across terminal 2-5, please refer to 02-09(P.38) in Chapter 5. If the target frequency is set by the input signal across terminal 4-5, please refer to 02-21(P.39) in Chapter 5. If the target frequency is set by the input signal across terminal 3-5, please refer to 02-30(P.508) in Chapter 5. If the target frequency is set by the high-speed pulse input across terminal HDI, please refer to Chapter 5.3.8.
3	<ul style="list-style-type: none"> Turn on STF or STR to run the motor. At this point, indicating lamp  or  will light up, indicating that the motor is running. <p>Note: 1. For setting up the starting terminals STF and STR, please refer to 00-15(P.78) in Chapter 5.1.8 and 5.4.1Function selection of digital input. 2. For detailed operation flow for the monitor mode, please refer to Section4.2.3. 3. If programmed operation mode is chosen, then STF and STR will become the starting signal and the pause signal, respectively, instead of being the Run Forward or Run Reverse terminals.</p>
4	<ul style="list-style-type: none"> Turn off STF or STR to decelerate the motor until it comes to a full stop. Indicating lamp  or  will not turn off until the inverter stops the output voltage.

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

Step	Description
1	<ul style="list-style-type: none"> Change the operation mode to the JOG mode and indicating lamp <input type="checkbox"/> PU will light up. At this point, the screen will display . <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> Press <input type="checkbox"/> FWD or <input type="checkbox"/> REV to run the motor. At this point, indicating lamp <input type="checkbox"/> FWD or <input type="checkbox"/> REV will light up, indicating that the motor is running. Release <input type="checkbox"/> FWD or <input type="checkbox"/> REV to decelerate the motor until it comes to a full stop. Indicating lamp <input type="checkbox"/> FWD or <input type="checkbox"/> REV will not turn off until the inverter stops the output. <p>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2. In the JOG mode, the target frequency is the value of 01-13(P.15), and the acceleration / deceleration time is the value of 01-14(P.16). Please refer to 01-13(P.15) in Chapter 5.</p>

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

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

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

Step	Description
1	<ul style="list-style-type: none"> In Combined Mode 1, indicating lamp <input type="checkbox"/> PU will light up. <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> Enter into the frequency setting mode and write the target frequency into memory. <p>Note: For detailed frequency setting procedures, please refer to Section 4.2.4.</p>
3	<ul style="list-style-type: none"> Set the target frequency via PU301 parameter unit and start the inverter by the digital input terminals. At this point, indicating lamp <input type="checkbox"/> FWD or <input type="checkbox"/> REV will light up, indicating that the motor is running. <p>Note: For detailed operation flow for the monitor mode, please refer to Section 4.2.3.</p>
4	<ul style="list-style-type: none"> When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. Indicating lamp <input type="checkbox"/> FWD or <input type="checkbox"/> REV will not turn off until the inverter stops the output.

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

Step	Description
1	<ul style="list-style-type: none"> In Combined Mode 2, indicating lamp <input type="checkbox"/> PU will light up. <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> The target frequency is set by the external terminals (the default priority is from high to low): If the programmable operating mode is chosen, please refer to Section 5.4.1 Function selection of digital input and 5.5.2 Programmed operation mode. If the target frequency is set by multi-speed stage levels, please refer to 04-00(P.4) in Chapter 5. If the target frequency is set by the input signal of terminal A2/B2 on PG board, please refer to 09-07(P.356) in Chapter 5. If the target frequency is set by PWM input pulse, please refer to Section 5.4.1. If the target frequency is set by the input signal across terminal 2-5, please refer to 02-09(P.38) in Chapter 5. If the target frequency is set by the input signal across terminal 4-5, please refer to 02-21(P.39) in Chapter 5. If the target frequency is set by the input signal across terminal 3-5, please refer to 02-30(P.508) in Chapter 5. If the target frequency is set by the high-speed pulse input across terminal HDI, please refer to Section 5.3.8.

Step	Description
3	<ul style="list-style-type: none"> Press <input type="button" value="FWD"/> or <input type="button" value="REV"/> of PU301 parameter unit to run the motor. At this point, indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will light up, indicating that the motor is running. <p>Note: 1.For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2.While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.</p>
4	<ul style="list-style-type: none"> Press <input type="button" value="STOP/RESET"/> and the motor will begin to decelerate until it comes to a full stop. Indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will not turn off until the inverter stops the output.

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

Step	Description
1	<ul style="list-style-type: none"> In Combined Mode 3, indicating lamp <input type="button" value="PU"/> will light up. <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> The target frequency is determined by communication: When RL, RM, RH and REX of multi-speed stage levels are “on”, the target frequency is determined by combination of multi-speed stage levels(Please refer to 04-00~04-02/P.4~P.6, 03-00~03-05/P.80~P.84、 P.86, 03-06(P.126), 03-09(P.550)). When external JOG is “on”, the target frequency is determined by 01-13(P.15). Acceleration / deceleration time is set by the value of 01-14(P.16).
3	<ul style="list-style-type: none"> The inverter starting is activated by the external Run Forward or Run Reverse terminals.At this point, indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will light up, indicating that the motor is running. The functions of 00-02(P.996、 P.998、 P.999) can be accomplished by communication. <p>Note: For detailed operation flow for the monitor mode, please refer to Section 4.2.3.</p>
4	<ul style="list-style-type: none"> When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. Indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will not turn off until the inverter stops the output.

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

Step	Description
1	<ul style="list-style-type: none"> In Combined Mode 4, indicating lamp <input type="button" value="PU"/> will light up. <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> The target frequency of the inverter is determined by the external terminals’ “external voltage signal”, “external current signal”, or “combination of multi-speed stage levels”.
3	<ul style="list-style-type: none"> The inverter starting is activated by communication (including “Reset”). At this point, indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will light up, indicating that the motor is running. <p>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.</p>
4	<ul style="list-style-type: none"> When communication sends the stop instruction, the motor will decelerate until it comes to a full stop. Indicating lamp <input type="button" value="FWD"/> or <input type="button" value="REV"/> will not turn off until the inverter stops the output.

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

Step	Description
1	<ul style="list-style-type: none"> In Combined Mode 5, indicating lamp <input type="checkbox"/> PU will light up. <p>Note: For selecting and switching the operation mode, please refer to Section 4.2.</p>
2	<ul style="list-style-type: none"> The target frequency of the inverter is set by PU301 parameter unit: When RL, RM, RH and REX of multi-speed stage levels are "on", the target frequency is determined by combination of multi-speed stage levels (please refer to 04-00~04-02/P.4~P.6, 03-00~03-05/P.80~P.84、P.86, 03-06(P.126)、03-09(P.550)). When external JOG is "on", the target frequency is determined by 01-13(P.15). Acceleration / deceleration time is set by the value of 01-14(P.16).
3	<ul style="list-style-type: none"> The inverter starting is activated by the external forward and reverse terminals. <p>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3. 2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed.</p>
4	<ul style="list-style-type: none"> When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop. Indicating lamp <input type="checkbox"/> FWD or <input type="checkbox"/> REV will not turn off until the inverter stops the output.

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

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

4.4 Operation


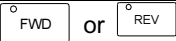
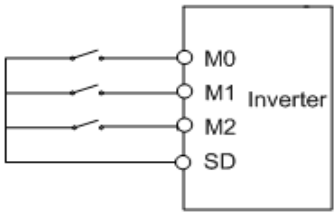
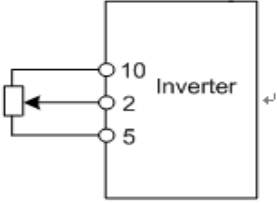
4.4.1 Pre-operation checks and preparation

Before starting the operation, the following shall be examined:

1. Check if the wiring is correct. Check especially the ac motor driver output terminals (U/T1, V/T2, W/T3), which cannot be connected to the power. Confirm that grounding terminal (\oplus) is well grounded.
2. Check if there is a short circuit at the terminals or charged exposure.
3. Verify all terminal connections, and check if plug connectors (optional) and screws are all fastened.
4. Verify that no mechanical device is connected to the motor.
5. All switches must be disconnected before power on. Make sure that the inverter will not start and there is no abnormal activity when power on.
6. Turn on the power only after the cover is well placed.
7. Do not operate the switch with a wet hand.
8. Make sure of the following after power on:
 - (1). PU301 power indicating lamp ■ POWER will light up but not alarm indicating lamp ■ ALARM .
 - (2). PU301 parameter unit, both indicating lamp Hz and EXT will light up.


4.4.2 Operation methods





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

Operation method	Source of the target frequency	Source of the operating signal
parameter unit operation		
External terminal signal operation	 <p style="margin-left: 20px;">Parameter Setting : 04-00(P.4)=40 04-01(P.5)=30 04-02(P.6)=10</p>	Input by digital input terminal: STF-SD STR-SD
	 <p style="text-align: center;">2-5 terminal input</p>	

Note: RH, RM and RL mentioned in this section are function names of the “multi-function digital input terminal”. Please refer to 03-00~03-05/P.80~P.84、 P.86, 03-06(P.126), 03-09、 03-25~03-30/P.550~P.556, 03-33~03-38/P.559~P.564 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

4.4.3 Trial run

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

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

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

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

5. PARAMETER DESCRIPTION

5.1 System parameter group00

Group	Parameter Number	Name	Setting Range	Factory Value	Page
00-00	P.90	The inverter model	Read	read	82
00-01	P.188	Firmware version	Read	read	82
00-02	P.996 ~ P.999	Parameter restoration	0: Non-function	0	83
			1: Alarm history clear (P.996=1)		
			2: Inverter reset (P.997=1)		
			3: Restoring all parameters to default values (P.998=1)		
			4: Restoring some parameters to default values1 (P.999=1)		
			5: Restoring some parameters to default values2 (P.999=2)		
			6: Restoring some parameters to default values3 (P.999=3)		
00-03	P.77	Selection of parameterswrite protection	0: Parameters can be written only when the motor stops.	0	85
			1: Parameters cannot be written.		
			2: Parameters can also be written when the motor is running.		
			3: Parameters cannot be written when in password protection.		
00-04	P.294	Decryption parameter	0~65535	0	85
00-05	P.295	Password setup	2~65535	0	85
00-06	P.110	Parameter unit monitoring selection	X0: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency.	1	89
			X1: When the inverter starts, the screen of the parameter unit displays the target frequency.		
			X2: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system		
			0X : Boot screen to monitor model output frequency		
			1X : Boot screen to set the target frequency mode		
			2X : Boot screen to monitor model of output curren		
			3X : Boot screen to monitor mode of the output voltage		
00-07	P.161	Multi-function display	0: Output voltage (V)	0	89
			1: Inverter voltage between (+/P) and (-/N) terminals. (V)		
			2: Temperature rising accumulation rate of inverter (%)		
			3: Target pressure of the constant pressure system (%)		
			4: Feedback pressure of the constant pressure system (%)		

Group	Parameter Number	Parameter Name	Setting Range	Factory Value	User Setting
00-07	P.161	Multi-function display	5: Operation frequency (Hz)	0	89
			6: Electronic thermal accumulation rate (%)		
			7: Signal value (V) of 2-5 simulating input terminals.		
			8: Signal value (mA) of 4-5 simulating input terminals (mA/V).		
			9: Output power (kW).		
			10: PG card's feedback rotation speed. (Hz)		
			11: Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state.		
			12: NTC temperature (°C)		
			13: Electronic thermal accumulation rate of motor (%)		
			14: Reserve.		
			15: Input frequency of terminal HDI. (kHz)		
			16: Real-time curling radius value. (mm)		
			17: Real-time line speed. (m/min)		
			18: Output torque of inverter (%) (Valid only when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6)		
			19: Digital terminal input state		
			20: Digital terminal output state		
			21: Actual working carrier frequency		
			22: Signal value (mA) of 3-5 simulating input terminals. (mA/V)		
23: Synchronous motor rotor pole position (Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective)					
24 : Current target frequency					
25 : PTC Enter the percentage					
26 : Target pressure and feedback the constant pressure system					
27 : motor speed					
00-08	P.37	Speed display	0: Display output frequency (the mechanical speed is not displayed)	0.0	90
			1~50000		
			1~9999		
00-09	P.259	Speed unit selection	0: Speed display selection unit is 1	1	90
			1: Speed display selection unit is 0.1		
00-10	Reserve	Reserve	Reserve	--	--
00-11	P.72	Carrier frequency	Frame A/B/C: 1~15kHz	5 kHz	91
			Frame D/E: 1~9 kHz	4 kHz	
			Frame F/G: 1~9 kHz	2 kHz	
			Frame H: 1~3 kHz	2 kHz	
00-12	P.31	Soft-PWM carrier operation selection	0: None Soft-PWM operation	0	91
			1: When 00-11(P.72)< 5, Soft-PWM is valid (only apply to V/F control)		
00-13	P.71	Idling braking / DC braking	0: Idling braking	1	91
			1: DC braking		

System parameter group 00

Group	Parameter Number	Name	Setting Range	Factory Value	Page
00-14	P.75	Stop function selection	0: Press STOP button and stop the operation only in the PU and H2 mode	1	91
			1: Press STOP button and stop the operation in all mode.		
00-15	P.78	Forward/reverse rotation prevention selection	0: Forward rotation and reverse rotation are both permitted.	0	92
			1: Reverse rotation is prohibited (Press the reverse reference to decelerate and stop the motor).		
			2: Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor).		
00-16	P.79	Operation mode selection	0: "PU mode", "external mode" and "Jog mode" are interchangeable.	0	93
			1: "PU mode" and "JOG mode" are interchangeable.		
			2: "External mode" only		
			3: "Communication mode" only		
			4: "Combined mode 1"		
			5: "Combined mode 2"		
			6: "Combined mode 3"		
			7: "Combined mode 4"		
			8: "Combined mode 5"		
99999: The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97)					
00-17	P.97	The second target frequency selection	0: Frequency set by parameter unit	0	93
			1: Frequency set by Communication RS485		
			2: Frequency set by the analog		
			3: Frequency set by communication expansion card		
			4: Frequency set by PG board A2B2		
			5: Frequency set by HDIpulse		
00-18	P.109	The second start signal selection	0: Operating signal set by parameter unit	0	93
			1: Operating signal set by digital input terminal		
			2: Operating signal set by Communication RS485		
			3: Operating signal set by communication expansion card		
00-19	P.35	Communication mode instruction selection	0: Incommunication mode, operating instruction and setting frequency is set by communication.	0	93
			1: Incommunication mode, operating instruction and setting frequency is set by external.		

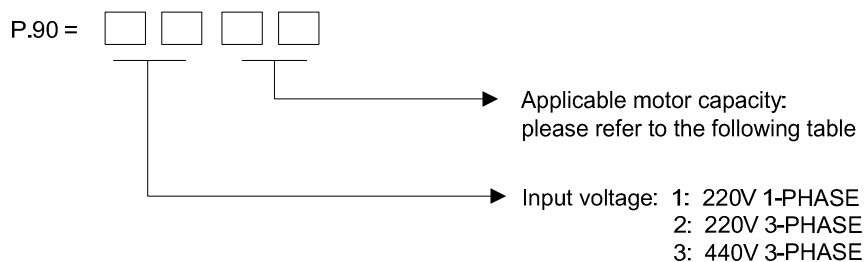
Group	Parameter Number	Name	Setting Range	Factory Value	Page
00-20	P.400	Control mode selection	0: Speed control	0	94
			1: Torque control		
			2: Position control		
00-21	P.300	Motor control mode selection	0: Induction motor V/F control	0	94
			1: Induction motor close-loop V/F control (VF + PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motorPG vector control		
			5: Synchronous motor PG vector control		
			6: Synchronous motor without PG vector control		
00-22	P.370	The second motor control mode selection	0: Induction motorV/Fcontrol	99999	94
			1: Induction motorV/F close-loop control (VF+PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motorPG vector control		
			5: Synchronous motor PG vector control		
			6: Synchronous motor without PG vector control		
			99999: The second motor control mode is not selected.		
00-23	P.186	Motor types selection	0: Normal Duty (ND), apply to the fans and water pump type duty.	1	95
			1: Heavy Duty (HD), apply to other duties.		
00-24	P.189	50Hz/60Hz switch selection	0: The frequency parameter default valueis 60Hz system.	0	96
			1: The frequency parameter default valueis 50Hz system.	1	
00-25	P.990	Parameter mode setting	0: Parameter is displayed as “group mode”	0	96
			1: Parameter is displayed as “conventional P mode”		
00-26	P.125	Expansion card type	Read	Read	97

5.1.1 Inverter information

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

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

◆ The inverter model



Read The applicable motor capacity:

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

Value (value of the two low-order bits of 00-00)	Capacity (kw)
16	45
17	55
18	75
19	90
20	110
21	132
22	160
23	185
24	220
25	250
26	280
27	315

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

5.1.2 Parameter restoration

➤ Restore the parameters to the default values.

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

Setting Parameter restoration

- ◆ 1: 00-02 is set to 1, and the screen will display *ErLL* after writing, the abnormal record will be erased, 00-02 is restored to 0.
- ◆ 2: 00-02 is set to 1, and the screen will display *rESr*, the inverter will be reset. 00-02 is restored to 0. After resetting the inverter, the values of the two relays, "electronic thermal relay" and "IGBT module thermal relay" will be set to zero.
- ◆ 3: 00-02 is set to 3, and the screen will display *ALLC*, all the parameters will be restored to the default values except the parameters in the **table 1** below. After parameters are restored, 00-02 is restored to 0.

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

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

Group	No.	Name
06-57	P.753	E1 alarm output current
06-58	P.754	E1 alarm output voltage
06-59	P.755	E1 alarm the temperature rising accumulation rate
06-60	P.756	E1 alarm PN voltage
06-61	P.757	E1 alarm the time of the inverter has run
06-62	P.758	E1 alarm the inverter operation status code
06-63	P.759	E1 alarm (years/months)
06-64	P.760	E1 alarm (days/hours)
06-65	P.761	E1 alarm (minutes/seconds)
06-70	P.766	E2 alarm output frequency
06-71	P.767	E2 alarm output current
06-72	P.768	E2 alarm output voltage
06-73	P.769	E2 alarm the temperature rising accumulation rate
06-74	P.770	E2 alarm PN voltage
06-75	P.771	E2 alarm the time of inverter has run
06-76	P.772	E2 alarm the inverter operation status code
06-77	P.773	E2 alarm (years/months)
06-78	P.774	E2 alarm (days/hours)
06-79	P.775	E2 alarm (minutes/seconds)

Group	No.	Name
09-13	P.124	Expansion card version
13-02	P.285	Low frequency vibration inhibition factor

Group	No.	Name
13-03	P.286	High frequency vibration inhibition factor

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

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

Group	No.	Name
00-21	P.300	Motor control mode selection
02-12	P.192	The minimum input positive voltage of 2-5
02-13	P.193	The maximum input positive voltage of 2-5
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal 2-5
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal 2-5
02-16	P.512	The minimum input negative voltage of 2-5
02-17	P.513	The maximum input negative voltage of 2-5
02-18	P.510	The percentage corresponding to the minimum negative voltage of terminal 2-5
02-19	P.511	The percentage corresponding to the maximum negative voltage of terminal 2-5
02-25	P.198	The minimum input current/voltage of 4-5
02-26	P.199	The maximum input current/voltage of 4-5
02-27	P.196	The percentage corresponding to the minimum input current/voltage of 4-5
02-28	P.197	The percentage corresponding to the maximum input current/voltage of 4-5
02-34	P.548	The minimum input current/voltage of 3-5
02-35	P.549	The maximum input current/voltage of 3-5
02-36	P.546	The percentage corresponding to the minimum input current/voltage of 3-5
02-37	P.547	The percentage corresponding to the maximum input current/voltage of 3-5
02-39	P.524	HDI input minimum frequency
02-40	P.525	HDI input maximum frequency
02-41	P.522	The percentage corresponding to HDI input minimum frequency
02-42	P.523	The percentage corresponding to HDI input maximum frequency
02-46	P.191	AM1 output gain

Group	No.	Name
02-47	P.190	AM1 output bias
02-49	P.536	AM2 output gain
02-50	P.535	AM2 output bias
02-59	P.187	FM calibration parameter
05-00	P.301	Motor parameter auto-tuning function selection
05-01	P.302	Motor rated power
05-02	P.303	Motor poles
05-03	P.304	Motor rated voltage
05-04	P.305	Motor rated frequency
05-05	P.306	Motor rated current
05-06	P.307	Motor rated rotation speed
05-07	P.308	Motor excitation current
05-08	P.309	IM motor stator resistance
05-09	P.310	IM motor rotor resistance
05-10	P.311	IM motor leakage inductance
05-11	P.312	IM motor mutual inductance
05-12	P.313	PM motor stator resistance
05-13	P.314	PM motor d-axis inductance
05-14	P.315	PM motor q-axis inductance
05-15	P.316	PM motor Back-EMF coefficient
05-16	P.317	PM motor PhaseZ origin pulse compensation
05-17	P.318	Rotation inertia
11-00	P.320	Speed control proportion coefficient 1
11-01	P.321	Speed control integral time 1
11-02	P.322	PI coefficient switching frequency 1
11-03	P.323	Speed control proportion coefficient 2
11-04	P.324	Speed control integral time 2
11-05	P.325	PI coefficient switching frequency 2
11-06	P.326	Current control proportion coefficient

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

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

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

5.1.3 Parameter protection

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

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

Setting Parameter write protection selection

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

Exception During operation, the parameters below can be written:

Group	No.	Name	Group	No.	Name
00-03	P.77	Selection of parameters write protection	02-25	P.198	The minimum input current/voltage of 4-5
00-07	P.161	Multi-function display	02-26	P.199	The maximum input current/voltage of 4-5
02-04	P.54	Function of terminal AM1 output	02-27	P.196	The percentage corresponding to the minimum input current/voltage of 4-5
02-05	P.537	Function of terminal AM2 output	02-28	P.197	The percentage corresponding to the maximum input current/voltage of 4-5
02-12	P.192	The minimum input positive voltage of 2-5	02-34	P.548	The minimum input current/voltage of 3-5
02-13	P.193	The maximum input positive voltage of 2-5	02-35	P.549	The maximum input current/voltage of 3-5
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal 2-5	02-36	P.546	The percentage corresponding to the minimum input current/voltage of 3-5
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal 2-5	02-37	P.547	The percentage corresponding to the maximum input current/voltage of 3-5
02-16	P.512	The minimum input negative voltage of 2-5	02-39	P.524	HDI input minimum frequency
02-17	P.513	The maximum input negative voltage of 2-5	02-40	P.525	HDI input maximum frequency
02-18	P.510	The percentage corresponding to the minimum negative voltage of terminal 2-5	02-41	P.522	The percentage corresponding to HDI input minimum frequency
02-19	P.511	The percentage corresponding to the maximum negative voltage of terminal 2-5	04-20	P.132	Programmed operation mode speed 2
02-42	P.523	The percentage corresponding to HDI input maximum frequency	04-21	P.133	Programmed operation mode speed 3
02-44	P.543	FM output function selection	04-22	P.134	Programmed operation mode speed 4

System parameter group 00

Group	No.	Name
02-45	P.64	AM1 output signal selection
02-46	P.191	AM1 output gain
02-47	P.190	AM1 output bias
02-48	P.538	AM2 output signal selection
02-49	P.536	AM2 output gain
02-50	P.535	AM2 output bias
02-51	P.55	Frequency display reference when in the analog output
02-52	P.56	Current monitoring reference when in the analog output
02-55	P.592	PT100 voltage level 1
02-56	P.593	PT100 voltage level 2
02-59	P.187	FM calibration parameter
04-00	P.4	Speed1(high speed)
04-01	P.5	Speed2(mediumspeed)
04-02	P.6	Speed3(low speed)
04-03	P.24	Speed4
04-04	P.25	Speed5
04-05	P.26	Speed6
04-06	P.27	Speed7
04-07	P.142	Speed8
04-08	P.143	Speed9
04-09	P.144	Speed10
04-10	P.145	Speed11
04-11	P.146	Speed12
04-12	P.147	Speed13
04-13	P.148	Speed14
04-14	P.149	Speed15
04-19	P.131	Programmed operation mode speed 1

Group	No.	Name
04-23	P.135	Programmed operation mode speed 5
04-24	P.136	Programmed operation mode speed 6
04-25	P.137	Programmed operation mode speed 7
04-26	P.138	Programmed operation mode speed 8
06-17	P.261	Maintenance alarm function
06-40	P.288	Alarm code query
06-42	P.290	Alarm message query
08-03	P.225	PID target value panel reference
08-16	P.221	Minimum pressuresampling value
08-17	P.222	Maxmum pressure sampling value
08-18	P.223	Analog feedback bias pressure
08-19	P.224	Analog feedback gain pressure
10-19	P.230	Dwell frequency at acceleration
10-21	P.232	Dwell frequency at deceleration
10-45	P.267	Regeneration and avoidance operation selection
10-46	P.268	Regeneration and avoidance DC bus voltage level
10-47	P.269	DC bus voltage detection sensitivity at deceleration
10-48	P.270	Regeneration and avoidance frequency compensation value
10-49	P.271	Regeneration avoidance voltage gain coefficient
10-50	P.272	Regeneration avoidance frequency gain coefficient
11-12	P.401	Torque reference
14-05	P.605	Tension setting
14-45	P.657	Line speed setting

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

◆ **Exception** The parameters below can be written.

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

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

Exception During operation, the parameters below cannot be written:

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

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

Group	No.	Name
03-59	P.585	Monitor noumenon digital input terminal state
03-60	P.586	Monitor noumenon and expanded Slot3 output terminal state
03-61	P.587	Monitor expanded Slot2&3 digital input terminal state

Group	No.	Name
00-26	P.125	Expansion card type
03-62	P.588	Monitor expanded Slot2 digital output terminal state
06-01	P.22	Stall prevention operation level
06-08	P.155	Over torque detection level
06-11	P.160	Stall level when restart
06-21	P.705	Low voltage level
06-22	P.706	Regenerative brake operation level
06-23	P.707	Regenerative brake operation level
06-25	P.709	Capacitor lifetime detection level
06-27	P.292	Accumulative motor operation time(minutes)
06-28	P.293	Accumulative motor operation time (days)
06-29	P.296	Accumulative motor power time (minutes)
06-30	P.297	Accumulative motor power time (days)
06-41	P.289	Alarm code display
06-43	P.291	Alarm message display
06-44	P.740	E1
06-45	P.741	E2
06-46	P.742	E3
06-47	P.743	E4
06-48	P.744	E5
06-49	P.745	E6
06-50	P.746	E7
06-51	P.747	E8
06-52	P.748	E9
06-53	P.749	E10
06-54	P.750	E11
06-55	P.751	E12
06-56	P.752	E1 alarm output frequency
06-57	P.753	E1 alarm output current

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

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

ExceptionThe parameters below can still be read:

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

Group	No.	Name
03-60	P.586	Monitor noumenon and expanded Slot3 output terminal state
03-61	P.587	Monitor expanded Slot2&3 digital input terminal state
03-62	P.588	Monitor expanded Slot2 digital output terminal state
06-25	P.709	Capacitor lifetime detection level
06-41	P.289	Alarm code display
06-43	P.291	Alarm message display

Group	No.	Name
03-59	P.585	Monitor noumenon digital input terminal state
06-46	P.742	E3
06-47	P.743	E4
06-48	P.744	E5
06-49	P.745	E6
06-50	P.746	E7
06-51	P.747	E8
06-52	P.748	E9
06-53	P.749	E10
06-54	P.750	E11
06-55	P.751	E12
06-56	P.752	E1 alarm output frequency
06-57	P.753	E1 alarm output current
06-58	P.754	E1 alarm output voltage
06-59	P.755	E1 alarm the temperature rising accumulation rate
06-60	P.756	E1 alarm PN voltage
06-61	P.757	E1 alarm the time of inverter has run
06-62	P.758	E1 alarm inverter operation status code
06-63	P.759	E1 alarm(years/months)

Group	No.	Name
06-44	P.740	E1
06-45	P.741	E2
06-64	P.760	E1 alarm (days/hours)
06-65	P.761	E1 alarm (minutes/seconds)
06-70	P.766	E2 alarm output frequency
06-71	P.767	E2 alarm output current
06-72	P.768	E2 alarm output voltage
06-73	P.769	E2 alarm the temperature rising accumulation rate
06-74	P.770	E2 alarm PN voltage
06-75	P.771	E2 alarm the time of inverter has run
06-76	P.772	E2 alarm inverter operation status code
06-77	P.773	E2 alarm (years/months)
06-78	P.774	E2 alarm (days/hours)
06-79	P.775	E2 alarm (minutes/seconds)
07-17	P.802	CANopen communication status
07-18	P.803	CANopen control status
09-13	P.124	Expansion card version
14-20	P.618	Current value of curling radius
14-32	P.630	Actual line speed

Setting

Password protection

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

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

5.1.4 Monitoring function

- The item to be displayed on the parameter unit can be selected.


Parameter	Name	Factory Value	Setting Range	Content
00-06 P.110	Parameter unit monitoring selection	1	X0	When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency.
			X1	When the inverter starts, the screen of the parameter unit displays the target frequency.
00-06 P.110	Parameter unit monitoring selection	1	X2	When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system
			0X	Boot screen to monitor model output frequency
			1X	Boot screen to set the target frequency mode
			2X	Boot screen to monitor model of output current
			3X	Boot screen to monitor mode of the output voltage
00-07 P.161	Multi-function display	0	0	Output voltage (V)
			1	Inverter voltage between (+/P) and (-/N) terminals. (V)
			2	Temperature rising accumulation rate of inverter (%)
			3	Target pressure of the constant pressure system (%)
			4	Feedback pressure of the constant pressure system (%)
			5	Operation frequency (Hz)
			6	Electronic thermal accumulation rate (%)
			7	Signal value (V) of 2-5 simulating input terminals.
			8	Signal value (mA) of 4-5 simulating input terminals (mA/V).
			9	Output power (kW).
			10	PG card's feedback rotation speed. (Hz)
			11	Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state.
			12	NTC temperature (°C)
			13	Electronic thermal accumulation rate of motor (%)
			14	Reserve.
			15	Input frequency of terminal HDI. (kHz)
			16	Real-time curling radius value. (mm)
			17	Real-time line speed. (m/min)
			18	Output torque of inverter (%) (Valid only when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6)
			19	Digital terminal input state
			20	Digital terminal output state
			21	Actual working carrier frequency
			22	Signal value (mA) of 3-5 simulating input terminals. (mA/V)
23	Synchronous motor rotor pole position (Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective)			

Parameter	Name	Factory Value	Setting Range	Content
00-07 P.161	Multi-function display	0	24	Current target frequency
			25	PTC Enter the percentage
			26	Target pressure and feedback the constant pressure system
			27	motor speed

Note: 1. The “output frequency” here is the value after slip compensation.

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

Display Parameter unit monitoring selection

- ◆ Display the current target pressure and feedback pressure of the constant pressure system(00-06="3"). At this point, the screen display shows two sections. A decimal point is used to separate the boundaries. What is on the left is the target pressure of the constant pressure system and what is on the right is the feedback pressure of the constant pressure system. As is shown in this figure, , 20 denotes that the target pressure of the constant pressure system is 2.0kg/cm³; 30 denotes that the feedback pressure of the constant pressure system is 3.0kg/cm³.

Display Multi-function display

- ◆ The multi-function display selection is realized in the monitoring voltage mode. Please refer to 4.2.3 The operation flow charts for monitoring mode with PU301 for for monitoring mode selection.

5.1.5 Speed display

➤ In the mode of “monitoring output frequency”, the screen displays the corresponding machine speed.

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

Setting Speed display

- ◆ The setting value of 00-08 is the machine speed of the inverter when its output frequency is 60Hz. For example:
 1. If the transmitting belt speed is 950 m/minute when the inverter output frequency is 60Hz, set 00-08 = 950.

2. After setting, in the “output frequency monitoring mode” of parameter unit, the screen will display the speed of the transmitting belt.

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

5.1.6 PWMcarrier frequency

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

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

Setting Carrier frequency

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




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

Setting Carrier operation selection **V/F**

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

5.1.7 Stop operation selection

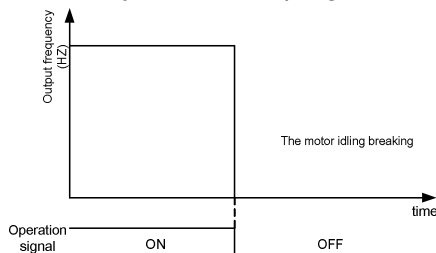
- Select the inverter stop operation

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

Setting Idling braking / linear braking

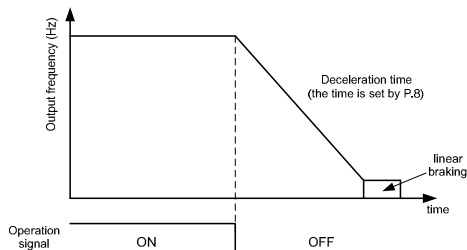
◆ Idling braking(00-13="0")

The inverter will terminate the output immediately after the stop signal is accepted, and the motor will be "racing".



◆ Linear braking(00-13="1")

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



Setting button function selection

◆ to stop the operation.(00-14="1")

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

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

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

Note: 1. In the programmed operation mode, it is not necessary to cancel the start signal.The inverter will run at the section where it stopped after reset.)

2.After resetting the inverter, the values of the two relays of "electronic thermal relay" and "IGBT module thermal relay" will be set to zero.

5.1.8 Forward/reverse rotation prevention selection

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

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

Note: It is valid to all start signals.

5.1.9 Operation mode selection

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

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

Setting

Operation mode selection

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

Setting

Communication mode instruction selection

◆ When 00-16=3, select communication mode:

1. If 00-19=0, operating instruction and speed instruction is set by communication;
2. If 00-19=1, operating instruction and speed instruction is set by external.

5.1.10 Control mode selection

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

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

Setting Control mode selection

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

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

5.1.11 Motor control mode selection

➤ Determine the control mode of the selected AC motor inverter

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

Setting Motor control mode

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

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

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

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

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

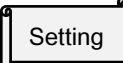
5. When 00-22 ≠ 99999, and RTsignal is ON, the second motor parameter 05-22~05-38 is valid, please refer to Section 5.2.10 for the second function parameter.

6. RT mentioned here is the function name of "multi-function digital input terminal". Please refer to 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09(P.550) for the function selection of multi-function digital input terminal; please refer to Section 3.5 for related wiring.

5.1.12 Motor types selection

➤ Modify the load pattern of the inverter.

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

 Setting Motor types selection

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

5.1.13 50/60Hz switch selection

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

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

Setting 50/60Hz switch selection

◆ If the customer would like to set frequency related parameter to 60Hz system (00-24="0"), please follow the following two steps.

1. Set 00-24=0;
2. Set 00-02 to the factory default value (at this point, frequency-related parameters of the inverter will be reset to 60Hz).

◆ The affected parameters are as follows:

Group	No.	Name
01-03	P.3	Base frequency
01-09	P.20	Accelerate/decelerate reference frequency
02-09	P.38	2-5 maximum operation frequency
02-21	P.39	The maximum operation frequency of terminal 4-5
02-30	P.508	The maximum operation frequency of terminal 3-5

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

5.1.14 Parameter mode setting

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

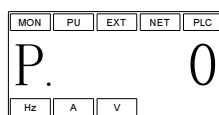
Parameter	Name	Factory Value	Setting Range	Content
00-25 P.990	Parameter mode setting	0	0	Parameter is displayed as "group mode"
			1	Parameter is displayed as "conventional P mode"

Display Parameter mode setting

◆ "Parameter group" displaying



◆ "Order number" displaying



5.1.15 Expansion card type display

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

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

Read The current expansion card type

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

bit												
2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
----- SLOT3 -----			----- SLO2 -----				----- SLO1 -----					

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

Expansion card type	Model	Expansion card			
Communication Expansion card	PD301	0	1	0	1
	DN301	1	0	0	1
	CP301	1	1	0	1
	EP301	0	0	1	1
I/OExpansion card	EB362R	1	0	1	0
	EB308R	0	1	1	0
PGExpansion card	PG301C	0	0	0	0
	PG301L	0	0	0	1
	PG302L	0	0	1	0

For example: Insert CP301 into SLOT1, insert PG302L into SLOT2, and insertEB308R into SLOT3, the read-out value of 00-26(P.125) is as follows:

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

$$\text{So } 00-26 = 0 \times 2^{11} + 1 \times 2^{10} + 1 \times 2^9 + 0 \times 2^8 + 0 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 1581$$

Note: SLOT1 is only for communication expansion card; SLOT2 is for PG and IO expansion card;SLOT3 is only for IOexpansion card. It will display alarm if the expansion card is inserted into the wrong slot. Please refer to 7.2 Appendix 2: Alarm code list.

5.2 Basic parameter group01

Group	Parameter Number	Name	Setting Range	Factory Value	Page
01-00	P.1	Maximum frequency	55K/75KF and types below: 0.00~01-02(P.18)Hz	120.00Hz	101
			75K/90KF and types above: 0.00~01-02(P.18)Hz	60.00Hz	
01-01	P.2	Minimum frequency	0 ~ 120.00Hz	0.00Hz	101
01-02	P.18	High-speed maximum frequency	01-00(P.1) ~ 650.00Hz	120.00Hz	101
01-03	P.3	Base frequency	50Hz system setting: 0 ~ 650.00Hz	50.00Hz	101
			60Hz system setting: 0 ~ 650.00Hz	60.00Hz	
01-04	P.19	Base frequency voltage	0 ~ 1000.0V	99999	101
			99999: Change according to the input voltage		
01-05	P.29	Acceleration/deceleration curve selection	0: Linear acceleration /deceleration curve	0	102
			1: S pattern acceleration /deceleration curve 1		
			2: S pattern acceleration /deceleration curve 2		
			3: S pattern acceleration /deceleration curve 3		
01-06	P.7	Acceleration time	3.7K/5.5KF and types below:0 ~ 360.00s/0 ~ 3600.0s	5.00s	102
			5.5K/7.5KF and types above:0~360.00s/0 ~ 3600.0s	20.00s	
01-07	P.8	Deceleration time	3.7K/5.5KF and types below:0 ~ 360.00s/0 ~ 3600.0s	5.00s	102
			5.5K/7.5K~7.5K/11KF types:0 ~ 360.00s/0 ~ 3600.0s	10.00s	
			11K/15KF and types above:0 ~ 360.00s/0 ~ 3600.0s	30.00s	
01-08	P.21	Acceleration/deceleration time increments	0: Time increment is 0.01s	0	102
			1: Time increment is 0.1s		
01-09	P.20	Acceleration/deceleration reference frequency	50Hz system setting:1.00 ~ 650.00Hz	50.00Hz	102
			60Hz system setting: 1.00 ~ 650.00Hz	60.00Hz	
01-10	P.0	Torque boost	0.75K/1.5KF types: 0 ~ 30.0%	6.0%	104
			1.5K/2.2KF ~ 3.7K/5.5KF types: 0 ~ 30.0%	4.0%	
			5.5K/7.5KF ~ 7.5K/11KF types: 0 ~ 30.0%	3.0%	
			11K/15KF ~ 55K/75KF types: 0 ~ 30.0%	2.0%	
			75K/90KF and types above: 0 ~ 30.0%	1.0%	
01-11	P.13	Starting frequency	0 ~ 60.00Hz	0.50Hz	105
01-12	P.14	Load pattern selection	Applicable to constant torque loads(convey belt,etc.)	0	105
			Applicable to variable torque loads (fans and pumps, etc.)		
			Applicable to ascending / descending loads		
			Multipoint VF curve		
			Special two-point VF curve		
			V/F complete detached mode		
			V/F semidetached mode		
01-13	P.15	JOG frequency	0 ~ 650.00Hz	5.00Hz	108
01-14	P.16	JOG acceleration/ decelerationtime	0 ~ 360.00s/0 ~ 3600.0s	0.50s	108

Group	Parameter Number	Name	Setting Range	Factory Value	Page
01-15	P.28	Output frequency filter time	0 ~ 1000ms	0ms	108
01-16	P.91	Frequency jump 1A	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-17	P.92	Frequency jump 1B	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-18	P.93	Frequency jump 2A	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-19	P.94	Frequency jump 2B	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-20	P.95	Frequency jump 3A	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-21	P.96	Frequency jump 3B	0 ~ 650.00Hz	99999	109
			99999: invalid		
01-22	P.44	The second acceleration time	0 ~ 360.00s/0 ~ 3600.0s	99999	110
			99999: Not selected		
01-23	P.45	The second decelerationtime	0 ~ 360.00s/0 ~ 3600.0s	99999	110
			99999: Not selected		
01-24	P.46	The second torque boost	0 ~ 30.0%	99999	110
			99999: Not selected		
01-25	P.47	The second base frequency	0 ~ 650.00Hz	99999	110
			99999: Not selected		
01-26	P.98	Middle frequency 1	0 ~ 650.00Hz	3.00Hz	111
01-27	P.99	Output voltage 1 of middle frequency	0 ~ 100.0%	10.0%	111
01-28	P.162	Middle frequency 2	0 ~ 650.00Hz	99999	111
			99999: Not selected		
01-29	P.163	Output voltage 2 of middle frequency	0 ~ 100.0%	0.0%	111
01-30	P.164	Middle frequency 3	0 ~ 650.00Hz	99999	111
			99999: Not selected		
01-31	P.165	Output voltage 3 of middle frequency	0 ~ 100.0%	0.0%	111
01-32	P.166	Middle frequency 4	0 ~ 650.00Hz	99999	111
			99999: Not selected		
01-33	P.167	Output voltage 4 of middle frequency	0 ~ 100.0%	0.0%	111
01-34	P.168	Middle frequency 5	0 ~ 650.00Hz	99999	111
			99999: Not selected		
01-35	P.169	Output voltage 5 of middle frequency	0 ~ 100.0%	0.0%	111
01-36	P.255	S pattern time at the beginning of acceleration	0 ~ 25.00s/0 ~ 250.0s	0.20s	112

Basic parameter group 01

Group	Parameter Number	Name	Setting Range	Factory Value	Page
01-37	P.256	S pattern time at the end of acceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		
01-38	P.257	S pattern time at the beginningofdeceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		
01-39	P.258	S pattern time at the end of deceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		

5.2.1 Limiting the output frequency

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

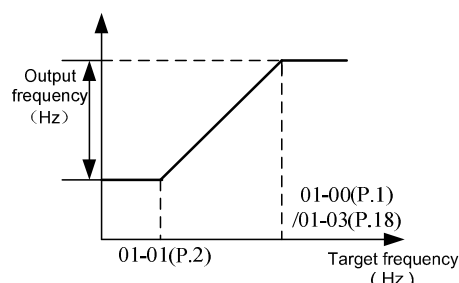
Parameter	Name	Factory Value	Setting Range	Content
01-00 P.1	Maximum frequency	120.00Hz	0.00 ~	55K/75KF and types below
		60.00Hz	01-02(P.18)Hz	75K/90KF and types above
01-01 P.2	Minimum frequency	0.00Hz	0 ~ 120.00Hz	Output minimum frequency
01-02 P.18	High-speed maximum frequency	120.00Hz	01-00(P.1)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

Setting Maximum frequency, high-speed maximum frequency

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

Setting Minimum frequency

- ◆ If the target frequency $\leq 01-01$, the steady output frequency equals to = 01-01.
- ◆ If $01-01 < \text{target frequency} \leq 01-00$ (01-03), the steady output frequency equals to target frequency.



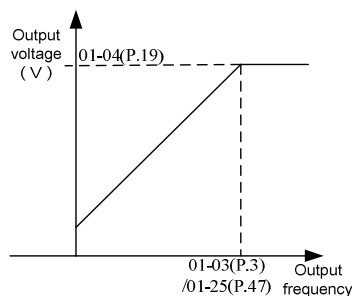
5.2.2 Base frequency, basefrequency voltage

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

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

Setting Base frequency

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



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

Setting Base frequency voltage

- ◆ If the output frequency is lower than the base frequency, the output voltage of the inverter will increase with output frequency. If the output frequency has reached the base frequency (01-03), the output voltage will just be equal to the base frequency voltage. If the output frequency exceeds the base frequency and increases continuously, the output voltage will be clamped to the base frequency voltage.

5.2.3 Acceleration/deceleration time setting

➤ Use this function to set motor acceleration/deceleration time.

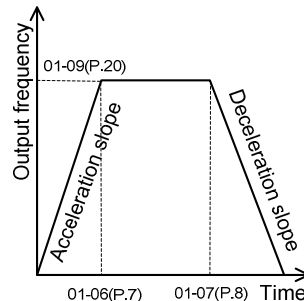
Parameter	Name	Factory Value	Setting Range	Content
01-05 P.29	Acceleration/deceleration curve selection	0	0	Linear acceleration /deceleration curve
			1	S pattern acceleration /deceleration curve 1 (Note 1)
			2	S pattern acceleration /deceleration curve 2 (Note 2)
			3	S pattern acceleration /deceleration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

Setting	Acceleration/deceleration curve selection
---------	---

◆ Linear acceleration /deceleration curve(01-05="0")

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

When the target frequency varies, it increases with the "acceleration slope" or decreases with the "deceleration slope" linearly. See the figure below:



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

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

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

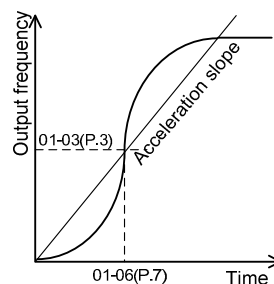
The S-shape equation between 0 and 01-03(P.3) is:

$$f = [1 - \cos(\frac{90^\circ \times t}{P.7})] \times P.3$$

The S-shape equation of 01-03(P.3) or above is:

$$t = \frac{4}{9} \times \frac{P.7}{(P.3)^2} \times f^2 + \frac{5}{9} \times P.7$$

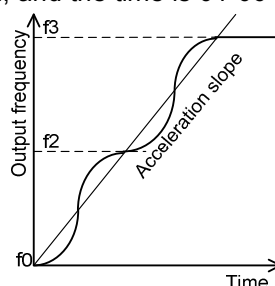
t = time; f = output frequency



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

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

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



Basic parameter group 01

◆ S pattern acceleration /deceleration curve 3(01-05="3")

Please refer to 5.2.12 Spattern time setting.

Setting Acceleration/deceleration time increments

- ◆ When 01-08=0, minimum acceleration / deceleration time (01-06、01-07、01-14、01-22、01-23、04-35~04-42) increment is 0.01s.
- ◆ When 01-08=1, minimum acceleration / deceleration time(01-06、01-07、01-14、01-22、01-23、04-35~04-42)increment is 0.1s.

Setting Acceleration / deceleration reference frequency

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

Note: 1. S pattern acceleration /deceleration curve 1 is used when acceleration/deceleration is required for a short time until a high-speed area equal to or higher than the base frequency, such as for the main shaft of the machine.
 2. S pattern acceleration /deceleration curve 2 can effectively reduce motor vibration during the acceleration / deceleration, and thus prevent the belts and gears from broken.
 3. S pattern acceleration /deceleration curve 3 is used to start the inverter gradually without impact.
 4. Please refer to Section 5.2.10 The second function for the second acceleration/deceleration time.
 5. When RT is "on", the second function is valid. For the operation characteristics of the motor, please refer to Section 5.2.10. RT mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

5.2.4 Torque boost V/F

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

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

Setting Torque boost

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

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

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

Note: 1. If the set value of 01-10 is too high, it will activate current inverter protection or the activation will be impeded.
 2. Please refer to Section 5.2.10 for the second torque boost.
 3. RT mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

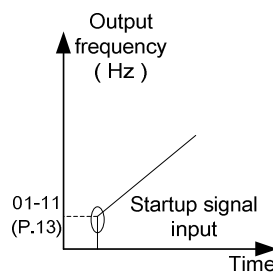
5.2.5 Starting frequency

➤ When the motor starts up, the instantaneous output frequency of the inverter is called “starting frequency”.

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

Setting Starting frequency

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



5.2.6 Load pattern selection **V/F**

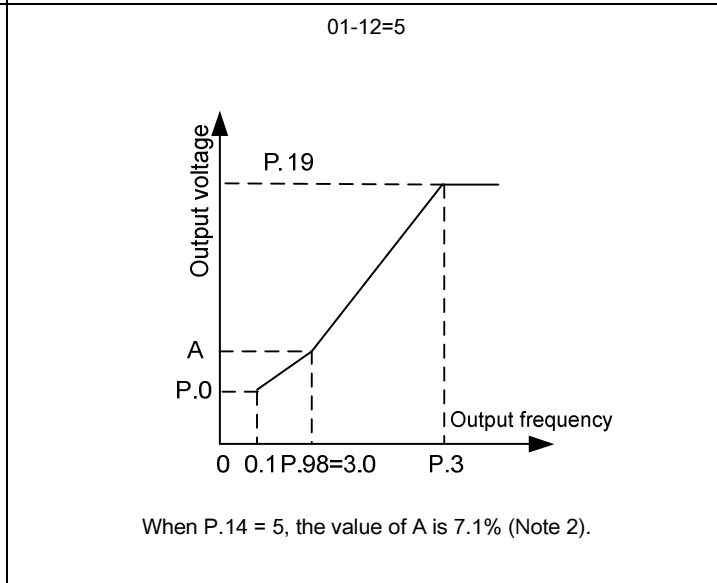
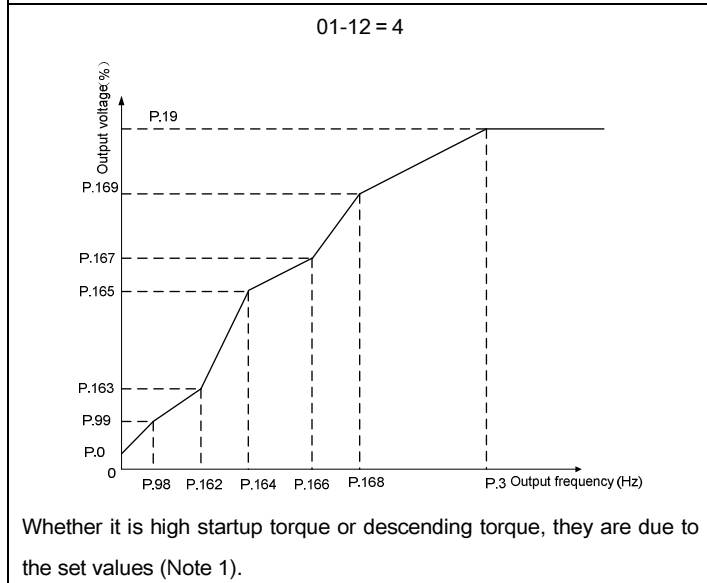
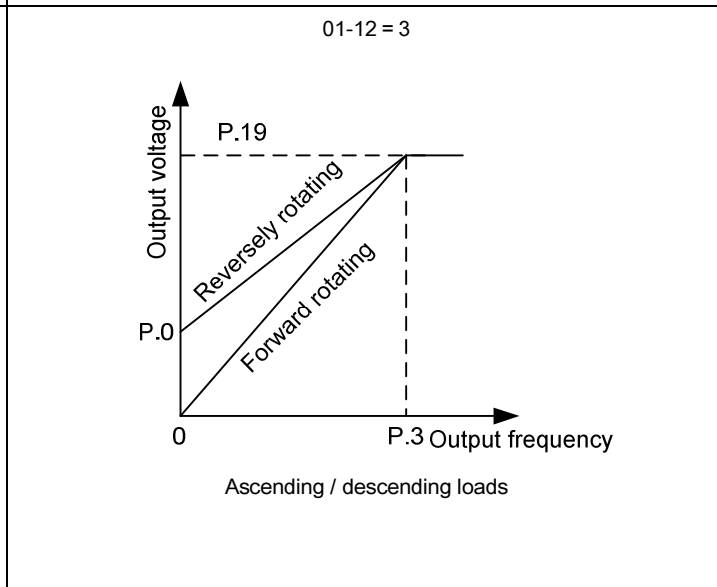
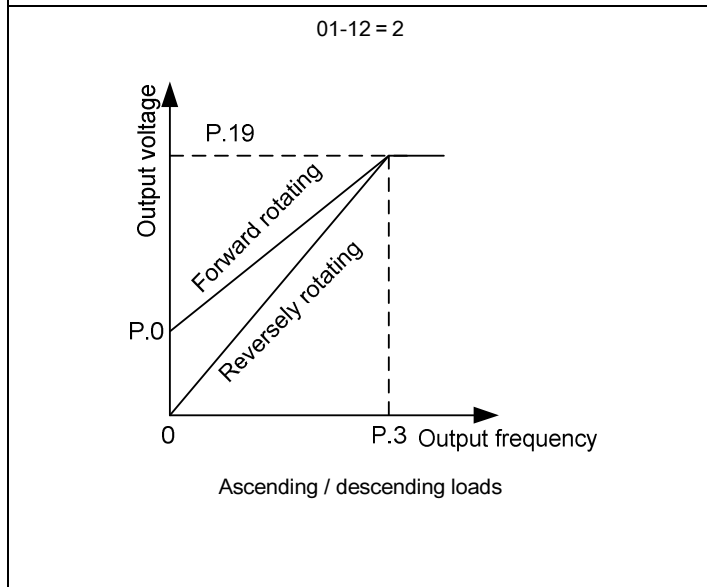
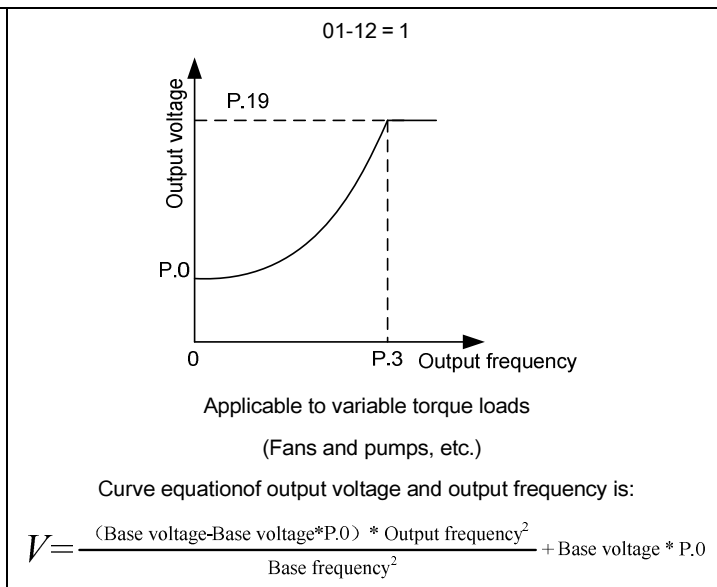
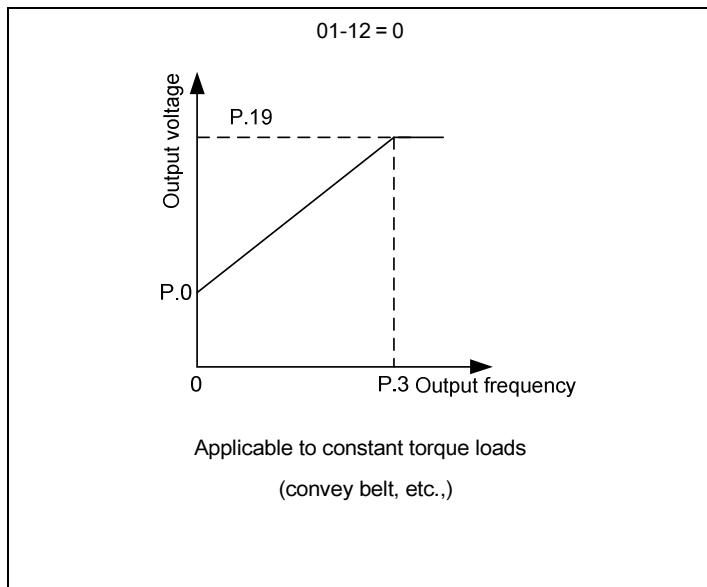
➤ Optimal output characteristics for application or load characteristics can be selected when in V/F control.

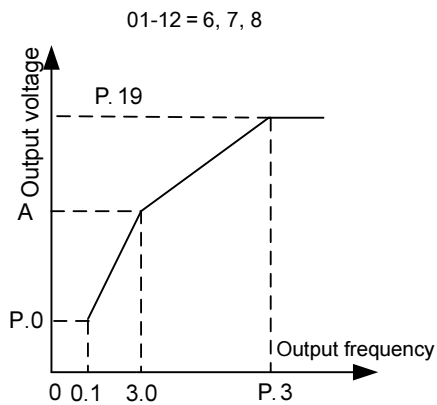
Parameter	Name	Factory Value	Setting Range	Content
01-12 P.14	Load pattern selection	0	0	Applicable to constant torque loads(convey belt, etc.)
			1	Applicable to variable torque loads (fans and pumps, etc.)
			2、3	Applicable to ascending / descending loads
			4	Multipoint VF curve
			5 ~ 13	Special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

Setting Load pattern selection

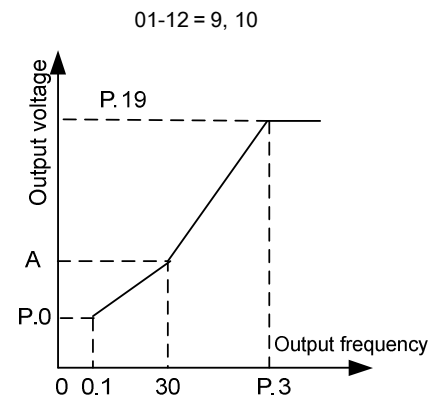
◆ When 01-12 = 4, suppose that 01-04=220V, 01-26=5Hz, 01-27=10%, when the inverter is running at 5Hz, the output voltage equals to $01-04 \times 01-27 = 220V \times 10\% = 22V$.

◆ If RT is “on”, 01-24 “the second torque boost” is valid.

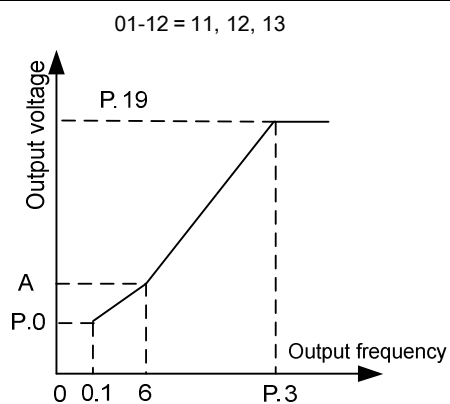




When 01-12=6, the value of A is 8.7%. When 01-12=7, the value of A is 10.4%. When 01-12=8, the value of A is 12.0%. (Note 2)



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



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

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

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

◆ VF complete separation(01-12="14")

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

◆ V/F half separation(01-12="15")

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

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

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

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

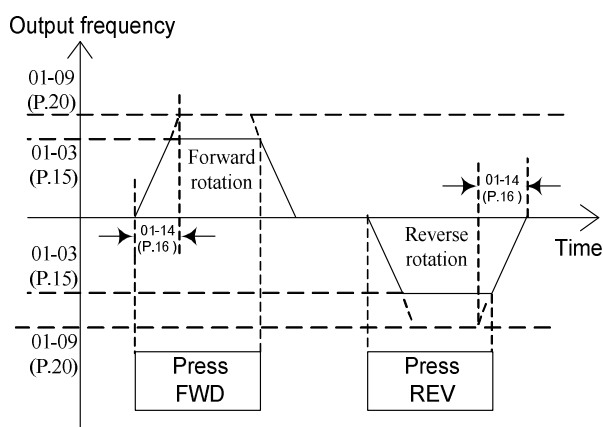
5.2.7 JOG operation

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

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

Setting JOG operation

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

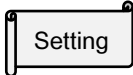


Note: Please refer to Section 4.3.3 for how to enter the JOG mode.

5.2.8 Output frequency filter time

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

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

 Setting Output frequency filter time

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

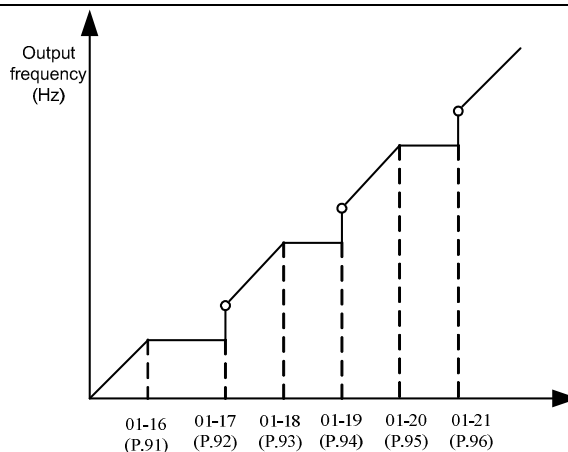
5.2.9 Frequency jump

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

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

 Setting Frequency jump

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



- ◆ For example: assuming 01-16=45 and 01-17=50;
 If the target frequency $\leq 45\text{Hz}$, then the steady output frequency = the target frequency.
 If $45\text{Hz} \leq \text{target frequency} < 50\text{Hz}$, then the steady output frequency = 45Hz.
 If the target frequency $\geq 50\text{Hz}$, then the steady output frequency = the target frequency.

Note: 1. During the acceleration / deceleration period, the output frequency of the inverter will still pass through the jump frequency.
 2. When 01-16=99999 or 01-17=99999, the first set of frequency jump is invalid.
 When 01-18=99999 or 01-19=99999, the second set of frequency jump is invalid.
 When 01-20=99999 or 01-21=99999, the third set of frequency jump is invalid.

5.2.10 The second function

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

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

Setting The second function

- ◆ When 01-08=0, minimum acceleration / deceleration time(01-22, 01-23)increment is0.01s.
- ◆ When 01-08=1, minimum acceleration / deceleration time(01-22、 01-23)increment is0.1s.

- ◆ When RT is “on”, the second function is valid. For the operation characteristics of the motor, please refer to the following second function setting.

If 01-22≠99999 and 01-23=99999, when RT is “on”, the acceleration /deceleration time is the “set value of 01-22”.

If 01-22≠99999 and 01-24=99999, when RT is “on”, the torque boost is the “set value of 01-10”.

If 01-22≠99999 and 01-24≠99999, when RT is “on”, the torque boost is the “set value of 01-24”.

If 01-22≠99999 and 01-25=99999, when RT is “on”, the base frequency is the “set value of 01-03”.


If 01-22≠99999 and 01-25≠99999, when RT is “on”, the base frequency is the “set value of 01-25”.

Note: RT mentioned here is the function name of “multi-function digital input terminal”. Please refer to 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09(P.550) for the function selection of multi-function digital input terminal; please refer to Section 3.5 for related wiring.

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

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

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

 Middle frequency, output voltage of middle frequency

- ◆ Please refer to the description on 01-12=4 in Section 5.2.6 Load pattern selection.

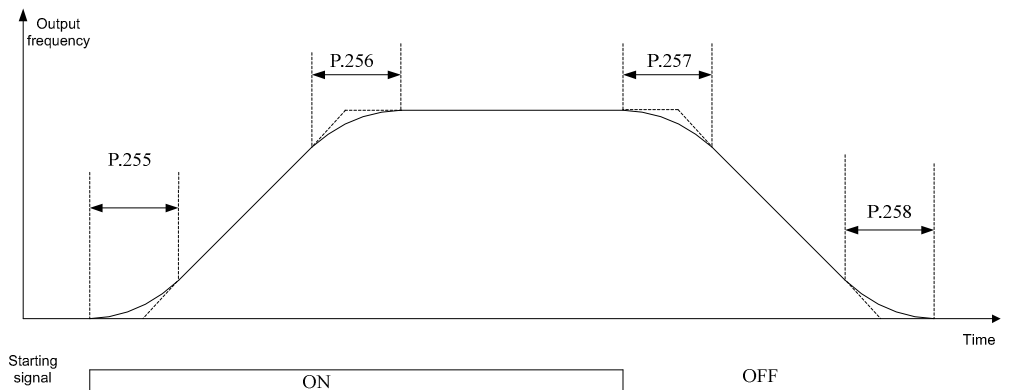
5.2.12 S pattern time

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

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

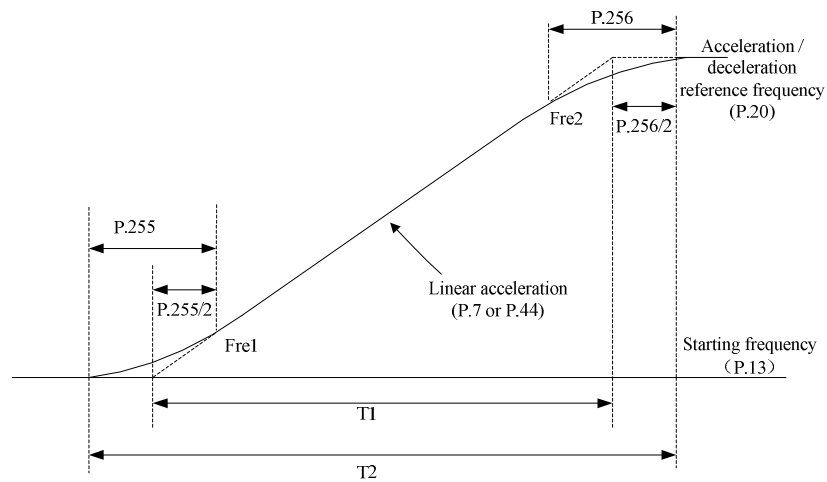
Setting S pattern time

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



- 1) The parameters 01-36, 01-37, 01-38 and 01-39 are used to start the inverter gradually without impact. And varying degrees of S pattern acceleration/deceleration curve are adjusted by the values. When the S pattern acceleration/deceleration curve is started, the inverter will accelerate/decelerate with different speed according to the primary acceleration/deceleration time.
- 2) When S pattern acceleration/deceleration curve 3 is selected, the acceleration/ deceleration time will be longer, as follows.
- 3) When the selected acceleration time (01-06 or 01-22) ≥ 01-36 and 01-37, the actual acceleration time is as follows:
The actual acceleration time = the selected acceleration time + (01-36 + 01-37) / 2
- 4) When the selected deceleration time (01-07 or 01-23) ≥ 01-38 and 01-39, the actual deceleration time is as follows:
The actual deceleration time = the selected deceleration time + (01-38 + 01-39) / 2

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



The acceleration time being set $T1 = (01-09 - 01-11) * 01-06 / 01-09$

The actual acceleration time $T2 = T1 + (01-36 + 01-37) * (01-09 - 01-11) / 2 / 01-09$

So $T1 = (60 - 0.5) * 5 / 60 = 4.96s$ (the actual acceleration time of linear acceleration)

The actual acceleration time $T2 = 4.96 + (0.2 + 0.2) * (60 - 0.5) / 2 / 60 = 5.16s$

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

5.3 Analog input and output parameter group 02

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-00	P.500	Function selection of terminal 2-5	0: Non-function	1	120
			1: Frequency reference		
			2: Torque reference		
			3: PID target value		
			4: PID feedback signal		
			5: Target tension setting		
			6: Line speed setting		
			7: Feedback line speed		
			8: Real-time curling radius		
			9: Initial curling radius		
			10: Material thickness		
			11: PTC		
			12: PT100		
			13: VF detached function		
			14: Positive torque limit		
			15: Negative torque limit		
			16: Positive/Negative torque limit		
17: Retrogradetorque limit					
02-01	P.501	Function of terminal 4-5	Same as 02-00	1	120
02-02	P.504	Function of terminal 3-5	Same as 02-00	0	120
02-03	P.503	Function of terminal HDI	Same as 02-00	0	120
02-04	P.54	Function of terminal AM1 output	0: Output frequency, the frequency display reference 02-51 (P.55) is 100%.	0	121
			1: Output frequency, the frequency display reference 02-52 (P.56) is 100%.		
			2: Output DC bus voltage, the OV level is 100%.		
			3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.		
			4: Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.		
			5: Target frequency, the frequency display reference 02-51(P.55) is 100%.		
			6: Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539)		
			7: Output voltage, inverter rated voltage is 100%		
8: Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3-6)					

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-04	P.54	Function of terminal AM1 output	9: Output torque, two times motor rated torque is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)	0	121
			10: Output power, two times motor rated power is 100%.		
			11: The high-speed pulse, 100.00KHz is 100%.		
			12: Motor speed, to display the level of 02-51(P.55) is 100%		
			13 : PLC analog output, details please refer to SA3 embedded PLC instructions		
02-05	P.537	Function of terminal AM2 output	6: Steady level output, voltage or current output level is set by 02-53(P.539).	0	121
			0~5, 7~13: Same as 02-04.		
02-06	P.185	Proportion linkage gain	0 ~ 100%	0%	122
02-07	P.240	Auxiliary frequency	0: No auxiliary frequency function is available.	0	123
			1: operation frequency = basic frequency + auxiliary frequency (given by the 2-5 terminal)		
			2: operation frequency = basic frequency + auxiliary frequency (given by the 4-5 terminal)		
			3: operation frequency = basic frequency - auxiliary frequency (given by the 2-5 terminal)		
			4: operation frequency = basic frequency - auxiliary frequency (given by the 4-5 terminal)		
			5: operation frequency = given by the terminal 2-5 as the proportion linkage signal		
			6: operation frequency = given by the terminal 4-5 as the proportion linkage signal		
			7: operation frequency = given by the terminal 3-5 as the proportion linkage signal		
			8: operation frequency = basic frequency + auxiliary frequency (given by the terminal 3-5)		
			9: operation frequency = basic frequency - auxiliary frequency (given by the terminal 3-5)		
02-08	P.73	2-5 signal selection	0: The valid range of signal sampling is 0~5V.	1	124
			1: The valid range of signal sampling is 0~10V.		
			2: The valid range of signal sampling is 0~ -5V.		
			3: The valid range of signal sampling is 0~ -10V.		
			4: The valid range of signal sampling is -5 ~ +5V.		
			5: The valid range of signal sampling is -10 ~ +10V.		
02-09	P.38	2-5 maximum operation frequency	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	124
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
02-10	P.60	2-5 filter time	0 ~ 2000ms	30ms	124
02-11	P.139	The bias rate of 2-5 voltage signal	-100.0%~100.0%	0.0%	124

Analog input and output parameter group 02

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-12	P.192	The minimum input positive voltage of 2-5	0 ~ 10.00V	0.00V	124
02-13	P.193	The maximum input positive voltage of 2-5	0 ~ 10.00V	10.00V	124
02-14	P.194	The percentage corresponding to the minimum positive voltage of terminal 2-5	-100.0% ~ 100.0%	0.0%	124
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-15	P.195	The percentage corresponding to the maximum positive voltage of terminal 2-5	-100.0% ~ 100.0%	100.0%	124
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-16	P.512	The minimum input negative voltage of 2-5	0 ~ 10.00V	0.00V	124
02-17	P.513	The maximum input negative voltage of 2-5	0 ~ 10.00V	0.00V	124
02-18	P.510	The percentage corresponding to the minimum negative voltage of terminal 2-5	-100.0% ~ 100.0%	0.0%	124
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-19	P.511	The percentage corresponding to the maximum negative voltage of terminal 2-5	-100.0% ~ 100.0%	0.0%	124
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-20	P.17	4-5 signal selection	0: The effective range of signal sampling is 4~20mA.	0	130
			1: The effective range of signal sampling is 0 ~ 10V.		
			2: The effective range of signal sampling is 0 ~ 5V.		
02-21	P.39	The maximum operation frequency of terminal 4-5	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	130
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
02-22	P.528	4-5 filter time	0 ~ 2000ms	30ms	130
02-23	P.505	The bias rate of 4-5 current/voltage signal	-100.0% ~ 100.0%	0.0%	130
02-24	P.184	4-5 disconnection selection	0: No disconnection selection is available.	0	130
			1: Decelerate to 0Hz, the digital output terminal will set off the alarm		
			2: The inverter will stop immediately, and the panel will display the "AEr" alarm.		
			3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-25	P.198	The minimum input current/ voltage of terminal 4-5	0 ~ 20.00mA	4.00mA	130
02-26	P.199	The maximum input current/ voltage of terminal 4-5	0 ~ 20.00mA	20.00mA	130
02-27	P.196	The percentage corresponding to the minimum input current/ voltage of terminal 4-5	-100.0% ~ 100.0%	0.0%	130
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-28	P.197	The percentage corresponding to the maximum input current/ voltage of terminal 4-5	-100.0% ~ 100.0%	100.0%	130
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-29	P.531	3-5 signal selection	0: The valid range of signal sampling is 4 ~ 20mA	1	132
			1: The valid range of signal sampling is 0 ~ 10V		
			2: The valid range of signal sampling is 为 0 ~ 5V		
02-30	P.508	The maximum operation frequency of terminal 3-5	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	132
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
02-31	P.527	3-5 filter time	0 ~ 2000ms	30ms	132
02-32	P.507	The bias rate of 3-5 current/ voltage signal	-100.0% ~ 100.0%	0.0%	132
02-33	P.545	3-5 disconnection selection	0: No disconnection selection.	0	132
			1: Decelerate to 0Hz,the digital output terminal will set off the alarm.		
			2: The inverter will stop immediately, and the panel will display the "AEr" alarm.		
			3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.		
02-34	P.548	The minimum input current/ voltage of terminal 3-5	0 ~ 10.00V	0.00V	132
02-35	P.549	The maximum input current/ voltage of terminal 3-5	0 ~ 10.00V	10.00V	132
02-36	P.546	The percentage corresponding to the minimum input current/ voltage of terminal 3-5	-100.0% ~ 100.0%	0.0%	132
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-37	P.547	The percentage corresponding to the maximum input current/ voltage of terminal 3-5	-100.0% ~ 100.0%	100.0%	132
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-38	P.526	HDI filter time	0 ~ 2000ms	10ms	133

Analog input and output parameter group 02

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-39	P.524	HDI input minimum frequency	0 ~ 100.00kHz	0.00kHz	133
02-40	P.525	HDI input maximum frequency	0 ~ 100.00kHz	100.00 kHz	133
02-41	P.522	The percentage corresponding to HDI input minimum frequency	-100.0% ~ 100.0%	0.0%	133
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-42	P.523	The percentage corresponding to HDI input maximum frequency	-100.0% ~ 100.0%	100.0%	133
			-400.0% ~ 400.0% (P.500= 2/14/15/16/17)		
02-43	P.74	HDO frequency multiplication coefficient	0: Select FM function as the output function of terminal HDO.	0	134
			1 ~ 9000: Select the square-wave pulse which is 02-43(P.74) times of running frequency as the output of terminal.		
02-44	P.543	FM output function selection	0: Output frequency, the frequency display reference 02-51(P.55) is 100%.	0	135
			1: Output current, the current monitoring reference 02-52(P.56) is 100%.		
			2: Output DC bus voltage, the OV level is 100%.		
			3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.		
			4: Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.		
			5: Target frequency, the frequency display reference 02-51 (P.55) is 100%.		
			6: Fixed voltage output, voltage output level is set by 02-54 (P.541).		
			7: Output voltage, the inverter rated voltage is 100%.		
			8: Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)		
			9: Output torque, two times motor rated torque is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)		
			10: Output power, two times motor rated power is 100%.		
			11: The high-speed pulse, 100.00KHz is 100%.		
12: Motor speed, to display the level of 02-51 (P.55) is 100%.					

Group	Parameter Number	Name	Setting Range	Factory Value	Page
02-45	P.64	AM1 output signal selection	0: 0~10V voltage can be output across terminal AM1-5.	0	135
			1: Reserve		
			2: 0~20mA current can be output across AM1-5.		
			3: 4~20mA current can be output across AM1-5.		
02-46	P.191	AM1 output gain	0 ~ 5000	3210	135
02-47	P.190	AM1 output bias	0 ~ 5000	80	135
02-48	P.538	AM2 output signal selection	Same as 02-45	0	137
02-49	P.536	AM2 output gain	0 ~ 5000	3210	137
02-50	P.535	AM2 output bias	0 ~ 5000	80	137
02-51	P.55	Frequency display reference at the analog output	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	137
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
02-52	P.56	Current monitoring reference at the analog output	0~500.00A: Types below Frame G	According to type	137
			0~5000.0A: Frame G and types above		
02-53	P.539	AM2 fixed output level	0 ~ 100.0%	0.0%	138
02-54	P.541	AM1/FM fixed output level	0 ~ 100.0%	0.0%	138
02-55	P.592	PT100 voltage level 1	0 ~ 10.00V	5.00V	138
02-56	P.593	PT100 voltage level 2	0 ~ 10.00V	7.00V	138
02-57	P.594	PT100 level 1 starting frequency	0 ~ 650.00Hz	0.00Hz	138
02-58	P.595	Starting PT100 level1 delay time	0 ~ 6000s	60s	138
02-59	P.187	FM calibration parameter	0 ~ 9998	450	139

5.3.1 Function selection of analog terminal and HDI terminal

➤ Input function selection of terminal 1, 2, 3 and HDI

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

 Setting Input function selection

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

Note: 1. The default priority level of terminal function selection is 2-5 > 4-5 > 3-5 > HDI, so if you want to set the terminal 3-5 as frequency reference, 02-00 and 02-01 should be set at 0.

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

5.3.2 Function selection of analog output terminal AM

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

Parameter	Name	Factory Value	Setting Range	Content
02-04 P.54	Function of terminal AM1 output	0	0	Output frequency, the frequency display reference 02-51 (P.55) is 100%.
			1	Output frequency, the frequency display reference 02-52 (P.56) is 100%.
			2	Output DC bus voltage, the OV level is 100%.
			3	Output the temperature rising accumulation rate of inverter, the NTC level is 100%.
			4	Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.
			5	Target frequency, the frequency display reference 02-51(P.55) is 100%.
			6	Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539)
			7	Output voltage, the inverter rated voltage is 100%.
			8	Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6).
			9	Output torque, two times motor rated torque is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)
			10	Output power, two times motor rated power is 100%.
			11	The high-speed pulse, 100.00KHz is 100%.
			12	Motor speed, to display the level of 02-51(P.55) is 100%.
02-05 P.537	Function of terminal AM2 output	0	0 ~ 13	6: Steady level output, voltage or current output level is set by 02-53(P.539).
				0~5, 7~13: Same as 02-04.

Setting Usage of analog output terminal AM

- ◆ For the voltage/current calibration of terminal AM, please refer to calibration parameter in Section 5.3.11 Selection and handling of output terminal AM1.

5.3.3 Proportion linkage gain

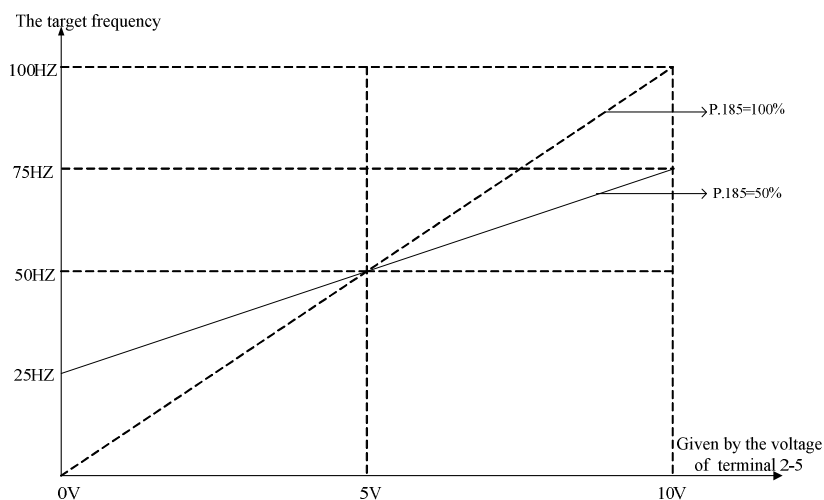
- The function is used to multiply the setting frequency by the external analog input terminal. When many inverters run proportionally, the reference frequency from the master inverter to the slave inverter can be fine tuned effectively with the function.

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

Setting Proportion linkage gain

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

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



In the above figure, when 0V is given, the target frequency is $50\text{Hz} - (50\text{Hz} \times 50\%) = 25\text{Hz}$;

when 5V is given, the target frequency is $50\text{Hz} - (50\text{Hz} \times 0\%) = 50\text{Hz}$;

when 10V is given, the target frequency is $50\text{Hz} + (50\text{Hz} \times 50\%) = 75\text{Hz}$.

Note: 1. Please refer to the instruction of 02-07(P.240) for the proportion linkage signal input.
 2. When the analog current/voltage signal of external terminal 4-5 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters 02-09, 02-21, 02-30, 02-20, 02-08, 02-29.

5.3.4 Auxiliary frequency

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

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

Setting Auxiliary frequency

- ◆ When the operation frequency is smaller than 01-01, the operation frequency will be equal to the minimum limited frequency 01-01. When the operation frequency is larger than 01-00, the operation frequency will be equal to the maximum limited frequency 01-00.

Note:1. The basic frequency is set by operation penal which is the target frequency reference source, communication or multi-speed combination.
 2. Please refer to the instruction of 02-06 for the proportion linkage signal input.
 3. When the analog current/voltage signal of external terminal 4-5 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters 02-09, 02-21, 02-30, 02-20, 02-08, 02-29.

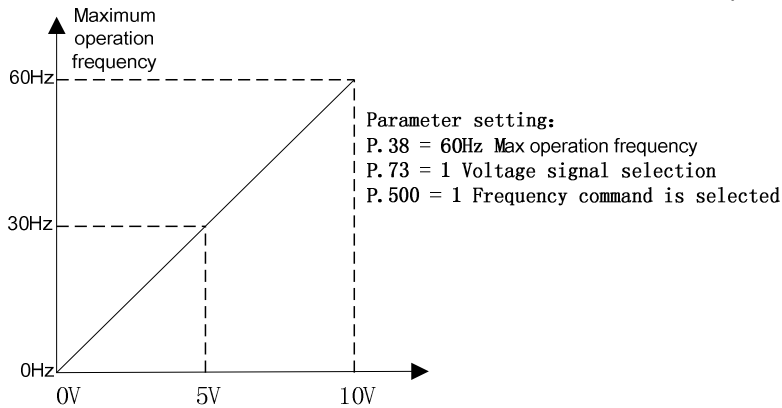
5.3.5 Selection and handling of input terminal 2-5

- Selects the signal specifications, frequency compensation function, and input signal polarity, etc, via input terminal 2-5.

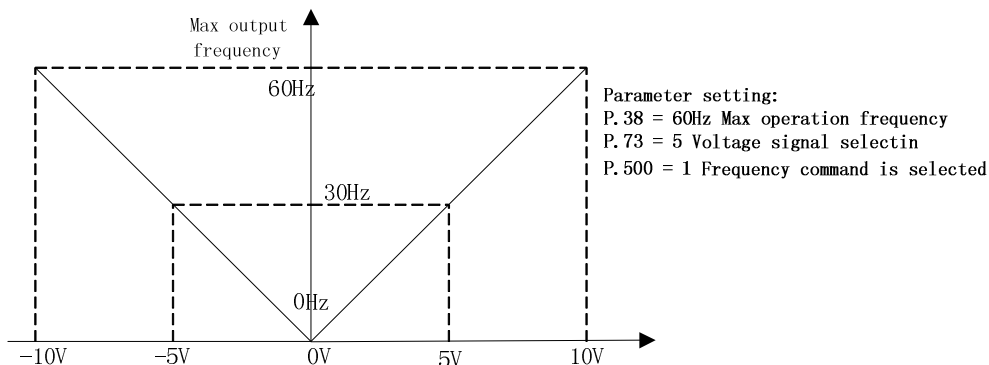
Parameter	Name	Factory Value	Setting Range	Content
02-08 P.73	2-5 signal selection	1	0	The valid range of signal sampling is 0~5V.
			1	The valid range of signal sampling is 0~10V.
			2	The valid range of signal sampling is 0~ -5V.
			3	The valid range of signal sampling is 0~ -10V.
			4	The valid range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

Setting	2-5 signal selection, 2-5 maximum operation frequency
---------	---

- ◆ The setting value of 02-09 is the target frequency value of the inverter when the input signal of terminal 2-5 is 5V (10V).
- ◆ Example 1: This example is the most commonly used method of adjustment. It is used when the inverter is in the "external mode", "combined mode 2" or "combined mode 4", and the frequency is set by terminal 2-5.



- ◆ The value of 02-08 needs to be changed if the terminal 2-5 connects to negative voltage. The frequency arithmetic is the same as positive voltage and the rotation direction is invariant.



- Note: 1. In "External mode", "combined mode 2" or "combined mode 4", the target frequency of the inverter will be determined by the signal between 3-5/2-5/4-5 terminal when RH, RM, RL and REX are all "off." (the default priority is 2-5>4-5>3-5, please refer to 02-00, 02-01, 02-02.
2. RH, RM, RL, REX, AU, RT and RUN mentioned in this section is the function name of the "multi-function digital input terminal". Please refer to 03-00~03-06, 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.
3. The selection of range of voltage signal sampling across terminal 2-5 by parameter 02-08 will affect the parameters value of 2-5 terminal input signal.

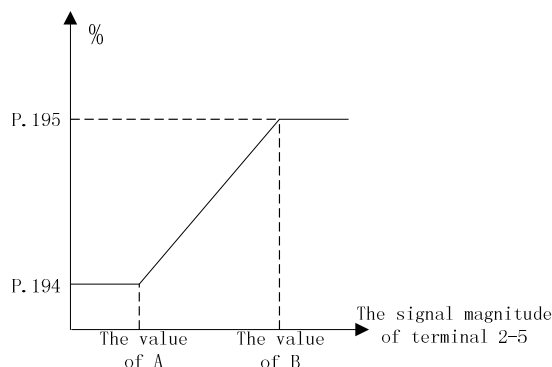
Setting	Handling of input terminal 2-5
---------	--------------------------------

- ◆ The parameters above define the relationship between analog input voltage and the setting value what analog input represents. When the analog input voltage exceeds the maximum or minimum range of the setting value, the excess will be computed as the maximum or minimum input.
- ◆ There are two setting order when the maximum or minimum percentage is set:

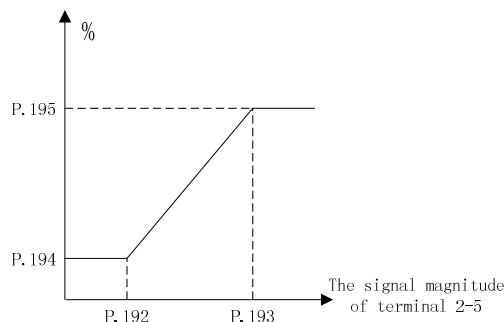
Analog input and output parameter group 02

- 1) If the users hope to adjust the analog input magnitude to correspond to a certain proportion relationship, the analog input need to be adjusted before setting the corresponding proportion parameters. Now the inverter will compute automatically without setting the voltage parameters. Please refer to the example 1.1.
- 2) If the users skip adjusting analog input to set the proportion relationship, the proportion parameter should be set before setting the voltage parameters. Please refer to the example 1.2.

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



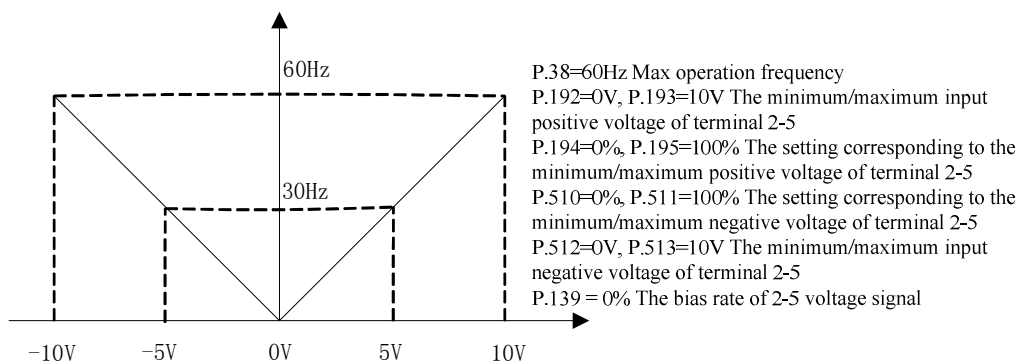
Example 1.2: Set the value of 02-14 and 02-15, then set 02-12 and 02-13. The figure is shown as follows:



If 02-00 is set at 1, the analog input of terminal 2-5 corresponds to frequency function, that is to say the actual frequency input value is equal to the product of the proportion worked out in the above figure and 02-09 (the bias rate 02-11 is 0).

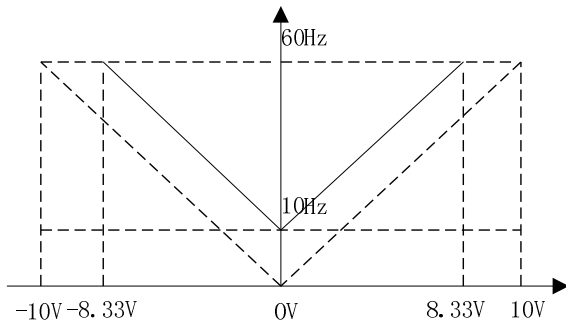
- ◆ The positive voltage setting can be referred to for the negative voltage setting, as above.

Example 2: This example is the most commonly used method of adjustment. It is used when the inverter is in the "external mode", "combined mode 2" or "combined mode 4", and the frequency are set by terminal 2-5.



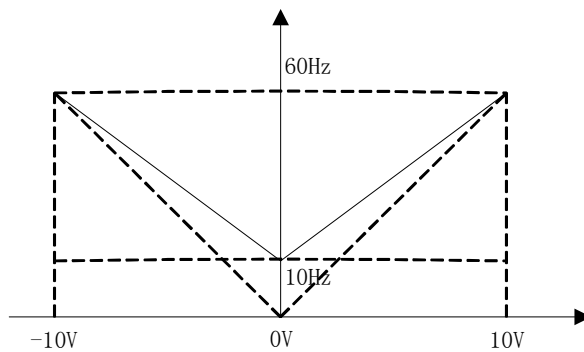
Example 3: This example is used by the industry for operating the ac motor drive. The goal is to have the set

potentiometer equals to 10Hz when rotating to the far left. In other words, when activating, the lowest output of the ac motor drive has to be 10Hz. Other frequencies can be adjusted by the industry freely.



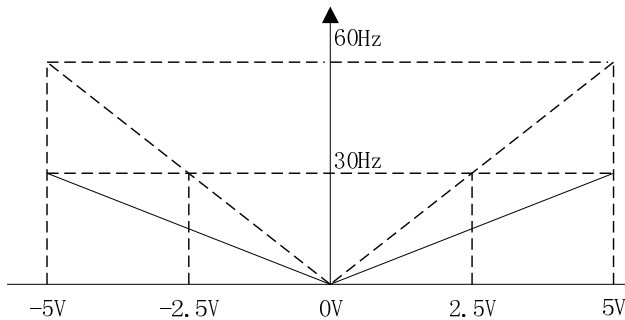
P.38=60Hz Max operation frequency
 P.192=0V, P.193=8.33V The minimum/maximum input positive voltage of terminal 2-5
 P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
 P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative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

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



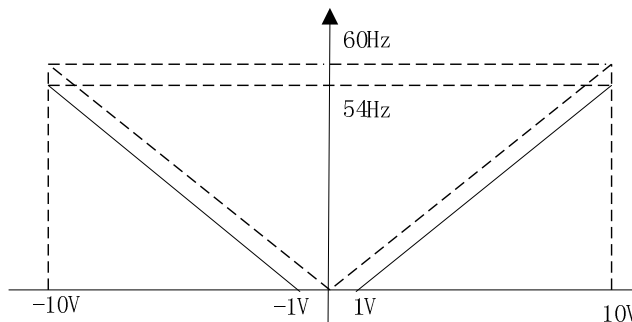
P.38=60Hz Max operation frequency
 P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
 P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
 P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative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

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



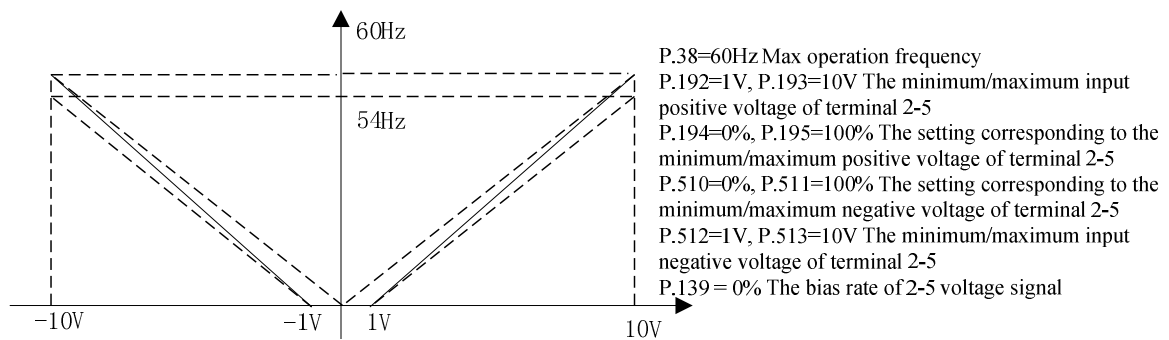
P.38=60Hz Max operation frequency
 P.192=0V, P.193=5V The minimum/maximum input positive voltage of terminal 2-5
 P.194=0%, P.195=50% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
 P.510=0%, P.511=50% The setting corresponding to the minimum/maximum negative voltage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

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

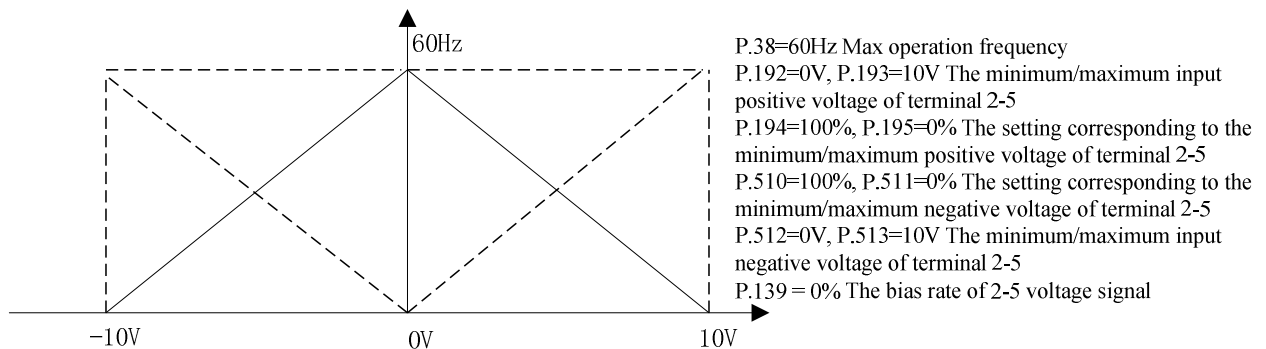


P.38=60Hz Max operation frequency
 P.192=1V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
 P.194=0%, P.195=90% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
 P.510=0%, P.511=90% The setting corresponding to the minimum/maximum negative voltage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

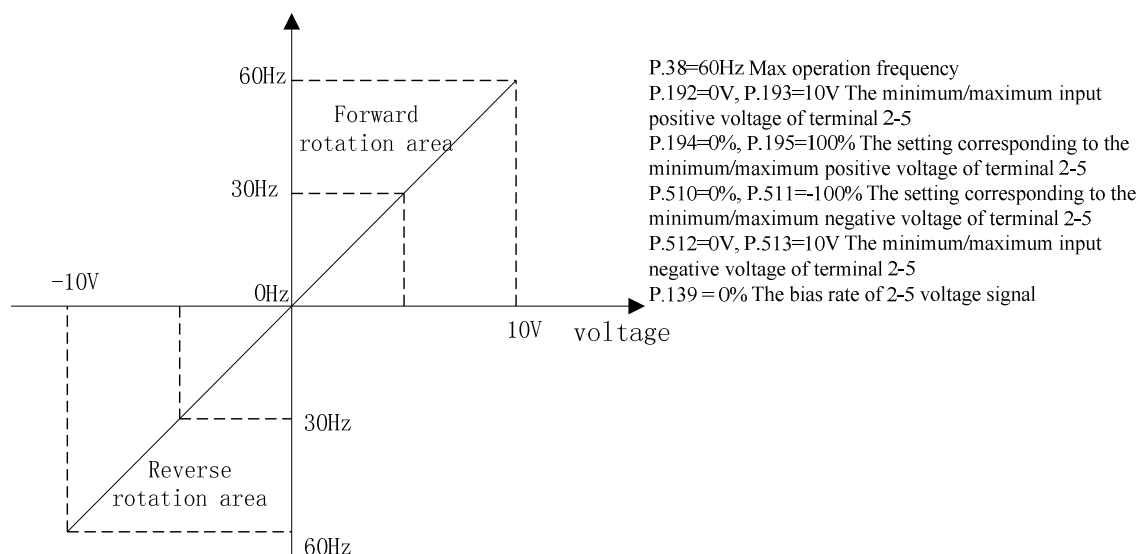
Example 7: This example is an extension of Example 6. The wide application of this example offers the users good flexibility.

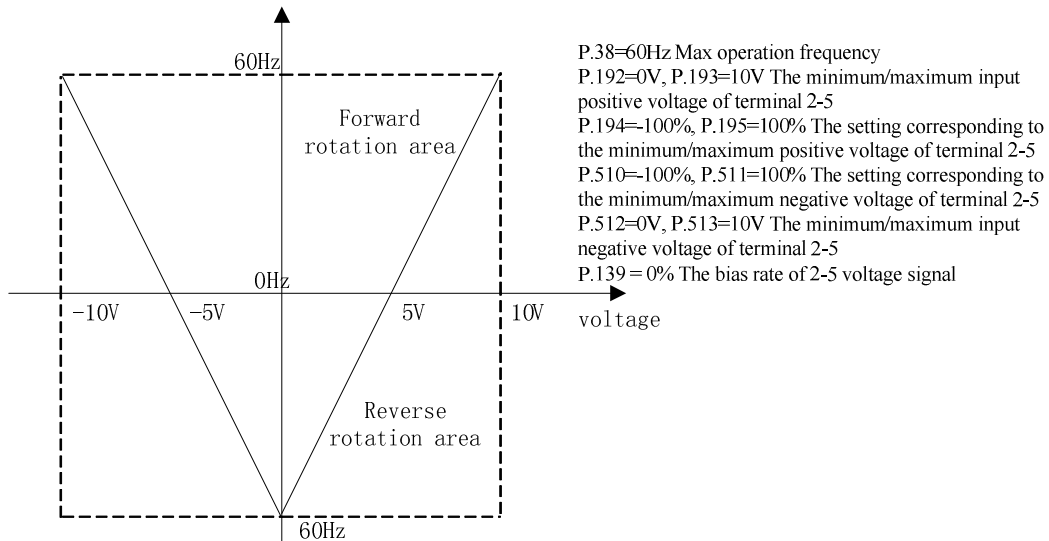


Example 8: This example is an application of negative slop setup. The industry often uses sensors for pressure, temperature or flow control. Some of the sensors output a 10V signal at high voltage or high flow. This signal acts as a reference for the AC motor drive to decelerate or to stop. The setup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

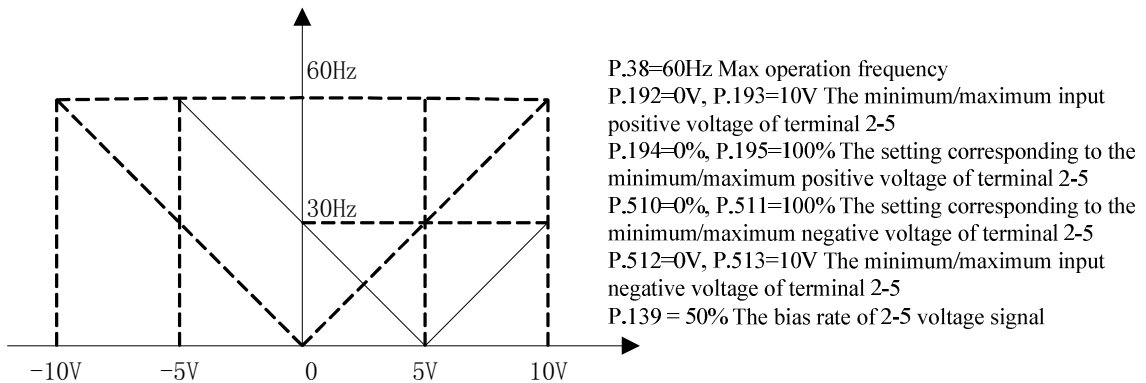


Example 9: This example integrates all the application of potentiometer. Together with the application of forward and reverse rotation, it fits in the system easily for assorted complicated application.





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



Note: 1.The examples above are in the condition that 02-00 is 1. It is also applicable when 02-00 is other non-zero value. Please refer to the definition instruction of 02-00 for details.
 2. The selection of range of voltage signal sampling across terminal 2-5 by parameter 02-08 will affect the parameters value of 2-5 terminal input signal in this part.

5.3.6 Selection and handling of input terminal 4-5

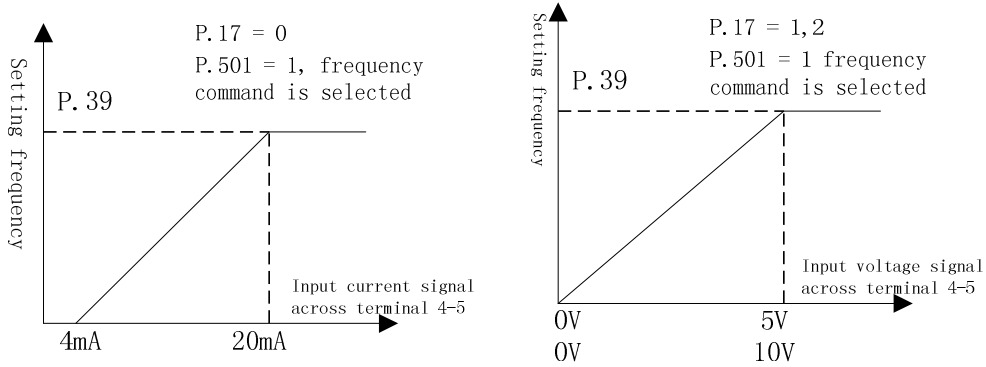
➤ Selects the signal specifications, frequency compensation function, etc, via input terminal 4-5.

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

Setting

Selection and handling of input terminal 4-5

◆ 4-5 signal selection and the maximum operation frequency of terminal 4-5



Note:1. In “external mode”, “combined mode 2” or “combined mode 4”, if AU is “on” and 02-01=1, target frequency of the inverter will be set by the input signal across terminal 4-5. If AU is “off”, please refer to 02-00, 02-01, 02-02.
 2. In “external mode”, “combined mode 2” or “combined mode 4”, if AU and either one of RH, RM, RL and REX are valid concurrently, multi-speed has higher priority.
 3. RH, RM, RL, REX and AU mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-00~03-06,03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

◆ 4-5 disconnection selection

- 1) When 02-24 = 0, the inverter will decelerate to 0Hz when disconnected. After reconnecting the inverter, the inverter will accelerate to the corresponding frequency.
- 2) When 02-24 =1, the inverter will decelerate to 0Hz when disconnected. Meanwhile, the multi-function digital output terminal will set off the alarm.After reconnecting the inverter, the inverter will accelerate to the corresponding frequency. Reconnection will clear the alarm.
- 3) When 02-24=2, the panel will display the “AEr” alarm when disconnected. The inverter will stop immediately. Reset to clear the alarm.
- 4) When 02-24 = 2, the inverter will run continuously according to the frequency reference before the disconnection. The multi-function digital output terminal will set off the alarm. Reconnect to clear the alarm.

Note: 1. 4 - 5 bolt function applies only to current break line, please pay attention to parameter 02-20 (P. 17) set and the location of the switch SW2.
 2. The function of the multi-function digital output terminals to choose, please refer to the 03-10, 12, 03-03-13;Related wiring, please refer to section 3.5.

◆ Input current/voltage of terminal 4-5

The setting of 4-5 terminal input current/voltage is similar to the setting of 2-5. And they also have the same effect except that the terminal 4-5 can't give the negative voltage and the minimum input current is 4mA.

Note: Operating the 4-5 terminal function mentioned above, you must flip the switch SW2 to corresponding position at first and make sure it matches the setting value of parameter 02-20.

5.3.7 Selection and handling of input terminal 3-5

➤ Selects the signal specifications, frequency compensation function, etc, via input terminal 3-5.

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

Setting

Selection and handling of input terminal 3-5

◆ Please refer to terminal 4-5 for selection and handling of input terminal 3-5.

Note: 1. 3-5 bolt function applies only to current break line, please pay attention to parameter 02-29 (P. 531) set and the location of the switch SW1.
2. The 3-5 terminals function must first toggle switch SW1 to the corresponding position and ensure that match the 02-29 set value.

5.3.8 Selection and handling of input terminal HDI

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

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

Setting Selection and handling of input terminal HDI

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

Note: The frequency computing method of HDI input signal is similar to 2-5 analog input, the formula is $01-00 * ((02-40 - 02-39) * (02-42 - 02-41) / (the\ input\ frequency - 02-39) + 02-41)$.

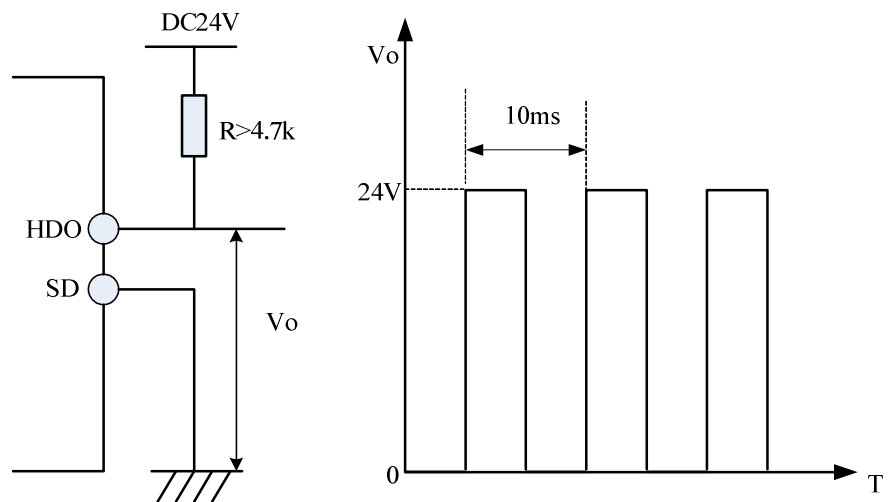
5.3.9 HDO frequency multiplication coefficient

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

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

Setting HDO frequency multiplication coefficient

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



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

5.3.10 Function selection of FM output

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

Parameter	Name	Factory Value	Setting Range	Content
02-44 P.543	FM output function selection	0	0	Output frequency, the frequency display reference 02-51(P.55) is 100%.
			1	Output current, the current monitoring reference 02-52(P.56) is 100%.
			2	Output DC bus voltage, the OV level is 100%.
			3	Output the temperature rising accumulation rate of inverter, the NTC level is 100%.
			4	Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.
			5	Target frequency, the frequency display reference 02-51 (P.55) is 100%.
			6	Fixed voltage output, voltage output level is set by 02-54 (P.541).
			7	Output voltage, the inverter rated voltage is 100%.
			8	Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6).
			9	Output torque, two times motor rated torque is 100%.
			10	Output power, two times motor rated power is 100%.
			11	The high-speed pulse, 100.00KHz is 100%.
12	Motor speed, to display the level of 02-51(P.55) is 100%			

Setting Usage of analog output terminal FM

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

5.3.11 Selection and handling of output terminal AM1

➤ It is used to adjust the analog voltage level that terminal AM1 outputs.

Parameter	Name	Factory Value	Setting Range	Content
02-45 P.64	AM1 output signal selection	0	0	0~10V voltage can be output across terminal AM1-5.
			1	Reserve
			2	0~20mA current can be output across AM1-5.
			3	4~20mA current can be output across AM1-5.
02-46 P.191	AM1 output gain	3210	0 ~ 5000	---
02-47 P.190	AM1 output bias	80	0 ~ 5000	---

Setting Selection and handling of output terminal AM1

- ◆ The current/voltage output of terminal AM1 is set by both the toggle switch SW3 on control board and 02-45. When the user need to select the output type of terminal AM1, please turn the toggle switch SW3 to the corresponding type at first and then set the value of 02-45.
- ◆ The output of the terminal AM1 are shown as follows:

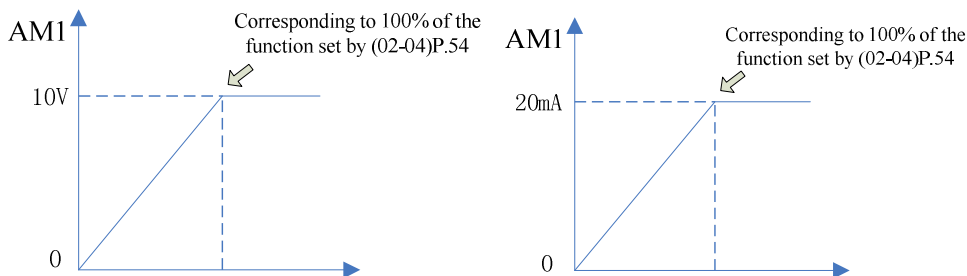


Figure 1. AM1-5 output 0~10V voltage Figure 2. AM1-5 output 0~20mA current

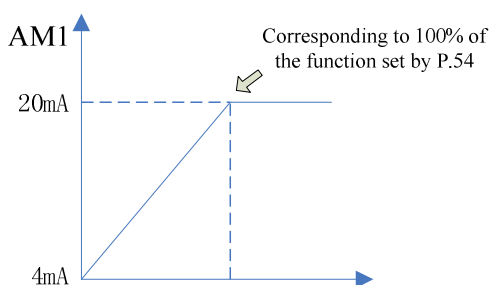


Figure 3. AM1-5 output 4~20mA current

- ◆ For the difference on the components, header needs to be calibrated, the voltage/current calibration procedures of AM1 terminal:
 1. Set the toggle switch SW3 to 0~10V/0~20mA, then set 02-45 at 0 or 2.
 2. Insert an electric meter with a full graduation of 10V/20mA across terminal AM1 and terminal 5. Set 02-04 at 0., 02-51 at 60Hz.
 3. Set 01-11 at 0. Start the motor. Fix the output frequency of the inverter to 0 Hz.
 4. Press to adjust the value of 02-47. The screen will display the accumulated output bias voltage of AM1. Press for more than 1 second, and the pointer will move upward. Press to reduce the value of 02-47, and the screen will display the progressively decreased output bias voltage of AM1. Press for more than 1second, and the pointer will move downward. When the pointer is adjusted to 0, the calibration of AM1 output bias voltage is completed.
 5. Adjust and fix the output frequency of the inverter at 60 Hz.
 6. Read the set value of 02-46, and the screen will display the current output gain of AM1.
 7. Press or to adjust the value of 02-46. Press for more than 1 second, and the pointer will move upward or downward. When the pointer moves to the full-scale position, the calibration is completed.

Note: When selecting the output signal of terminal AM1, please pay attention to the switch of SW3. If 4~20mA output current is selected, please switch SW3 to 0~20mA.

5.3.12 Selection and handling of output terminal AM2

➤ It is used to adjust the analog voltage level that terminal AM2 outputs.

Parameter	Name	Factory Value	Setting Range	Content
02-48 P.538	AM2 output signal selection	0	0	0~10V voltage can be output across terminal AM2-5.
			1	Reserve
			2	0~20mA current can be output across AM2-5.
			3	4~20mA current can be output across AM2-5.
02-49 P.536	AM2 output gain	3210	0 ~ 5000	---
02-50 P.535	AM2 output bias	80	0 ~ 5000	---

Setting Selection and handling of output terminal AM2

- ◆ Please refer to the instruction of AM1 for this terminal function. The operation of adjusting the bias voltage and gain of AM2 is similar to AM1. 02-50 corresponds to 02-47, and 02-49 corresponds to 02-46.
- ◆ The output current/voltage of terminal AM2 is controlled by both the toggle switch SW4 on the control board and the parameter 02-48. The factory default value is 0~10V.

Note: When selecting AM2 output signal, please notice to switch SW4. If 4~20mA output current is selected, please switch SW4 to 0~20mA.

5.3.13 Display reference at the analog output

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

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

Setting Display reference

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

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

5.3.14 AM/FM fixed output level

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

Parameter	Name	Factory Value	Setting Range	Content
02-53 P.539	AM2 fixed output level	0.0%	0 ~ 100.0%	---
02-54 P.541	AM1/FMfixed output level	0.0%	0 ~ 100.0%	---



- ◆ The voltage/current of terminal AM is controlled by 02-53 and 02-54, 02-53 is set to 0~100.0%, which corresponds to 0~10V/20mA of AM2;set 02-54 to 0~100.0%, which corresponds to 0~10V/20mA of AM1;

For example:02-54(P.541) =50%, the output of AM1 is 10V*50%=5V.

5.3.15 PT100 level setting

➤ Sets PT100 protection level and operation frequency

Parameter	Name	Factory Value	Setting Range	Content	
02-55 P.592	PT100 voltage level 1	5.00V	0 ~ 10.00V	0	No PT100 level 1 protection.
				0.10V~10.00V	When PT100 is larger than level 1, after 02-58 (P.595) setting the time, the output frequency will decrease to 02-57(P.594).
02-56 P.593	PT100 voltage level 2	7.00V	0 ~ 10.00V	0	No PT100 level 2 protection.
				0.10V~10.00V	When PT100 is larger than level 2, it will operate according to the setting of 06-15(P.533)
02-57 P.594	PT100 level 1 starting frequency	0.00Hz	0 ~ 650.00Hz	When it is over PT100 level 1, the output frequency will decrease to02-57(P.594).	
02-58 P.595	Starting PT100 level 1 delay time	60s	0 ~ 6000s	The operation delay time for output frequency decreasing to02-57(P.594).	




PT100 level setting

- ◆ Viaanalogvoltage input, PT100 sets the voltage input range of 2-5/4-5/3-5 is0~10V(02-08=1;02-20=1;02-29=1, please pay attention to switch the voltage/current switch on control board to the position of voltage input), and sets analog voltage input to be used in PT100 function. (02-00,02-01,02-02 is set to 12).
- ◆ When the inverter is in operation state, the input voltage of PT100 is larger than the setting value of 02-55, after 02-58 setting the time, the output frequency of the inverter will decrease to the setting frequency of 02-57.
- ◆ When the input voltage of PT100 is larger than the setting value of 02-46, it will operate according to the setting of 06-15.

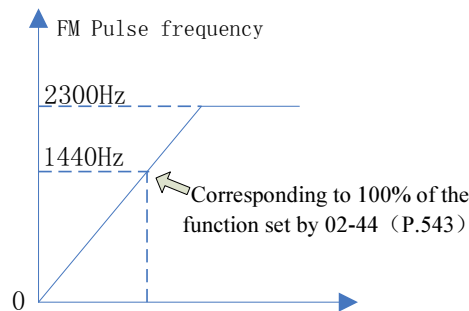
5.3.16 FM calibration parameter

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





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

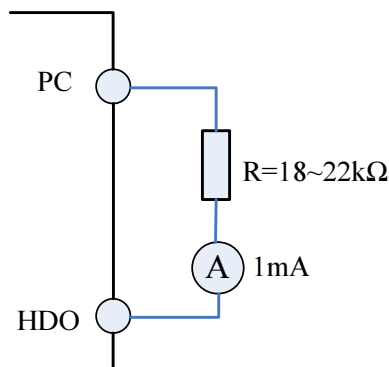
 FM calibration parameter

◆ The output of the terminal HDO with FM function is shown as follows:



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

1. Insert an electric meter with a full graduation or a frequency counter of 1mA across terminal HDO and terminal SD.Wiring as the following figure shown, and set 02-51 at 60Hz,02-44at 0.
2. Start the motor and fix the output frequency of the inverter to 60Hz.
- 3.When the motor runs steadily, read the set value of 02-59. At this point, the screen will display the FM correction index. Press  to adjust the value of 02-59. The screen will display a progressively increase of the FM correction index. Press  for more than 1 second, and the pointer will move upward. Press  to adjust the value of 02-59 downward, and the screen will display a progressively decrease of the FM correction index. Press  for more than 1 second and the pointer will move downward.



5.4 Digital input/ output parameter group03

Group	Parameter Number	Name	Setting Range	Factory Value	Page
03-00	P.83	STF function selection	0: STF(the inverter runs forward)	0	145
			1: STR(the inverter runs reverse)		
			2: RL(Multi-speed low speed)		
			3: RM(Multi-speed medium speed)		
			4: RH(multi-speed high speed)		
			5:AU(Analog terminal 4-5 priority)		
			6: The external thermal relay operation		
			7: MRS(the instantaneous stopping of the inverter output)		
			8: RT(the inverter second function)		
			9: EXT(external JOG)		
			10: STF+EXJ		
			11: STR+EXJ		
			12: STF+RT		
			13: STR+RT		
			14: STF+RL		
			15: STR+RL		
			16: STF+RM		
			17: STR+RM		
			18: STF+RH		
			19: STR+RH		
			20: STF+RL+RM		
			21: STR+RL+RM		
			22: STF+RT+RL		
			23: STR+RT+RL		
			24: STF+RT+RM		
			25: STR+RT+RM		
			26: STF+RT+RL+RM		
			27: STR+RT+RL+RM		
			28: RUN(the inverter runs forward)		
			29: STF/STR(it is used with RUN, when STF/STR is "on", the inverter runs reverse ; when STF/STR is "off", the inverter runs forward)		
			30: RES(external reset function)		
			31: STOP(it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)		
			32: REX(multi-speed set (16 levels))		
			33: PO(in "external mode", programmed operation mode is chosen)		
34: RES_E (external reset become valid only when the alarm goes off.)					

Group	Parameter Number	Name	Setting Range	Factory Value	Page
03-00	P.83	STF function selection	35: MPO (in "external mode" the manually operation cycle mode is chosen.)	0	145
			36: TRI(triangle wave function is chosen)		
			37: GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)		
			38: CS(Manual switch to commercial power supply)		
			39: STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.		
			40: P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input)		
			41: PWM setting frequency		
			42: Reserve		
			43: RUN_EN (the digital input terminal running enable)		
			44: PID_OFF (the digital input terminal stopping PID enable)		
			45: The second mode		
			46: Initial curling radius selection terminal 1		
			47: Initial curling radius selection terminal 2		
			48: Thickness selection terminal 1		
			49: Thickness selection terminal 2		
			50: Wind-up roll-down switching		
			51: Predrive reference		
			52: Torque memory		
			53: Torque memory enable		
			54: Turn counting signal (note1)		
			55: Switch speed/Torque control		
			56: Curling radius restore		
			57: High-speed pulse input function (note1)		
			58: Analog terminal 2-5 priority		
			59: Analog terminal 3-5 priority		
			60: Starting/Stopping of PLC		
			61: Origin retry enable function SHOM		
			62: Origin retry setting origin ORGP		
			63: Switch position/Speed control		
			64: External switch zero-servo		
			65: External accelerate/decelerate pause		
			66: External forced stop		
			67 : coil diameter calculation Stop		
68 : Single point positioning can make					
69 : Multipoint positioning can make					
70 : entire position control pulse input command can make					
71 : External torque command polarity reverse					
99999 : Not choose in addition of terminal function					
03-01	P.84	STRfunction selection	Same as 03-00	1	146

Digital input/ output parameter group 03

Group	Parameter Number	Name	Setting Range	Factory Value	Page
03-02	P.86	RES function selection	Same as 03-00	30	147
03-03	P.80	M0 function selection	Same as 03-00	2	147
03-04	P.81	M1 function selection	Same as 03-00	3	147
03-05	P.82	M2 function selection	Same as 03-00	4	147
03-06	P.126	M3 function selection	Same as 03-00	5	147
03-07	P.127	M4 function selection	Same as 03-00	8	147
03-08	P.128	M5 function selection	Same as 03-00	7	147
03-09	P.550	HDI terminal function	Same as 03-00	57	147
03-10	P.40	SO1-SE function	0: RUN(inverter running)	1	151
			1: SU(reaching the output frequency)		
			2: FU(output frequency detection)		
			3: OL(overload detection)		
			4: OMD(zero current detection)		
			5: ALARM(alarm detection)		
			6: PO1(programmed operation section detection)		
			7: PO2(programmed operation periodical detection)		
			8: PO3(programmed operation pause detection)		
			9: BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output)		
			10: GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)		
			11 : OMD1(zero current detection)		
			12 ~ 15: Reserve		
			16: Abnormal signal of fan		
17: RY(the accomplishment of inverter running preparation)					
18: Maintenance alarm detection					
19: OL2 (Over torque alarm output)					
20: Capacitor lifetime abnormal					
21: Position control position attained					
22 : Tension control curl pattern detection					
23 : Power marker detection					
03-11	P.85	A1-B1-C1 function	Same as 03-10	5	151
03-12	P.129	SO2-SE function	Same as 03-10	2	151
03-13	P.130	A2-B2-C2 function	Same as 03-10	0	151
03-14	P.87	Multi-function terminal digital input negative/positive logic	0 ~ 1023	0	153
03-15	P.88	Multi-function terminal digital output negative/positive logic (noumenon and slot3)	0 ~ 4095	0	153
03-16	P.120	Output signal delay time	0 ~ 3600.0s	0.0s	154
03-17	P.157	Digital input terminal filter time	0 ~ 2000ms	4ms	154
03-18	P.158	Digital input terminal power enable	0: Digital input terminal power unable	0	155
			1: Digital input terminal power enable		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
03-20	P.41	Up-to-frequency sensitivity	0 ~ 100.0%	10.0%	155
03-21	P.42	Output frequency detection for forward rotation	0 ~ 650.00Hz	6.00Hz	155
03-22	P.43	Output frequency detection for reverse rotation	0 ~ 650.00Hz	99999	155
			99999: Same as the setting of 03-21(P.42)		
03-23	P.62	Zero current detection level	0 ~ 200.0%	5.0%	156
			99999: Function invalid		
03-24	P.63	Zero current detection time	0 ~ 100.00s	0.50s	156
			99999: Function invalid		
03-25	P.551	Expanded digital input terminal M10(Slot3)	Same as 03-00	99999	157
03-26	P.552	Expanded digital input terminal M11(Slot3)	Same as 03-00	99999	157
03-27	P.553	Expanded digital input terminal M12(Slot3)	Same as 03-00	99999	157
03-28	P.554	Expanded digital input terminal M13(Slot3)	Same as 03-00	99999	157
03-29	P.555	Expanded digital input terminal M14(Slot3)	Same as 03-00	99999	157
03-30	P.556	Expanded digital input terminal M15(Slot3)	Same as 03-00	99999	157
03-33	P.559	Expanded digital input terminal M10(Slot2)	Same as 03-00	99999	157
03-34	P.560	Expanded digital input terminal M11(Slot2)	Same as 03-00	99999	157
03-35	P.561	Expanded digital input terminal M12(Slot2)	Same as 03-00	99999	157
03-36	P.562	Expanded digital input terminal M13(Slot2)	Same as 03-00	99999	157
03-37	P.563	Expanded digital input terminal M14(Slot2)	Same as 03-00	99999	157
03-38	P.564	Expanded digital input terminal M15(Slot2)	Same as 03-00	99999	157
03-41	P.567	Expanded digital input terminal negative/ positive logic (Slot2&3)	0 ~ 65535	0	158
03-42	P.568	Expanded digital output terminal A10(Slot3)	Same as 03-10	99999	158
03-43	P.569	Expanded digital output terminal A11(Slot3)	Same as 03-10	99999	158
03-44	P.570	Expanded digital output terminal A12(Slot3)	Same as 03-10	99999	158

Digital input/ output parameter group 03

Group	Parameter Number	Name	Setting Range	Factory Value	Page
03-45	P.571	Expanded digital output terminal A13(Slot3)	Same as 03-10	99999	158
03-46	P.572	Expanded digital output terminal A14(Slot3)	Same as 03-10	99999	158
03-47	P.573	Expanded digital output terminal A15(Slot3)	Same as 03-10	99999	18
03-48	P.574	Expanded digital output terminal A16(Slot3)	Same as 03-10	99999	158
03-49	P.575	Expanded digital output terminal A17(Slot3)	Same as 03-10	99999	158
03-50	P.576	Expanded digital output terminal A10(Slot2)	Same as 03-10	99999	159
03-51	P.577	Expanded digital output terminal A11(Slot2)	Same as 03-10	99999	159
03-52	P.578	Expanded digital output terminal A12(Slot2)	Same as 03-10	99999	159
03-53	P.579	Expanded digital output terminal A13(Slot2)	Same as 03-10	99999	159
03-54	P.580	Expanded digital output terminal A14(Slot2)	Same as 03-10	99999	159
03-55	P.581	Expanded digital output terminal A15(Slot2)	Same as 03-10	99999	159
03-56	P.582	Expanded digital output terminal A16(Slot2)	Same as 03-10	99999	159
03-57	P.583	Expanded digital output terminal A17(Slot2)	Same as 03-10	99999	159
03-58	P.584	Expanded digital output terminal negative/positive logic (Slot2)	0 ~ 255	0	159
03-59	P.585	Monitor noumenon digital input terminal state	Read	Read	160
03-60	P.586	Monitor noumenon and expanded Slot3 output terminal state	Read	Read	160
03-61	P.587	Monitor expanded Slot2&3 digital input terminal state	Read	Read	160
03-62	P.588	Monitor expanded Slot2 digital output terminal state	Read	Read	160

5.4.1 Function selection of digital input

- Use the following parameters to select or change the digital input terminal functions. Any function from 0 to 66 can be selected by each terminal (Note 1).

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

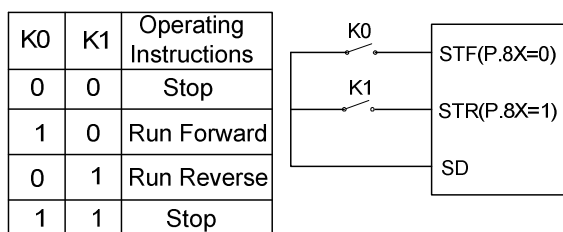
Parameter	Name	Factory Value	Setting Range	Content
03-00 P.83	STFfunction selection	0	34	RES_E (external reset become valid only when the alarm goes off.)
			35	MPO (in "external mode" the manually operation cycle mode is chosen.)
			36	TRI(triangle wave function is chosen)
			37	GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)
			38	CS(Manual switch to commercial power supply)
			39	STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.)
			40	P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input)
			41	PWM setting frequency
			42	Reserve
			43	RUN_EN (the digital input terminal running enable)
			44	PID_OFF (the digital input terminal stopping PID enable)
			45	The second mode
			46	Initial curling radius selection terminal 1
			47	Initial curling radius selection terminal 2
			48	Thickness selection terminal 1
			49	Thickness selection terminal 2
			50	Wind-up roll-down switching
			51	Predrive reference
			52	Torque memory
			53	Torque memory enable
			54	Turn counting signal (note1)
			55	Switch speed/Torque control
			56	Curling radius restore
			57	High-speed pulse input function (note1)
			58	Analog terminal 2-5 priority
			59	Analog terminal 3-5 priority
			60	Starting/Stopping of PLC
			61	Home moving function SHOM
			62	Origin position ORGP
			63	Position/Speed control switch
			64	External switch zero-servo
			65	External accelerate/decelerate pause
66	External forced stop			
67	coil diameter calculation Stop			
68	Single point positioning can make			
69	Multipoint positioning can make			
70	entire position control pulse input command can make			
71	External torque command polarity reverse			
			99999	Not choose in addition of terminal function
03-01 P.84	STRfunction selection	1	Same as 03-00	Same as 03-00

Parameter	Name	Factory Value	Setting Range	Content
03-02 P.86	RESfunction selection	30	Same as 03-00	Same as 03-00
03-03 P.80	M0 function selection	2	Same as 03-00	Same as 03-00
03-04 P.81	M1 function selection	3	Same as 03-00	Same as 03-00
03-05 P.82	M2 function selection	4	Same as 03-00	Same as 03-00
03-06 P.126	M3 function selection	5	Same as 03-00	Same as 03-00
03-07 P.127	M4 function selection	8	Same as 03-00	Same as 03-00
03-08 P.128	M5 function selection	7	Same as 03-00	Same as 03-00
03-09 P.550	HDI terminal function	57	Same as 03-00	Same as 03-00

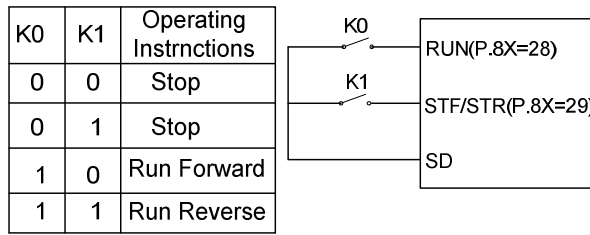
Setting Function selection of digital input

- ◆ The default value are 03-03=2(RL), 03-04=3(RM), 03-05=4(RH), 03-00=0(STF), 03-01=1(STR), 03-02=30(RES), 03-06=5(AU), 03-09=57(HDI_FRQ).
- ◆ If the setting of 03-01~03-03, 03-06 and 03-09 are changed, the functions of the terminals are modified too. For example, when 03-03 is equal to 2, the M0 terminal is used for RL. When 03-03 is changed to 8, than the M0 terminal function will be changed to RT, i.e., the second function selection terminal. Take another example, if 03-00 is equal to 0, the STF terminal will be STF forward rotation function. When 03-00 is changed to 6, then STF terminal function will be changed OH, i.e., the external thermal relay terminal.
- ◆ Analog terminal 4-5 priority
When the contact is ON, the source of external frequency will force to be 4-5. (If the frequency commands are set to 4-5, 2-5 and 3-5at the same time, the priority is 2-5 > 4-5 > 3-5).
- ◆ Wiring for the external thermal relay (OH): for the conventional motor wiring, the external thermal relay is often placed at the front of the motor to prevent the motor from overheating. When the external thermal relay is separated, the alarm of the inverter will be tripped off and "OHT" will be displayed on the screen.
- ◆ The operation of the inverter can be controlled by four means ("1" for terminal close, "0" for terminal open, and X = 0, 1, 2, 3, 4, 6).

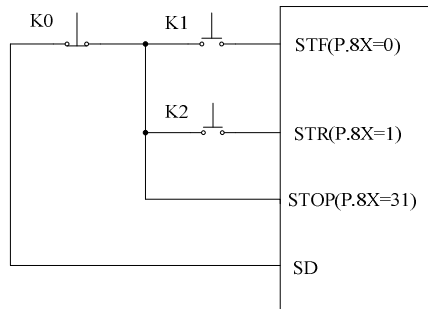
1) Two-wire control mode 1:



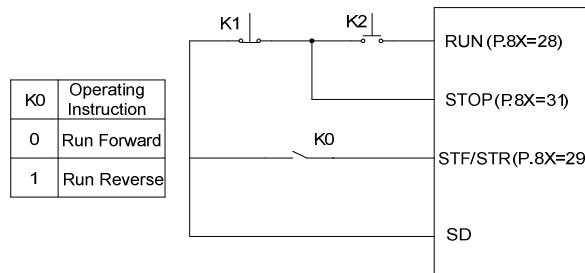
2) Two-wire control mode 2:



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



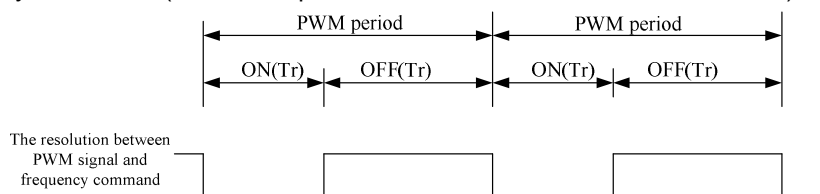
◆ Three-wire control mode 2 (with self-maintenance function): K1 is for the STOP function that is normally close. When it is open, the inverter will stop. K2 is the RUN signal that is normally open. It indicates that pulse signal is active, i.e., jog is valid. For the direction changing signal (STF/STR),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



◆ In “external mode” and when PO is “on”, select the programmed operation mode. At this stage, the STF terminal is the source of the start signal. When STF is “on”, the inverter begins to run in the programmed operation mode at the first section. When STF is “off”, the invert stops running, and STR becomes the pause signal source. When STR is “on”, the operation will be suspended. When STR is “off”, the operation will be continued (continues from the suspended section). For details, please refer to 04-15, 04-27~04-42, 04-16~04-18 and 04-19~04-26.

◆ In the external mode, the manual operation cycle mode is selected when MPO is “on”. For details on parameter, please refer to 04-19~04-26.

◆ PWM setting frequency (03-09 = 41): the inverter will measure and calculate the time of ON and OFF every PWM period as the frequency reference. (The PWM period within 0.9ms ~ 1100ms admissible)

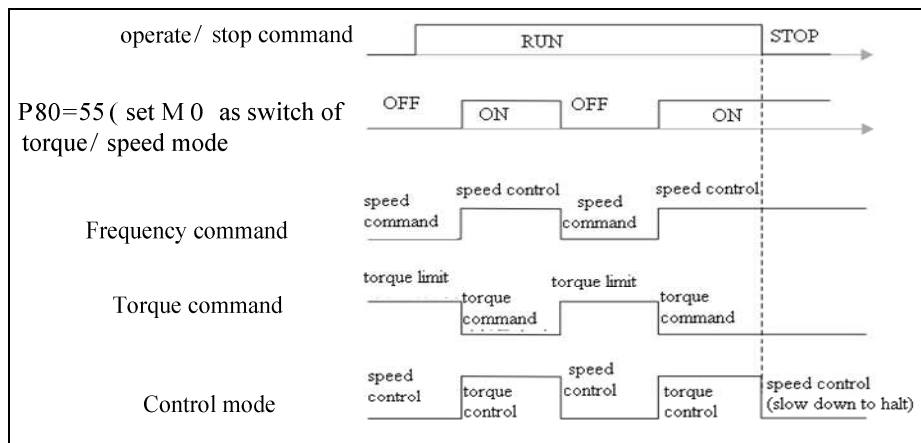


$$\text{Frequency command (Hz)} = \frac{\text{ON time}}{\text{PWM period}} \times \text{upper limit frequency P.1 (Hz)}$$

The function is only valid for the terminal HDI. Near the minimum frequency and the maximum frequency, the precision of the output frequency will be reduced relative to the input signal, please avoid using on the occasion needed rigorous frequency control.

- ◆ As the high-speed pulse input terminal, HDI is used to give the target frequency, please refer to 5.3.8.
- ◆ When 03-09 = 54, the function is under the tension control mode and it is used to calculate the turns of the winding shaft rotation when calculating the curling radius with the sickness accumulation method.
- ◆ Digital input terminals switch “speed/torque control”: when switch speed-control to torque-control, torque limit turns to Torque reference, and speed reference turns to speed limit. When return torque control back to speed control, Torque reference turns to torque limit, and speed limit turns to speed reference. If you operate the switch of speed control/ torque control, please be in the mode of closed-loop vector speed control (00-21=4, 5) and set 00-20=0. If you set 00-20=1 and digital input terminals=55 at the same time, the switch function will be invalid and only torque-control operates.
- ◆ Digital input terminals switch “speed/position control”, please be in the mode of closed-loop vector speed control (00-21(P.300)=4), and set 00-20(P.400)=2. If you set 00-20(P.400)=0,1, and digital input terminals=63 at the same time, the position control doesn't operate and only speed control or torque control operates.

The figure as below:

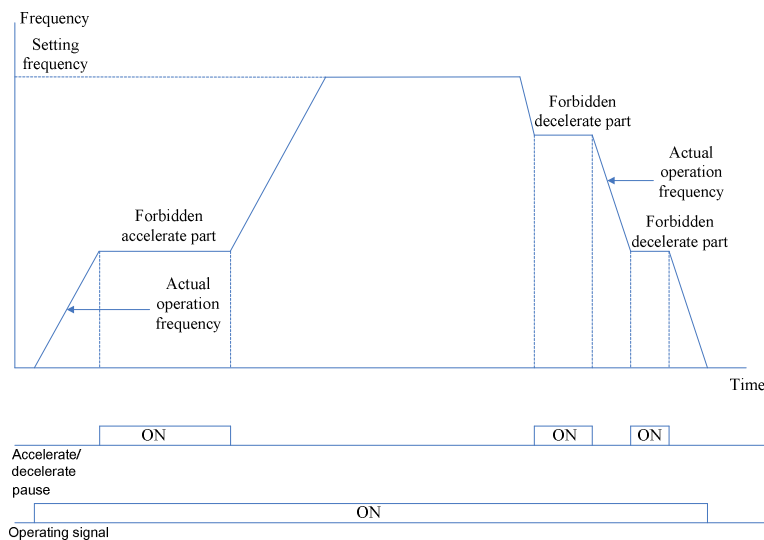


- ◆ Analog terminal 2-5 priority
When the contact is ON, the source of external frequency will force to be 2-5. (If the frequency commands are set to 4-5, 2-5 and 3-5 at the same time, the priority is 2-5 > 4-5 > 3-5).
- ◆ Analog terminal 3-5 priority
When the contact is ON, the source of external frequency will force to be 3-5. (If the frequency commands are set to 4-5, 2-5 and 3-5 at the same time, the priority is 2-5 > 4-5 > 3-5).
- ◆ Starting/stopping of PLC
When the contact is ON, internal PLC starts; when it is OFF, PLC stops.
- ◆ Home moving function SHOM
When the contact is ON, as SHOM signal is activated, home moving function would be executed.
- ◆ Origin reset set origin ORGP
ORGP origin input. When the switch of this function operates, the inverter will execute the home moving function according to 12-00, 12-01 and 12-02.
- ◆ External switch zero-servo
When the contact is ON, zero-servo function is valid.

◆ The second mode

When the contact is ON, and function and parameter 00-16(P.79)=99999, the second mode is the same which is selected, the operation instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97).

◆ When executing the external accelerate/decelerate pause function, the inverter will stop accelerating or decelerating at once. When removing the instruction, the inverter will go on accelerating/decelerating from the forbidden point.



◆ External forced stop

When the contact is ON, the driver will forced stop according to the setting of 00-13(P.71).

◆ point positioning

Details please refer to the 5.13.4 single point positioning function.

◆ Multipoint positioning

Multipoint positioning is based on single point positioning, setting function for more of the external terminals can make (03-03 = 68 , 01-04 = 69), single point positioning movement after completion of execution, if the multipoint positioning terminal can make, the frequency converter based on multistage position terminal condition (REX, RH, RM, RL) inverter circuit within 15 paragraph positioning function, don't walk deceleration curve, the number of pulses positioning multi-segment location instructions (12-21,12-23...), please refer to the specific parameter setting 5.13.5.

◆ Entire pulse position control

In a speed control based ON embedded terminal function, when the terminals ON the inverter switch for Pt position control mode, and the position control of Pt difference only lies in this mode without setting 00-20 (P.400) = 2, other are consistent).

◆ External torque command polarity reverse

Through the input terminal of the on/off switch to the direction of rotation of the torque instruction.

Note: The setting valve of “41”, “54” and “57” is for HDI terminal only.

5.4.2 Function selection of digital output

➤ Detect the message during the inverter operation.

Parameter	Name	Factory	Setting Range	Content
-----------	------	---------	---------------	---------

		Value		
03-10 P.40	SO1-SE function	1	0	RUN(inverter running)
			1	SU(reaching the output frequency)
			2	FU(output frequency detection)
			3	OL(overload detection)
			4	OMD(zero current detection): when the percentage of the output current is lower than the setting value of 03-23(P.62), and exceeds a period of time (03-24(P.63)), OMD will output signal.
			5	ALARM(alarm detection)
			6	PO1(programmed operation section detection)
03-10 P.40	SO1-SE function	1	7	PO2(programmed operation periodical detection)
			8	PO3(programmed operation pause detection)
			9	BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output)
			10	GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)
			11	OMD1(zero current detection): When the inverter output frequency reaches the target frequency, and the percentage of the output current is lower than the setting value of 03-23(P.62), and exceeds a period of time (03-24(P.63) setting), OMD1 will output signal.
			12 ~ 15	Reserve
			16	Abnormal signal of fan
			17	RY(the accomplishment of inverter running preparation)
			18	Maintenance alarm detection
			19	OL2 (Over torque alarm output)
			20	Capacitor lifetime abnormal
			21	Position control position attained
			22	Tension control curl pattern detection
			23	Power marker detection
03-11 P.85	A1-B1-C1 function	5	Same as 03-10(P.40)	Same as 03-10(P.40)
03-12 P.129	SO2-SE function	2	Same as 03-10(P.40)	Same as 03-10(P.40)
03-13 P.130	A2-B2-C2 function	0	Same as 03-10(P.40)	Same as 03-10(P.40)

Setting Function selection of digital output

- ◆ For the multi-function digital output terminal SO1, the default value of 03-10 is 1 which means the “SU” function. When changing the value of 03-10, the corresponding function will change as shown in the above table.
- ◆ For the multi-function digital output terminal SO2, the default value of 03-12 is 2 which means the “FU” function. When changing the value of 03-12, the corresponding function will change as shown in the above table.
- ◆ The internal structures for multi-function digital output terminals SO1/SO2-SE are “open collector output.” Please refer to Section 3.7 and Section 3.7.6.

Digital input/ output parameter group 03

- ◆ For multi-function relay A1-B1-C1, the default setting value of 03-11 is 5 (i.e., the alarm function). When the value of 03-11 is revised, its function will change respectively according to the function listed in the table above.
- ◆ For multi-function relay A2-B2-C2, the default setting value of 03-13 is 0 (i.e., the run function). When the value of 03-13 is revised, its function will change respectively according to the function listed in the table above.

5.4.3 Terminal logic selection

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

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

Setting Digital input/output logic

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

bit									
2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
HDI	M5	M4	M3	RES	M2	M1	M0	STR	STF

For example: A three-wire control type needs the function of STOP to be kept open (negative logic). So if set 03-03(P.80)=31, take M0 terminal as three-wire control STOP function, and 03-03(P.80)=0, 03-01(P.84)=1, and take STF and STR terminals as default positive/negative logic function, the parameter of 03-14(P.87) should be set as follows:

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

So (03-14)P.87= $0 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 4$

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

bit											
2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
ABC17	ABC16	ABC15	ABC14	ABC13	ABC12	ABC11	ABC10	ABC2	SO2	ABC1	SO1
								SLOT3 expanded digital output			

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

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

5.4.4 Output signal delay

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

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


 Setting Output signal delay

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

5.4.5 Digital input terminal filter

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

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

 Setting Digital input terminal filter

- ◆ 03-17 is used to select response time to the signal of digital input terminals, and its action range including: STR, STF, RES, HDI, M0, M1, M2, and M3, M4, M5 and expanded SLOT2/SLOT3 digital input digital except for HDI when it is input as high-speed pulse. And the actual delay time is 03-17*2ms. For example, if 03-17=100, the actual delay time is 200ms.

5.4.6 Digital input terminal power enable

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

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

Setting Digital input terminal power enable

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

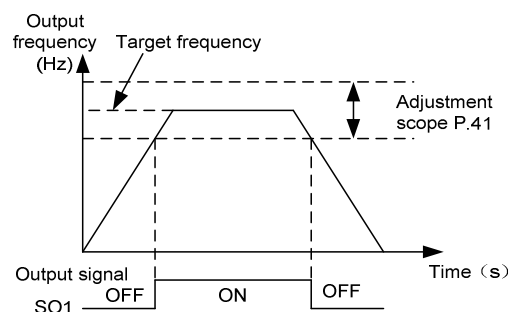
5.4.7 Output frequency detection

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

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

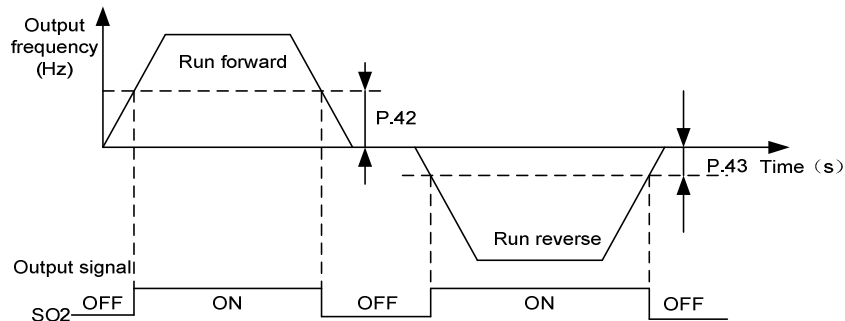
Setting Up-to-frequency sensitivity

- ◆ If 03-20=5%, when the output frequency enters the “5% region near the target frequency”, it will send out SU signals. For example, when the target frequency is set to 60Hz and 03-20=5%, then if the output frequency is between $60 \pm 60 \times 5\% = 57\text{Hz}$ and 63Hz, a SU signal will be sent out.



Setting Output frequency detection for forward / reverse rotation

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



Note: In this paragraph, SU, FU is the function name for “multi-function digital output terminal”SO1, SO2. Please refer to 03-10 ~ 03-13. For wiring, please refer to Section 3.5.

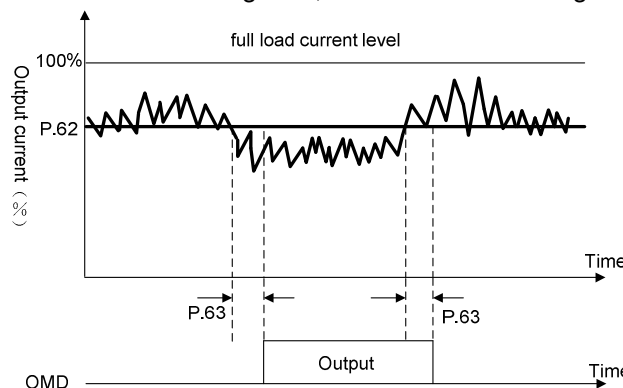
5.4.8 Zero current detection

- Detects the output frequency to the output terminal.

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

Setting Zero current detection

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



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

Note: In this paragraph, OMD is the function name for “multi-function digital output terminal”. Please refer to 03-10, 03-10~03-13. For wiring, please refer to Section 3.5.

5.4.9 Function selection of expanded digital input terminal SLOT3

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

Parameter	Name	Factory Value	Setting Range	Content
03-25 P.551	Expanded digital input terminal M10(SLOT3)	99999	Same as 03-00	Same as 03-00
03-26 P.552	Expanded digital input terminal M11(SLOT3)	99999	Same as 03-00	Same as 03-00
03-27 P.553	Expanded digital input terminal M12(SLOT3)	99999	Same as 03-00	Same as 03-00
03-28 P.554	Expanded digital input terminal M13(SLOT3)	99999	Same as 03-00	Same as 03-00
03-29 P.555	Expanded digital input terminal M14(SLOT3)	99999	Same as 03-00	Same as 03-00
03-30 P.556	Expanded digital input terminal M15(SLOT3)	99999	Same as 03-00	Same as 03-00

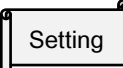
 Expanded digital input terminal SLOT3

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

5.4.10 Function selection of expanded digital input terminal SLOT2

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

Parameter	Name	Factory Value	Setting Range	Content
03-33 P.559	Expanded digital input terminal M10(SLOT2)	99999	Same as 03-00	Same as 03-00
03-34 P.560	Expanded digital input terminal M11(SLOT2)	99999	Same as 03-00	Same as 03-00
03-35 P.561	Expanded digital input terminal M12(SLOT2)	99999	Same as 03-00	Same as 03-00
03-36 P.562	Expanded digital input terminal M13(SLOT2)	99999	Same as 03-00	Same as 03-00
03-37 P.563	Expanded digital input terminal M14(SLOT2)	99999	Same as 03-00	Same as 03-00
03-38 P.564	Expanded digital input terminal M15(SLOT2)	99999	Same as 03-00	Same as 03-00

 Expanded digital input terminal SLOT2

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

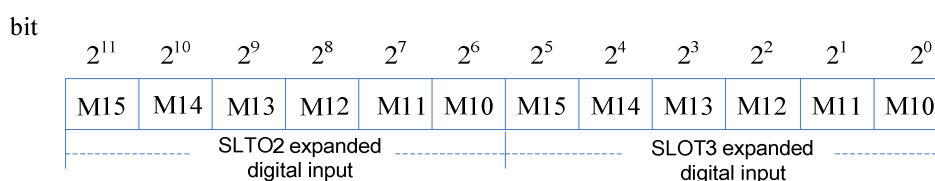
5.4.11 Expanded digital input terminal logic selection

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

Parameter	Name	Factory Value	Setting Range	Content
03-41 P.567	Expanded digital input terminal negative/ positive logic (Slot2&3)	0	0 ~ 65535	---

Setting Expanded digital input terminal logic

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



5.4.12 Function selection of expanded digital output terminal SLO3

- Detect the message during the inverter operation.

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

Setting Expanded digital output terminal function SLO3

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

5.4.13 Function selection of expanded digital output terminal SLOT3

- Detect the message during the inverter operation.

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

Setting Expanded digital output terminal function SLOT2

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

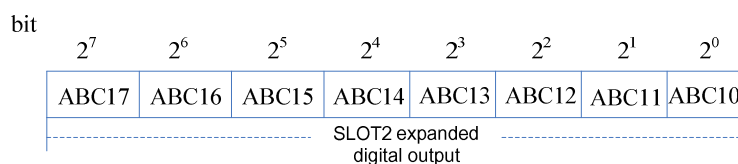
5.4.14 Expanded digital output terminal logic selection

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

Parameter	Name	Factory Value	Setting Range	Content
03-58 P.584	Expanded digital output terminal negative/positive logic (Slot2)	0	0 ~ 255	---

Setting Expanded digital output terminal logic

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



5.4.15 Digital input / output terminal monitor

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

Parameter	Name	Factory Value	Setting Range	Content
03-59 P.585	Monitor noumenon digital input terminal state	Read	Read	---
03-60 P.586	Monitor noumenon and expanded SLOT3 output terminal state	Read	Read	---
03-61 P.587	Monitor expanded SLOT2&3 digital input terminal state	Read	Read	---
03-62 P.588	Monitor expanded SLOT2 digital output terminal state	Read	Read	---

Read Digital input / output terminal state

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

Each bit corresponded input terminal of 03-59:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	HDI	M5	M4	M3	RES	M2	M1	M0	STR	STF

Each bit corresponded output terminal of 03-60:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	A17	A16	A15	A14	A13	A12	A11	A10	ABC2	SO2	ABC1	SO1

----- SLOT3 expanded digital output -----

Each bit corresponded input terminal of 03-61:

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

----- SLTO2 expanded digital input ----- ----- SLOT3 expanded digital input -----

Each bit corresponded output terminal of 03-62:

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

----- SLOT2 expanded digital output -----

Example:**Input terminal:**

Set 03-00 = 0(STF), forward rotation signal;03-03 = 5(M0), Analog terminal 4-5priority, other terminals are default set to the factory value. After digital input terminal STF and M0 close,the inverter operates in forward rotationaccording to the frequency given by 4-5.Each bit state of 03-59 is as follows, indicating the operation of STF andM0.

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

So $03-59 = 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 5$

Output terminal:

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

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

So $03-62 = 1 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 129$

5.5 Multi-speed parameter group 04


Group	Parameter Number	Name	Setting Range	Factory Value	Page
04-00	P.4	Speed1(high speed)	0 ~ 650.00Hz	60.00Hz	164
04-01	P.5	Speed2(mediumspeed)	0 ~ 650.00Hz	30.00Hz	164
04-02	P.6	Speed3(low speed)	0 ~ 650.00Hz	10.00Hz	164
04-03	P.24	Speed4	0 ~ 650.00Hz	99999	164
			99999: Function invalid		
04-04	P.25	Speed5	Same as 04-03	99999	164
04-05	P.26	Speed6	Same as 04-03	99999	164
04-06	P.27	Speed7	Same as 04-03	99999	164
04-07	P.142	Speed8	Same as 04-03	99999	164
04-08	P.143	Speed9	Same as 04-03	99999	164
04-09	P.144	Speed10	Same as 04-03	99999	164
04-10	P.145	Speed11	Same as 04-03	99999	164
04-11	P.146	Speed12	Same as 04-03	99999	164
04-12	P.147	Speed13	Same as 04-03	99999	164
04-13	P.148	Speed14	Same as 04-03	99999	164
04-14	P.149	Speed15	Same as 04-03	99999	164
04-15	P.100	Minute/second selection	0: The minimum increment of run time is 1 minute.	1	166
			1: The minimum increment of run time is 1 second.		
04-16	P.121	Run direction in each section	0 ~ 255	0	166
04-17	P.122	Cycle selection	0: Cycle function invalid	0	166
			1 ~ 8: Run circularly from the settingsection.		
04-18	P.123	Acceleration/deceleration time setting selection	0: The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8).	0	166
			1: The acceleration and deceleration time is both determined by 04-35(P.111) ~ 04-42(P.118).		
04-19	P.131	Programmed operation mode speed 1	0 ~ 650.00Hz	0.00 Hz	166
04-20	P.132	Programmed operation mode speed 2	0 ~ 650.00Hz	0.00 Hz	166
04-21	P.133	Programmed operation mode speed3	0 ~ 650.00Hz	0.00 Hz	166
04-22	P.134	Programmed operation mode speed 4	0 ~ 650.00Hz	0.00 Hz	166
04-23	P.135	Programmed operation mode speed 5	0 ~ 650.00Hz	0.00 Hz	166
04-24	P.136	Programmed operation mode speed 6	0 ~ 650.00Hz	0.00 Hz	166
04-25	P.137	Programmed operation mode speed 7	0 ~ 650.00Hz	0.00 Hz	166
04-26	P.138	Programmed operation mode speed 8	0 ~ 650.00Hz	0.00 Hz	166

Group	Parameter Number	Name	Setting Range	Factory Value	Page
04-27	P.101	Programmed operation mode speed 1 operating time	0 ~ 6000.0s	0.0s	166
04-28	P.102	Programmed operation mode speed 2 operating time	0 ~ 6000.0s	0.0s	166
04-29	P.103	Programmed operation mode speed3 operating time	0 ~ 6000.0s	0.0s	166
04-30	P.104	Programmed operation mode speed 4 operating time	0 ~ 6000.0s	0.0s	167
04-31	P.105	Programmed operation mode speed 5 operating time	0 ~ 6000.0s	0.0s	167
04-32	P.106	Programmed operation mode speed 6 operating time	0 ~ 6000.0s	0.0s	167
04-33	P.107	Programmed operation mode speed 7 operating time	0 ~ 6000.0s	0.0s	167
04-34	P.108	Programmed operation mode speed 8 operating time	0 ~ 6000.0s	0.0s	167
04-35	P.111	Programmed operation mode speed 1 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-36	P.112	Programmed operation mode speed 2 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-37	P.113	Programmed operation mode speed 3 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-38	P.114	Programmed operation mode speed 4 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-39	P.115	Programmed operation mode speed 5 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-40	P.116	Programmed operation mode speed 6 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-41	P.117	Programmed operation mode speed 7Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
04-42	P.118	Programmed operation mode speed 8 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167

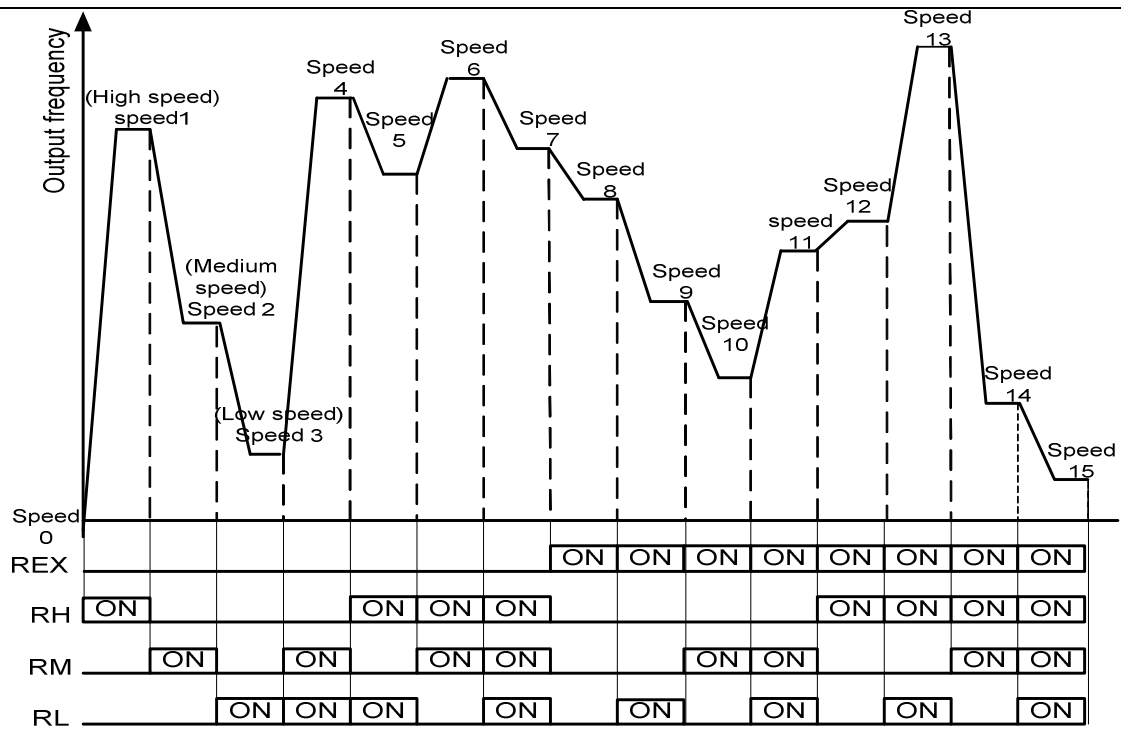
5.5.1 16 speeds

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

Parameter	Name	Factory Value	Setting Range	Content
04-00 P.4	Speed1(high speed)	60.00Hz	0 ~ 650.00Hz	---
04-01 P.5	Speed2 (mediumspeed)	30.00Hz	0 ~ 650.00Hz	---
04-02 P.6	Speed3(low speed)	10.00Hz	0 ~ 650.00Hz	---
04-03 P.24	Speed4	99999	0 ~ 650.00Hz	---
			99999	99999: Function invalid
04-04 P.25	Speed5	99999	Same as 04-03	Same as 04-03
04-05 P.26	Speed6	99999	Same as 04-03	Same as 04-03
04-06 P.27	Speed7	99999	Same as 04-03	Same as 04-03
04-07 P.142	Speed8	99999	Same as 04-03	Same as 04-03
04-08 P.143	Speed9	99999	Same as 04-03	Same as 04-03
04-09 P.144	Speed10	99999	Same as 04-03	Same as 04-03
04-10 P.145	Speed11	99999	Same as 04-03	Same as 04-03
04-11 P.146	Speed12	99999	Same as 04-03	Same as 04-03
04-12 P.147	Speed13	99999	Same as 04-03	Same as 04-03
04-13 P.148	Speed14	99999	Same as 04-03	Same as 04-03
04-14 P.149	Speed15	99999	Same as 04-03	Same as 04-03

 16 speeds

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



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

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

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

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

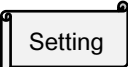
2. RL, RM, RH and REX mentioned in this section are the function names of the “multi-function digital input terminal”. (For example, when 03-03=2, select the M0 terminal to perform the RL (function). Please refer to 03-00~03-06 and 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

5.5.2 Programmed operation mode

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

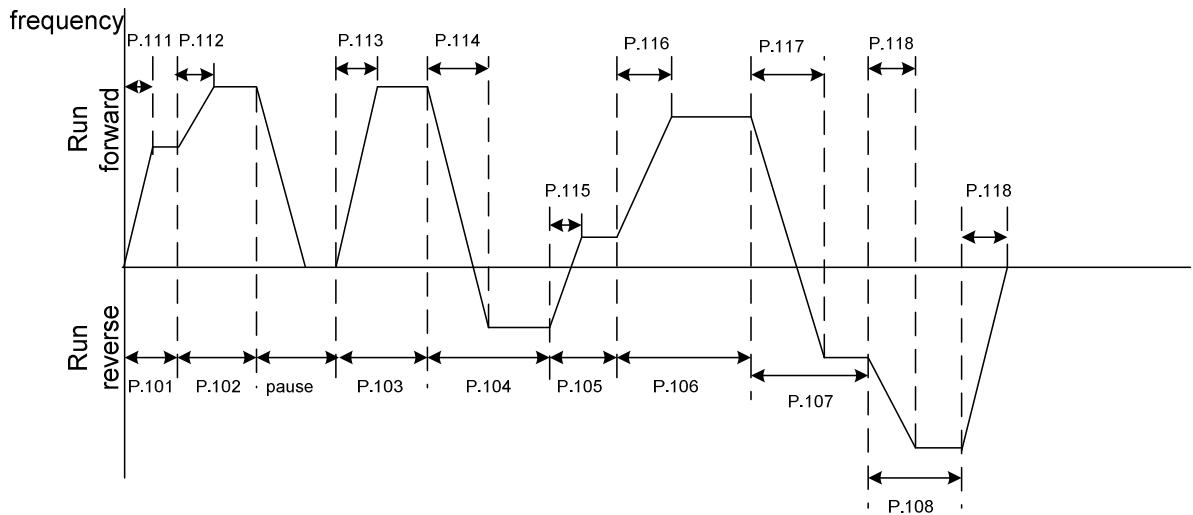
Parameter	Name	Factory Value	Setting Range	Content
04-15 P.100	Minute/second selection	1	0	The minimum increment of run time is 1 minute.
			1	The minimum increment of run time is 1 second.
04-16 P.121	Run direction in each section	0	0 ~ 255	0 ~ 255
04-17 P.122	Cycle selection	0	0	0: Cycle function invalid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

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

 Programmed operation mode

◆ Programmed operation mode

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



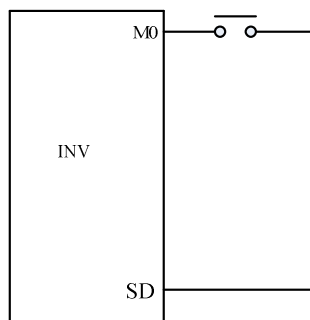
- The run direction is set in binary form (8-bit), and then translated to decimal form and stored in 04-16. "1" means run forward, and "0" means run reverse. The highest bit is the run direction of section 8, while the lowest bit is the direction of the section 1.

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

$$04-16 = 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 105$$

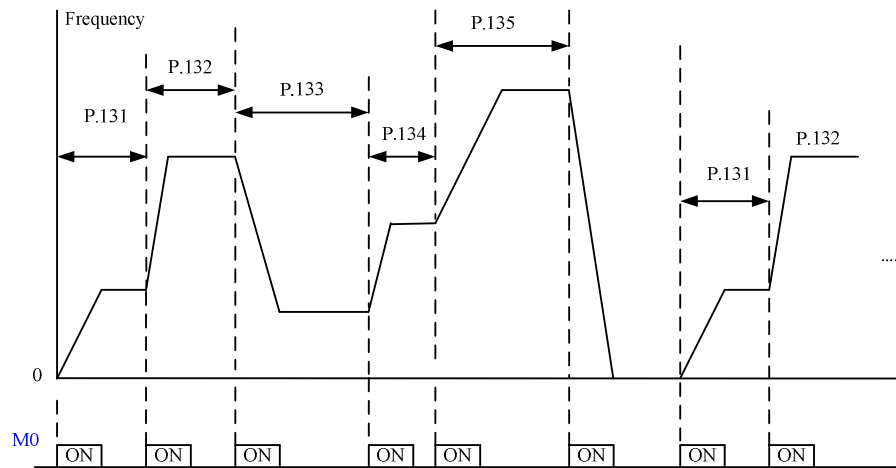
- When 04-16=0, it will not run in circular motion.
- When 04-17 is 1~8, it is the initial sectional speed at the beginning of the cycle.
For example: When 04-17=3, the inverter will run circularly from the third section to the eighth section after it finishes its running from the first section to the eighth section.
- When 04-18 = 0, the acceleration time is determined by 01-06, and the deceleration time is determined by 01-07.
- When 04-18 = 1, the acceleration time and deceleration time are both determined by 04-35~04-42.

◆ Manual operation cycle mode



Wiring diagram for manual operation cycle mode

- Insert an impulse type switch between M0 and SD.
- After turning on the power, according to terminals wiring, set corresponding parameter 03-03 to 35. The inverter is on standby at this point.
- The mode of operation is shown in the figure below:



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

5.6 Motor parameter group 05

Group	Parameter Number	Name	Setting Range	Factory Value	Page
05-00	P.301	Motor parameter auto-tuning function selection	0: Parameter auto-tuning function with no motor	0	173
			1: Induction motor parameter auto-tuning measuring the running motor		
			2: Induction motor parameter auto-tuning measuring the stopped motor		
			3: Induction motor online auto-tuning function		
			4: Induction motor the system inertia auto-tuning measuring in the mode of closed loop vector control		
			5 : Induction motor parameters automatic measurement [Measurement of motor is not running]		
			8: Synchronous motor parameter auto-tuning function		
			9: Synchronous motor Phase Z position auto-tuning function		
			10: Synchronous motor the rotation inertia auto-tuning function.		
05-01	P.302	Motor rated power	0 ~ 650.00kW	0.00kW	176
05-02	P.303	Motor poles	0 ~ 48	4	176
05-03	P.304	Motor rated voltage	440 Voltage : 0 ~ 510V	According to voltage	176
			220 Voltage : 0~255V		
05-04	P.305	Motor rated frequency	50Hz system: 0 ~ 650.00Hz	50.00Hz	176
			60Hz system: 0 ~ 650.00Hz	60.00Hz	
05-05	P.306	Motor rated current	0~500.00A: Types below Frame G	According to type	176
			0~5000.0A: Frame G and types above		
05-06	P.307	Motor rated rotation speed	50Hz system: 0 ~ 65000r/min	1410r/min	176
			60Hz system: 0 ~ 65000r/min	1710r/min	
05-07	P.308	Motor excitation current	0~500.00A: Types below Frame G	According to type	176
			0~5000.0A: Frame G and types above		
05-08	P.309	IM motor stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
05-09	P.310	IM motor rotor resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
05-10	P.311	IM motor leakage inductance	0 ~ 6500.0mH: 45K/55KF and types below	According to type	176
			0 ~ 650.00mH: 55K/75KF and types above		
05-11	P.312	IM motor mutual inductance	0 ~ 6500.0mH: 45K/55KF and types below	According to type	176
			0 ~ 650.00mH: 55K/75KF and types above		
05-12	P.313	PM motor stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
05-13	P.314	PM motor d-axis inductance	0 ~ 650.00mH	According to type	176
05-14	P.315	PM motor q-axis inductance	0 ~ 650.00mH	According to type	176

Group	Parameter Number	Name	Setting Range	Factory Value	Page
05-15	P.316	PM motor Back-EMF coefficient	0 ~ 6500.0V/krpm	According to type	176
05-16	P.317	PM motor PhaseZ origin pulse compensation	0 ~ 359.9°	0.0°	176
05-17	P.318	Rotation inertia	0 ~ 6.5000kg.m ² :5.5K/7.5KF and types below	According to type	176
			0 ~ 65.000kg.m ² : 7.5K/11KF~ 90K/110KF types		
			0 ~ 650.00kg.m ² : 110K/132KF and types above		
05-18	P.631	Inertia self-learning setting T1	0 ~ 05-19(P.632) %	30.0%	178
05-19	P.632	Inertia self-learning setting T2	05-18(P.631) ~ 100.0%	60.0%	178
05-22	P.332	The second motor rated power	0 ~ 650.00kW	99999	178
			99999		
05-23	P.333	The second motor poles	0 ~ 48	99999	178
			99999		
05-24	P.334	The second motor rated voltage	440Voltage : 0 ~ 510V	99999	178
			220Voltage : 0~255V		
05-25	P.335	The second motor rated frequency	0 ~ 650.00Hz	99999	178
			99999		
05-26	P.336	The second motor rated current	0~500.00A: Types below Frame G	99999	178
			0~5000.0A: Frame G and types above		
			99999		
05-27	P.337	The second motor rated rotation speed	0 ~ 65000r/min	99999	178
			99999		
05-28	P.338	The second motor excitation current	0~500.00A: Types below Frame G	99999	178
			0~5000.0A: Frame G and types above		
			99999		
05-29	P.339	The second motor (IM)stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	179
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
05-30	P.340	The second motor (IM)rotor resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	178
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
05-31	P.341	The second motor (IM)leakage inductance	0 ~ 6500.0mH: 45K/55KF and types below	99999	179
			0 ~ 650.00mH: 55K/75KF and types above		
			99999		
05-32	P.342	The second motor (IM)mutual inductance	0 ~ 6500.0mH: 45K/55KF and types below	99999	179
			0 ~ 650.00mH: 55K/75KF and types above		
			99999		
05-33	P.343	The second motor (PM) stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	179
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
05-34	P.344	The second motor (PM) d-axis inductance	0 ~ 650.00mH	99999	179
			99999		

Motor parameter group 05

Group	Parameter Number	Name	Setting Range	Factory Value	Page
05-35	P.345	The second motor (PM)q-axis inductance	0 ~ 650.00mH	99999	179
			99999		
05-36	P.346	The second motor (PM) Back-EMF coefficient	0 ~ 6500.0V/krpm	99999	179
			99999		
05-37	P.347	The second motor (PM) PhaseZ origin pulse compensation	0 ~ 359.9°	99999	179
			99999		
05-38	P.348	The second motor rotation inertia	0 ~ 6.5000kg.m ² : 5.5K/7.5KF and types below	99999	179
			0 ~ 65.000kg.m ² : Types from 7.5K/11KF to 90K/110KF		
			0 ~ 650.00kg.m ² : 110K/132KF and types above		
			99999		

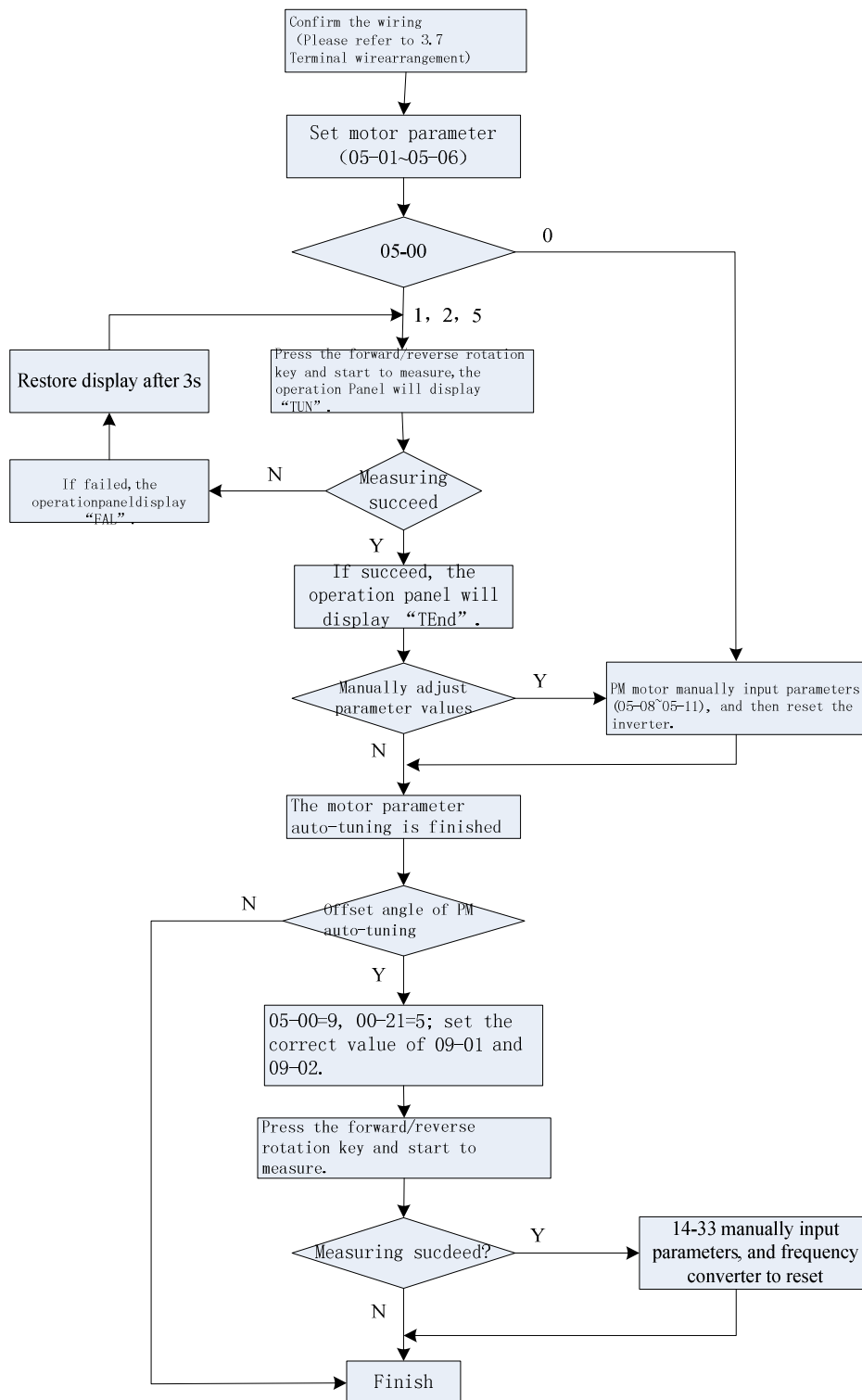
5.6.1 Motor parameter auto-tuning function selection

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

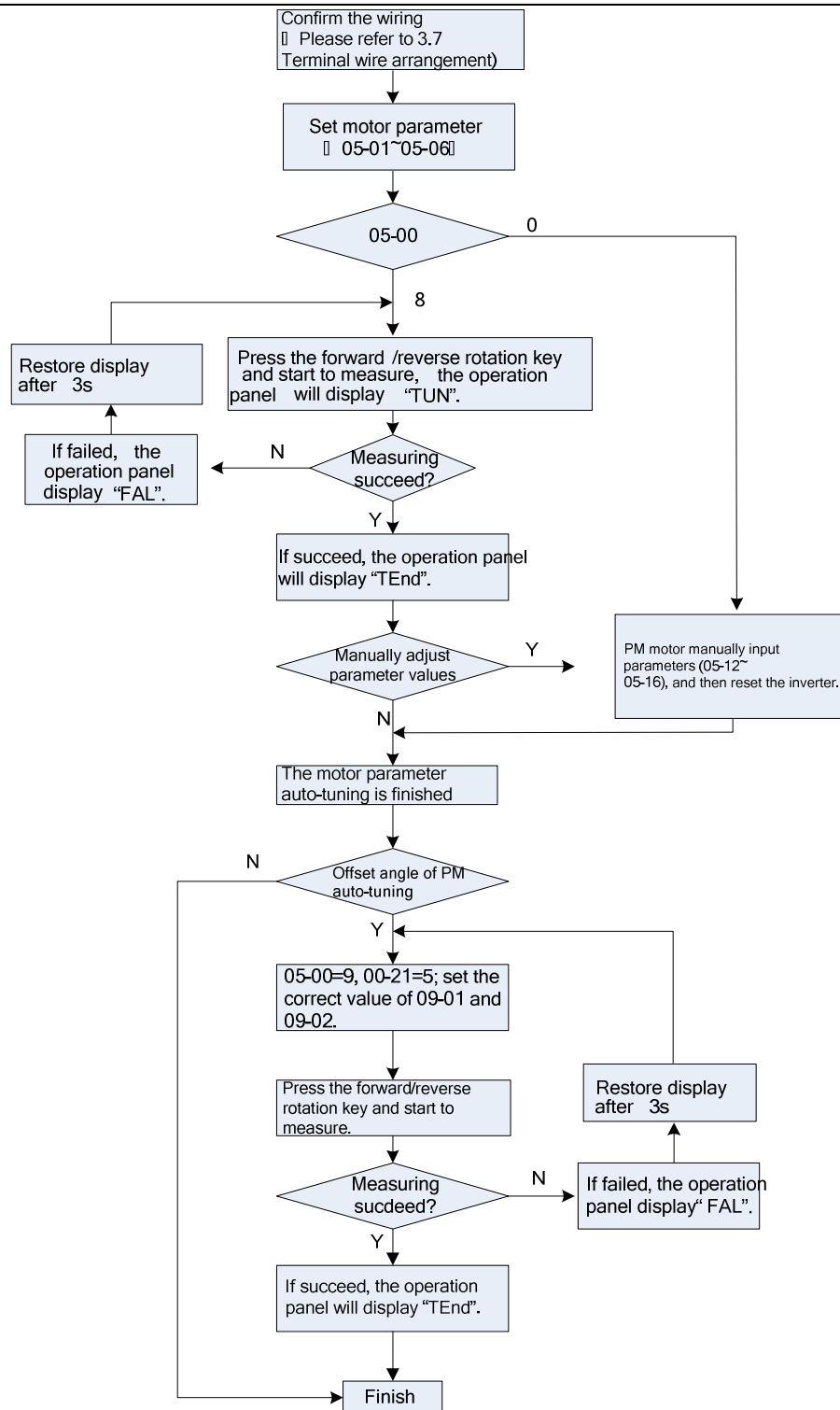
Parameter	Name	Factory Value	Setting Range	Content
05-00 P.301	Motor parameter auto-tuning function selection	0	0	Parameter auto-tuning function with no motor
			1	Induction motor parameter auto-tuning measuring the running motor
			2	Induction motor parameter auto-tuning measuring the stopped motor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

 Setting Motor parameter auto-tuning function

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



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



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

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

5.6.2 Motor parameter

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

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

Setting	Motor parameter
---------	-----------------

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

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

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

I_0 is the idling current, L_m is mutual inductance, L_δ is leakage inductance.

- ◆ When executing PM motor parameter auto-tuning function, set 05-00 to 8, then press or on the keyboard panel for the inverter to automatically calculate the following parameter: 05-12~05-16.
- ◆ When executing PM motor Phase Z position auto-tuning function, be sure to make the motor fully separated from the load, and set 05-00 to 9, then press or on the keyboard panel for the inverter to automatically calculate the following parameter: 05-16.
- ◆ When executing PM motor rotation inertia auto-tuning function, set 05-00 to 10, then press or on the keyboard panel for the inverter to automatically calculate the following parameter: 05-17.

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

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

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

5.6.3 Motor inertia auto-tuning

➤ It is applicable in tension control open-loop torque mode.

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

Setting Motor inertia auto-tuning

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

5.6.4 The second motor parameter

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

Parameter	Name	Factory Value	Setting Range	Content
05-22 P.332	The second motor rated power	99999	0 ~ 650.00kW	---
			99999	Not selected.
05-23 P.333	The second motor poles	99999	0 ~ 48	---
			99999	Not selected.
05-24 P.334	The second motor rated voltage	99999	0 ~ 510V	440 Voltage
			0~255V	220 Voltage
			99999	Not selected.
05-25 P.335	The second motor rated frequency	99999	0 ~ 650.00Hz	---
			99999	Not selected.
05-26 P.336	The second motor rated current	99999	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and types above
			99999	Not selected.
05-27 P.337	The second motor rated rotation speed	99999	0 ~ 65000r/min	---
			99999	Not selected.
05-28 P.338	The second motor excitation current	99999	0~500.00A	Types below Frame G
			0~5000.0A	Frame G and types above
			99999	Not selected.

Parameter	Name	Factory Value	Setting Range	Content
05-29 P.339	The second motor (IM)stator resistance	99999	0 ~ 65000mΩ	45K/55KF and types below
			0 ~ 650.00mΩ	55K/75KF and types above
			99999	Not selected.
05-30 P.340	The second motor (IM)rotor resistance	99999	0 ~ 65000mΩ	45K/55KF and types below
			0 ~ 650.00mΩ	55K/75KF and types above
			99999	Not selected.
05-31 P.341	The second motor (IM)leakage inductance	99999	0 ~ 6500.0mH	45K/55KF and types below
			0 ~ 650.00mH	55K/75KF and types above
			99999	Not selected.
05-32 P.342	The second motor (IM)mutual inductance	99999	0 ~ 6500.0mH	45K/55KF and types below
			0 ~ 650.00mH	55K/75KF and types above
			99999	Not selected.
05-33 P.343	The second motor (PM) stator resistance	99999	0 ~ 65000mΩ:	45K/55KF and types below
			0 ~ 650.00mΩ	55K/75KF and types above
			99999	Not selected.
05-34 P.344	The second motor (PM) d-axis inductance	99999	0 ~ 650.00mH	According to type
			99999	Not selected.
05-35 P.345	The second motor (PM)q-axis inductance	99999	0 ~ 650.00mH	According to type
			99999	Not selected.
05-36 P.346	The second motor (PM) Back-EMF coefficient	99999	0 ~ 6500.0V/krpm	According to type
			99999	Not selected.
05-37 P.347	The second motor (PM) PhaseZ origin pulse compensation	99999	0 ~ 359.9°	---
			99999	Not selected.
05-38 P.348	The second motor rotation inertia	99999	0 ~ 6.5000kg.m ²	5.5K/7.5KF and types below
			0 ~ 65.000kg.m ²	Types from 7.5K/11KF to 90K/110KF
			0 ~ 650.00kg.m ²	110K/132KF and types above
			99999	Not selected.

Setting The second motor parameter

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

5.7 Protection parameter group 06

Group	Parameter Number	Name	Setting Range	Factory Value	Page
06-00	P.9	Electronic thermal relay capacity	0~500.00A: Types below Frame G	According to type	184
			0~5000.0A: Frame G and types above		
06-01	P.22	Stall prevention operation level	0 ~ 400.0%	150.0%	185
06-02	P.23	Compensation factor at level reduction	0 ~ 150.0%	99999	185
			99999: Stall prevention operation level is the setting value of 06-01(P.22).		
06-03	P.66	Stall prevention operation reduction starting frequency	50Hz system: 0 ~ 650.00Hz	50.00Hz	185
			60Hz system: 0 ~ 650.00Hz	60.00Hz	
06-04	P.220	Current stall selection of time of acceleration and deceleration	0: According to the current time of Acc/Dec	3	185
			1: According to the first time of Acc/Dec		
			2: According to the second time of Acc/Dec		
			3:Automatically calculate the best time of acceleration/deceleration		
06-05	P.30	Regenerative brake function selection	0: If regenerative brake duty is fixed at 3%, parameter 06-06(P.70) will be invalid.	0	186
			1: The regenerative brake duty is the value of 06-06(P.70).		
			2 : External brake unit protection function (D framework and the above models)	2	
06-06	P.70	Special regenerative brake duty	0 ~ 100.0%	0.0%	186
06-07	P.263	Decrease carrier protection setting	0: Rated carrier frequency, limit load current according to the setting carrier.	0	187
			1: Rated current, limit carrier according to the load current and temperature.		
06-08	P.155	Over torque detection level	0 ~ 200.0%	0.0%	189
06-09	P.156	Over torque detection time	0.1 ~ 60.0s	1.0s	189
06-10	P.260	Over torque detection selection	0: The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.	1	189
			1: The OL2 alarm is reported after the over torque detection, and the inverter stops.		
06-11	P.160	Stall level when restart	0 ~ 150.0%	100.0%	190
06-12	P.245	Cooling fan operation	0X: Fan alarm for abnormal fan	0	190
			1X: No fan alarm for abnormal fan, but the output of terminal alarm.		
			X0: The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.		
			X1: Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too.		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
06-12	P.245	Cooling fan operation	X2: The fan will be turned on if the temperature of the heat sink is higher than 40°C. When the power is turned off, the fan will be turned off, too.	0	190
			X3: The fan will be turned on when the temperature of the heat sink is higher than 60°C. When it is lower than 40°C, the fan will be turned off.		
06-13	P.281	Input phase failure protection	0: No Phase Failure Protection	0	191
			1: Phase failure protection, the parameter unit will display the "IPF" alarm and the output stops.		
06-14	P.287	SCP Short circuit protection function	0: No the output end short-circuits protection function.	1	191
			1: If outputend is short, the parameter unit will display the "SCP" alarm and the output stops.		
06-15	P.533	The process mode of PTC alarm	0: Alarm and continue to run	0	192
			1: Alarm and decelerate to stop		
			2: Alarm and stop freely		
			3: No alarm		
06-16	P.534	The percentage of PTC level	0 ~ 100.0%	0.0%	192
06-17	P.261	Maintenance alarm function	0: No maintenance alarm	0	193
			1 ~ 9998day: Used to set time whenmaintenancealarm sends out signal		
06-18	P.280	Short circuit detection when starting	0: No short circuit detection when starting	0	194
			1: Short circuit detection when starting		
06-19	P.282	Operation GF detection level	280K/315KF types below:0~100.0%	50.0%	194
			315K/355KF type:0~100.0%	70.0%	
06-20	P.262	Output phase failure protection	0: No output phase failure protection selection	0	194
			1: Output phase failure protection, the parameter unit will display the "LF" abnormal alarm and the inverter will stop the output.		
06-21	P.705	Low voltage level	155 ~ 220V: 220V inverter type	155V	195
			310 ~ 440V: 440V inverter type	310V	
06-22	P.706	Regenerative brake operation level	205 ~ 400V: 220V inverter type	360V	195
			410 ~ 800V: 440V inverter type	720V	
06-23	P.707	Voltage stall level	205 ~ 400V: 220V inverter type	380V	195
			410 ~ 800V: 440V inverter type	760V	
06-24	P.708	Capacitor lifetime detection	0: No capacitor lifetime detection.	0	196

Protection parameter group 06


Group	Parameter Number	Name	Setting Range	Factory Value	Page
06-24	P.708	Capacitor lifetime detection	1: When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit.	0	196
06-25	P.709	Capacitor lifetime detection level	0 ~ 100.0%	100.0%	196
06-26	P.710	Capacitor lifetime detection result	0: No abnormal signal.	Read	196
			1: Electrolytic capacitor abnormal.		
06-27	P.292	Accumulative motor operation time (minutes)	0 ~ 1439min	0min	197
06-28	P.293	Accumulative motor operation time (days)	0 ~ 9999day	0day	197
06-29	P.296	Accumulative motor power time (minutes)	0 ~ 1439min	0min	197
06-30	P.297	Accumulative motor power time (days)	0 ~ 9999day	0day	197
06-40	P.288	Alarm code query	0 ~ 12	1	197
06-41	P.289	Alarm code display	Read	Read	197
06-42	P.290	Alarm message query	0 ~ 10	0	197
06-43	P.291	Alarm message display	Read	Read	198
06-44	P.740	E1	Read	Read	199
06-45	P.741	E2	Read	Read	199
06-46	P.742	E3	Read	Read	199
06-47	P.743	E4	Read	Read	199
06-48	P.744	E5	Read	Read	199
06-49	P.745	E6	Read	Read	199
06-50	P.746	E7	Read	Read	199
06-51	P.747	E8	Read	Read	199
06-52	P.748	E9	Read	Read	199
06-53	P.749	E10	Read	Read	199
06-54	P.750	E11	Read	Read	199
06-55	P.751	E12	Read	Read	199
06-56	P.752	E1 alarm output frequency	Read	Read	200
06-57	P.753	E1 alarm output current	Read	Read	200
06-58	P.754	E1 alarm output voltage	Read	Read	200
06-59	P.755	E1 alarm the temperature rising accumulation rate	Read	Read	200
06-60	P.756	E1 alarm PN voltage	Read	Read	200
06-61	P.757	E1 alarm the time of the inverter has run	Read	Read	200

Group	Parameter Number	Name	Setting Range	Factory Value	Page
06-62	P.758	E1 alarm the inverter operation status code	Read	Read	200
06-63	P.759	E1 alarm(years/months)	Read	Read	200
06-64	P.760	E1 alarm (days/hours)	Read	Read	200
06-65	P.761	E1 alarm(minutes/seconds)	Read	Read	200
06-70	P.766	E2 alarm output frequency	Read	Read	201
06-71	P.767	E2 alarm output current	Read	Read	201
06-72	P.768	E2 alarm output voltage	Read	Read	201
06-73	P.769	E2 alarm the temperature rising accumulation rate	Read	Read	201
06-74	P.770	E2 alarm PN voltage	Read	Read	201
06-75	P.771	E2 alarm the time of inverter has run	Read	Read	201
06-76	P.772	E2 alarm the inverter operation status code	Read	Read	201
06-77	P.773	E2 alarm (years/months)	Read	Read	201
06-78	P.774	E2 alarm (days/hours)	Read	Read	201
06-79	P.775	E2 alarm(minutes/seconds)	Read	Read	201

5.7.1 Electronic thermal relay capacity

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

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

 Setting Electronic thermal relay capacity

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

Note: 1. After the inverter is reset; the thermal accumulating record of the electronic thermal relay will be reset to zero.

Please pay attention in this area.

2. When two or more motors are connected to the inverter, they cannot be protected by the electronic thermal relay. Install an external thermal relay for each motor.
3. When a special motor is employed, the electronic thermal relay is no longer valid. Install an external thermal relay for each motor.
4. About wiring for an external thermal relay, please refer to 03-00~03-06 and 03-09.

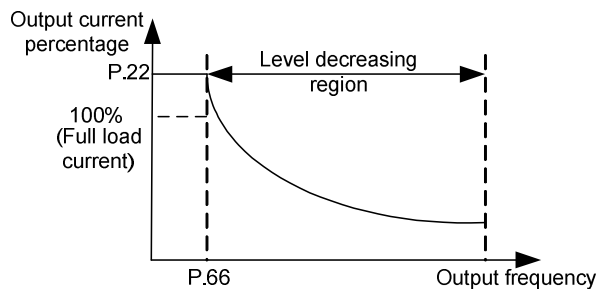
5.7.2 Current stalling protection

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

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

Setting Current stalling protection

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

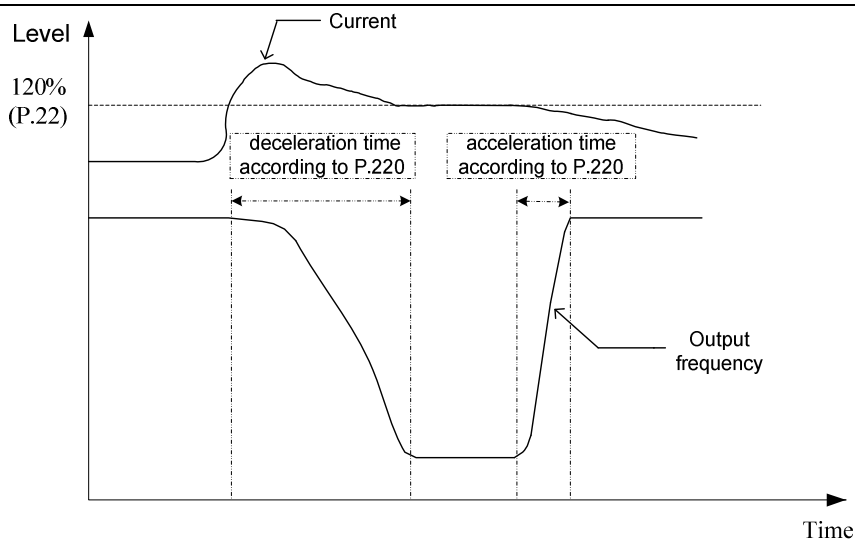


Calculation formula for stall prevention operation level:

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

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

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



The current in the figure refers to the current amplitude

Note: 1. When 00-21=3 for sensorless vector control is selected from 00-21 control method, 06-01 will be used for the torque limited horizontal operation.
 2. When 06-04=2, if 01-22 is not set, acceleration time is 01-07; if 01-23 is not set, deceleration time is 01-07.

5.7.3 Regenerative brake

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

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

Setting Regenerative brake

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

Note: 1. In occasions where frequency starts or stops, a high capacity brake resistor is required.
 2. Please refer to Section 3.6.3 for brake resistor selection.

5.7.4 Decrease carrier protection setting

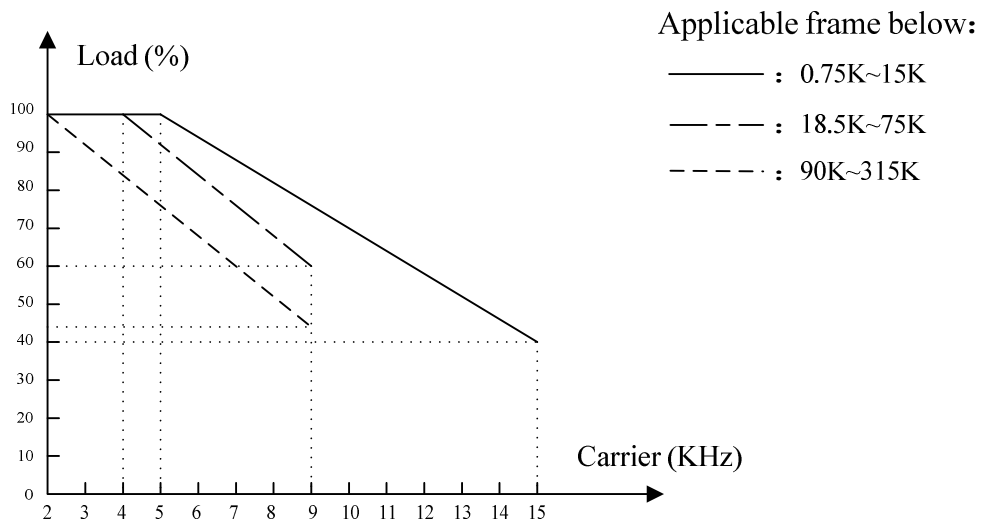
- Select decrease carrier or decrease rated current protection.

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

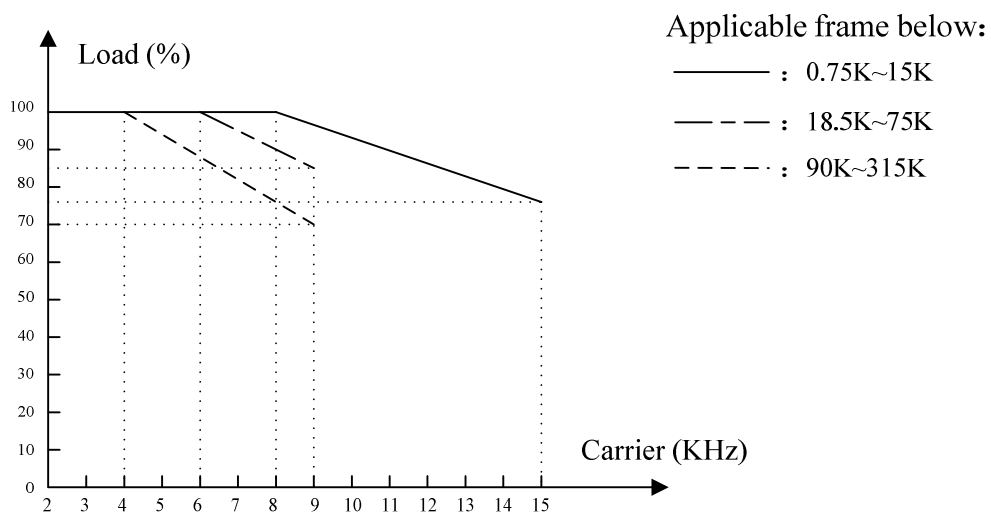
Setting Decrease carrier protection

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

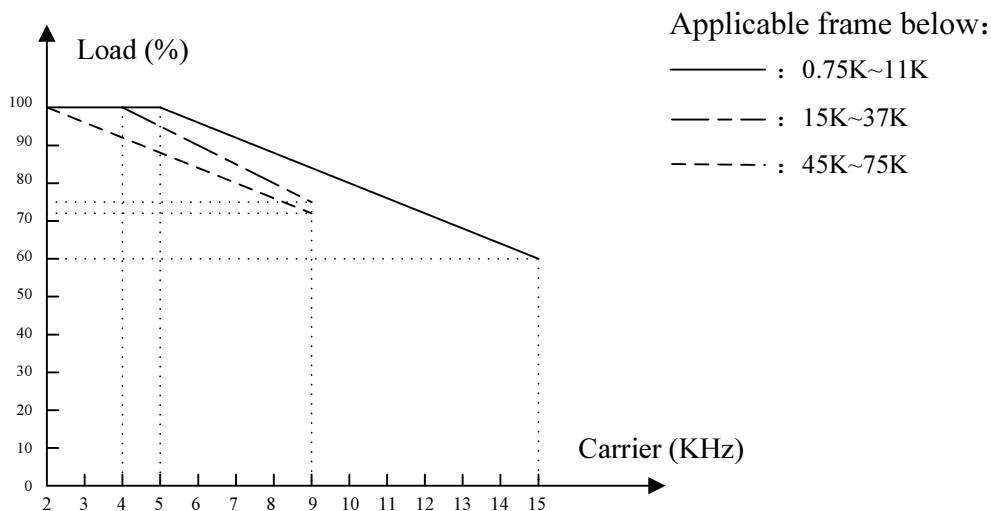
440V type heavy duty (HD)



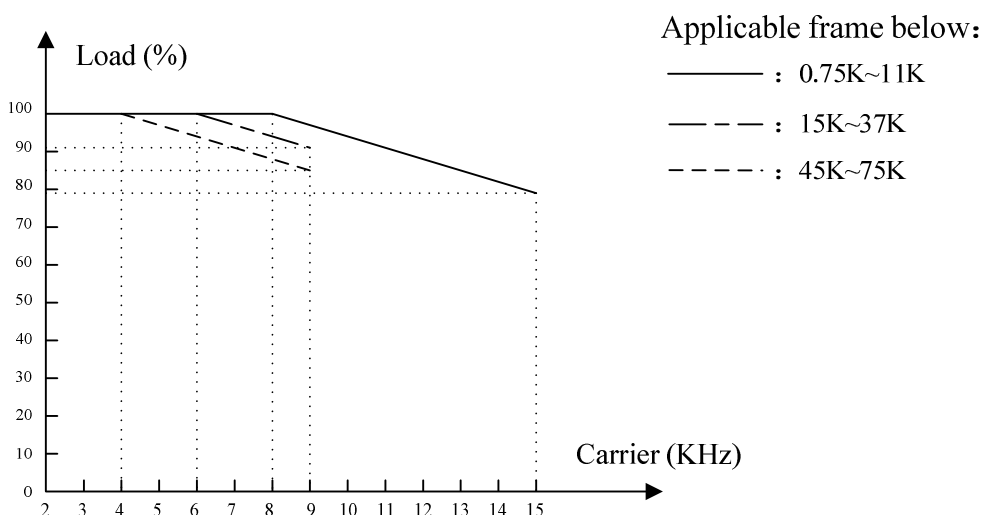
440V type normal duty (ND)



220V type heavy duty (HD)



220V type normal duty (ND)



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

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

Special types:

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

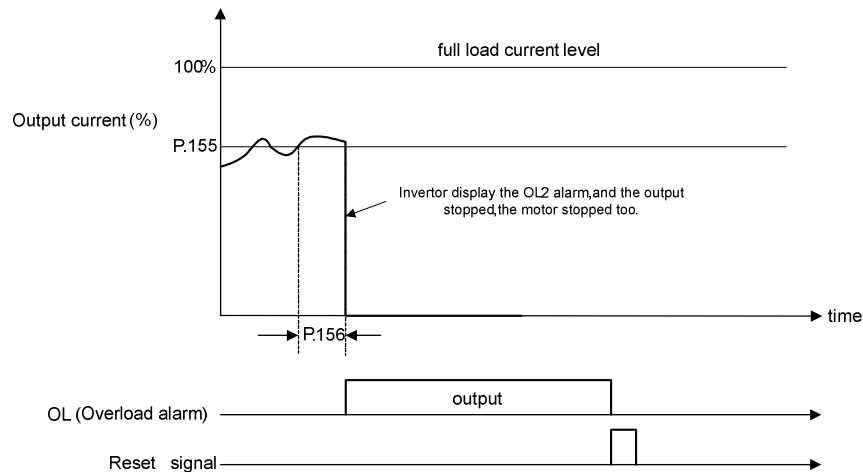
5.7.5 Over torque detection

➤ The output current detection function can be used for purposes such as overtorque detection.

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

Setting Over torque detection

- ◆ When the value of 06-08 is nonzero, the function of over torque detection is selected.
- ◆ When the output current exceeds the detection level of over torque (06-08) and the detection time of over torque (06-09), then inverter alarm OL2 will go off and the inverter will stop the operation. If multi-function digital outputs terminal SO1-SE(03-10), SO2-SE(03-12), multi-function relay A1-B1-C1(03-11), and A2-B2-C2(03-13) are set as over-torque alarm (set the value to 19), then the inverter will send out signals; if multi-function digital outputs terminal SO1-SE(03-10), SO2-SE(03-12), multi-function relay A1-B1-C1(03-11), and A2-B2-C2(03-13) are set as over-load alarm (set the value to 3), and 06-10(P.260)=1, then the inverter will send out signals. For details, please refer to 03-10, 03-11 and 03-12~03-13 in Chapter 5.



5.7.6 Stall level when restart

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

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

Setting Stall level when restart

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

5.7.7 Cooling fan operation

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

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

Setting Cooling fan operation

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


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

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

5.7.8 Input phase failure protection

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

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

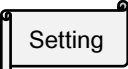
 Input phase failure protection

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

5.7.9 SCP Short circuit protection function

- Sets SCP short circuit protection function valid or invalid.

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

 SCP Short circuit protection function

- ◆ Set 06-14 to 0 to cancel the output end short-circuits protection function.
- ◆ Set 06-14 to 1, short circuit protection function is valid; the inverter will output "SCP" alarm when detecting the SCP short circuit.

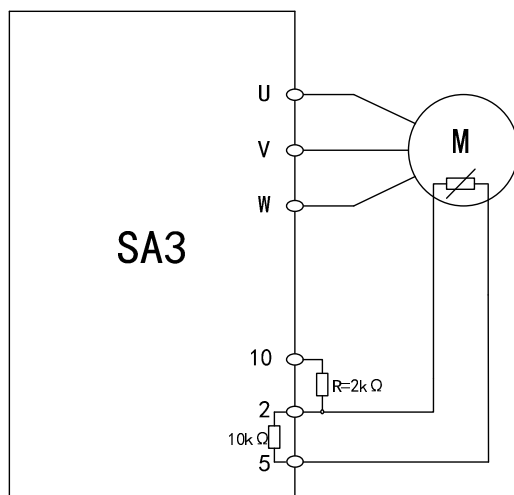
5.7.10 PTC protection selection

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

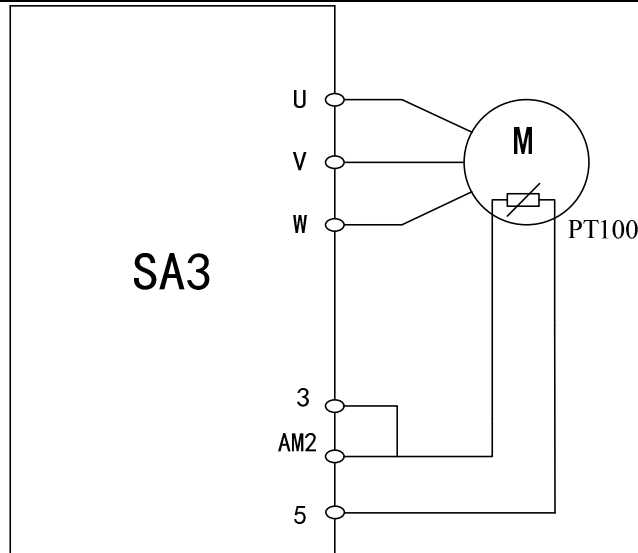
Parameter	Name	Factory Value	Setting Range	Content
06-15 P.533	The process mode of PTC alarm	0	0	Alarm and continue to run
			1	Alarm and decelerate to stop
			2	Alarm and stop freely
			3	No alarm
06-16 P.534	The percentage of PTC level	0.0%	0	NO PTC alarm
			0.1%~100.0%	The motion level of PTC function,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

Setting PTC level

◆ It needs to set 2-5/4-5/3-5 analog input function 02-00~02-02 to 11 (P.T.C. thermistor input value). It is used to set the PTC level, and the corresponding value for 100% is maxanalog input value.



PTC Electronic input wiring diagram



PT100 Electronic input wiring diagram

5.7.11 Maintenance alarm function

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

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


Setting Maintenance alarm function

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

5.7.12 Short circuit protection

➤ Control the start or end of the short circuit detection and set the detection level

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


 Short circuit protection

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

5.7.13 Output phase failure protection

➤ Control the start or end of output phase failure protection via the parameter.

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

 Output phase failure protection

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

5.7.14 Low voltage protection

- Control the low voltage level via the parameter.

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

Setting Low voltage level

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

5.7.15 Regenerative brake operation level

- Set regenerative brake operation level via the parameter.

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

Setting Regenerative brake operation level

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

5.7.16 Voltage stall level

- Set voltage stall operation level.

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

Setting Voltage stall level

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

5.7.17 Capacitor lifetime detection

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

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

Setting Capacitor lifetime detection

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

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

The capacitor lifetime detection percentage 06-25 is the value by theoretical calculation, so the result can be only as the reference.

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

- ◆ The detection steps are as follows:

1. Check that the motor is connected.
2. Set 06-24 to 1 in the stop state and cut off the power.
3. The inverter applies DC voltage to the motor to measure the capacitor capacity while the inverter is OFF.
4. After confirming that the power lamp is OFF, turn ON the power again.
5. Check that "3" is set in 06-24, read 06-25, and check the deterioration degree of the main circuit capacitor.

- ◆ Under the following conditions, measurement cannot be performed correctly.

6. Terminals P/N is connected to DC power supply.
7. The power supply is switched ON during measurement.
8. The motor is not connected to the inverter.
9. The motor is running (coasting).
10. Capacitance detection alarm
11. The inverter output is shut off with the MRS signal.

12. The motor capacity is smaller than the inverter capacity by two ranks or more.
13. The start command is given while measuring.

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

5.7.18 Time record function

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

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

Setting Time record function

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

5.7.19 Alarm query function

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

Parameter	Name	Factory Value	Setting Range	Content
06-40 P.288	Alarm code query	1	0 ~ 12	The value of 06-40 (P.288), 1~12, corresponds to the abnormal codes of 06-41(P.289)'s alarm E1~E12.
06-41 P.289	Alarm code display	Read	Read	

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

Setting Alarm query function

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

Abnormal code corresponded alarm condition:

Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type
00	No alarm	32	OV1	49	THN	82	IPF	144	OHT
16	OC1	33	OV2	50	NTC	97	OLS	160	OPT
17	OC2	34	OV3	64	EEP	98	OL2	179	SCP
18	OC3	35	OV0	65	FAN	112	BE	192	CPU

Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type	Abnormal code	Alarm type
19	OC0	48	THT	66	PID	129	AErr	193	CPR
209	PG1	210	PG2	211	PG3	212	bEb	213	PTC
51	NTC2	52	NTC3	53	NTC4	54	NTC5	55	NTC6
56	NTC7	57	NTC8	216	dv1	217	dv2	215	dv3
214	dv4	84	LF	85	HDC	86	ADE	113	rAE
128	GF	116	SAF	195	EbE1	196	EbE2	197	EbE3
208	PG0	161	PUE	162	CbE				

Note: Set 06-42(P.290) to 8,9,10, selecting 06-43(P.291) display alarm year and month, day and hour, minute and second is valid only when PU301C is used as an option board. If PU301 is used, these thress selections are invalid.

5.7.20 Alarm code query

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

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

Setting Alarm code

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

5.7.21 The latest alarm message (E1)

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

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

Note: Set 06-63(P.759)~06-65(P.761) to display the alarm year and month, day and hour, minute and second which is valid only when PU301C is used as an option board in alarm. If PU301 is used, these three selections are invalid.

5.7.22 The second alarm message (E2)

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

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

Note: Set 06-77(P.773)~06-79(P.775) to display the alarm year and month, day and hour, minute and second which is valid only when PU301C is used as an option board in alarm. If PU301 is used, these thress selections are invalid.

5.8 Communication parameter group 07

Group	Parameter Number	Name	Setting Range	Factory Value	Page
07-00	P.33	COM1 Communication protocol selection	0: Modbus protocol	1	205
			1: Shihlin protocol		
			2 : PLC protocol (Effective when using the shilin built-in PLC)		
07-01	P.36	COM1 Converter stations	0 ~ 254	0	205
07-02	P.32	COM1 Serial communication baud rate	0: Baud rate:4800bps	1	205
			1: Baud rate:9600bps		
			2: Baud rate:19200bps		
			3: Baud rate:38400bps		
			4: Baud rate:57600bps		
			5: Baud rate:115200bps		
07-03	P.48	COM1 data length	0: 8bit	0	205
			1: 7bit		
07-04	P.49	COM1 length of the stop bit	0: 1bit	0	205
			1: 2bit		
07-05	P.50	COM1Parity check selection	0: No parity verification	0	205
			1: Odd		
			2: Even		
07-06	P.51	COM1 CR/LFselection	1: CR only	1	205
			2: Both CR and LF		
07-07	P.154	COM1 Modbus communication format	0: 1, 7, N, 2 (Modbus, ASCII)	4	205
			1: 1, 7, E, 1 (Modbus, ASCII)		
			2: 1, 7, O, 1 (Modbus, ASCII)		
			3: 1, 8, N, 2 (Modbus, RTU)		
			4: 1, 8, E, 1 (Modbus, RTU)		
			5: 1, 8, O, 1 (Modbus, RTU)		
07-08	P.52	COM1 Number of communication retries	0 ~ 10	1	205
07-09	P.53	COM1 Communication check time interval	0 ~ 999.8s: Use the set value for the communication overtime test.	99999	205
			99999: No communication overtime test.		
07-10	P.153	COM1 Communication error handling	0: Warn and call to stop	0	205
			1: No warning and keep running		
07-11	P.34	Communication EEPROM write selection	0: When parameter write is performed, write them to RAM and EEPROM	0	223
			1: When parameter write is performed, write them to RAM only.		
07-15	P.800	CANopen slave address	0 ~ 127	0	223
07-16	P.801	CANopen speed	0: 1Mbps	0	223
			1: 500Kbps		
			2: 250K/280KFbps		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
07-16	P.801	CANopen speed	3: 125Kbps	0	223
			4: 100Kbps		
			5: 50 Kbps		
07-17	P.802	CANopen communication status	0: Node reset state	0	223
			1: Com reset state		
			2: Boot up state		
			3: Pre operation state		
			4: Operation state		
07-18	P.803	CANopen control status	0: Not ready for use state	0	223
			1: Inhibit start state		
			2: Ready to switch on state		
			3: Switched on state		
			4: Enable operation state		
			7: Quick stop active state		
			13: Err reaction activation state		
14: Error state					
07-25	P.810	PUCommunication protocol selection	0 : Modbus protocol	1	205
			1 : shilin protocol		
			2 : PLC protocol (Effective when using the shilin built-in PLC)		
07-26	P.811	PUconverter stations	0 ~ 254	0	205
07-27	P.812	PUSerial communication baud rate	0 : Baud rate 4800bps	1	206
			1 : Baud rate 9600bps		
			2 : Baud rate 19200bps		
			3 : Baud rate 38400bps		
			4 : Baud rate 57600bps		
07-28	P.813	PU data length	0 : 8bit	0	206
			1 : 7bit		
07-29	P.814	PU stop bit	0 : 1bit	0	206
			1 : 2bit		
07-30	P.815	PU Parity check option	0 : no odd-even check	0	206
			1 : odd check		
			2 : even check		
07-31	P.816	PU CR/LFchoose	1 : only CR	1	206
			2 : CR,LF Both		
07-32	P.817	PU Modbus communication format	0 : 1, 7, N, 2 (Modbus, ASCII)	4	206
			1 : 1, 7, E, 1 (Modbus, ASCII)		
			2 : 1, 7, O, 1 (Modbus, ASCII)		
			3 : 1, 8, N, 2 (Modbus, RTU)		
			4 : 1, 8, E, 1 (Modbus, RTU)		
			5 : 1, 8, O, 1 (Modbus, RTU)		

Communication parameter group 07

Group	Parameter Number	Name	Setting Range	Factory Value	Page
07-33	P.818	PU Communication exception permit number	0 ~ 10	1	206
07-34	P.819	PU Communication between permissible time	0 ~ 999.8s : To set data communication timeout inspection 99999 : No time out inspection	99999	206
07-35	P.820	PUCommunication error handling	0 : Alarm and stop idling 1 : no alarm and keep on running	1	206
07-41	P.826	Outside enlarge communication cartoon - exception permit number	0 ~ 10	1	206
07-42	P.827	Outside enlarge communication cartoon - error handling	0 : Alarm and stop idling 1 : no alarm and keep on running	1	206
07-43	P.828	Outside enlarge communication cartoon dispatch interval allowable time	0 ~ 999.8s : set data communication timeout inspection 99999 : No timeout inspection	99999	206
07-44	P.829	EP301 Communication expansion card version number	read	read	224
07-45	P.830	IP allocation	0 : calm IP 1 : move IP	0	224
07-46	P.831	IP Add 1	0~255	192	224
07-47	P.832	IP Add 2	0~255	168	224
07-48	P.833	IP Add 3	0~255	2	224
07-49	P.834	IP Add 4	0~255	102	224
07-50	P.835	Subnet mask 1	0~255	255	224
07-51	P.836	Subnet mask 2	0~255	255	224
07-52	P.837	Subnet mask 3	0~255	255	224
07-53	P.838	Subnet mask 4	0~255	0	224
07-54	P.839	default gateway 1	0~255	192	224
07-55	P.840	default gateway 2	0~255	168	224
07-56	P.841	default gateway 3	0~255	2	224
07-57	P.842	default gateway 4	0~255	100	224

5.8.1 Shihlin protocol and Modbusprotocol

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

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

Communication parameter group 07

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

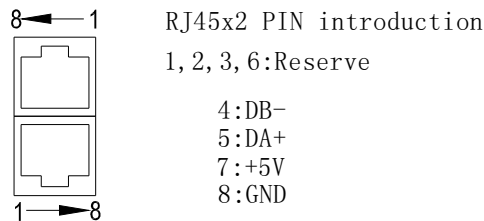
Setting Shihlin protocol and Modbus protocol

- ◆ When the communication parameters are revised, please reset the inverter.
- ◆ The SA3 inverters have two communication protocols for selection, namely, Shihlin protocol and Modbus protocol. Parameter 07-02, 07-01, 07-08, 07-09 and 07-10 are suitable for both protocols. 07-03~07-06 is only suitable for the Shihlin protocol, while 07-07 is only suitable for the Modbus protocol. Please refer to communication protocols for more details.

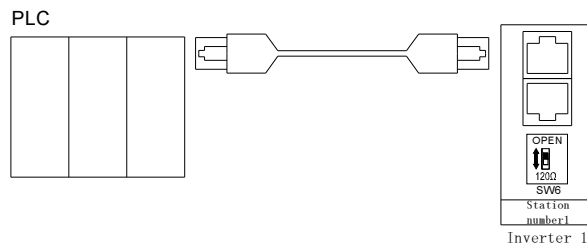
Note: 1. The number of inverters is practically determined by the wiring method and impedance matching. If Modbus protocol is used, please set the value to a nonzero value.
 2.If the frequency of communication error exceeds the setting value of 07-08(P.52), and 07-10(P.153) is set to 0, the alarm will go off and display OPT.
 3. Modbus protocol. Displayed according to the starting bit, the data bit, parity check bit, and the stop bit. N: no parity check. E: 1-bit parity check. O: 1-bit odd parity check.

✓ SA3 RS-485 Communication interface constituents and wiring

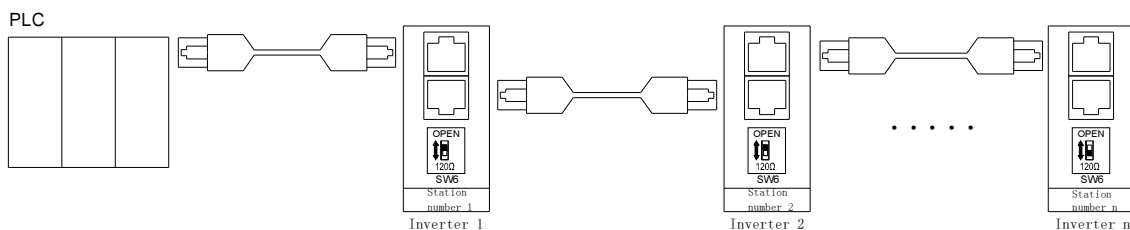
1. SA3 RS-485 communication interface terminal arrangement (COM1)



2. Communication between the position machine and single inverter (take PLC as an example).



3. Communication between the position machine and multiple inverters (take PLC as an example).



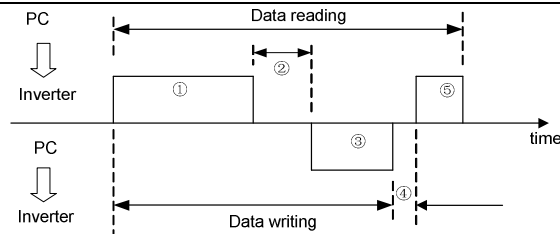
4. SA3 series inverters support Shihlin communication protocol and MODBUS communication protocol.

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

✓ Shihlin communication protocol

1. Automatically switch the position machine and the inverter to ASCII codes (hexadecimal) for communication.
2. Please follow the following steps for data communication between the position machine and the inverter.

Communication parameter group 07



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

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

①Data of the communication request sent by the position machine to the inverter.

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

③Inverter reply data

Data write-in

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

Data read-out

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

⑤ Reply data from the position machine to the inverter during data read-out.

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

*1) Control code

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

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

*3) End symbol (CR, LF codes)

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

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

*5) Error code:

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

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

*7) Request the sum check code

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

✓ Communication example:

Example 1. The position machine sends a forward rotation reference to the inverter:

Step 1: Use the position machine to send a FA reference in Format A:

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

Communication parameter group 07

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

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

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

Example 2. The position machine sends a stop rotation reference to the inverter:

Step 1: Use the position machine to send a FA reference in Format A:

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

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

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

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

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

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



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

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

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

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

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



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

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

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

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

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

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

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

First, 195 minus 100 equals to 95;
Concert 95 to H5F hexadecimal digits,
H5F+H80=HDF
codes for transmission.

because the smallest unit of 02-15(P.195) is 0.01,
50 x 100 = 5000; then convert 5000 to hexadecimal
digits H13888; Then covert 1, 3, 8 and 8 to ASCII

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

ACK	Inverter station number 0	CR
H06	H30 H30	H0D

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

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

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

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

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

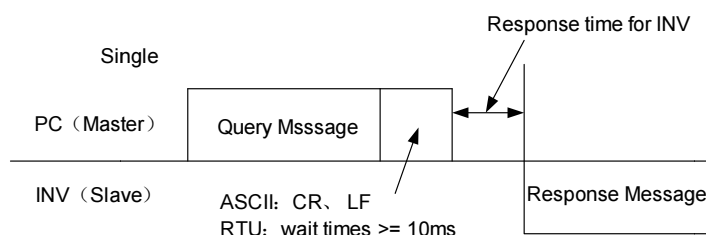
NAK	Inverter station number 0	Error code H0C	CR
H15	H30 H30	H43	H0D

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

✓ MODBUS communication protocol

✓ Message format

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





(1) Query

Position machine (main address) sends messages to the inverter of the assigned address (from the address).

(2) Normal Response

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

(3) Error Response

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

(4) Broadcast

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

✓ Communication format:

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

✓ Message constituents:

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

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

Message	Content															
②Function message set	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Function name</th> <th style="width: 25%;">Function code</th> <th>Function description</th> </tr> </thead> <tbody> <tr> <td>Read multiple registers</td> <td style="text-align: center;">H03</td> <td>Read slave machine's continuous register content.</td> </tr> <tr> <td>Write single register</td> <td style="text-align: center;">H06</td> <td>Write data into slave machine's single register.</td> </tr> <tr> <td>Function diagnosis</td> <td style="text-align: center;">H08</td> <td>Function diagnosis (only for communication calibration)</td> </tr> <tr> <td>Write multiple registers</td> <td style="text-align: center;">H10</td> <td>Write data into slave machine's multiple registers.</td> </tr> </tbody> </table>	Function name	Function code	Function description	Read multiple registers	H03	Read slave machine's continuous register content.	Write single register	H06	Write data into slave machine's single register.	Function diagnosis	H08	Function diagnosis (only for communication calibration)	Write multiple registers	H10	Write data into slave machine's multiple registers.
Function name	Function code	Function description														
Read multiple registers	H03	Read slave machine's continuous register content.														
Write single register	H06	Write data into slave machine's single register.														
Function diagnosis	H08	Function diagnosis (only for communication calibration)														
Write multiple registers	H10	Write data into slave machine's multiple registers.														
③Data message set	Changes, including the starting address, the number of the write-in or read-out registers, and the write-in data, are made according to the function codes.															
④Error check message set	ASCII is the check method for LRC, while RTU is the check method for CRC.															

ASCII mode's LRC check value calculation:

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

RTU mode, CRC check value calculation:

- 1 . Add one hexadecimal digit register. All the digits are 1.
 - 2 . Carry out XOR calculation for the higher bit of the hexadecimal digit register and the eight bits. The calculated result is entered to the hexadecimal digit register.
 - 3 . Shift this hexadecimal digit register one bit to the right.
 - 4 . If the right shifted bit (the marked bit) is 1, then polynomial 101000000000001 and this register will carry out the XOR calculation. If the right shifted bit is 0, then it will return to 3.
 - 5 . Repeat 3 and 4 until 8 bits are shifted.
 - 6 . The other eight bits and the hexadecimal register carry out the XOR calculation.
 - 7 . Repeat 3~6 until all the bytes of the text carry out the XOR calculation with the hexadecimal register and was shifted for eight times.
 - 8 . The hexadecimal register content is the 2-byte CRC error checking, and it is added to the highest valid bit of the text.
- When CRC is added to the message, lower bytes are added first, followed by the higher bytes.

✓ Communication format:

1. Data read-out (H03)

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

Regular response

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

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

2. Data write-in (H06)

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

Communication parameter group 07

Regular response

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

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

Note: Regular response content and the inquired message are the same.

3. Write multiple registers (H10)

Mode	Start	Address*1)	Function*2)	Start Address*3)	Number of register *4)	Data*5)	Write-in data *6)	Check	Stop
ASCII	H3A	2char	2char	4char	4char	2char	4char ...2N×8bit	2char	0D 0A
RTU	>=10ms	8bit	8bit	2byte	2byte	1byte	2byte ...N×16bit	2byte	>=10ms

Regular response

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

Message	Content
*1)Address	Set up the address for the to-be delivered message.
*2)Function code	H10
*3)Starting address	Set up the starting address of the register to be engaged in the write-in function.
*4)Number of register	Set up the number of register for reading. Maximum number: 20.
*5) Amount of data	The range should be 2 ~ 24. Set Twice the amount of *4).
*6)Write-in data	Set the assigned data in *4), write the data according to the sequence of the Hi byte and the Lo byte and the data of the starting address: According to the order of the data of the starting address +1, data of the starting address +2..., etc.

4. Function Diagnosis (H08)

By sending query information and getting the same query information back (the function of the subroutine code H00), it can do communication calibration.

The subroutine code H00 (for inquiring the return of data)

The query information

Mode	Start	Address*1)	Function*2)	Subroutine *3)	Data *4)	Check	End
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	1byte	1byte	2byte	2byte	2byte	>=10ms

Normal response

Mode	Start	Address*1)	Function*2)	Subroutine *3)	Data *4)	Check	End
ASCII	H3A	2char	2char	4char	4char	2char	0D 0A
RTU	>=10ms	1byte	1byte	2byte	2byte	2byte	>=10ms

Setting of the query information

Message	Content
*1)Address	Set the address for the information to be sent to, not able to radio communications(0 invalid)
*2)Function code	H08
*3)Subroutine code	H0000
*4)Data	If the data is 2 byte, it can be set arbitrarily. Set range from H0000 to HFFFF.

5. Error response

Carry out error response according to the error in the function, address and data of the query message received by the equipment.

There will be no errors if one or more addresses can be operated when they are accessed by the function code H03 or H10.

Mode	Start	Address*1)	Function*2) H80+function	Error code * 3)	Check	End
ASCII	H3A	2char	2char	2char	2char	0D 0A
RTU	>=10ms	8bit	8bit	8bit	2byte	>=10ms

Message	Content
*1) Address	Set up the address for the to-be delivered message.
*2) Function code	The function code set for the main equipment + H80
*3)Error code	Set the codes listed in the table below.

The list of error codes:

Source	Code	Meaning	Remarks
Slave reply	H01	Invalid function code	Set up function codes that cannot be handled by the equipment in the query message sent by the main equipment. Function codes that are not H03, H06, H08 and H10 (temporarily).
	H02	Invalid data address	Set up addresses that cannot be handled by the equipment in the query message sent by the main equipment (Asides from the addresses listed in the address table of the register; preserve the parameters, prohibit parameter reading, prohibit parameter writing).
	H03	Invalid data value	Set up data that cannot be handled by the equipment in the query message sent by the main equipment (parameters written outside the range, exist assigned mode, other errors, etc.)

Note: When performing multi-parameter reading, reading a preserved parameter is not a mistake.

Data sent to the main equipment will be tested by the inverter for the following mistakes, but the inverter will make no response for any detected error.

The list of the error test items:

Error item	Error content
Parity error	The parity test for data received by the inverter is different from the parity test set at the initial stage.
Frame error	The stop byte of the data received by the inverter mismatches the stop byte set at the initial stage.
Overflow error	When the inverter is receiving data, the position machine sends the next set of data before the inverter finishes receiving the current one.
Error test	The LRC/CRC calculated by the inverter according to the received data is different from the received LRC/CRC.

Communication parameter group 07

✓ Communication example:

Example 1. The operation mode written by the communication is the CU (communication) mode.

Step 1: The position machine modifies the mode of the inverter.

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H31H30	H30 H30	H30 H30	H30 H30	H45 H39	0D 0A
RTU	>=10ms	01	06	10	00	00	00	8D 0A	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H31H30	H30 H30	H30 H30	H30 H30	H45 H39	0D 0A
RTU	>=10ms	01	06	10	00	00	00	8D 0A	>=10ms

Example 2. Read the parameter 02-15(P.195) value by the position machine

Step 1: The position machine sends message to the inverter for reading the value of 02-15(P.195).The address of 02-15(P.195) is H00C3.

Mode	Starting	Address	Function	Starting address		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30H30	H43 H33	H30 H30	H30 H31	H33 H38	0D 0A
RTU	>=10ms	01	03	00	C3	00	01	74 36	>=10ms

Step 2: Once the message is received and processed without mistake, the inverter will send the content of 02-15(P.195) to the position machine.

Mode	Starting	Address	Function	Number of data read	Read-out data		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30 H32	H31 H37	H37 H30	H37 H33	0D 0A
RTU	>=10ms	01	03	02	17	70	B6 50	>=10ms

Because the decimal form of H1770 is 6000 and the unit of 02-15(P.195) is 0.01, 02-15(P.195) is 60 (6000 x 0.01 = 60).

Example 3. Change the content of 02-15(P.195) to 50.

Step 1: The position machine sends message to the inverter for writing 50 into 02-15(P.195).

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H30H30	H43 H33	H31 H33	H38 H38	H39 H42	0D 0A
RTU	>=10ms	01	06	00	C3	13	88	74 A0	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

Mode	Starting	Address	Function	Starting address		Write-in data		Check	Stop
ASCII	H3A	H30 H31	H30 H36	H30H30	H43 H33	H31 H33	H38 H38	H39 H42	0D 0A
RTU	>=10ms	01	06	00	C3	13	88	74 A0	>=10ms

Example 4. Read the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3),

04-00~04-02/P.4~P.6,01-06~01-07/P.7~P.8, 06-00(P.9),10-00~10-01/P.10~P.11 by the position machine.

Step 1: The position machine sends message to the inverter for reading the value of 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11. Starting address is H0000.

Mode	Starting	Address	Function	Starting address		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H30 H33	H30H30	H30 H30	H30 H30	H30 H43	H46 H30	0D 0A
RTU	>=10ms	01	03	00	00	00	0C	45 CF	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

Mode	Starting	Address	Function	Number of data read	Read-out data	Check	Stop
ASCII	H3A	H30 H31	H30 H33	H31 H38	...12×4 char	2char	0D 0A
RTU	>=10ms	01	03	18	...12×2 byte	2byte	>=10ms

Example 5. Rewrite the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11 by the inverter

Step 1: The position machine sends message to the inverter for writing the value of 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11.

Mode	Starting	Address	Function	Starting address		Number of registers		Data volume	Write-in data	Check	Stop
ASCII	H3A	H30 H31	H31 H30	H30 H30	H30 H30	H30 H30	H30 H43	H31 H38	...N×4 char	2char	0D 0A
RTU	>=10ms	01	10	00	00	00	0C	18	...N×2byte	2byte	>=10ms

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

Mode	Starting	Address	Function	Starting address		Number of registers		Check	Stop
ASCII	H3A	H30 H31	H31 H30	H30H30	H30 H30	H30 H30	H30 H43	H45 H33	0D 0A
RTU	>=10ms	01	10	00	00	00	0C	00 18	>=10ms

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

◆ The list of communication references

The following references and data are set for carrying out assorted operation control and monitoring.

Item	Shihlin protocol reference code	Modbus reference code	Modbus address	Data content and function description				
Operation mode read-out	H7B	H03	H1000	H0000: communication mode; H0001: external mode; H0002: JOG Mode; H0003: combination mode 1; H0004: combination mode 2; H0005: combination mode 3; H0006: combination mode 4; H0007: combination mode 5; H0008: PUMode; b15 b14~b12 b11~b8 b7~b0 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Setting value of 00-18</td> <td style="text-align: center;">Setting value of 00-17</td> <td style="text-align: center;">00000000</td> </tr> </table> : the second operation mode.	1	Setting value of 00-18	Setting value of 00-17	00000000
1	Setting value of 00-18	Setting value of 00-17			00000000			
Operation mode write-in	HFB	H06/H10						
Inverter status monitoring	H7A	H03	H1001	H0000~H00FF b15: during tuning b14: during inverter resetting b13, b12: Reserve b11: inverter EO status b10: PLC operating				

Item		Shihlin protocol reference code	Modbus reference code	Modbus address	Data content and function description										
Inverter status monitoring		H7A	H03	H1001	b9: inverter undervoltage b8: inverter voltage stall b7: abnormality occurred b6: frequency test b5: reserve b4: overloaded b3: reached the frequency b2: during reverse rotation b1: during forward rotation b0: during rotation										
Target frequency write-in	EEPROM	HEE	H06/H10	H1009	H0000~HFDE8: 0~650Hz										
	RAM	HED		H1002											
Special monitor select codes read out		H7D	H03	H1013	H0000~H0010: monitor selected information. Special monitor select read out codes as described in the special monitoring code table (H0009 is reserved)										
Special monitor select codes write in		HF3	H06/H10												
Monitor the external operation condition		H7C	H03	H1012	H0000~H000F: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">b15-b4</td><td style="text-align: center;">b3</td><td style="text-align: center;">b2</td><td style="text-align: center;">b1</td><td style="text-align: center;">b0</td></tr><tr><td style="text-align: center;">0000 0000 0000</td><td style="text-align: center;">MRS</td><td style="text-align: center;">STR</td><td style="text-align: center;">STF</td><td style="text-align: center;">RES</td></tr></table>	b15-b4	b3	b2	b1	b0	0000 0000 0000	MRS	STR	STF	RES
b15-b4	b3	b2	b1	b0											
0000 0000 0000	MRS	STR	STF	RES											
Inverter reset		HFD	H06/H10	H1101	H9696: function of 00-02=2/P.997=1. When communicating with the position machine, resetting the inverter will cause the inverter to be incapable of sending data back to the position machine.										
Parameter delete		HFC	H06/H10	H1104	H5A5A	For details, please refer to the parameter restoration status table.									
					H5566										
					H5959										
				H1103	H9966										
				H1106	H9696										
					H99AA										
					H9A9A										
	H55AA														
	HA5A5														
Parameter read-out		H00~H63	H03		1. The data range and the position of the decimal point, please refer to the parameter table..										
Parameter write-in		H80~HE3	H06/H10	P mode: H0000~H0513 Parameter group mode: H2710~H2D4F	2. In P mode, the Modbus address of each parameter corresponds to the hexadecimal digit of the parameter number. For example, the Modbus address of 04-26(P.138) is H008A. 3. In parameter group mode, the Modbus address of each parameter corresponds to the parameter number+ the hexadecimal digit of 10000, such as the Modbus address of 04-26(P.138) is 0x28BA.										

Item	Shihlin protocol reference code	Modbus reference code	Modbus address	Data content and function description
Line speed feedback read-out	---	H03	H100A	H0000~HFDE8
Line speed feedback write-in		H06/H10		
Line speed target value read-out	---	H03	H100B	H0000~HFDE8
Line speed target value write-in		H06/H10		
Tension reference read-out	---	H03	H100C	H0000~H7530
Tension reference write-in		H06/H10		
Torque reference read-out	---	H03	H100D	H0000~H0FA0 (0~400.0%) HF060~HFFFF(-400.0%~0)
Torque reference write-in		H06/H10		
Loopback test for asynchronous serial communication	---	H08	H0000 (sub function code for loopback test)	The content value is arbitrary (H0000~HFFFF)
Operation reference write-in	HFA	H06/ H10	H1001	H0000~HFFFF b8~b15: reserve. b7: inverter emergency stop (MRS) b6: the second function (RT) b5: high speed (RH) b4: medium speed (RM) b3: low speed (RL) b2: reverse rotation (STR) b1: forward rotation (STF) b0: reserve.
Monitor the INV real-time data	---	H03	H1014~H1027	The corresponding monitoring value of each Modbus address is as follows: H1014: digital input terminal input state. H1015: digital input terminal output state. H1016: 2-5 terminal input voltage H1017: 4-5 terminal input current/voltage H1018: AM1-5 terminal output voltage/current H1019: DC bus voltage H101A: the electronic thermal accumulation rate of inverter H101B: inverter output power H101C: the temperature rising accumulation rate of inverter H101D: the NTC temperature accumulation of inverter H101E: the electronic thermal accumulation rate of motor H101F: target pressure when PID control H1020: feedback pressure when PID control H1021: rotating speed fed back by PG H1022: HDI terminal input frequency H1023: reserve

Item	Shihlin protocol reference code	Modbus reference code	Modbus address	Data content and function description
Monitor the INV real-time data	---	H03	H1014~H1027	H1024: AM2-5 terminal output voltage / current H1025: output torque of inverter H1026: 3-5terminal input voltage H1027 : EP301 Communication expansion card version number
Monitor the INV real-time data	---	H03	H1014~H1027	The corresponding monitoring value of each Modbus address is as follows: H1014: digital input terminal input state. H1015: digital input terminal output state. H1016: 2-5 terminal input voltage H1017: 4-5 terminal input current/voltage H1018: AM1-5 terminal output voltage/current H1019: DC bus voltage H101A: the electronic thermal accumulation rate of inverter H101B: inverter output power H101C: the temperature rising accumulation rate of inverter H101D: the NTC temperature accumulation of inverter H101E: the electronic thermal accumulation rate of motor H101F: target pressure when PID control H1020: feedback pressure when PID control H1021: rotating speed fed back by PG H1022: HDI terminal input frequency H1023: reserve H1024: AM2-5 terminal output voltage / current H1025: output torque of inverter H1026: 3-5terminal input voltage H1027 : EP301 Communication expansion card version number

Item		Shihlin protocol reference code	Modbus reference code	Modbus addresses	Data content and function description					
Page change for parameter reading and writing	Read	H7F	---	---	P mode: H0000: P.0~P.99; H0001: P.100~P.199; H0002: P.200~P.299; H0003: P.300~P.399; H0004: P.400~P.499; H0005: P.500~P.599; H0006: P.600~P.699; H0007: P.700~P.799; H0008: P.800~P.899; H0009: P.900~P.999; H000A: P.1000~P.1099; H000B: P.1100~P.1199; H000C: P.1200~P.1299; Parameter group mode: H0064: 00-00~00-99; H0065: 01-00~01-99; H0066: 02-00~02-99; H0067: 03-00~03-99; H0068: 04-00~04-99; H0069: 05-00~05-99; H006A: 06-00~06-99; H006B: 07-00~07-99; H006C: 08-00~08-99					
	Write	HFF								
Page change for parameter reading and writing	Read	H7F	---	---	H006D: 09-00~09-99 H006E: 10-00~10-99 H006F: 11-00~11-99 H0070: 12-00~12-99 H0071: 13-00~13-99 H0072: 14-00~14-99 H0073: 15-00~15-99					
	Write	HFF								
Monitoring	Frequency setup	EEPROM	H73	H03	H1009	H0000~HFDE8(two decimal points when 00-08=0; one decimal point when non-zero)				
		RAM	H6D		H1002					
	Output frequency		H6F		H1003	H0000~H9C40(same as above)				
	Output current		H70		H1004	H0000~HFFFF(two decimal points)				
	Output voltage		H71		H1005	H0000~HFFFF(two decimal points)				
	Abnormal content		H74		H1007	H0000~HFFFF: Abnormal codes from the last two times H74/H1007: Error code 1 and 2; b15 b8 b7 b0 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Error code 2</td> <td style="width: 50%;">Error code 1</td> </tr> </table> H75/H1008: Error code 3 and 4; b15 b8 b7 b0 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Error code 4</td> <td style="width: 50%;">Error code 3</td> </tr> </table> For abnormal codes, please refer to the abnormal code list in the abnormal record parameter06-40~06-43.	Error code 2	Error code 1	Error code 4	Error code 3
			Error code 2		Error code 1					
Error code 4	Error code 3									
H75	H1008									

Data content	Parameter P operation	Communication Parameter P (Note 1)	Table 1 (Note2)	Table 2 (Note2)	User registered parameter	Other P parameters	Error codes
H5A5A	00-02=4(P.999=1)	o	x	x	o	o	x
H5566	00-02=5(P.999=2)	o	x	o	x	o	x
H5959	00-02=6(P.999=3)	o	x	x	x	o	x
H9966	00-02=3(P.998=1)	o	x	o	o	o	x
H9696	Communication 999 1	x	x	x	o	o	x
H99AA	Communication 999 2	x	x	o	x	o	x
H9A9A	Communication 999 3	x	x	x	x	o	x
H55AA	Communication 998	x	x	o	o	o	x
HA5A5	00-02=1(P.996=1)	x	x	x	x	x	o

Note: 1. Communication P parameters includes 07-02(P.32), 07-00(P.33), 07-01(P.36), 07-03(P.48)~ 07-09(P.53), 00-16(P.79), 07-10(P.153) and 07-07(P.154).
 2. For the table 1 and table 2, please refer to Section 5.1.2.

◆ The table of the special monitor code

Information	Content	Unit
H0000	Monitor the digital input terminal input port state.	Note 1
H0001	Monitor the digital output terminal output port state.	Note 2
H0002	Monitor the voltage which can be input across terminal 2-5.	0.01V
H0003	Monitor the voltage/current which can be input across terminal 4-5.	0.01A/0.01V
H0004	Monitor the voltage which can be output across terminal AM1-5.	0.01V
H0005	Monitor the DC bus voltage value.	0.1V
H0006	Monitor the electronic thermal accumulation rate	---
H0007	The temperature rising accumulation rate of inverter	0.01
H0008	The inverter output power	0.01kW
H0009	Inverter NTC temperature accumulation	0.01
H000A	The electronic thermal accumulation rate of motor	---
H000B	Target pressure when PID control	0.1%
H000C	Feedback pressure when PID control	0.1%
H000D	The rotating speed fed back by PG	0.01Hz
H000E	The input frequency of terminal HDI	0.01kHz
H000F	Reserve	---
H0010	The output voltage of terminal AM2-5	0.01V
H0011	The inverter output torque	0.1%
H0012	The input voltage of terminal 3-5	0.01V
H1013	Communication expansion card version number	---

Note: 1. Details of the digital input terminal input port state.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	HDI	M5	M4	M3	RES	M2	M1	M0	STR	STF

2. Details of the digital output terminal output port state.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	A17	A16	A15	A14	A13	A12	A11	A10	ABC2	SO2	ABC1	SO1

----- SLO3 expanded digital output -----

5.8.2 Communication EEPROM write selection

- Use this function if parameter settings are changed frequently.

Parameter	Name	Factory Value	Setting Range	Content
07-11 P.34	Communication EEPROM write selection	0	0	Parameter values written by communication are written to the EEPROM and RAM.
			1	Parameter values written by communication are written to the RAM.

Setting Communication EEPROM write selection

- ◆ When parameter write is performed via the RS-485 terminal, the parameters storage device can be changed from EEPROM + RAM to RAM only.
- ◆ When changing the parameter values frequently, set "1" in 07-11(P.34) Communication EEPROM write selection. The life of the EEPROM will be shorter if parameter write is performed frequently with the setting unchanged from "0"(EEPROM write).

Note: Turning OFF the inverter's power supply clears the modified parameter settings when 07-11(P.34) = "1 (write only to RAM)". Therefore, the parameter values at next power-ON are the values last stored in EEPROM.

5.8.3 Canopen protocol

- The relative settings for Canopen communication expanded board

Parameter	Name	Factory Value	Setting Range	Content
07-15 P.800	CANopen slave address	0	0 ~ 127	---
07-16 P.801	CANopen speed	0	0	1Mbps
			1	500Kbps
			2	250K/280KFbps
			3	125Kbps
			4	100Kbps
			5	50Kbps
07-17 P.802	CANopen communication status	0	0	Node reset state
			1	Com reset state
			2	Boot up state
			3	Pre operation state
			4	Operation state
			5	Stop state
07-18 P.803	CANopen control status	0	0	Not ready for use state
			1	Inhibit start state
			2	Ready to switch on state
			3	Switched on state
			5	Enable operation state
			7	Quick stop active state
			13	Err reaction activation state
			14	Error state

Setting Canopen protocol

Communication parameter group 07

- ◆ Parameters 07-17 and 07-18 are for read only, which are used to monitor the state of Canopen communication expanded board.

5.8.4 Communication expansion card version number

- To show the current software communication expansion card program version number

Parameter	Name	Factory Value	Setting Range	Content
07-44 P.829	EP301 Communication expansion card version number	read	read	To show the current software communication expansion card program version number, read only

5.8.5 Ethernet communication

- Using EP301 communication expansion card related Settings

Parameter	Name	Factory Value	Setting Range	Content
07-45 P.830	IP configuration	0	0	IP state
			1	IP move
07-46 P.831	IP address 1	192	0~255	
07-47 P.832	IP address 2	168	0~255	
07-48 P.833	IP address 3	2	0~255	
07-49 P.834	IP address 4	102	0~255	
07-50 P.835	Subnet mask 1	255	0~255	
07-51 P.836	Subnet mask 2	255	0~255	
07-52 P.837	Subnet mask 3	255	0~255	
07-53 P.838	Subnet mask 4	0	0~255	
07-54 P.839	Default gateway 1	192	0~255	
07-55 P.840	Default gateway 2	168	0~255	
07-56 P.841	Default gateway 3	2	0~255	
07-57 P.842	Default gateway 4	100	0~255	

Setting

Ethernet communication Settings

- ◆ At 07-45 ~ 07-57 on the number of parameters, please refer to the EP301 EtherNet communication expansion card specifications.

5.9 PID parameter group08

Group	Parameter Number	Name	Setting Range	Factory Value	Page
08-00	P.170	PID function selection	0: PID function non-selected	0	227
			0X: Parameter 08-03(P.225) sets target value.		
			1X: Take the input of terminal 2-5 as target source		
			2X: Take the input of terminal 4-5 as target source		
			3X: Take the input of terminal 3-5 as target source		
			4X: Take the input of terminal HDI as target source		
			X1: Take the input of terminal 2-5 as feedback source		
			X2: Take the input of terminal 4-5 as feedback source		
X3: Take the input of terminal 3-5 as feedback source					
08-01	P.171	PID feedback control method	0: Negative feedback control.	0	227
			1: Positive feedback control.		
08-02	P.241	Sampling period by PID	0 ~ 60000ms	20ms	228
08-03	P.225	PID target value panel reference	0 ~ 100.0%	20.0%	228
08-04	P.172	Proportion gain	0.1% ~ 1000.0%	20.0%	228
08-05	P.173	Integral time	0 ~ 60.00s	1.00s	228
08-06	P.174	Differential time	0 ~ 10000ms	0ms	228
08-07	P.175	Abnormal deviation	0 ~ 100.0%	0.0%	228
08-08	P.176	Exception duration time	0 ~ 600.0s	30.0s	228
08-09	P.177	Exception handling mode	0: Free stop	0	228
			1: Decelerate and stop		
			2: Continue to run when the alarm goes off		
08-10	P.178	Sleep detects deviation	0 ~ 100.0%	0.0%	228
08-11	P.179	Sleep detects duration time	0 ~ 255.0s	1.0s	228
08-12	P.180	Revival level	0 ~ 100.0%	90.0%	228
08-13	P.181	Outage level	0 ~ 120.00Hz	40.00Hz	228
08-14	P.182	Integral upper limit	0 ~ 200.0%	100.0%	228
08-15	P.183	Deceleration step length with stable pressure	0 ~ 10.00Hz	0.50Hz	228
08-16	P.221	Minimum pressuresampling value	0 ~ 65535	0	229
08-17	P.222	Maxmum pressure sampling value	0 ~ 65535	0	229
08-18	P.223	Analog feedback bias pressure	0 ~ 100.0%	0.0%	229
08-19	P.224	Analog feedback gain pressure	0 ~ 100.0%	100.0%	229
08-20	P.641	PID proportion Gain P2	0.1% ~ 1000.0%	20.0%	232
08-21	P.642	Integral time I2	0 ~ 60.00s	1.00s	232
08-22	P.643	Differential time D2	0 ~ 10000ms	0ms	232

PID parameter group 08

Group	Parameter Number	Name	Setting Range	Factory Value	Page
08-23	P.644	Auto adjustment for PID parameters	0: Adjust according to the feedback deviation value	0	232
			1: Adjust according to the curling radius.		
			2: Adjust according to the operation frequency		
			3: Adjust according to the operation frequency		
08-24	P.711	PID target signal filter time	0 ~ 650.00s	0.00s	233
08-25	P.712	PID feedback signal filter time	0 ~ 60.00s	0.00s	233
08-26	P.713	PID output signal filter time	0 ~ 60.00s	0.00s	233
08-27	P.714	PID deviation control limit	0 ~ 100.00%	0.00%	233
08-28	P.715	Integral separated property	0: Integral not separated	0	234
			1: Integral separated		
08-29	P.716	Integral separated point	0 ~ 100.00%	50.00%	234
08-30	P.717	PID differential limit	0 ~ 100.00%	0.10%	234
08-31	P.718	PID output in forward direction deviation limit	0 ~ 100.00%	100.0%	234
08-32	P.719	PID output in reverse direction deviation limit	0 ~ 100.00%	100.0%	234
08-33	P.720	PID parameter switchover operation selection	0: No PID parameter switchover.	0	235
			1: PID parameter switchover based on deviation.		
08-34	P.721	PID parameter switchover deviation lower limit	0 ~ 100.00%	20.00%	235
08-35	P.722	PID parameter switchover deviation upper limit	0 ~ 100.00%	80.00%	235
08-36	P.723	PID wire-break operation selection 1	0: When PID wire-break, select to no need to operate to the upper limit value.	1	235
			1: When PID wire-break, select to need to operate to the upper limit value.		
08-39	P.726	PID operation at stop	0: No PID operation at stop.	0	235
			1: PID Stop operation		
08-40	P.727	PID enable reverse run operation	0: PID reverse run is not allowed.	0	236
			1: PID reverse run is allowed.		
08-41	P.728	PID in reverse direction integral limit	0 ~ 100.0%	0.0%	236
08-42	P.729	PID minimum output frequency	0 ~ 10.00Hz	0.00Hz	236

5.9.1 PID function selection

- Process control such as flow rate, air volume or pressure are possible on the inverter. A feedback system can be configured and PID control can be performed using the digital input signal or parametersetting value as the set point, and the digital input signal as the feedback value.

Parameter	Name	Factory Value	Setting Range	Content
08-00 P.170	PID function selection	0	0	PID function non-selected
			0x	Parameter 08-03(P.225) sets target value.
			1x	Take the input of terminal 2-5 as target source
			2x	Take the input of terminal 4-5 as target source
			3x	Take the input of terminal 3-5 as target source
			4x	Take the input of terminal HDI as target source
			x1	Take the input of terminal 2-5 as feedback source
			x2	Take the input of terminal 4-5 as feedback source
			x3	Take the input of terminal 3-5 as feedback source
08-01 P.171	PID feedback control method	0	0	Negative feedback control.
			1	Positive feedback control.

Setting PID function selection

- ◆ During the operation of PID control, the frequency displayed on the screen is the output frequency of the inverter.
- ◆ For input signal filtering of terminal 2-5, terminal 3-5 and terminal 4-5, please refer to the instructions for 02-10.

Note: When selecting the target source and feedback source, please pay attention to the setting of 08-00 and 02-00~02-02, the terminals' priority are 2-5 > 4-5 > 3-5.

5.9.2 PID parameter group 1

➤ Auto-adjusting of process control can be easily performed by user via setting PID parameter.

Parameter	Name	Factory Value	Setting Range	Content
08-02 P.241	Sampling period by PID	20ms	0~6000ms	The parameter is the sampling period for feedback signal. The adjuster computes once every sampling period. The longer the sampling period, the slower the response.
08-03 P.225	PID target value panel reference	20%	0~100%	The target value is set by 08-03(P.225) when the ten-digit of 08-00 (P.170) value is 0, and the single-digit is not 0.
08-04 P.172	Proportion gain	20.0%	0.1% ~ 1000.0%	This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration.
08-05 P.173	Integral time	1.00s	0 ~ 60.00s	This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable.
08-06 P.174	Differential time	0ms	0 ~ 10000ms	This gain determines deviation controller's impact on the amount of change of the deviation. Appropriate deviation time can reduce the overshooting between the proportion controller and the integral controller. Yet when the deviation time is too large, system vibration may be induced.
08-07 P.175	Abnormal deviation	0.0%	0 ~ 100.0%	---
08-08 P.176	Exception duration time	30.0s	0 ~ 600.0s	---
08-09 P.177	Exception handling mode	0	0	Free stop
			1	Decelerate and stop
			2	Continue to run when the alarm goes off
08-10 P.178	Sleep detects deviation	0.0%	0 ~ 100.0%	---
08-11 P.179	Sleep detects duration time	1.0s	0 ~ 255.0s	---
08-12 P.180	Revival level	90.0%	0 ~ 100.0%	---
08-13 P.181	Outage level	40.00Hz	0 ~ 120.00Hz	---
08-14 P.182	Integral upper limit	100.0%	0 ~ 200.0%	When the deviation value accumulated with the integral time, an upper limit for deviation accumulation should be set. For example, the upper integral limit of frequency is equal to 01-03 * 08-14.
08-15 P.183	Deceleration step length with stable pressure	0.50Hz	0 ~ 10.00Hz	When the feedback pressure satisfies the deviation value for stopping the machine and the set time (in seconds) for stopping the machine for detection is reached, the inverter will take the 08-15 (P.183) step to reduce the frequency.

Parameter	Name	Factory Value	Setting Range	Content
08-16 P.221	Minimum pressuresampling value	0	0 ~ 65535	---
08-17 P.222	Maxmum pressure sampling value	0	0 ~ 65535	---
08-18 P.223	Analog feedback bias pressure	0.0%	0 ~ 100.0%	Revising the feedback signal to unify the signal range of inverter's feedback terminal and actual feedback, so that the inverter display in accordance with the feedback meter.
08-19 P.224	Analog feedback gain pressure	100.0%	0 ~ 100.0%	

Setting PID parameter group 1

Simulation of the feedback signal correction :

1.Please refer to 5.3.5 ~ 5.3.8 analog input selection and processing parts.

Example 1 : The user does not answer the feedback signal

First set proportion parameter 02-14 (P. 194) = 0%, 02 to 15 (P. 195) = 100%;
02-12 set voltage parameters (P. 192) = 0, 11-13 (P. 193) = 7.

Example 2 : Users choose 4-5 terminals to 0 to 20 ma feedback signals

First set proportion parameter 02-27 (P. 196) = 0%, 02-28 (P. 197) = 100%;

To set the current parameter 02-25 (P. 198) = 0, 11-26 (P. 199) = 2.

2.Users need to feedback signal correction

Example 3 : User feedback range 0~10kg (3 to 5 analog input)

Adjust the feedback signal to 0 kg, write parameters 02-36 (P. 546) = 0%

Adjust the feedback signal to 10 kg, write parameters 02-37 (P. 547) = 100%

Note : 1. If the user wants to by adjusting the size of the analog input corresponding to a certain proportion relations, need to adjust good analog input first, then set the corresponding proportion parameter, this time without setting voltage parameter, frequency converter will calculate itself.If the user to skip regulating the relationship between analog input to set the proportion will be expected to set a good first proportion parameters, voltage parameter Settings again.

2. Users such as case 3 that case, must be the actual feedback signal.

3 In the process of PID correction, the correction value must be the upper and lower limits of the selected signal.

4. If you use a 4-5 terminals for the target source or source of feedback, please be sure to first set 02-20 value and collocation of SW2 switch, choose 4-5 terminal voltage/current signal is, to other actions.

5. If use 3 to 5 terminals for the target source or feedback, please be sure to first set SW1 switch 02-29 value and collocation, choose 3-5 terminal voltage/current signal is, to other actions.

◆ The instruction for the target pressure given by external analog terminal:

1. When the target value is set by terminal2-5(02-00 = 1X)

When 02-08 = 0, the given range is 0~5V corresponding to 0~100%;

PID parameter group 08

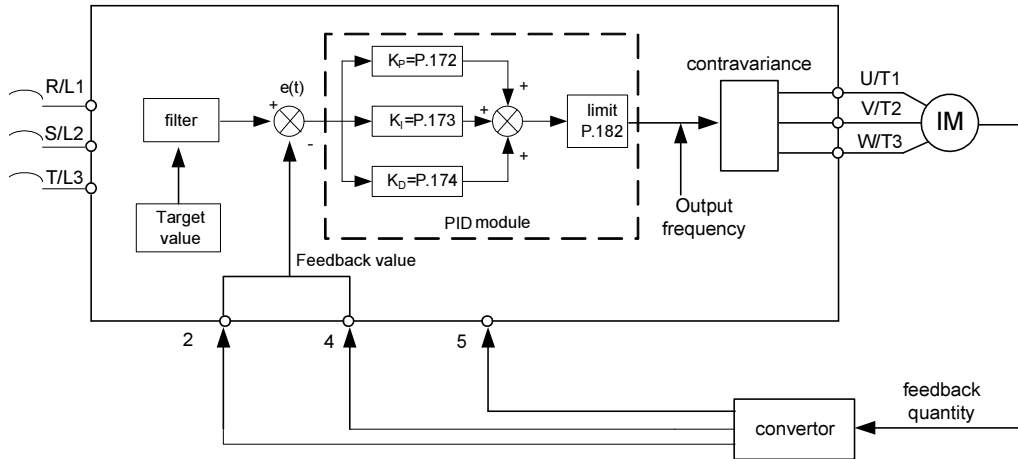
When 02-08 = 1, the given range is 0~10V corresponding to 0~100%.

- When the target value is set by terminal 4-5(02-01 = 2X)
The given range is 4~20mA corresponding to 0~100%.

Example: Set 08-00 = 1, 08-01 = 0.

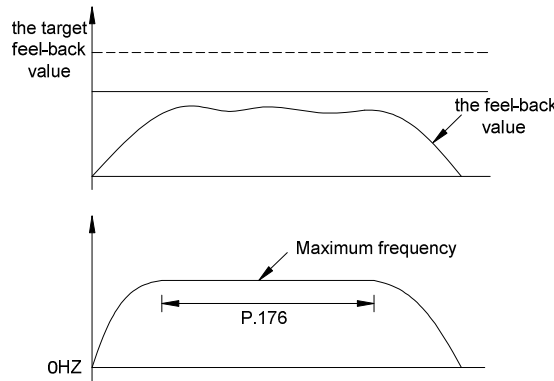
It indicates that the PID target value is given by the current of terminal 4-5(4~20mA).

If 8mA is given by the user, the corresponding given proportion is $(8-4) / (20-4) * 100.0 = 25.0$



- When the output frequency reaches the value of $01-03 * 08-14$, the feedback value will be less than the product of the target value multiplying 08-07. In addition, when the duration lasts more than the set value of 08-08, PID will be considered as abnormal and handled according to the set value of 08-09.

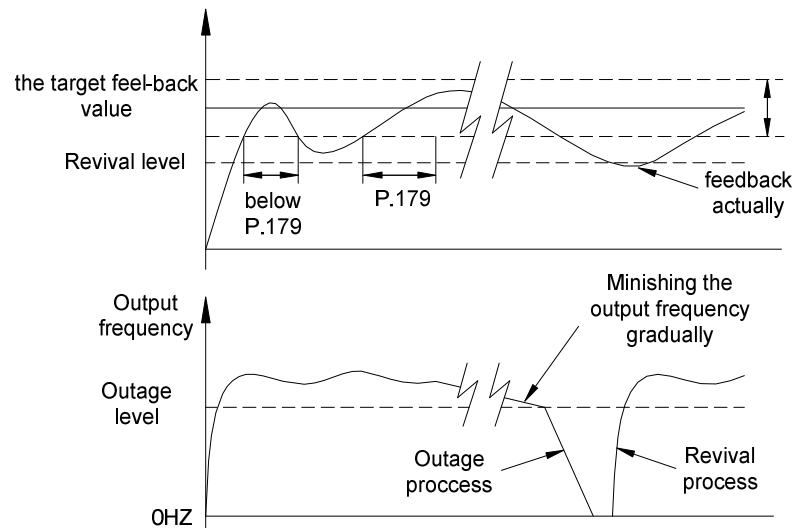
For example, when 08-07=60%, 08-08=30s, 08-09=0, 01-03=50Hz and 08-14= 100%, the output frequency reaches 50Hz, and the feedback value is lower than 60% of the target feedback value for 30 seconds continuously, alarm will be display and the inverter will be stopped freely.



- If 08-10 is set to 0, then the set values of 08-11, 08-12, 08-13 and 08-15 are invalid. If the setting value of 08-10 is nonzero, than PID's sleep function will be activated. When the absolute value of the deviation between the feedback value and the target feedback value is less than the sleep detected deviation value for the duration of 08-11's sleep detection time, the inverter will steadily reduce the output frequency. Once the output frequency of the inverter is less than the machine stop level of 08-13, the inverter will decelerate and stop. When the feedback value is lower than the wake-up level, the output frequency of the inverter will again be controlled by PID.

For example, if 08-10=5%, 08-11=1.0s, 08-12=90%, 08-13=40Hz, and 08-15=0.5Hz, and when the feedback value is at a stable zone, i.e., larger than 95% of the target feedback value but less than 105% of the target feedback value, the inverter at the stable zone will reduce the output frequency by 0.5Hz/second. When the output

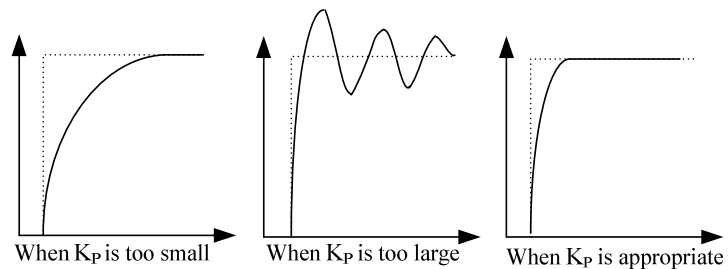
frequency of the inverter is less than 40Hz, the inverter will directly decelerate and stop. When the feedback value lower than 90% of the target feedback value, the inverter will wake up and the output frequency will again be controlled by PID.



◆ PID gain simple setting:

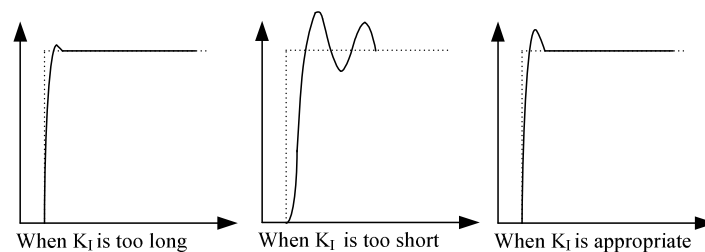
1. After changing target, response is slow ---Increase P-gain ($K_P = 08-04$)

response is quick but unstable ---Decrease P-gain ($K_P = 08-04$)



2. Target and feedback do not become equal ---Decrease Integration time ($K_I = 08-05$)

become equal after unstable vibration ---Increase Integration time ($K_I = 08-05$)



◆ Even after increasing K_P , response is still slow ---Increase D-gain ($K_D = 08-06$)

It is still unstable ---Decrease D-gain ($K_D = 08-06$)

Note: 1. When 08-09=2, the panel has no alarm display but the multi-function output terminal has alarm detection. To turn off the alarm, reset 00-02 or turn down the power.
 2. When selecting the target source and feedback source, please pay attention to the setting of 08-00 and 02-00~02-02, the terminals' priority are 2-5>4-5>3-5.

5.9.3 PID parameter group2

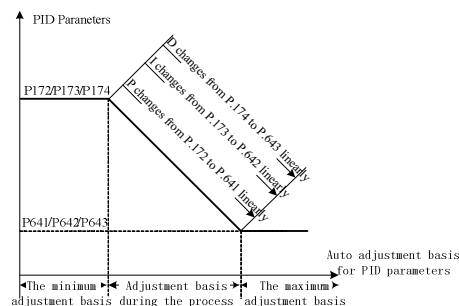
➤ This group of parameters is only related to the close loop speed mode.

Parameter	Name	Factory Value	Setting Range	Content
08-20 P.641	PID proportion Gain P2	20.0%	0.1% ~ 1000.0%	This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration.
08-21 P.642	Integral time I2	1.00s	0 ~ 60.00s	This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable.
08-22 P.643	Differential time D2	0ms	0 ~ 10000ms	This gain determines differential controller's impact on the amount of change of the deviation. Appropriate differential time can reduce the overshooting between the proportion controller and the integral controller. Yet when thedifferential time is too large, system vibration may be induced.
08-23 P.644	Auto adjustment for PID parameters	0	0	Adjust according to the feedback deviation value
			1	Adjust according to the curling radius.
			2	Adjust according to the operation frequency.
			3	Adjust according to the line speed.

Setting PID parameter group2

- ◆ 08-23 is the auto adjustment basis for PID parameters..
 1. When 08-23=0, he adjustment is according to the feedback deviation value.IOnly the first group of PID parameters is used, and the second group is inactive.
 2. When08-23=1, the adjustment is according to the curling radius. The first group of PID parameters is used for empty roll, while the second group of PID parameters is used for full roll. The PID parameters change continuously during the process.
 3. When 08-23=2, the adjustment is according to the operation frequency. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum frequency. The PID parameters change continuously during the process.
 4. When 08-23=3, the adjustment is according to the line speed. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum line speed. The PID parameters change continuously during the process.

◆ The relationship between PID auto adjustment basis and PID parameters is shown as following diagram:



5.9.4 PID filter setting

- Filter function setting can help to reduce interference on the system yet slow the response.

Parameter	Name	Factory Value	Setting Range	Content
08-24 P.711	PID target signal filter time	0.00s	0 ~ 650.00s	Set PID target signal low-pass filter time constant
08-25 P.712	PID feedback signal filter time	0.00s	0 ~ 60.00s	Set PID feedback signal low-pass filter time constant
08-26 P.713	PID output signal filter time	0.00s	0 ~ 60.00s	Set PID output signal low-pass filter time constant

Setting PID filter time constant

- ◆ 08-24 is used to set PID target signal filter time constant, which can reduce the impact caused by PID target signal sudden setting change on the system.
- ◆ 08-25 is used to set PID feedback signal filter time constant, which can reduce the impact caused by feedback signal, but will slow the response of the process closed-loop system.
- ◆ 08-26 is used to set PID output signal filter time constant, which can help to weaken sudden change of the PID output frequency, but will slow the response of the process closed-loop system.

5.9.5 PID deviation control limit

- If the deviation between PID target and PID feedback is smaller than the value of 08-27, PID output frequency keeps unchanged.

Parameter	Name	Factory Value	Setting Range	Content
08-27 P.714	PID deviation control limit	0.00%	0 ~ 100.00%	If the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops.

Setting PID deviation limit

- ◆ 08-27 is used to set PID deviation control limit, if the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops. The small deviation between PID target and PID feedback will make the output frequency stabilize, effective for some closed-loop control applications.

5.9.6 PID integral property

- PIDIntegral separated function can help to reduce the PID overshoot effectively.

Parameter	Name	Factory Value	Setting Range	Content
08-28 P.715	Integral separated property	0	Integral not separated	Set the integral function is valid
		1	Integral separated	
08-29 P.716	Integral separated point	50.00%	0 ~ 100.00%	Set the deviation between target and feedback in integral separated function.

Setting PID integral separated function

- ◆ When 08-28 is set to 1, integral separated function is valid, when the deviation between PID target and PID feedback is larger than the value of 08-29, only PID proportion and differential operate, which can help to reduce the PID overshoot.

5.9.7 PID differential limit

- In PID control, differential may cause system oscillation, generally limit differential to a small range.

Parameter	Name	Factory Value	Setting Range	Content
08-30 P.717	PID differential limit	0.10%	0 ~ 100.00%	Set PID differential limit

Setting PID differential limit

- ◆ In PID control, the differential operation is sensitive and may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range. 08-27 is used to set the PID differential output range.

5.9.8 PID output deviation limit

- PID output deviation limit setting can control the change of PID outputs and stabilize the running of the inverter.

Parameter	Name	Factory Value	Setting Range	Content
08-31 P.718	PID output in forward direction deviation limit	100.00%	0 ~ 100.00%	Set the deviation limit calculated by two PID outputs
08-32 P.719	PID output in reverse direction deviation limit	100.00%	0 ~ 100.00%	

Setting PID output deviation limit

- ◆ This function is used to limit the deviation between two PID outputs to suppress the rapid change of PID output and stabilize the running of the inverter.

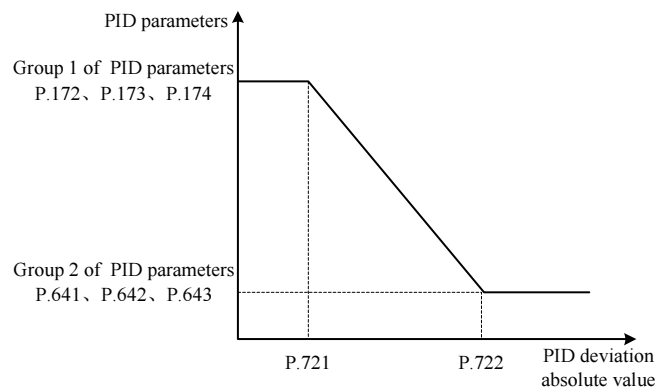
5.9.9 PID parameter switchover

- Two groups of PID parameters are required when one group of PID parameters cannot satisfy the requirement of the whole running process.

Parameter	Name	Factory Value	Setting Range	Content
08-33 P.720	PID parameter switchover operation selection	0	0: No switchover	When deviation is smaller than the value of 08-34, Group 1 of PID parameters operate. When deviation is larger than the value of 08-35, Group 2 of PID parameters operate. When the deviation is between 08-35 and 08-34, PID parameters linear change.
			1: According to the deviation switch PID	
08-34 P.721	PID parameter switchover deviation lower limit	20.00%	0 ~ 100.00%	
08-35 P.722	PID parameter switchover deviation upper limit	80.00%	0 ~ 100.00%	

Setting PID parameter switchover

- ◆ In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process. Two groups of PID parameters can switch automatically according to deviation, as the figure shows below:



5.9.10 PID malfunction selection

- When in PID malfunction, 08-39 and 08-40 will show different operation to apply for different applications.

Parameter	Name	Factory Value	Setting Range	Content
08-36 P.723	PID wire-break operation selection 1	1	0 ~ 1	0: When PID wire-break, select to no need to operate to the upper limit value. 1: When PID wire-break, select to need to operate to the upper limit value.
08-39 P.726	PID operation at stop	0	0: PID operation at stop	It is used to select whether to operate PID in the state of stop.
			1: No PID operation at stop	

PID parameter group 08

Setting PID malfunction selection

- ◆ 08-36 is used to select PID wire-breakoperation. In general, once detecting PID loss, the inverter will output alarm.
- ◆ 08-39 is used to select PID operation at stop. In general, it will operate PID in the state of stop.

5.9.11 PID reverse run operation selection

- It is used to set whether reverse run is allowed when PID calculation is negative

Parameter	Name	Factory Value	Setting Range	Content
08-40 P.727	PID enable reverse run operation	1	0: PID not allow the reverse	--
			1: PID Allow the reversal	
08-41 P.728	PID in reverse direction integral limit	0.0%	0 ~ 100.0%	Used to set PID in reverse direction integral limit. Set it to 0 when reverse run operation is not allowed.
08-42 P.729	PID minimum output frequency	0.00Hz	0 ~ 10.00Hz	Used to set the minimum value of PID output.

Setting PID reverse run operation selection

- ◆ When PID reverse run is allowed, 08-41 should be set to a value larger than 0, generally it is set to 100.0%. When PIDreverse run is not allowed, 08-41 is set to 0.
- ◆ 08-42 is used to PIDcalculation minimum output frequency, when the output is smaller than the value, the inverter output stops.

5.10 PG feedback parameter group 09

Group	Parameter Number	Name	Setting Range	Factory Value	Page
09-00	P.349	PG type selection	0: ABZ	0	239
			1: ABZ (Synchronous motor decicated)		
			2: Resolver 1x Synchronous motor standard encoder		
			3: ABZ/UVW Synchronous motor standard encoder		
09-01	P.350	Number 1 of the encoder pulses	0 ~ 20000	1024	239
09-02	P.351	Encoder input mode setup 1	0: No function	0	239
			1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.		
			2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.		
			3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.		
			4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.		
09-03	P.352	PG abnormality detection time	0 ~ 100.0s	1.0s	241
09-04	P.353	Over-speed detection frequency	0 ~ 30.00Hz	4.00Hz	241
09-05	P.354	Over-speed detection time	0 ~ 100.0s	1.0s	241
09-06	P.355	Number 2 of the encoder pulses	0 ~ 20000	2500	241
09-07	P.356	Encoder input mode 2	0:No function	0	241
			1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.		
			2:Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.		
			3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.		
			4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.		
09-08	P.357	Dividing frequency output setting	1 ~ 255	1	242
09-09	P.358	Dividing frequency filter coefficient	0 ~ 255	0	242
09-10	P.359	Electronic gear ratio	0 ~ 300.00	1.00	243

PG feedback parameter group 09

Group	Parameter Number	Name	Setting Range	Factory Value	Page
09-11	P.360	Prevent reverse rotation detection pulse number	0 ~ 65535	0	243
09-12	P.361	Rse reverotation detection number	0 ~ 65535	0	243
09-13	P.124	Expansion card version	Read	Read	244
09-14	P.363	Phase Z adjust margin	0.0°Do not adjust	15.0°	244
			0.1°~360.0° : Phase Z impulse adjust		
09-15	P.364	Phase Z DV1/DV2 alarm-enabled	0 : Phase Z DV1/DV2 alarm is not valid	1	244
			1 : Phase Z DV1/DV2 alarm is valid		
09-16	P.386	PG302 Hardware break line detection	0 : Break line detection is invalid	1	241
			1 : Break line detection is effective		

5.10.1 PG type selection

➤ PG is short for Pulse Generator.

Parameter	Name	Factory Value	Setting Range	Content
09-00 P.349	PG type selection	0	0	0: ABZ
			1	1: ABZ (Synchronous motor decicated)
			2	2: Resolver 1x Synchronous motor standard Encoder
			3	3: ABZ/UVW Synchronous motor standard Encoder

 PG type selection

- ◆ Please set the the value of 09-00(P.349) properly according to the type of motor and PG board.
- ◆ PM motor with ordinary ABZ photoelectric encoder, should set up the 09-00 (P. 349) = 0, frequency converter based on 11-08 (P. 328) set the choose pull in way or the high frequency pulse vibration mode for PM motor rotor initial magnetic pole position to start the PM motor.
- ◆ PM motor with province line UVW photoelectric encoder, should set up the 09-00 (P. 349) = 1, the encoder will be on electricity for the first time, a PM motor rotor magnetic pole position information, start PM motor frequency converter according to the initial magnetic pole position, if there are different P of the frequency converter, inverter electrical action again, be sure to do otherwise PM motor drive.
- ◆ PM motors with rotating transformer, should set the 09-00 (P. 349) = 2, the inverter will each time on electrical or reset, read the PM motor rotor magnetic pole position information, frequency converter according to the initial magnetic pole position to start the PM motor.

5.10.2 PG1 parameter

➤ It is used to select the input mode of PG1 encoder.

Parameter	Name	Factory Value	Setting Range	Content
09-01 P.350	Number 1 of the encoder pulses	1024	0 ~ 20000	---
09-02 P.351	Encoder input mode setup 1	0	0	No function
			1	Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.
			2	Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.
			3	Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.
			4	Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.

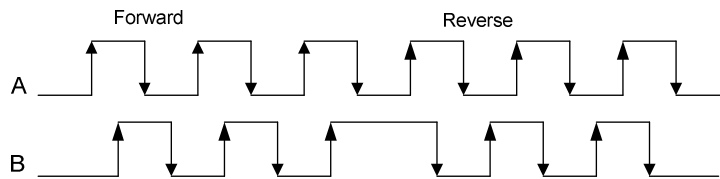
 PG1 parameter

PG feedback parameter group 09

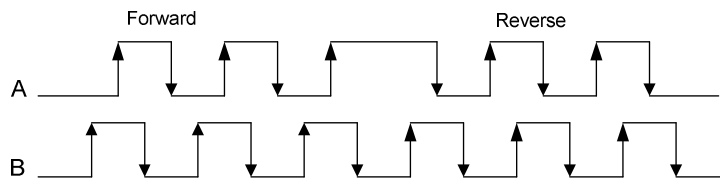
- ◆ 09-01 and 09-02 are used to set the encoder signal which connects to the A1/B1 interface on PG board. When the closed loop controls, the encoder signal for feedback can only be connected to the A1/B1 on PG board. 09-01 is applied for setting up the number of pulses to be generated by the encoder per revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.
- ◆ 09-02 is applied for setting up the encoder's input mode. The following encoder input modes are used as some examples:

0: No function.

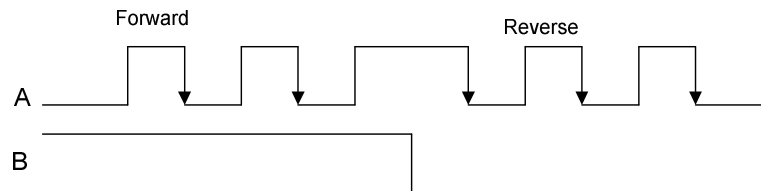
1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.



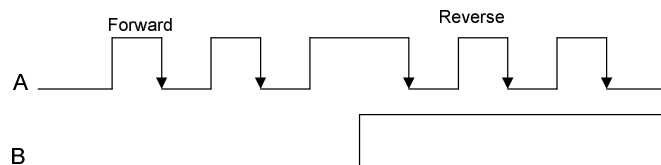
2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.



3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.



4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.



Note: 1. If closed-loop control is selected but 09-02=0, then the inverter will display alarm PG1 and stop the operation.
 2. PG card does not work with encoder wiring wrong or encoder, shows different p PG and stop working.
 3. When 00-21=1, execute the IM motor V/F closed-loop control; when 00-21=4, execute the IM motor closed-loop vector control. When 00-21=5, execute the PM motor closed-loop vector control.
 4. When 10-03=1, zero-speed operation is executed under the closed-loop control; DC voltage brake is executed under the V/F closed-loop control.

5.10.3 PG abnormality detection

➤ It is the detection standard when the abnormality occurs in PG feedback control.

Parameter	Name	Factory Value	Setting Range	Content
09-03 P.352	PG abnormality detection time	1.0s	0 ~ 100.0s	PG wire-breakdetection time setting
09-04 P.353	Over-speed detection frequency	4.00Hz	0 ~ 30.00Hz	Motor over-speed detection frequency threshold setting
09-05 P.354	Over-speed detection time	1.0s	0 ~ 100.0s	Motor over-speed detection time setting
09-16 P.386	PG302 Hard ware break line detection	1	0	Break line detection is invalid
			1	Break line detection is effective

Setting PG abnormality detection

- ◆ When carrying out PG feedback control, if the detected frequency is 0, and with duration longer than the time set by 09-03, and then the PG card's feedback signal is abnormal. The inverter will display alarm PG2 and stop the operation. If PG signal abnormal (zero speed) detection time 09-03 is set to 0, then there is no PG card feedback signal abnormal function, i.e., no alarm PG2.
- ◆ When carrying out PG feedback control, if the difference between the detected frequency and the output frequency exceeds 09-04, and with duration longer than the set time of 09-05, then the speed deviation is too big. The inverter will display alarm PG3 and stop the operation. If PG over-speed detection time 09-05 is set to 0, then alarm PG3 function is not available.

5.10.4 PG2 parameter

➤ It is used to select the input mode of PG2 encoder.

Parameter	Name	Factory Value	Setting Range	Content
09-06 P.355	Number 2 of the encoder pulses	2500	0 ~ 20000	It is used to set the encoder signal which connects to the A2/B2 interface on PG03.
09-07 P.356	Encoder input mode 2	0	0	No function
			1	Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.
			2	Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.
			3	Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.
			4	Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.

Setting PG2 parameter

PG feedback parameter group 09


- ◆ When using the PG card, 09-06 is applied for setting up the number of pulses to be generated by the encoder per revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.
- ◆ Parameter 09-07 is applied for setting up the encoder's input mode. For the encoder's input mode, please refer to parameter 09-02.
- ◆ In speed mode, when 09-07 is not set to 0, the frequency command is the pulse input of A2/B2 (target frequency (0.01Hz) = pulse frequency (Hz) / 09-06 * 09-10); After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.
- ◆ In position mode, when 09-07 is not set to 0, the position command is the pulse input of A2/B2 (target position = A2/B2 pulse number * 09-10); After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.
- ◆ When frequency command or position command is from the pulse input of A2/B2, the actual rotation direction of the motor is as the figure below:

Rotation command	09-07 (P.356)	A2B2 pulse train	Actual rotation direction of the motor
FWD	1, 3	A2ahead ofB2	Forward
		B2ahead ofA2	Reverse
	2, 4	A2ahead ofB2	Reverse
		B2ahead ofA2	Forward
REV	1, 3	A2ahead ofB2	Reverse
		B2ahead ofA2	Forward
	2, 4	A2ahead ofB2	Forward
		B2ahead ofA2	Reverse

5.10.5 Dividing frequency output function

- The multiple setting for PG board feedback and output.

Parameter	Name	Factory Value	Setting Range	Content
09-08 P.357	Dividing frequency output setting	1	1 ~ 255	The multiple setting for PG card feedback and output
09-09 P.358	Dividing frequency filter coefficient	0	0 ~ 255	The setting of PG card dividing frequency filter coefficient

 Dividing frequency output function

- ◆ 09-08 is the multiple setting for the feedback and output of PG card. If the feedback is 1024PPR and 09-08 is set to 2, the output of PG OUT (pulse output) on PG card is 512PPR.

5.10.6 Electronic gear ratio

- Electronic gear ratio setting for the pulse input of A2/B2 of PG301 card.

Parameter	Name	Factory Value	Setting Range	Content
09-10 P.359	Electronic gear ratio	1.00	0 ~ 300.00	---

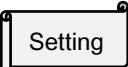
 Electronic gear ratio

- ◆ For the usage of 09-10, please refer to 09-07.

5.10.7 Reverse rotation detection

- The relative settings for PM motor prevent reverse rotation

Parameter	Name	Factory Value	Setting Range	Content
09-11 P.360	Prevent reverse rotation detection pulse number	0	0 ~ 65535	PM motor prevent reverse rotation detection pulse number setting.
09-12 P.361	Reverse rotation detection number	0	0 ~ 65535	PM motor reverse rotation detection number setting.

 Reverse rotation detection

- ◆ 09-11 is used to set prevent reverse rotation detection pulse number. When the motor rotates continuously for the pulse number of 09-11 at the opposite direction of the speed command, it will output prevent reverse rotation detection alarm dv4. Set 09-11 to 0 for applications where the direction of the load is the opposite of the speed command, which will cancel prevent reverse rotation detection alarm. It is valid only in PM motor close-loop vector control mode.
- ◆ 09-12 is used to set reverse rotation detection number. When detecting continuously for the number of 09-12 that the direction of acceleration is opposite to the speed command, it will output reverse rotation detection alarm dv3. When 09-12=0, it will cancel reverse rotation detection alarm. It is valid only in PM motor close-loop vector control mode.

5.10.8 Expansion card version information

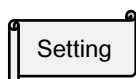
➤ It is used to display the current firmware version or type of the inverter/expansion card.

Parameter	Name	Factory Value	Setting Range	Content
09-13 P.124	Expansion card version	Read	Read	It is used to display the current firmware version or type of the inverter/Expansion card which is readable only.

5.10.9 PG card phaseZadjust degrees

➤ PhaseZadjusting can eliminate the cumulative error of AB phase

Parameter	Name	Factory Value	Setting Range	Content
09-14 P.363	PhaseZadjust degrees	15.0°	0.0°	Don't adjust
			0.1°~360.0°	PhaseZ pulse adjust

 Z phase adjust degrees

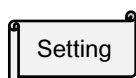
- ◆ Judge pulses deviation value of AB phase between two phases Z. Theoretically, the deviation value is 09-01 (P.350) (or 4*09-01 (P.350)) , Convert Angle is 360° mechanical point of view. When the deviation value decreasing the 09-01 (P. 350) (or 4 * 09-01 (P. 350)) is less than 9-14 (P. 363) and the deviation value is greater than the 09-04 (P. 363), which can adjust the phase Z , or can not.
- ◆ When the signal of phase Z is destroyed by the external, please the 09-14 (P.363) set 0.

Note: It is valid, only with the VC model of PM motor and the place model of IM motor.

5.10.10 PG card phase ZDV1/DV2 alarm-enabled

➤ Select phase Z DV1, DV2 alarm is or isn't valid

Parameter	Name	Factory Value	Setting Range	Content
09-15 P.364	Phase ZDV1/DV2 alarm enable	1	0	Phase ZDV1/DV2 alarm enable is not valid
			1	Phase ZDV1/DV2 alarm enable is valid

 Phase ZDV1/DV2 alarm enable

- ◆ DV1 is phase Z pulse lose alarm , DV2 is phase Z noise detectin alarm, When 09-15 (P.364) is 0, can cancel DV1 , DV2 alarm.

Note: It is valid only 00-21 (P.300) =5

5.11 Application parameter group 10

Group	Parameter Number	Name	Setting Range	Factory Value	Page
10-00	P.10	DC injection brake operation frequency	0 ~ 120.00Hz	3.00Hz	250
10-01	P.11	DC injection brake operation time	0 ~ 60.0s	0.5s	250
10-02	P.12	DC injection brake operation voltage	0 ~ 30.0%: 7.5K/11KF and types below	4.0%	250
			0 ~ 30.0%: 11K/15KF ~ 55K/75KF types	2.0%	
			0 ~ 30.0%: 75K/90KF and types above	1.0%	
10-03	P.151	Zero-speed control function selection	0: There is no output at zero-speed.	0	251
			1: The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.		
			2: The zero-servo running is carried out in close-loop vector mode.		
10-04	P.152	Voltage at zero-speed control	0 ~ 30.0%: 7.5K/11KF and types below	4.0%	251
			0 ~ 30.0%: Types from 11K/15KF to 55K/75KF	2.0%	
			0 ~ 30.0%: 75K/90KF and types above	1.0%	
10-05	P.242	DC injection brake function before start	0: DC injection brake function is not available before starting.	0	252
			1: DC brake injection function is selected before starting.		
10-06	P.243	DC injection brake time before start	0 ~ 60.0s	0.5s	252
10-07	P.244	DC injection brake voltage before start	0 ~ 30.0%: 7.5K/11KF(included) and types below	4.0%	252
			0 ~ 30.0%: 11K/15KF ~ 55K/75KF types	2.0%	
			0 ~ 30.0%: 75K/90KF (included) and types above.	1.0%	
10-08	P.150	Restart mode selection	XX0: No frequency search.	0	253
			XX1: Direct frequency search		
			XX2: Decrease voltage mode		
			X0X: Power on once.		
			X1X: Start each time.		
			X2X: Only instantaneous stop and restart		
			0XX: No rotationdirection detection.		
			1XX: Rotation direction detection.		
			2XX:00-15(P.78)=0, rotation direction detection ; 00-15(P.78)=1/2, no rotation direction detection.		
10-09	P.57	Restart coasting time	0 ~ 30.0s	99999	253
			99999: No restart function.		
10-10	P.58	Restart cushion time	0 ~ 60.0s: 7.5K/11KF(included)and types below.	5.0s	253
			0 ~ 60.0s: 11K/15KF ~ 55K/75KF types	10.0s	
			0 ~ 60.0s: 75K/90KF(included)and types above.	20.0s	

Application parameter group 10

Group	Parameter Number	Name	Setting Range	Factory Value	Page
10-11	P.61	Remote setting functionselection	0: No remote setting function.	0	255
			1: Remote setting function, frequency setup storage is available.		
			2: Remote setting function, frequency setup storage is not available.		
			3: Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR "turn off".		
10-12	P.65	Retry selection	0: Retry is invalid.	0	257
			1: Over-voltageoccurs, the inverter will perform the retry function.		
			2: Over-currentoccurs,the inverter will perform the retry function.		
			3: Over-voltage or over-currentoccurs, the inverter will perform the retry function.		
			4: All the alarms have the retry function.		
10-13	P.67	Number of retries at alarm occurrence	0: Retry is invalid.	0	257
			1 ~ 10: The setting value of 10-13(P.67) isexceeded, the inverter will not perform the retry function.		
10-14	P.68	Retry waiting time	0 ~ 360.0s	1.0s	257
10-15	P.69	Retry accumulation time at alarm	Read	0	257
10-16	P.119	The dead time of positive and reverse rotation	0 ~ 3000.0s	0.0s	258
10-17	P.159	Energy-saving control function	0: Normal running mode.	0	258
			1: Energy-saving running mode.		
10-18	P.229	Dwell function selection	0: None.	0	259
			1: Backlash compensation function.		
			2: Acceleration and deceleration interrupt waiting function.		
10-19	P.230	Dwellfrequency at acceleration	0 ~ 650.00Hz	1.00Hz	259
10-20	P.231	Dwelltime at acceleration	0 ~ 360.0s	0.5s	259
10-21	P.232	Dwellfrequency at deceleration	0 ~ 650.00Hz	1.00Hz	259
10-22	P.233	Dwelltime at deceleration	0 ~ 360.0s	0.5s	259
10-23	P.234	Triangular wave function selection	0: None.	0	261
			1: External TRIs turned on,triangular wave function will be valid.		
			2: The triangular wave function is effective at any given time.		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
10-24	P.235	Maximum amplitude	0 ~ 25.0%	10.0%	261
10-25	P.236	Amplitude compensation for deceleration	0 ~ 50.0%	10.0%	261
10-26	P.237	Amplitude compensation for acceleration	0 ~ 50.0%	10.0%	261
10-27	P.238	Amplitude acceleration time	0 ~ 360.00s/0 ~ 3600.0s	10.00s	261
10-28	P.239	Amplitude deceleration time	0 ~ 360.00s/0 ~ 3600.0s	10.00s	261
10-29	P.247	MC switchover interlock time	0.1 ~ 100.0s	1.0s	262
10-30	P.248	Start waiting time	0.1 ~ 100.0s	0.5s	262
10-31	P.249	Switchover frequency from inverter to commercial power supply frequency	0 ~ 60.00Hz 99999: No automatic switchover order.	99999	262
10-32	P.250	Automatic switchover frequency range	0 ~ 10.00Hz: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation. 99999: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.	99999	262
10-33	P.273	Power failure stop selection	0: Power failure time deceleration-to-stop function disabled. 1: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.) 2: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.) 11: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.) 12: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)	0	265

Application parameter group 10

Group	Parameter Number	Name	Setting Range	Factory Value	Page
10-34	P.274	Subtracted frequency at deceleration start	0 ~ 20.00Hz	3.00Hz	265
10-35	P.275	Subtraction starting frequency	0 ~ 120.00Hz: When output frequency \geq 10-35(P.275), The motor decelerates from the "output frequency - 10-34(P.274)"; When output frequency < 10-35(P.275), deceleration from output frequency	50.00Hz	265
			99999: The motor decelerates from the "output frequency - 10-34(P.274)"		
10-36	P.276	Power-failure deceleration time 1	0 ~ 360.00s/0 ~ 3600.00s	5.00s	265
10-37	P.277	Power-failure deceleration time 2	0 ~ 360.00s/0 ~ 3600.00s: Set the Dec time starting at 10-38(P.278) and downward.	99999	265
			99999: Set the Dec time to the setting frequency of 10-38(P.278).		
10-38	P.278	Power failure deceleration time switchover frequency	0 ~ 650.00Hz	50.00Hz	265
10-39	P.279	UV avoidance voltage gain	0 ~ 200.0%	100.0%	265
10-40	P.700	VF separated voltage source	0: Given by digital 10-41(P.701).	0	266
			1: Given by analog or HDI pulse.		
10-41	P.701	VF separated voltage digital	0 ~ 440.00V/0 ~ 220.00V	According to voltage	266
10-42	P.702	VF separated voltage Acc time	0 ~ 1000.0s	0.0s	266
10-43	P.703	VF separated voltage Dec time	0 ~ 1000.0s	0.0s	266
10-44	P.704	VF separated Stop selection	0: Frequency/voltage independently decreases to 0.	0	266
			1: After the voltage decreases to 0, frequency decreases.		
10-45	P.267	Regeneration and avoidance operation selection	0: Regeneration avoidance function is invalid.	0	267
			1: Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action)		
			2: Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)		

Group	Parameter Number	Name	Setting Range	Factory Value	Page
10-45	P.267	Regeneration and avoidance operation selection	11:Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))	0	267
			12: Regeneration and avoidance function only in constant speed(Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))		
10-46	P.268	Regeneration and avoidance DC bus voltage level	155 ~ 400V: 220V types	380V	268
			310 ~ 800V: 440V types	760V	268
10-47	P.269	DC bus voltage detection sensitivity at deceleration	0: Disables regeneration avoidance due to bus voltage change rate.	0	268
			1 ~ 5: Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity.		
10-48	P.270	Regeneration and avoidance frequency compensation value	0 ~ 10.00Hz: Set the limit value of frequency which rises at activation of regeneration avoidance function.	6.00Hz	268
			99999: Frequency limit invalid.		
10-49	P.271	Regeneration avoidance voltage gaincoefficient	0 ~ 400.0%/0 ~ 40.0%	100.0%	268
10-50	P.272	Regeneration avoidance frequency gain coefficient	0 ~ 400.0%/0 ~ 40.0%	100.0%	268
10-51	P.264	Overexcitation deceleration	0: Overexcitation deceleration is invalid.	0	268
			1: Overexcitation deceleration is valid.		
10-52	P.265	Overexcitation current level	0 ~ 200.0%	150.0%	268
10-53	P.266	Overexcitation gain	1.00 ~ 1.40	1.10	268
10-54	P.362	Short-circuit brake time at PM motor start	0~60.0s	0.0s	269
10-55	P.780	PLC Action choice	0:PLCFunction invalid	0	270
			1:PLCFunction effective,PLC RUN signal from the external terminal input signal or 10-56 (P.781)。		
			2 : PLCFunction effective,PLC RUNsignal from the external terminal input signal		
10-56	P.781	PLC run	0: No effect	0	270
			1: PLC RUN		
10-57	P.782	PLC Program erase	0: invalid	0	270
			1: Erase the PLC program, after the success of the erasure parameter value is 0		
10-58	P.783	PLC Monitor choosing component	0~326	0	270
10-59	P.784	PLC Component monitoring value	Read	Read	270

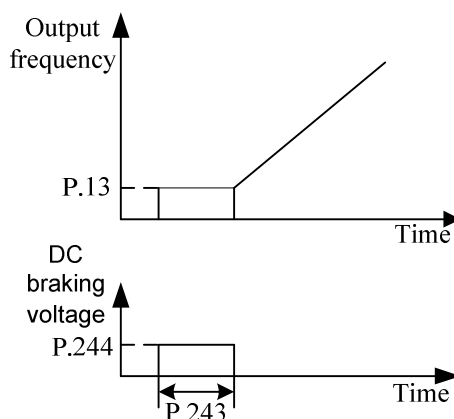
5.11.1 DC injection brake

- Timing to stop or braking torque can be adjusted by applying DC voltage to the motor to prevent the motor shaft to turn at the time of stopping motor.

Parameter	Name	Factory Value	Setting Range	Content
10-00 P.10	DC injection brake operation frequency	3.00Hz	0 ~ 120.00Hz	---
10-01 P.11	DC injection brake operation time	0.5s	0 ~ 60.0s	---
10-02 P.12	DC injection brake operation voltage	4.0%	0 ~ 30.0%	7.5K/11KF and types below
		2.0%		11K/15KF ~ 55K/75KF types
		1.0%		75K/90KF and types above

Setting DC injection brake

- ◆ After a stop signal is put in (please refer to Chapter 4 for the primary operation of motor activation and stop), the output frequency of the inverter will decrease gradually. In case the output frequency reaches the “DC injection brake operation frequency (10-00),” the DC injection brake will be activated.
- ◆ During DC injection brake, a DC voltage will be injected into the motor windings by the inverter, which is used to lock the motor rotor. This voltage is called “DC injection brake operation voltage (10-02)”. The larger the 10-02 is, the higher the DC brake voltage is, and the stronger the brake capability is.
- ◆ The DC brake operation will last a period (the set value of 10-01) to overcome the motor inertia.
- ◆ See the figure below:



Note: 1. To achieve the optimum control characteristics, 10-01 and 10-02 should be set properly.
 2. If any of 10-00, 10-01 and 10-02 is set to 0, DC injection brake will not operate, i.e., the motor will coast to stop.

5.11.2 Zero-speed/zero-servo control

➤ Zero-speed/ zero-servo function selection

Parameter	Name	Factory Value	Setting Range	Content
10-03 P.151	Zero-speed control function selection	0	0	There is no output at zero-speed.
			1	The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.
			2	The zero-servo running is carried out in close-loop vector mode.
10-04 P.152	Voltage at zero-speed control	4.0%	0 ~ 30.0%	7.5K/11KF and types below
		2.0%		Types from 11K/15KF to 55K/75KF
		1.0%		75K/90KF and types above

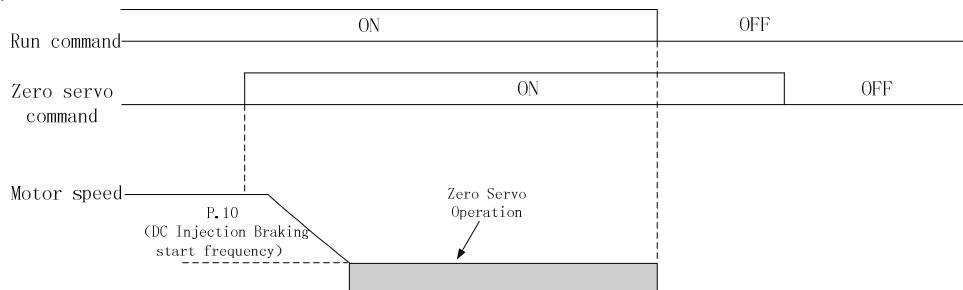
Setting Zero-speed control

- ◆ Make sure that 01-11 (start frequency) is set to zero when using this function.

Note: 1. Suppose that 10-04 = 6%, and then the output voltage of zero speed is 6% of base frequency voltage 01-04.
 2. For V/F, V/F close-loop control, and close-loop vector control mode, please refer to the motor control mode parameter 00-21, 00-22.

Setting Zeroservo

- ◆ The zero servo function is a position loop that can keep the motor to stop at any position point (origin) and lock the motor by external force at a certain position.
- ◆ When zero servo is active, once the motor speed falls below the level set in parameter 10-00, the drive goes into the zero servo mode and holds the current position. When the input assigned to trigger the Zero Servo function is released and the run command is still present, the motor reaccelerates.
- ◆ Zero servo operation:



Note: Avoid using zero servo to lock 100% load for long periods, as this can trigger a fault. If such loads need to be held in place for long periods, either make sure the current is less than 50% of the drive rated current during Zero Servo, or use a larger capacity drive.

5.11.3 DC injection brake before start

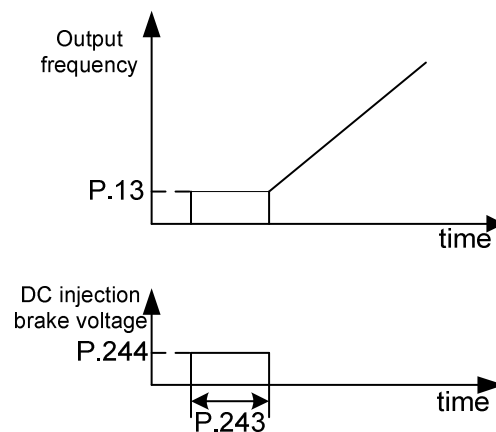
- The motor may be in the rotation status due to external force or itself inertia. If the drive is used with the motor at this moment, it may cause motor damage or drive protection due to over current.

Parameter	Name	Factory Value	Setting Range	Content
10-05 P.242	DC injection brake function before start	0	0	DC injection brake function is not available before starting.
			1	DC brake injection function is selected before starting.
10-06 P.243	DC injection brake time before start	0.5s	0 ~ 60.0s	---
10-07 P.244	DC injection brake voltage before start	4.0%	0 ~ 30.0%	7.5K/11KF(included) and types below
		2.0%		11K/15KF ~ 55K/75KF types
		1.0%		75K/90KF (included) and types above.

Setting DC injection brake before start

- ◆ If 10-05=0, DC injection brake function is not available before starting. If 10-05=1, DC brake injection function is selected before starting. When the output frequency reaches the starting frequency 01-11, a DC voltage (the set value of 10-07) will be injected into the motor windings by the inverter, which is used to lock the motor rotor. The DC brake operation will last a period (the set value of 10-06) before the motor starts.

See the figure below:



Note: This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

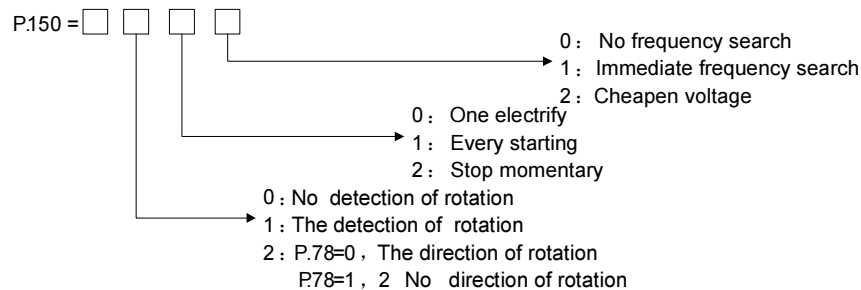
5.11.4 Restart mode selection

- Select the best start mode according to the different load.

Parameter	Name	Factory Value	Setting Range	Content	
10-08 P.150	Restart mode selection	0	xx0	No frequency search.	
			xx1	Direct frequency search	
			xx2	Decrease voltage mode	
			x0x	Power on once.	
			x1x	Start each time.	
			x2x	Only instantaneous stop and restart	
			0xx	No rotation direction detection.	
			1xx	Rotation direction detection.	
				2xx	00-15(P.78)=0, rotation direction detection. 00-15(P.78)=1/2, no rotation direction detection.
10-09 P.57	Restart coasting time	99999	0 ~ 30.0s	---	
			99999	No restart function.	
10-10 P.58	Restart cushion time	5.0s	0 ~ 60.0s	7.5K/11KF (included) and types below.	
		10.0s		11K/15KF ~ 55K/75KF types	
		20.0s		75K/90KF (included) and types above.	

Setting Restart mode selection

- ◆ There are four digits in 10-08, and every digit has a different meaning and relevant position as following:



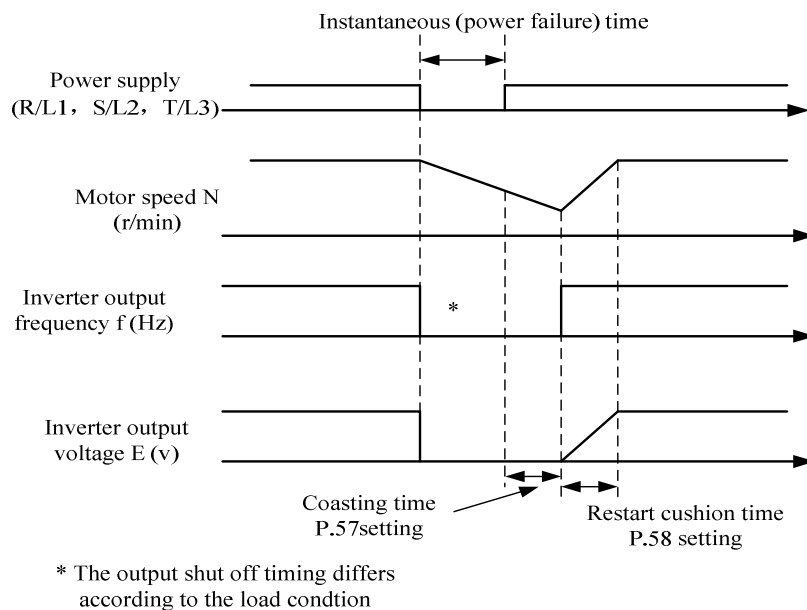
- Note: 1. When one needs an instant restart function, 10-08 must be set.
2. When 10-08 is nonzero, linear acceleration / deceleration curve is the default.
3. The direction detection position of 10-08 is only valid for direct frequency search.
4. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

Setting Restart

- ◆ Once the driving power is interrupted while the motor is still running, voltage output will be stopped instantly. When the power is recovered and 10-09=99999, the inverter will not restart automatically. When 10-09=0.1~30, the motor will coast for a while (the set value of 10-09) before the inverter restarts the motor automatically.
- ◆ Once the motor is restarted automatically, the output frequency of the inverter will be the target frequency, but the output voltage will be zero. Then the voltage will be increased gradually to the expected voltage value. The period for voltage increase is called "Restart cushion time (10-10)".

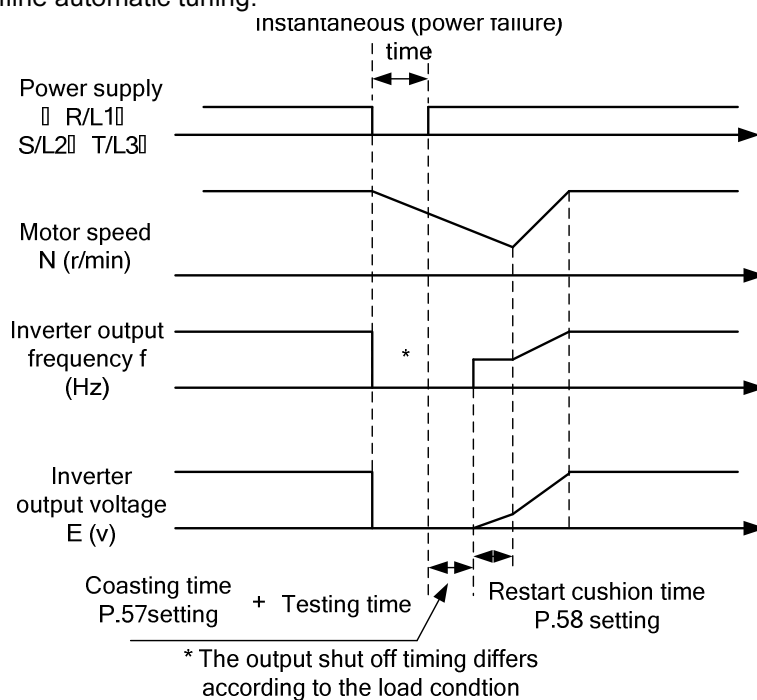
◆ No frequency search again to start the action

Restart action has nothing to do with the free running speed of the motor, but remains a moment to stop in front of the target frequency, slowly increase the voltage of the voltage reduction.



◆ Frequency search again to start the action

◆ Restart, the need for offline automatic tuning.



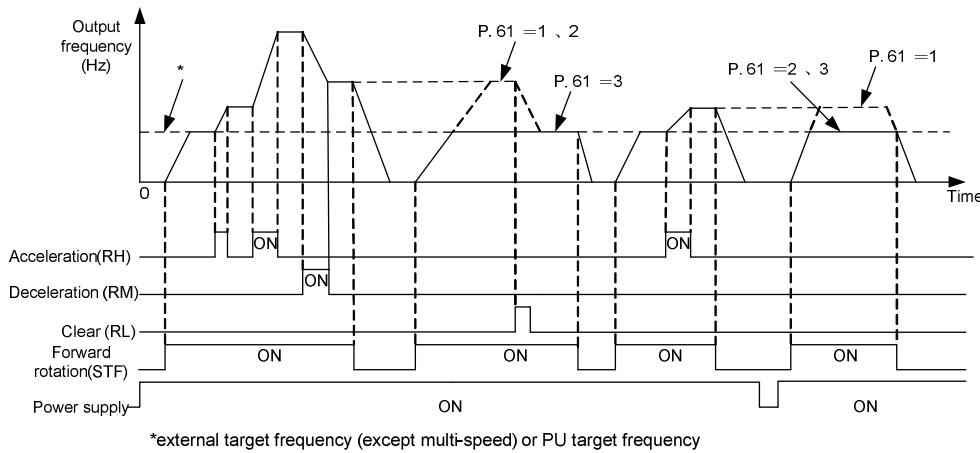
5.11.5 Remote setting function selection

- If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals

Parameter	Name	Factory Value	Setting Range	Content
10-11 P.61	Remote setting function selection	0	0	No remote setting function.
			1	Remote setting function, frequency setup storage is available.
			2	Remote setting function, frequency setup storage is not available.
			3	Remote setting function, frequency setup storage is not available, the remote setting frequency is cleared by STF/STR "turn off".

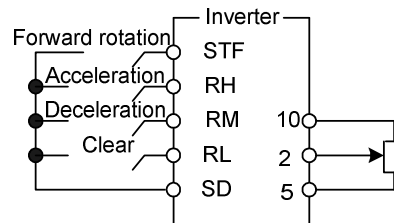
Setting Remote setting function

- ◆ If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals under the external mode, combined mode 1 and combined mode 5.



◆ Remote setting function

- Whether the remote setting function is valid and whether the frequency setting storage function in the remote setting mode is used or not are determined by 10-11.
Set 10-11=1~3 (valid remote setting function), the function of terminal RM, RH and RL will be changed to acceleration (RH), deceleration (RM) and clear (RH). See the following figure:



- In the remote setting, the output frequency of the inverter is: (frequency setting by RH/RM operation + external setting frequency other than multi-speeds/PU setting frequency)

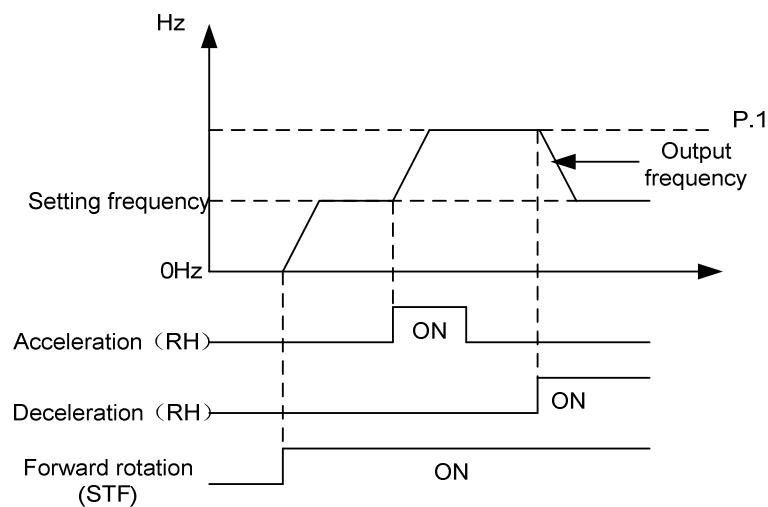
◆ Frequency setting storage condition

The frequency setting storage function is to store the remote-set frequency (frequency set by RH/RM operation) in memory (EEPROM). Once the power supply is cut off and turned on again, the inverter can start running again at the remote-set frequency (10-11=1).

<Frequency setting storage condition>

1. It is the frequency when the start signal (STF/STR) is “off”.
2. When the signal RH (acceleration) and RM (deceleration) are both “off” and “on”, the remote-set frequency is stored every minute. (Current frequency set value and the last frequency set value are compared ever minute. If they are different, then the current frequency set value is written in the memory. If RL is on, write-in will unavailable).

Note: 1. The frequency can be varied by RH (acceleration) and RM (deceleration) between 0 and (the maximum frequency – frequency set by the main speed). The output frequency is limited by 01-00.



2. When the acceleration or deceleration signal is “on”, the acceleration / deceleration time will be determined by the set value of 01-06 (the first acceleration time) and 01-07 (the first deceleration time).
3. When RT signal is “on” and 01-22≠99999 (the second acceleration time), 01-23≠99999 (the second deceleration time), the acceleration / deceleration time will be determined by the set value of 01-22 and 01-23.
4. When the start signal (STF/STR) is “off” and RH (acceleration) / RM (deceleration) is “on”, the target frequency will also change.
5. When the start signal (STF/STR) becomes “off”, make the frequency setting storage function invalid (10-11=2, 3) if the frequency has to be changed continuously through RH/RM. If the frequency setting storage function is valid (10-11=1), the life of EEPROM will be shortened by frequent EEPROM data writing.
6. RH, RM and RL mentioned in this chapter are function names of “multi-function digital input terminal”. If the functions of the terminals are changed, other functions are likely to be affected. Please verify the functions of the terminals before changing the options and functions of the multi-function digital input terminal (please refer to 03-00~03-05, 03-06 and 03-09). For wiring, please refer to Section 3.5.

5.11.6 Retry selection

- This function allows the inverter to reset itself and restart at fault indication. The retry generating protective functions can be also selected.

Parameter	Name	Factory Value	Setting Range	Content
10-12 P.65	Retry selection	0	0	Retry is invalid.
			1	Over-voltage occurs, the inverter will perform the retry function.
			2	Over-current occurs, the inverter will perform the retry function.
			3	Over-voltage or over-current occurs, the inverter will perform the retry function.
			4	All the alarms have the retry function.
10-13 P.67	Number of retries at alarm occurrence	0	0	Retry is invalid.
			1 ~ 10	The setting value of 10-13(P.67) is exceeded, the inverter will not perform the retry function.
10-14 P.68	Retry waiting time	1.0s	0 ~ 360.0s	---
10-15 P.69	Retry accumulation time at alarm	0	Read	---

Setting Retry selection

- ◆ When an alarm goes off, a "retry" will take place to restore the previous setting.
- ◆ Inverter's retry is performed conditionally. When the alarm goes off and the inverter has an automatic retry, the re-occurrence of alarm going off before a set time is called a "continuous alarm". If continuous alarms happen for more than a set time, there is a significant malfunction. In this case, manual trouble shooting is necessary. The inverter at this point will perform no more the retry function. The number of Pre-defined occurrence is called "number of retries at abnormality (10-13)".
- ◆ If none of the alarm belongs to "continuous alarms", the inverter will perform retry for unlimited times.
- ◆ The period from the moment of alarm to that of retry is defined as "retry waiting time".
- ◆ For each time a retry happens, the value of 10-15 will be increased by one automatically. Therefore, the number of 10-15 read from the memory indicates the number of retries that have occurred.
- ◆ If 10-15 is rewritten with 0, the number of retry executed is cleared.

Note: The inverter will perform retry only after the retry waiting time of 10-14. Therefore when using this function, please be aware of the possible danger when operating the inverter.

5.11.7 The dead time of positive and reverse rotation

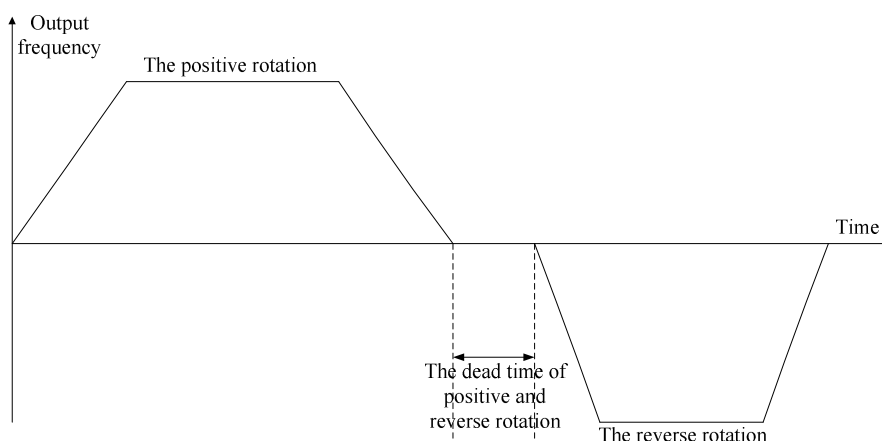
- Set the waiting or holding time after the output frequency outputs to 0Hz when the positive and reverse rotation is switching.

Parameter	Name	Factory Value	Setting Range	Content
10-16 P.119	The dead time of positive and reverse rotation	0.0s	0	Without the function.
			0.1~3000.0s	The waiting or holding time after the output frequency decreases to 0 when the positive and reverse rotation is switching.

Setting The dead time of positive and reverse rotation

- ◆ When the inverter is running and receive the reverse rotation reference, the output frequency will decrease to 0 in the process of switching from the current rotation direction to the opposite rotation direction. The dead time of positive and reverse rotation is the waiting or holding time after the output frequency decreases to 0.

The diagram is as follows:



5.11.8 Energy-saving control functionV/F

- Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

Parameter	Name	Factory Value	Setting Range	Content
10-17 P.159	Energy-saving control function	0	0	Normal running mode.
			1	Energy-saving running mode.

 Setting Energy-saving mode

- ◆ Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

Note: 1. This function is valid only in the V/F mode(00-21="0").

2. After selecting the energy-saving running mode, the deceleration time may be longer than the setting value. In addition, the properties of the regular torque load will produce abnormal voltage more easily. Please slightly prolong the deceleration time.
3. For big load purposes or machines with frequent acceleration/deceleration, the energy-saving effect may be poor.

5.11.9 Dwell function V/F

- The backlash measures that stop acceleration/deceleration by the frequency or time set with parameters at acceleration/deceleration can be set.

Parameter	Name	Factory Value	Setting Range	Content
10-18 P.229	Dwell function selection	0	0	None.
			1	Backlash compensation function.
			2	Acceleration and deceleration interrupt waiting function.
10-19 P.230	Dwell frequency at acceleration	1.00Hz	0 ~ 650.00Hz	Set the stopping frequency and time of Dwell function.
10-20 P.231	Dwell time at acceleration	0.5s	0 ~ 360.0s	
10-21 P.232	Dwell frequency at deceleration	1.00Hz	0 ~ 650.00Hz	Set the stopping frequency and time of Dwell function.
10-22 P.233	Dwell time at deceleration	0.5s	0 ~ 360.0s	

 Setting Dwell function

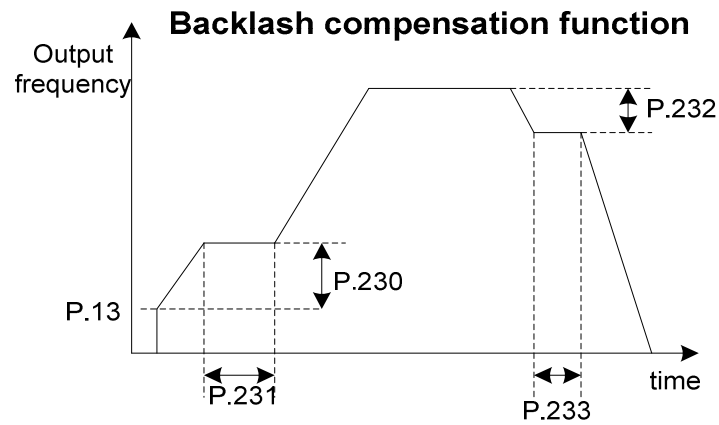
- ◆ Backlash compensation(10-18="1")

Reduction gears have an engagement gap and a dead zone between forward and reverse rotation. This dead zone is called backlash, and the gap disables a mechanical system from following motor rotation.

More specifically, a motor shaft develops excessive torque when the direction of rotation changes or when constant-speed operation shifts to deceleration, resulting in a sudden motor current increase or regenerative status.

To avoid backlash, acceleration/deceleration is temporarily stopped. Set the acceleration/deceleration stopping frequency and time in 10-18 ~ 10-22.

Shown as the figure below:

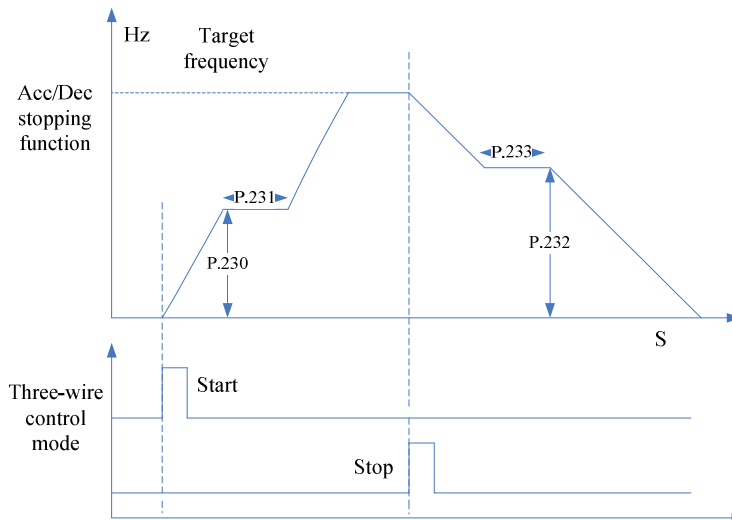


Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

◆ Acceleration and deceleration interrupt waiting function(10-18="2")

When 10-18=2, start acceleration and deceleration interrupt waiting function. When accelerating to the frequency set by 10-19, wait for the time set by 10-20 and then accelerate to the target. When decelerating to the frequency set by 10-21, wait for the time set by 10-22, and then decelerate to the target.

Shown as the figure below:



Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

5.11.10 Triangular wave function **V/F**

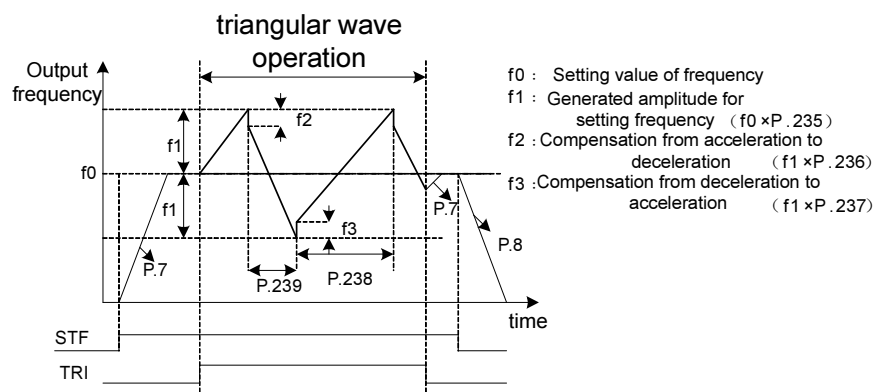
- The triangular wave operation, which oscillates the frequency at a constant cycle, is available.

Parameter	Name	Factory Value	Setting Range	Content
10-23 P.234	Triangular wave function selection	0	0	0: None.
			1	External TRI is turned on, triangular wave function will be valid.
			2	The triangular wave function is effective at any given time.
10-24 P.235	Maximum amplitude	10.0%	0 ~ 25.0%	---
10-25 P.236	Amplitude compensation for deceleration	10.0%	0 ~ 50.0%	---
10-26 P.237	Amplitude compensation for acceleration	10.0%	0 ~ 50.0%	---
10-27 P.238	Amplitude acceleration time	10.00s	0 ~ 360.00s/ 0 ~ 3600.0s	When 01-08=0, the unit of 10-27(P.238) and 10-28(P.239) is 0.01s.
10-28 P.239	Amplitude deceleration time	10.00s	0 ~ 360.00s/ 0 ~ 3600.0s	When 01-08=1, the unit of 10-27(P.238) and 10-28(P.239) is 0.1s.

Setting

 Triangular wave function

- ◆ If 10-23 “Triangular wave function selection” is “1” and triangular wave operation signal (TRI) is turned on, triangular wave function will be valid. Set any parameter in 03-00~03-06 and 03-09 “Input terminal selection function” to “36” and then assign the TRI signal for the external terminal.
- ◆ If 10-23 “triangular wave function selection” is equal to “2,” the triangular wave function is effective at any given time.



- Note: 1. During the movement of the triangular wave, the output frequency is limited by the maximum and the minimum frequency.
2. If the amplitude compensation, i.e., 10-25 and 10-26, is too big, over-voltage will be tripped off and the stall prevention action will be executed automatically. Consequently, the setting method will not be carried out.
3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

5.11.11 Commercial power supply frequency operation function

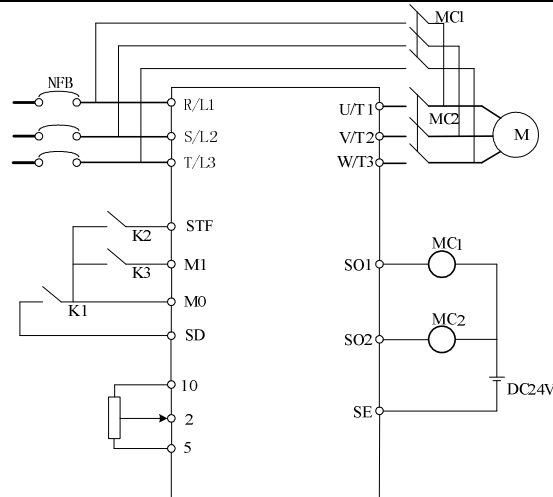
- The inverter contains control function for switching between the commercial power supply operation and inverter operation. Therefore, interlock operation of the magnetic contactor for switching can be easily performed by simply inputting start, stop, and automatic switching selection signals.

Parameter	Name	Factory Value	Setting Range	Content
10-29 P.247	MC switchover interlock time	1.0s	0.1 ~ 100.0s	---
10-30 P.248	Start waiting time	0.5s	0.1 ~ 100.0s	---
10-31 P.249	Switchover frequency from inverter to commercial power supply frequency	99999	0 ~ 60.00Hz	---
			99999	No automatic switchover order.
10-32 P.250	Automatic switchover frequency range	99999	0 ~ 10.00Hz	When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.
			99999	When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.

Setting

 Commercial power supply frequency operation function

- ◆ 10-31 is used to switch the frequency from inverter operation to commercial power supply operation. Between starting and 10-31 inverter operation, an output frequency greater than 10-31 will automatically change the inverter operation to commercial power supply operation. When 10-31 is set to 99999, there is no automatic switchover.
- ◆ When 10-32≠99999, automatic switchover is valid during the operation (10-31≠99999). After the inverter operation is switched bypass operation, if the frequency reference is lower than (10-31-10-32), the operation will be switched to inverter operation and run by the frequency of the frequency reference. Inverter activation when the inverter start reference (STF/STR) is turned off, the operation is also switched to the inverter operation.
- ◆ When 10-32=99999, it is valid during automatic switchover operation (10-31≠99999). When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.
- ◆ Examples for the commercial power supply frequency switchover function:
 1. Assume that 03-03 = 37, 03-04 = 38, 03-10 = 10 and 03-12= 9. The wiring diagram is presented below:



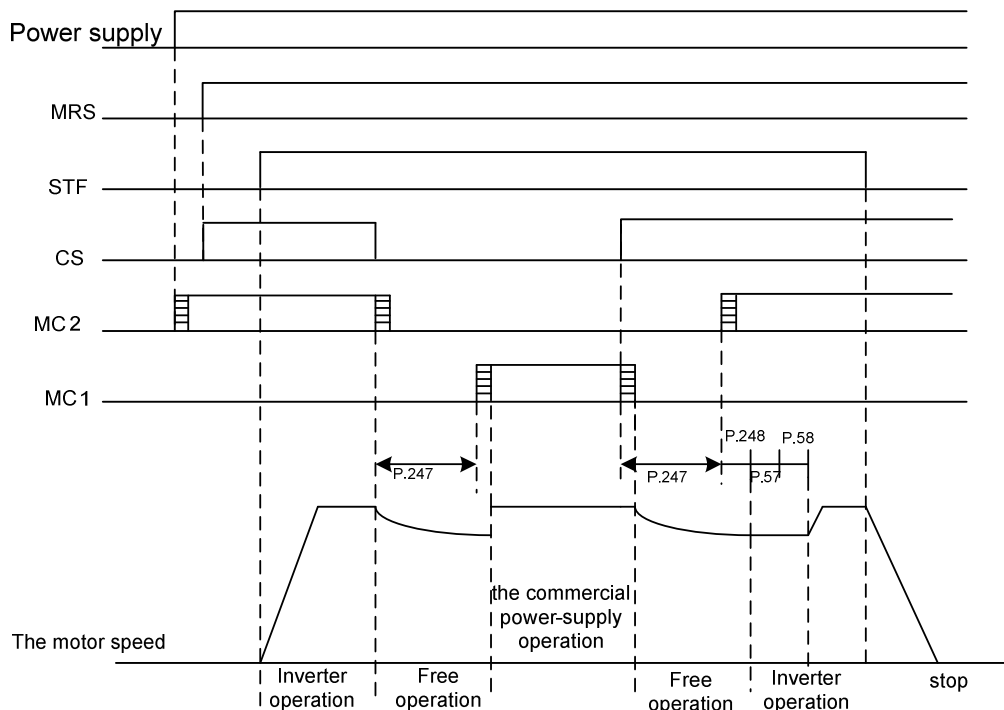
Please be cautious of the capacity of the output terminals. The used terminals vary according to the setup of 03-10, 03-11, 03-12 and 03-13 (output terminal function selection). When 10 is selected for the output terminal function, connect the relay that drives the commercial power supply frequency operation. When 9 is selected for the output terminal function, connect the relay that drives the inverter operation. When 37 is selected for the digital input terminal function, commercial power-supply operation switchover function is selected. When 38 is selected for the input terminal function, commercial power supply frequency operation switchover signal CS is selected.

Warning:

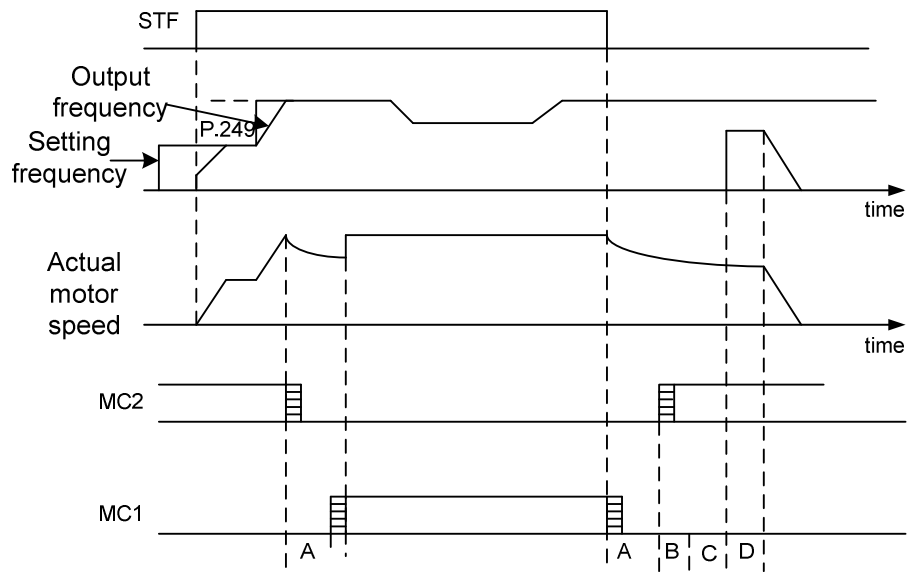
1. MC1 and MC2 must be mechanically interlocked; the running direction of the inverter operation and the commercial power supply operation should be consistent.
2. Use the commercial power operation switchover function under the external operation mode.
3. STF/STR is effective when the CS signal is ON.

◆ Here are some typical sequence diagrams for the switchover of the commercial power supply frequency:

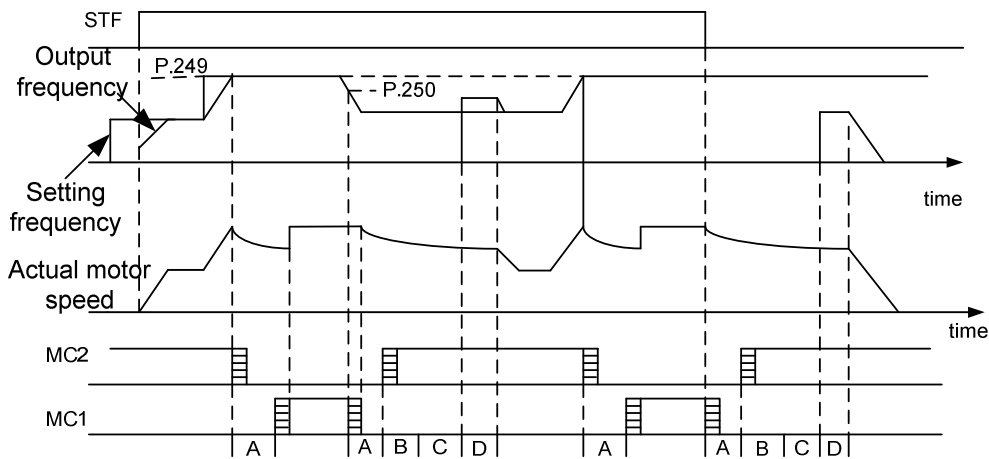
1. No action sequence for the automatic switchover sequence (10-31 = 99999).



2. With action sequence for the automatic switchover sequence(10-31 = 99999, 10-32 = 99999).



3. With action sequence for the automatic switchover sequence series (10-31 = 99999, 10-32 = 99999)



During the automatic switchover, A: 10-29 MC switchover interlocking time; B: 10-30 starting waiting time; C: 10-09 restarting free operation time; D: 10-10 restarting elevating time.

- Note: 1. When the motor runs at 50Hz (or 60Hz), the commercial power supply will offer a more efficient operation than the inverter will. Moreover, during the inverter maintenance/inspection period, the commercial power supply circuit should be installed to prevent the motor from being stopped for too long.
2. To prevent the inverter from setting off the over-current alarm when changing between the inverter operation and the commercial power supply operation, the interlock measure has to be taken. Once the motor stops, it will be activated via the inverter. Switchover and interlock can be carried out through the inverter and a complicated commercial power supply if commercial power supply switchover sequence function that can send out the signal for electromagnetic contactor actions is used.
3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

5.11.12 Power failure stopfunction

- When the inverter power comes to a sudden failure, regenerative power can maintain the inverter output to deceleration stop.

Parameter	Name	Factory Value	Setting Range	Content
10-33 P.273	Power failure stop selection	0	0	Power failure time deceleration-to-stopfunction disabled.
			1	No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)
			2	No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)
			11	Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)
			12	Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)
10-34 P.274	Subtracted frequency at deceleration start	3.00Hz	0 ~ 20.00Hz	Normally, the motor runs at the initial value as it is. However, adjust to suit the size of the load specification (moment of inertia, torque).
10-35 P.275	Subtraction starting frequency	50.00Hz	0 ~ 120.00Hz	When output frequency \geq 10-35(P.275), The motor decelerates from the "output frequency - 10-34(P.274)"; When output frequency < 10-35(P.275), deceleration from output frequency
			99999	The motor decelerates from the "output frequency - 10-34 (P.274)"
10-36 P.276	Power-failure deceleration time 1	5.00s	0 ~ 360.00s/0 ~ 3600.00s	Set the time from the deceleration start to the 10-38(P.278) set frequency.
10-37 P.277	Power-failure deceleration time 2	99999	0 ~ 360.00s/0 ~ 3600.00s	Set the deceleration time for the frequency range starting at 10-38(P.278) and downward.
			99999	Same as 10-36(P.276)
10-38 P.278	Power failure deceleration time switchover frequency	50.00Hz	0 ~ 650.00Hz	Set the frequency at which the slope during deceleration switches from the 10-36(P.276) setting to the 10-37(P.277) setting.
10-39 P.279	UV avoidance voltage gain	100.0%	0 ~ 200.0%	Adjust the response level for undervoltage avoidance operation.

Setting Power failure stop function

- ◆ When 10-33 is set to 1 or 11, (and 10-09=99999), the inverter decelerates to a stop at a power failure; When 10-33 is set to 2 or 12, the inverter decelerates to a stop at a power failure. During deceleration after power comes back ON, the inverter accelerates again.

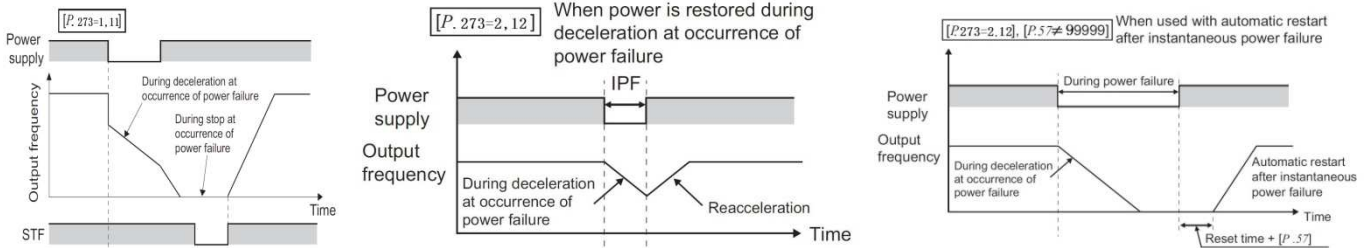
Set 10-34 according to the value of load inertia. If load inertia is larger, then 10-34 should be set to a smaller value to produce enough regenerative power, usually 3.00Hz is enough.

Application parameter group 10

The motor decelerates for the time set to 10-36. (The deceleration time setting is the time it takes for the motor to stop from 01-09 Acceleration/deceleration reference frequency.)

10-38 is the switch frequency between power-failure deceleration time 1 and power-failure deceleration time 2; if 10-37 is not set, the motor still decelerates for the time set to 10-36.

10-39 is the UV avoidance voltage gain when 10-33=11 or 12; if 10-33=11 or 12, 10-39 is invalid.



◆ Undervoltage avoidance function(10-33=11,12):

When setting 10-33=11 or 12, frequency is decreased to prevent an undervoltage from occurring during deceleration at occurrence of power failure.

Adjust the downward frequency slope and the response level via 10-39 UV avoidance voltage gain. Setting a large value improves the response to the bus voltage. But when load inertia is larger, regenerative power is also larger, please set a smaller value to 10-39.

Note: Power failure time deceleration-to-stop function is only applicable for V/F control mode.

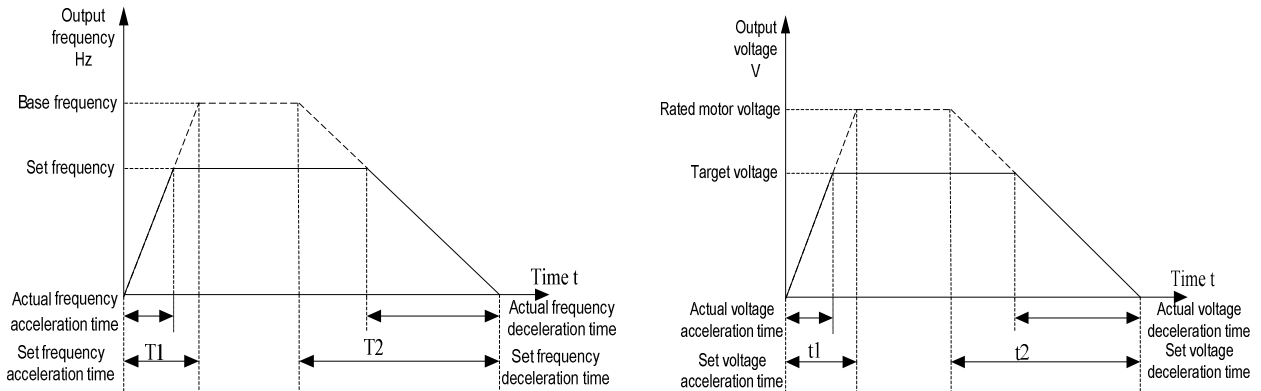
5.11.13 VF complete separation

- Voltage given mode, voltage acceleration/deceleration time and voltage deceleration mode in VF complete separation.

Parameter	Name	Factory Value	Setting Range	Content	
10-40 P.700	VF separated voltage source	0	0	Given by digital 10-41(P.701).	
			1	Given by analog or HDI pulse.	
10-41 P.701	VF separated voltage digital	380/440V	0 ~ 440V	440V voltage	50Hz (when 00-24=1) / 60Hz (when 00-24=0) system setting
		220V	0 ~ 220V	220V voltage	
10-42 P.702	VF separated voltage Acc time	0.0s	0 ~ 1000.0s	Time for voltage accelerating from 0 to motor rated voltage.	
10-43 P.703	VF separated voltage Dec time	0.0s	0 ~ 1000.0s	Time for voltage decelerating from motor rated voltage to 0.	
10-44 P.704	VF separated Stop selection	0	0	Frequency/voltage independently decreases to 0.	
			1	After the voltage decreases to 0, frequency decreases.	

Setting VF complete separation

- ◆ Parameter 10-40~10-44 are valid only when 01-12=14.VF complete separation is applicable to induction heating, inverse power supply and torque motor control.
- ◆ The voltage source for V/F complete separation is set in the same way as the frequency source, it can be set by digital or external analog terminal or HDI terminal.
- ◆ Frequency acceleration time of V/F complete separation indicates the time accelerates from 0 to base frequency (01-06).Frequency deceleration time indicates the time decelerates from base frequency to 0 (01-07); voltage acceleration time of VF complete separation indicates the time accelerates from 0 to the rated motor voltage. t1 (10-42). Voltage deceleration time of VF complete separation indicates the time decelerates from the rated motor voltage to 0. t2 (10-43).



- ◆ Using 10-41 to set digital voltage, the setting value of voltage cannot be over the motor rated voltage.
- ◆ When the setting voltage acceleration time is less than frequency acceleration time or voltage deceleration time is more than frequency deceleration time, voltage stall or current stall may occur during acceleration/ deceleration, which leads to alarm. So it is suggested that 10-42 > 01-06 and 10-43 < 01-07.

5.11.14 Regeneration and avoidance function

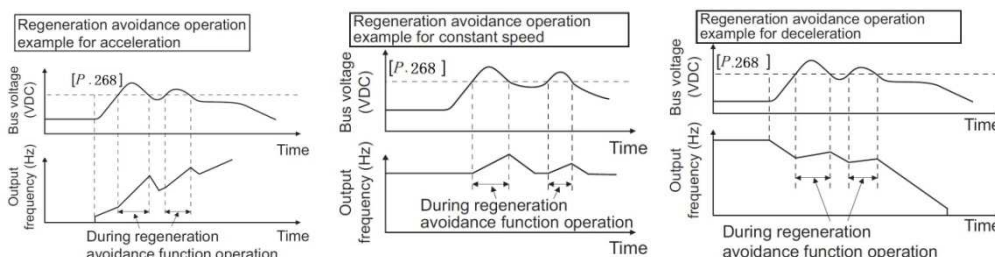
- When the inverter load inertia is larger, PN voltage will increase affected by regenerative power during deceleration or other process, and OV alarm occurs. This function can keep PN voltage on the fixed level and prevent PN level from increasing to OV level via adjusting the inverter output frequency and voltage.

Parameter	Name	Factory Value	Setting Range	Content
10-45 P.267	Regeneration and avoidance operation selection	0	0	Regeneration avoidance function is invalid.
			1	Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action)
			2	Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)
			11	Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))
			12	Regeneration and avoidance function only in constant speed (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))

Parameter	Name	Factory Value	Setting Range	Content
10-46 P.268	Regeneration and avoidance DC bus voltage level	380V	155 ~ 400V	220V types
		760V	310 ~ 800V	440V types
10-47 P.269	DC bus voltage detection sensitivity at deceleration	0	0	Disables regeneration avoidance due to bus voltage change rate.
			1 ~ 5	Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity.
10-48 P.270	Regeneration and avoidance frequency compensation value	6.00Hz	0 ~ 10.00Hz	Set the limit value of frequency which rises at activation of regeneration avoidance function.
			99999	Frequency limit invalid.
10-49 P.271	Regeneration avoidance voltage gain coefficient	100.0%	0 ~ 400.0%/0 ~ 40.0%	Set range and 10-45 (P. 267) set point, 10-45 (P. 267) > 10, set the range of 0 ~ 40.00%, 0-45 (P. 267) < 10, set the range of 0 ~ 400.0%.
10-50 P.272	Regeneration avoidance frequency gain coefficient	100.0%	0 ~ 400.0%/0 ~ 40.0%	Avoid actions should response speed adjusting regeneration. Increase the set point, will improve the response of busbar voltage change. The output frequency is likely to be unstable. Even reduce 10-49 set point (P. 271), or failing to reduce vibration, please reduce 10-50 set point (P. 272).

Setting Regeneration and avoidance function

◆ Function of regeneration and avoidance: When the regenerative status is serious, the DC bus voltage rises and an overvoltage alarm OV may occur. The function is to improve the output frequency of inverter and decrease the DC bus voltage for avoiding alarm OV when overvoltage happens (as the following shows).



5.11.15 Overexcitation deceleration function

➤ Overexcitation deceleration increases the flux during deceleration to increase the motor loss, so that deceleration time can be decreased without a braking resistor.

Parameter	Name	Factory Value	Setting Range	Content
10-51 P.264	Overexcitation deceleration	0	0	Overexcitation deceleration is invalid.
			1	Overexcitation deceleration is valid.
10-52 P.265	Overexcitation current level	150.0%	0 ~ 200.0%	When the output current is above the setting level in overexcitation deceleration, overexcitation gain will auto-decrease.
10-53 P.266	Overexcitation gain	1.10	1.00 ~ 1.40	---

Setting	Overexcitation deceleration function
---------	--------------------------------------

◆ Overexcitation deceleration(10-51=1)

Overexcitation control can suppress the increasing of DC bus voltage. The larger overexcitation gain is, the stronger suppressing effect is.

When the voltage stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or increase the overexcitation gain10-53.

When the current stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or decrease the overexcitation gain 10-53.

Note: 1. As regenerative energy is mainly dissipated as heat in the motor, the motor temperature will rise if overexcitation deceleration is applied frequently.

2. When a run command is entered during overexcitation deceleration, overexcitation operation is cancelled and the drive will reaccelerate to the specified speed.

3. When PM motor is used, overexcitation deceleration function is invalid.

5.11.16 Short-circuit brakefunctionat PM motor start

➤ This parameter can be used in OLV/PM. For the setting of motor control mode, please refer to 00-21(P.300) and 00-22(P.370).

Parameter	Name	Factory Value	Setting Range	Content
10-54 P.362	Short-circuit brake time at PM motor start	0.0s	0.0 ~ 60.0s	---

◆ Parameter 10-54 sets the time for short-circuit brake operation at start. By shorting all three motor phases, it produces a braking torque in the motor and can be used to stop a coasting motor before starting it again.

Note: Short Circuit Braking cannot prevent a PM motor from being rotated by an external force. To prevent the load from rotating the motor, use DC Injection.

5.11.17 Built-in PLC

➤ Setting of the parameters for the built-in PLC functions

Parameter	Name	Factory Value	Setting Range	Content
10-55 P.780	PLC Action choice	0	0	PLC Function invalid
			1	PLC Function effective, PLC RUN Signals from external terminal input or 10-56 (P. 780).
			2	PLC Function invalid, PLC RUN signal from the external terminal input signal.
10-56 P.781	PLC RUN/STOP control	0	0	No effect
			1	PLC RUN
10-57 P.782	PLC Program erase	0	0	Invalid
			1	Erase the PLC program, after the success of the erasure parameter value is 0
10-58 P.783	PLC Monitor choosing component	0	0~326	PLC Component monitoring type selection
10-59 P.784	PLC Component monitoring value	Read	Read	PLC Component state monitoring

Setting Built-in PLC

- ◆ In external input terminals M0, M1, M2, and STF, STR, M3, M4, M5, RES, HDI and external expansion board EB308R or EB362R option in the input terminal of a terminal set its corresponding function to PLC_ON_STOP corresponding parameter value is 60 which can control the RUN signal of PLC. About the external input terminal and expand the use of digital input terminals, refer to 5.4.
- ◆ P. 780 = 1 PLC running state

P.781	External PLC_ON_STOP signal	PLC state
0	0	STOP
1	0	RUN
0	1	RUN
1	1	RUN

- ◆ P.780 = 2 PLC running state

External PLC_ON_STOP signal	PLC state
0	STOP
1	RUN

- ◆ P. 783 choose monitor PLC element types, P. 784 has a value of the current state monitor PLC component, as shown in the table.

P.783	P.784	P.783	P.784
1	X0~X17(Name of octal)	20	T0~T7 (place)
2	X20~X25(Name of octal)	21	C0~C7 (place)
3	Y0~Y17(Name of octal)	22	M8000~M8015
4	Y20~Y23(Name of octal)	23	M8016~M8031
5	M0~M15	24	M8032~M8047
6	M16~M31	25	M8048~M8063
7	M32~M47	26	M8064~M8079
8	M48~M63	27~52	keep

P.783	P.784	P.783	P.784
9	M64~M79	53~60	T0~T7 Set value (word)
10	M80~M95	61~68	keep
11	M96~M111	69~76	C0~C7 Set value
12	M112~M127	77~84	keep
13	M128~M143	85~92	T0~T7 Set value (word)
14	M144~M159	93~100	keep
15	M160~M175	101~108	C0~C7 Set value (word)
16	M176~M191	109~116	keep
17	M192~M207	117~164	D0~D47
18	M208~M223	165~326	D8000~D8161
19	M224~M239		

5.12 Speed and torque control parameter group 11

Group	Parameter Number	Name	Setting Range	Factory Value	Page
11-00	P.320	Speed control proportion coefficient 1	0 ~ 2000.0	100	274
11-01	P.321	Speed control integral time 1	0 ~ 20.00s	0.30s	274
11-02	P.322	PI coefficient switching frequency 1	0 ~ 11-05(P.325)Hz	5.00Hz	274
11-03	P.323	Speed control proportion coefficient 2	0 ~ 2000.0	100	274
11-04	P.324	Speed control integral time 2	0 ~ 20.00s	0.30s	274
11-05	P.325	PI coefficient switching frequency 2	11-02(P.322) ~ 650.00Hz	10.00	274
11-06	P.326	Current control proportion coefficient	0 ~ 20	0	274
11-07	P.327	PM motor types	0: SPM	0	275
			1: IPM		
11-08	P.328	PM initial motor position detection selection	0: Pull in.	0	275
			1: High frequency pulse		
11-09	P.329	PMmotor acceleration id	0 ~ 200%	80%	275
11-10	P.330	PM motor constant speed id	0 ~ 200%	0%	275
11-11	P.331	PM motor estimatedrotation speed filter time	0 ~ 1000ms	2ms	275
11-12	P.401	Torque reference	-400.0 ~ 400.0%	0.0%	276
11-13	P.402	Speed limit	-120% ~ 120%	0%	276
11-14	P.403	Speed limit bias	0 ~ 120%	10%	276
11-15	P.404	Torque filter time	0 ~ 1000ms	0ms	276
11-16	P.405	Torque setting source	0: Given by the11-12(P.401).	0	276
			1: Given by the analog or pulse input.		
			2: Given by the communication mode.		
11-17	P.406	Selection of speed limit	0:The speed is limited according to 11-13(P.402) and 11-14(P.403)	0	276
			1: Frequency reference source(it is decided according to00-16(P.79))		
11-18	P.407	Unidirectional speed limit bias	0: Unidirectional speed limit bias is invalid.	1	276
			1: Unidirectional speed limit bias is valid.		
11-19	P.408	Forward motor torque limit	0 ~ 400.0%	200.0%	278
11-20	P.409	Reverse regenerative torque limit	0 ~ 400.0%	200.0%	278
11-21	P.410	Reverse motor torque limit	0 ~ 400.0%	200.0%	278
11-22	P.411	Forward regenerative torque limit	0 ~ 400.0%	200.0%	278
11-23	P.412	Zero velocity ratio	0~2000.0	100.0	274
11-24	P.413	Zero speed integration time	0~20.00s	0.30s	274
11-25	P.414	Zero speed switching frequency	0~650.00Hz	5.00Hz	274

Group	Parameter Number	Name	Setting Range	Factory Value	Page
11-30	P.371	The second motor speed control proportion coefficient 1	0 ~ 2000	100	279
			99999		
11-31	P.372	The second motor Speed control integral time1	0 ~ 20.00s	0.30s	279
			99999		
11-32	P.373	The second motor PI coefficient switchingfrequency 1	0 ~ 11-35 (P.376)Hz	5.00Hz	279
			99999		
11-33	P.374	The second motor speed control proportion coefficient 2	0 ~ 2000	100	279
			99999		
11-34	P.375	The second motor Speed control integral time 2	0 ~ 20.00s	0.30s	279
			99999		
11-35	P.376	The second motor PI coefficient switching frequency 2	11-32(P.373)~650.00Hz	10.00Hz	279
			99999		
11-36	P.377	The second motor current control proportion coefficient	0 ~ 20	0	279
			99999		
11-37	P.378	The second PM motor types	0: SPM	0	280
			1: IPM		
			99999		
11-38	P.379	The second PM initial motor position detection selection	0: Pull in.	0	280
			1: High frequency pulse		
			99999		
11-39	P.380	The second PM motor acceleration id	0 ~ 200%	80%	280
			99999		
11-40	P.381	The second PM motor constant speed id	0 ~ 200%	0%	280
			99999		
11-41	P.382	The second PM motor estimated rotation speed filter time	0 ~ 1000ms	2ms	280
			99999		
11-42	P.365	PM motor speed estimation observer source of PI parameters	0 : manual operation	0	281
			1 : automatic calculation		
11-43	P.366	PM motor speed estimation observer Kp	0 ~ 65000	10	281
11-44	P.367	PM motor speed estimation observer Ki	0 ~ 65000	376	281
11-45	P.383	PM Zero speed motor current loop bandwidth coefficient	0 ~ 100	40	281
11-46	P.384	PMMotor current loop bandwidth coefficient at low speed	0 ~ 100	40	281
11-47	P.385	PMMotor current loop bandwidth coefficient at a high speed	0 ~ 100	40	281

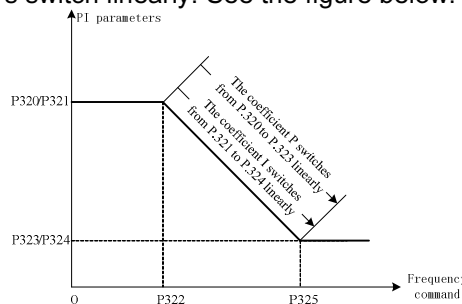
5.12.1 Control parameter

➤ Speed loop PI parameters vary with running frequencies of the inverter.

Parameter	Name	Factory Value	Setting Range	Content
11-00 P.320	Speed control proportion coefficient 1	100.0	0 ~ 2000.0	---
11-01 P.321	Speed control integral time 1	0.30s	0 ~ 20.00s	---
11-02 P.322	PI coefficient switching frequency 1	5.00Hz	0 ~ 11-05(P.325)Hz	---
11-03 P.323	Speed control proportion coefficient 2	100.0	0 ~ 2000.0	---
11-04 P.324	Speed control integral time 2	0.30s	0 ~ 20.00s	---
11-05 P.325	PI coefficient switching frequency 2	5.00Hz	11-02(P.322) ~ 650.00Hz	---
11-06 P.326	Current control proportion coefficient	0	0 ~ 20	This parameter decides the response characteristics of IM motor torque control.
11-23 P.412	Zero velocity ratio	100.0	0~2000.0	---
11-24 P.413	Zero speed integration time	0.30s	0~20.00s	---
11-25 P.414	Zero speed switching frequency	5.00Hz	0~650.00Hz	---

Setting Control parameter

◆ 11-00 and 11-01 are the PI adjusting parameter when the running frequency is less than the switching frequency 1 (11-02). 11-03 and 11-04 are the PI adjusting parameter when the running frequency is greater than the switching frequency 2 (11-05). When the running frequency is between the switching frequency 1 and the switching frequency 2, the two PI parameters switch linearly. See the figure below:



- ◆ 11-00 or 11-03 is used to set the proportion gain of speed control.(Set the value slightly larger to better follow changes on the speed reference and to reduce speed change due to external interference.)
- ◆ 11-01 or 11-04 is used to set the integral time of speed control.(Due to external interference-generated speed change, set the value smaller to shorten the time spent on returning to the original speed.)
- ◆ When 11-06 is set to 100%, the max output torque corresponding to the vector control is the motor rated torque.

Note: 1. Use 11-00 or 11-03 to increase the set value of speed control gain can elevate the effecting time. But a set value too high can generate vibration and noises.

2. Reduce speed control integral coefficient 11-01 or 11-04 to shorten the time required to go back to the original speed. But if the value is too small, overshoot can happen.

Setting	Adjuster parameter
---------	--------------------

- ◆ When the setting value of 11-06 increases, the current adjuster response level improves. But when the setting value is too large, the current loop shocks , and the electromagnetic noise becomes louder.

5.12.2 PM motor setting

- The parameters setting below can improve the VC and SVC control characteristic of PM motor.

Parameter	Name	Factory Value	Setting Range	Content
11-07 P.327	PM motor types	0	0	SPM
			1	IPM
11-08 P.328	PM initial motor position detection selection	0	0	Pull in.
			1	High frequency pulse
11-09 P.329	PMmotor acceleration id	80%	0 ~ 200%	PM motor acceleration id given, valid only when 00-21=6
11-10 P.330	PM motor constant speed id	0%	0 ~ 200%	PM motor constant speed id given, valid only when 00-21=6
11-11 P.331	PM motor estimated rotation speed filter time	2ms	0 ~ 1000ms	PM motor estimated rotation speed filter timecoefficient, valid only when 00-21=6

Setting	PM motor control setting
---------	--------------------------

- ◆ 11-08 is used to select how the rotor position is detected at PM motor start. In the mode of PM motor close-loop vector control, the inverter performs a magnetic pole search the first time it starts the motor. After that, rotor position is calculated from the PG encoder signal and saved until the inverter power is switched off.

When 11-08=0, detect the initial magnetic pole position of the rotor by using the pull-in method, at this point, the motor cannot start with heavy duty, or it may fail to start.

When 11-08=1, detect the initial magnetic pole position of the rotor by using the high frequency pulse vibration method, electromagnetic noise may be generated from the motor at start.

11-09 is the current for pulling in the pole when PM motor starts. 05-05(the motor rated current) is set to 100%, setting the pull-in current during acceleration/deceleration, adjustments to this setting may help in the following situations:

Increase this setting when a large amount of starting torque is required. Lower this setting if there is excessive current during acceleration.

- ◆ 11-10 is used to make the direction of pole position of PM motor during operation more effective, the current for pulling in, 05-05(the motor rated current) is set to 100%, set the d-axis current during operation at a constant speed. Please make adjustment in the following situations:

Increase this setting when hunting occurs or the motor speed is unstable while running at a constant speed. If there is too much current when driving a normal load at a constant speed, then reduce this setting value.

- ◆ 11-11 is PM motor speed observer filter time coefficient. Usually, it is not necessary to adjust.

5.12.3 Torque control parameter

➤ Used to select the inverter speed control or torque control.

Parameter	Name	Factory Value	Setting Range	Content
11-12 P.401	Torque reference	0.0%	-400.0 ~ 400.0%	-400.0 ~ 400.0%
11-13 P.402	Speed limit	0.0%	-120% ~ 120%	0 ~ 120%
11-14 P.403	Speed limit bias	10%	0 ~ 120%	0 ~ 120%
11-15 P.404	Torque filter time	0ms	0 ~ 1000ms	0 ~ 1000ms
11-16 P.405	Torque setting source	0	0	Given by the 11-12(P.401).
			1	Given by the analog or pulse input.
			2	Given by the communication mode.
11-17 P.406	Selection of speed limit	0	0	The speed is limited according to 11-13(P.402) and 11-14(P.403)
			1	Frequency reference source(it is decided according to 00-16(P.79))
11-18 P.407	Unidirectional speed limit bias	1	0	Unidirectional speed limit bias is invalid.
			1	Unidirectional speed limit bias is valid.

Setting Torque control parameter

◆ 11-12 is used to set the torque reference, the actual torque reference = 11-12 * the motor rated torque; according to

$$T(\text{N.M}) = \frac{P(\text{W})}{\omega(\text{rad/s})}$$

the motor rated torque method:

P(W) is on the basis of 05-01, $\omega(\text{rad/s})$ can be worked out according to the parameter 05-06: $\frac{2\pi \times P.307}{60} (\text{rad/s})$.

◆ Input value polarity

The direction of motor output torque depends on the polarity of the Torque reference and it has nothing to do with Run command. The following sheet shows the relationship among Torque reference, Run command, motor run direction and inverter run indication lamp.

Item	Torque reference		Run command	
	+	-	FWD	REV
motor run direction	Forward	Reverse	Has nothing to do with run command	
Inverter run indication lamp	Has nothing to do with torque reference direction and motor run direction		FWD light on	REV light on

- ◆ 11-15 is the torque filter coefficient. When a bigger coefficient is set, the control will be stable, but the control response will be worse. When the coefficient is too small, the response will be quick, but the control can be unstable. If the best setting value is unknown, you can adjust the setting value appropriately according to the level of unstable control and response delay.
- ◆ When 11-16=1, the torque is given by the analog or pulse input. The maximum value of analog and pulse setting correspond to the motor rated torque. When 11-16=2, the torque is given by the communication mode. There are two ways to set the torque by communication mode, one is changing the value of 11-12 when 11-16 is set to 0, and another is setting by the Modbus communication address H100D when 11-16 is set to 2. When the Modbus communication address H100D is set to -10000~10000, it represents -100%~100% of the motor rated torque.
- ◆ Speed limit and speed limit bias of torque control
 When 11-17=0, limit speed of torque control according to 11-13 and 11-14; When 11-17=1, limit speed of torque control according to frequency source, which is set by 00-16.
 A bias can be added to the speed limit using parameter 11-14 and parameter 11-18 determines how the speed limit bias is applied. The following sheet shows the setting relationship, and "frequency" in sheet refers to the frequency reference set by frequency source which is set by 00-16.

Run command	Operating condition							
	Forward	Reverse	Forward	Reverse	Forward	Reverse	Forward	Reverse
Torque reference direction	+	+	-	-	+	+	-	-
Speed Limit Direction	+	-	-	+	-	+	+	-
Normal operation direction	Forward		Reverse		Forward		Reverse	
Normal speed limit (11-18=0,11-17=0)	11-13 + 11-14	11-13 + 11-14	11-13 + 11-14	11-13 + 11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=0)	11-13	11-13	11-13	11-13	11-14	11-14	11-14	11-14
Normal speed limit (11-18=0,11-17=1)	Frequency + 11-14	Frequency + 11-14	Frequency + 11-14	Frequency + 11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=1)	Frequency	Frequency	Frequency	Frequency	11-14	11-14	11-14	11-14

5.12.4 Torque limit

➤ Set the torque limit values of the four quadrants via parameters.

Parameter	Name	Factory Value	Setting Range	Content
11-19 P.408	Forward motor torque limit	200.0%	0 ~ 400.0%	Set the torque limit of the first quadrant.
11-20 P.409	Reverse regenerative torque limit	200.0%	0 ~ 400.0%	Set the torque limit of the second quadrant.
11-21 P.410	Reverse motor torque limit	200.0%	0 ~ 400.0%	Set the torque limit of the third quadrant.
11-22 P.411	Forward regenerative torque limit	200.0%	0 ~ 400.0%	Set the torque limit of the fourth quadrant.

Setting Fourquadrants torque limit function

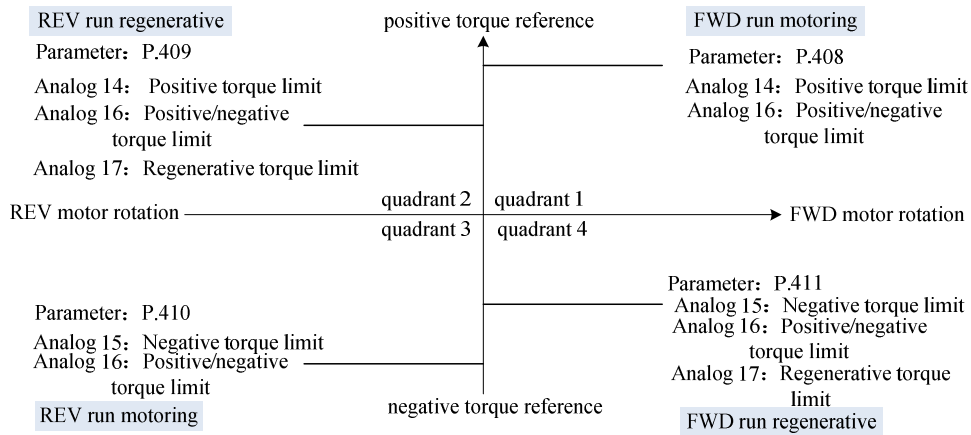
◆ 11-19~11-22 are set to 100.0%, corresponding to vector control, the inverter max output torque is the motor rated torque.

$$T(N.M) = \frac{P(W)}{\omega(rad/s)}$$

◆ The motor rated torque calculating method: $P(W)$ is on the basis of 05-01, $\omega(rad/s)$ can be worked out according to the parameter 05-06(P.307):

$$\frac{2\pi \times P.307}{60} (rad/s)$$

◆ See the figure below for four quadrants torque limit:



◆ Among the torque limit set by parameter, the torque limit set by analog and the inverter output current limit set by 06-01, the minimum torque limit is valid.

5.12.5 The second motor control parameter

- Realize the second motor driving function via setting the second motor control parameter with digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
11-30 P.371	The second motor speed control proportion coefficient 1	100	0 ~ 2000	---
			99999	
11-31 P.372	The second motor Speed control integral time 1	0.30s	0 ~ 20.00s	---
			99999	
11-32 P.373	The second motor PI coefficient switching frequency 1	5.00Hz	0 ~ 11-35 (P.376)Hz	---
			99999	
11-33 P.374	The second motor speed control proportion coefficient 2	100	0 ~ 2000	---
			99999	
11-34 P.375	The second motor Speed control integral time 2	0.30s	0 ~ 20.00s	---
			99999	
11-35 P.376	The second motor PI coefficient switching frequency 2	10.00Hz	11-32(P.373)~650.00 Hz	---
			99999	
11-36 P.377	The second motor current control proportion coefficient	0	0 ~ 20	---
			99999	

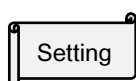
Setting The second motor control parameter

- ◆ When 00-22 ≠ 99999 and RT signal is ON, the second motor control parameter 11-30~11-36 are valid. For the second function parameter, please refer to Section 5.2.10.
- ◆ Please refer to 05-22~05-38 for the second motor parameter.
- ◆ For the parameter setting, please refer to 11-00~11-06 parameter function.

5.12.6 The second PM motor setting

- Realize the second PM motor driving function via setting the second PM motor control parameter with digital input terminal.

Parameter	Name	Factory Value	Setting Range	Content
11-37 P.378	The second PM motor types	0	0	SPM
			1	IPM
			99999	---
11-38 P.379	The second PM initial motor position detection selection	0	0	Pull in.
			1	High frequency pulse
			99999	---
11-39 P.380	The second PM motor acceleration id	80%	0 ~ 200%	0 ~ 200%
			99999	---
11-40 P.381	The second PM motor constant speed id	0%	0 ~ 200%	0 ~ 200%
			99999	---
11-41 P.382	The second PM motor estimated rotation speed filter time	2ms	0 ~ 1000ms	0 ~ 1000ms
			99999	---

 PM motor control parameter

- ◆ When 00-22 ≠ 99999, and RT signal is ON, second motor control parameter 11-30~11-36 are valid. For the second function parameter, please refer to Section 5.2.10.
- ◆ Please refer to 05-22~05-38 for the second motor parameter.
- ◆ For the parameter setting, please refer to 11-07~11-11 parameter function.

5.12.7 PM motor speed estimation observer parameters

- By setting the PM motor speed estimation observer parameters, it can improve the stability of the PM motor SVC mode.

Parameter	Name	Factory Value	Setting Range	Content
11-42 P.365	PM motor speed estimation observer source of PI parameters	0	0 : manual operation	---
			1 : automatic calculation	---
11-43 P.366	PM motor speed estimation observer Kp	10	0 ~ 65000	---
11-44 P.367	PM motor speed estimation observer Ki	376	0 ~ 65000	---

Setting

PM motor SVC mode speed estimation observer parameters

- ◆ Setting a PM motor SVC model (00-21 = 6), if the motor run abnormal, you can manually adjust 11-43, 11-44, eventually making PM motor SVC mode stable operation.

5.12.8 PM Motor current loop controller parameters

- By setting PM current loop controller parameters, adjustable current loop responsiveness

Parameter	Name	Factory Value	Setting Range	Content
11-45 P.383	PM Zero speed motor current loop bandwidth coefficient	40	0~100	---
11-46 P.384	PMMotor current loop bandwidth coefficient at low speed	40	0 ~ 100	---
11-47 P.385	PMMotor current loop bandwidth coefficient at a high speed	40	0 ~ 100	---

Setting

PM Motor current loop controller parameters

- ◆ Current loop bandwidth between the zero speed and low speed, high speed switching and switching speed loop controller parameters is consistent;
- ◆ Accordance with the requirements of responsive adjustment in 11-45, 46, 11-11-47, the setting, the greater the current loop response faster, but may be volatile, low electromagnetic noise lead to the motor.

5.13 Position control parameter 12

Group	Parameter Number	Name	Setting Range	Factory Value	Page
12-00	P.420	Homing mode	0 ~ 2123	0	284
12-01	P.421	The first high speed of Homing	0 ~ 650.00Hz	10.00Hz	284
12-02	P.422	The second high speed of Homing	0 ~ 650.00Hz	2.00Hz	284
12-03	P.423	The origin pulse offset	-30000~30000	0	284
12-04	P.424	Position instruction source	0: External pulse.	0	287
			1: Relative position.		
			2: Absolute position.		
12-05	P.425	Position control proportion gain	0 ~ 65535	10	287
12-06	P.426	Position control feed forward gain	0 ~ 65535	0	287
12-07	P.427	Position control feed forward low pass filter time	0 ~ 65535ms	100ms	287
12-08	P.428	External pulse position control speed limit	0 ~ 650.00Hz	10.00Hz	287
12-09	P.429	Position reaching margin	0 ~ 65535	10	287
12-10	P.430	Zero servo gain	0 ~ 100	5	289
12-11	P.431	Single point positioning location	0~65535	0	289
12-12	P.432	Frequency of single point locating	0~650.00Hz	0.00Hz	289
12-13	P.433	Zero velocity threshold	0~650.00Hz	0.50Hz	287
12-14	P.434	Position command response options	0~2	0	287
12-20	P.450	Number of turns position command1	-30000~30000	0	290
12-21	P.451	Number of pulses position command1	-30000~30000	0	290
12-22	P.452	Number of turns position command2	-30000~30000	0	290
12-23	P.453	Number of pulses position command2	-30000~30000	0	290
12-24	P.454	Number of turns position command3	-30000~30000	0	290
12-25	P.455	Number of pulses position command3	-30000~30000	0	290
12-26	P.456	Number of turns position command4	-30000~30000	0	290
12-27	P.457	Number of pulses position command4	-30000~30000	0	290
12-28	P.458	Number of turns position command5	-30000~30000	0	290
12-29	P.459	Number of pulses position command5	-30000~30000	0	290
12-30	P.460	Number of turns position command6	-30000~30000	0	291

Group	Parameter Number	Name	Setting Range	Factory Value	Page
12-31	P.461	Number of pulses position command6	-30000~30000	0	291
12-32	P.462	Number of turns position command7	-30000~30000	0	291
12-33	P.463	Number of pulses position command7	-30000~30000	0	291
12-34	P.464	Number of turns position command8	-30000~30000	0	291
12-35	P.465	Number of pulses position command8	-30000~30000	0	291
12-36	P.466	Number of turns position command9	-30000~30000	0	291
12-37	P.467	Number of pulses position command9	-30000~30000	0	291
12-38	P.468	Number of turns position command10	-30000~30000	0	291
12-39	P.469	Number of pulses position command10	-30000~30000	0	291
12-40	P.470	Number of turns position command11	-30000~30000	0	291
12-41	P.471	Number of pulses position command11	-30000~30000	0	291
12-42	P.472	Number of turns position command12	-30000~30000	0	291
12-43	P.473	Number of pulses position command12	-30000~30000	0	291
12-44	P.474	Number of turns position command13	-30000~30000	0	291
12-45	P.475	Number of pulses position command13	-30000~30000	0	291
12-46	P.476	Number of turns position command14	-30000~30000	0	291
12-47	P.477	Number of pulses position command14	-30000~30000	0	291
12-48	P.478	Number of turns position command15	-30000~30000	0	291
12-49	P.479	Number of pulses position command15	-30000~30000	0	291

5.13.1 Homing mode

➤ Set the Homing position of position control via Homing mode.

Parameter	Name	Factory Value	Setting Range	Content												
12-00 P.420	Homing mode	0	0 ~ 2123	Homing mode setting: <table border="1" style="margin-left: 20px;"> <tr> <td>u</td> <td>x</td> <td>y</td> <td>z</td> </tr> </table> <table border="1" style="margin-left: 20px;"> <tr> <td style="text-align: center;">u</td> <td>0: Close Homing mode. 1: When the power is ON, Homing mode operates automatically. 2: Set the terminal to SHOM function, homing function starts.</td> </tr> <tr> <td style="text-align: center;">x</td> <td>0: After checking point, the motor decelerates to point. 1: After checking point, the motor decelerates to stop at the forwarding direction.</td> </tr> <tr> <td style="text-align: center;">y</td> <td>0: When in Homing mode, return to search for Z-pulse. 1: No return when in Homing mode, forward run and search for Z-pulse. 2: When in Homing mode, locate in searcher point or Z-pulse.</td> </tr> <tr> <td style="text-align: center;">z</td> <td>0: Forward run to home. Set ORGPas check point. 1: Reverse run to home. Set ORGPas check point. 2: Forward run and search for Z-pulse as check point. 3: Reverse run and search for Z-pulse as check point.</td> </tr> </table>	u	x	y	z	u	0: Close Homing mode. 1: When the power is ON, Homing mode operates automatically. 2: Set the terminal to SHOM function, homing function starts.	x	0: After checking point, the motor decelerates to point. 1: After checking point, the motor decelerates to stop at the forwarding direction.	y	0: When in Homing mode, return to search for Z-pulse. 1: No return when in Homing mode, forward run and search for Z-pulse. 2: When in Homing mode, locate in searcher point or Z-pulse.	z	0: Forward run to home. Set ORGPas check point. 1: Reverse run to home. Set ORGPas check point. 2: Forward run and search for Z-pulse as check point. 3: Reverse run and search for Z-pulse as check point.
u	x	y	z													
u	0: Close Homing mode. 1: When the power is ON, Homing mode operates automatically. 2: Set the terminal to SHOM function, homing function starts.															
x	0: After checking point, the motor decelerates to point. 1: After checking point, the motor decelerates to stop at the forwarding direction.															
y	0: When in Homing mode, return to search for Z-pulse. 1: No return when in Homing mode, forward run and search for Z-pulse. 2: When in Homing mode, locate in searcher point or Z-pulse.															
z	0: Forward run to home. Set ORGPas check point. 1: Reverse run to home. Set ORGPas check point. 2: Forward run and search for Z-pulse as check point. 3: Reverse run and search for Z-pulse as check point.															
12-01 P.421	The first high speed of Homing	10.00Hz	0 ~ 650.00Hz	---												
12-02 P.422	The second high speed of Homing	2.00Hz	0 ~ 650.00Hz	---												
12-03 P.423	Home position shift pulse	0	-30000~30000	---												

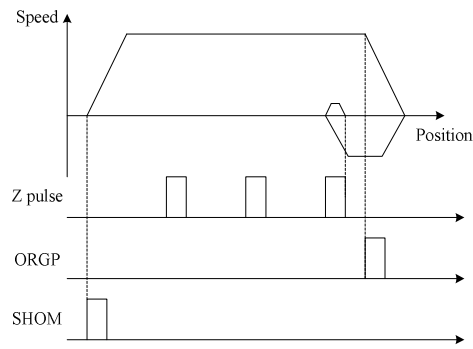
Setting Homing mode

◆ Homing mode setting table(√ represents setting is available, x represents setting is unavailable)

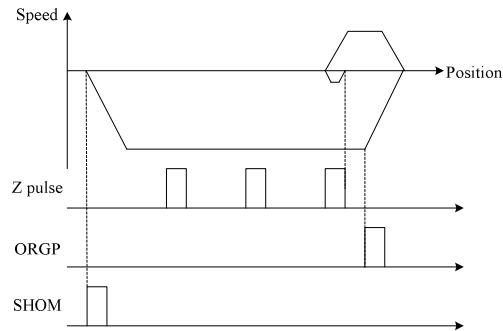
y \ z	0	1	2	3
0	√	√	x	x
1	√	√	x	x
2	√	√	√	√

◆ Take u=2, x=0 as example, speed of Homing corresponded position sequence Diagram:

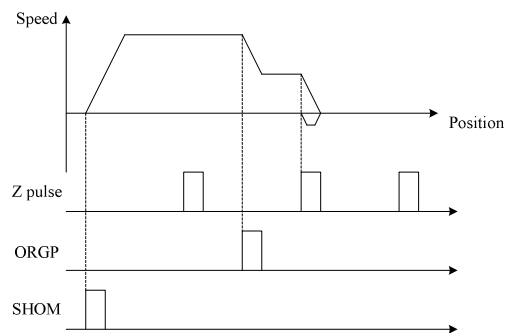
1. y=0、z=0



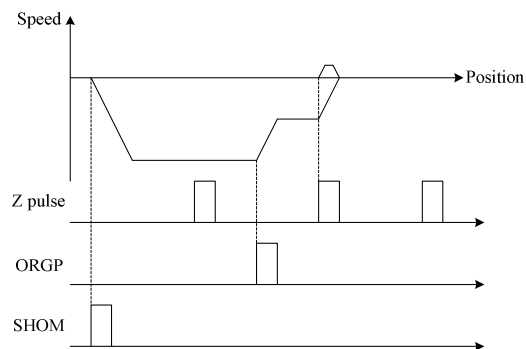
2. $y=0, z=1$



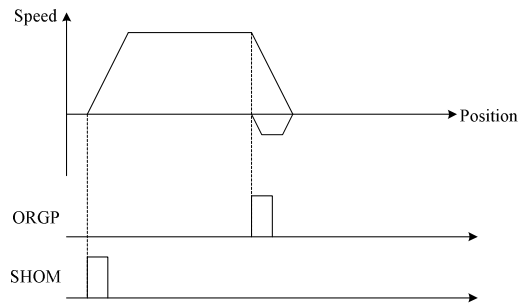
3. $y=1, z=0$



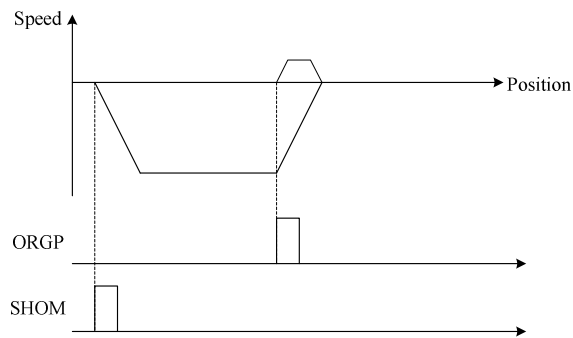
4. $y=1, z=1$



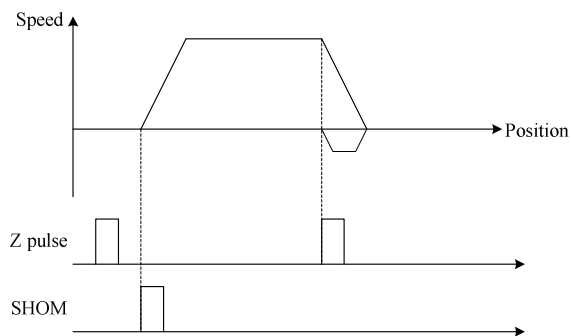
5. $y=2, z=0$



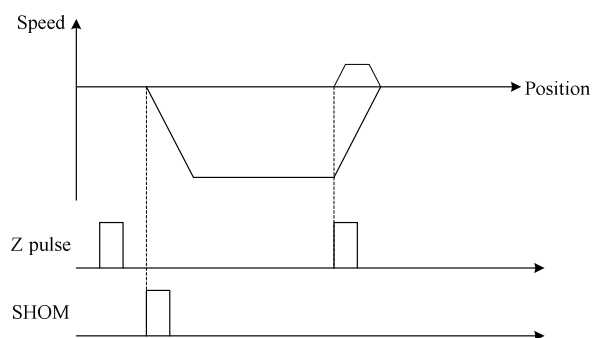
6. $y=2, z=1$



7. $y=2, z=2$



8. $y=2, z=3$



◆ Origin of pulse offset: according to the motor forward direction set origin pulse offset pulse number

5.13.2 Position control parameter

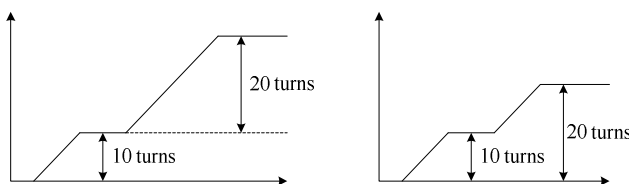
➤ Realize high accuracy position control function via setting with PG vector control mode.

Parameter	Name	Factory Value	Setting Range	Content
12-04 P.424	Position instruction source	0	0	Position instruction source comes from external pulse.
			1	Position instruction source comes from the parameter (relative position).
			2	Position instruction source comes from the parameter (absolute position).
12-05 P.425	Position control proportion gain	10	0 ~ 65535	Increase setting can improve the response of position control, but may cause overshoot.
12-06 P.426	Position control feed forward gain	0	0 ~ 65535	Increase setting can improve the response of position control, but may cause overshoot.
12-07 P.427	Position control feed forward low pass filter time	100ms	0 ~ 65535ms	---
12-08 P.428	External pulse position control speed limit	10.00Hz	0 ~ 650.00Hz	---
12-09 P.429	Position reaching margin	40	0 ~ 65535	---
12-13 P.433	Zero velocity threshold	0.50Hz	0~650.00Hz	
12-14 P.434	Position command response options	0	0~2	

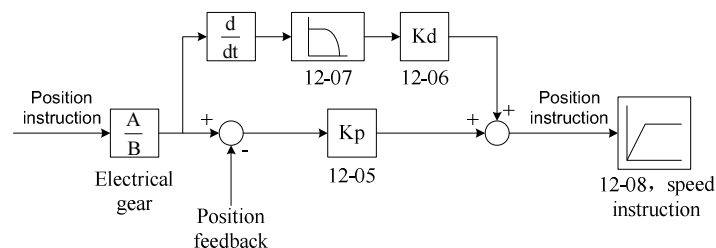
Setting

Position control function

- ◆ When 12-04=0, position instruction is given by the pulse of A2/B2.(For the pulse given, please refer to 09-07 Encoder input mode 2)
- ◆ When 12-04=1, 2, position instruction is given by 12-20~12-49, 1 stands for relative position, 2 stands for absolute position. See the figure below:



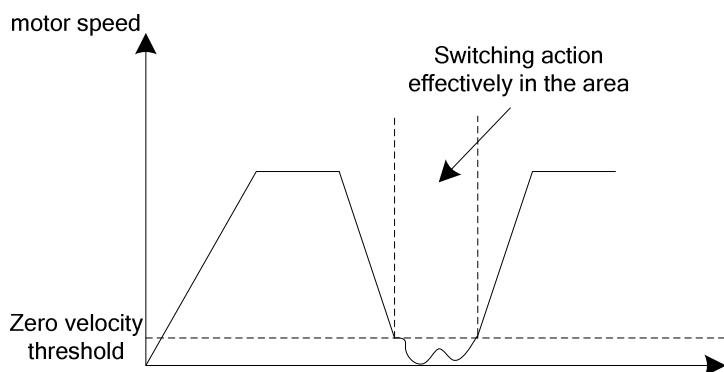
- ◆ Position control diagram



- ◆ When position instruction source comes from the parameter, the position control speed limit is decided by multi-speed instruction.
- ◆ The difference between the motor actual position and position command is smaller than the setting value of the position attained margin (12-09 (P.429)), which is regarded as position attained. If the function setting of multi-function digital output terminal is 21, the multi-function digits will output signals.

Position control parameter 12

- ◆ Zero velocity threshold: when the motor speed is less than 12-13 (P. 433), multi-function input terminal state (position/speed switching action) is effective.

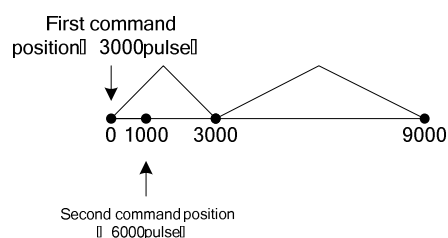


- ◆ Position command response

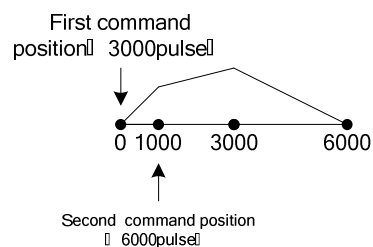
Pr position mode, the position command response

The relative position 12-04 (P. 424) = 1:

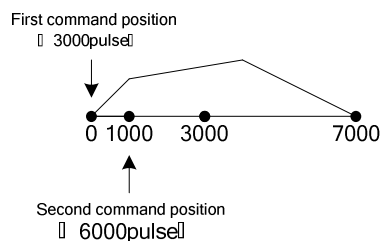
12-14(P.434)=0 :



12-14(P.434)=1 :

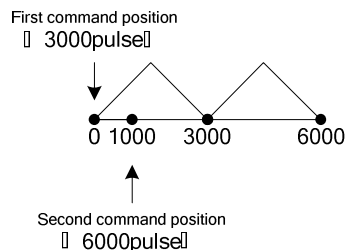


12-14(P.434)=2

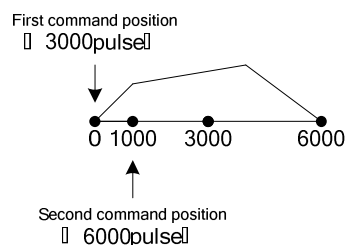


Absolute position 12-04 (P. 424) = 2:

12-14(P.434)=0 :



12-14(P.434)=1 :



Note: Please refer to 03-10~03-13 for function selection and purposes of the multi-function digital output terminal. For related wiring, please refer to Section 3.5.

5.13.3 Zero servo

- Adjusts the responsiveness of the zero servo position loop via setting zero servo gain.

Parameter	Name	Factory Value	Setting Range	Content
12-10 P.430	Zero servo gain	5	0 ~ 100	---

Setting Zero servo

- ◆ Parameter 12-10 adjusts the responsiveness of the zero servo position loop. Increase the value if the response is too slow and the deviation from the zero position rises too high when load is applied. Decrease the value if vibrations occur during zero servo operation.

5.13.4 Single point positioning function

- Single point positioning belongs to the category of position control, but with the application of existing Pt, completely independent Pr position mode.

Parameter	Name	Factory Value	Setting Range	Content
12-11 P.431	Single point positioning location	0	0~65535	---
12-12 P.432	Frequency of single point locating	0.00Hz	0~650.00Hz	---

Setting Single point positioning

- ◆ Single point positioning is in speed control mode, through external terminal function embedded in a motor rotor finally stopped to control the amount of the Angle of the position control function, function as shown in the figure below:

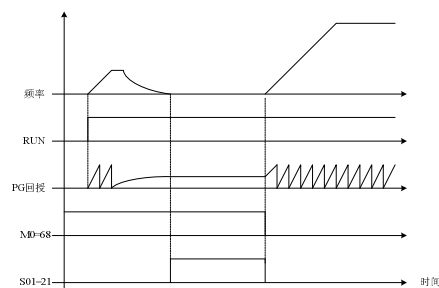


Figure 1.1 single point positioning can make before operation

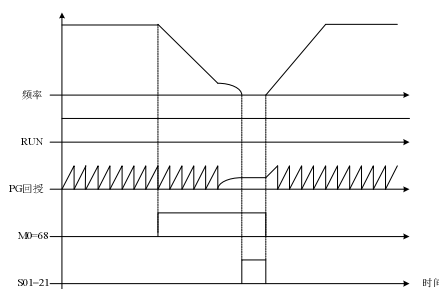


Figure 1.2 single point positioning can make during operation

Position control parameter 12

As shown in the above, the single point positioning function can be described as follows:

In closed loop speed mode, set the external terminals can function as the single point positioning make (example 03-03 (P. 80) = 68), when M0 terminal OFF, is pure speed mode, when M0 terminal ON inverter from the current operating frequency curve acceleration and deceleration, run to locate frequency parameters (12-12 set), located in the frequency of operation, until the Z phase was detected, will switch to the value is set to 12-11 position control of the target location (position control process not deceleration curve), the position control gain (12-05 (P. 425)), arriving position output terminal and position allowance (12-09 (P. 429)) and Pt, Pr position mode share.

5.13.5 Position command

- Set the position command value in position control mode via parameter with the digital input terminal state.

Parameter	Name	Factory Value	Setting Range	Content																																																																																																																																																						
12-20 P.450	Number of turns position command1	0	-30000~30000	<table border="1"> <thead> <tr> <th colspan="4">Terminal state</th> <th colspan="3">Target position</th> <th rowspan="2">upper limit of frequency</th> </tr> <tr> <th>REX</th> <th>RH</th> <th>RM</th> <th>RL</th> <th colspan="3">Rotation turns+ number of pulses</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td colspan="3"></td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>Position1</td> <td>12-20</td> <td>12-21</td> <td>Speed 1</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>Position2</td> <td>12-22</td> <td>12-23</td> <td>Speed 2</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>Position3</td> <td>12-24</td> <td>12-25</td> <td>Speed 3</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>Position4</td> <td>12-26</td> <td>12-27</td> <td>Speed 4</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>Position5</td> <td>12-28</td> <td>12-29</td> <td>Speed 5</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>Position6</td> <td>12-30</td> <td>12-31</td> <td>Speed 6</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>Position7</td> <td>12-32</td> <td>12-33</td> <td>Speed 7</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>Position8</td> <td>12-34</td> <td>12-35</td> <td>Speed 8</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>Position9</td> <td>12-36</td> <td>12-37</td> <td>Speed 9</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>Position10</td> <td>12-38</td> <td>12-39</td> <td>Speed 10</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>Position11</td> <td>12-40</td> <td>12-41</td> <td>Speed 11</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>Position12</td> <td>12-42</td> <td>12-43</td> <td>Speed 12</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>Position13</td> <td>12-44</td> <td>12-45</td> <td>Speed 13</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>Position14</td> <td>12-46</td> <td>12-47</td> <td>Speed 14</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>Position15</td> <td>12-48</td> <td>12-49</td> <td>Speed 15</td> </tr> </tbody> </table>								Terminal state				Target position			upper limit of frequency	REX	RH	RM	RL	Rotation turns+ number of pulses			0	0	0	0				0	0	1	0	0	Position1	12-20	12-21	Speed 1	0	0	1	0	Position2	12-22	12-23	Speed 2	0	0	0	1	Position3	12-24	12-25	Speed 3	0	0	1	1	Position4	12-26	12-27	Speed 4	0	1	0	1	Position5	12-28	12-29	Speed 5	0	1	1	0	Position6	12-30	12-31	Speed 6	0	1	1	1	Position7	12-32	12-33	Speed 7	1	0	0	0	Position8	12-34	12-35	Speed 8	1	0	0	1	Position9	12-36	12-37	Speed 9	1	0	1	0	Position10	12-38	12-39	Speed 10	1	0	1	1	Position11	12-40	12-41	Speed 11	1	1	0	0	Position12	12-42	12-43	Speed 12	1	1	0	1	Position13	12-44	12-45	Speed 13	1	1	1	0	Position14	12-46	12-47	Speed 14	1	1	1	1	Position15	12-48	12-49	Speed 15
Terminal state												Target position			upper limit of frequency																																																																																																																																											
REX	RH	RM	RL									Rotation turns+ number of pulses																																																																																																																																														
0	0	0	0												0																																																																																																																																											
0	1	0	0									Position1	12-20	12-21	Speed 1																																																																																																																																											
0	0	1	0									Position2	12-22	12-23	Speed 2																																																																																																																																											
0	0	0	1									Position3	12-24	12-25	Speed 3																																																																																																																																											
0	0	1	1									Position4	12-26	12-27	Speed 4																																																																																																																																											
0	1	0	1									Position5	12-28	12-29	Speed 5																																																																																																																																											
0	1	1	0									Position6	12-30	12-31	Speed 6																																																																																																																																											
0	1	1	1									Position7	12-32	12-33	Speed 7																																																																																																																																											
1	0	0	0									Position8	12-34	12-35	Speed 8																																																																																																																																											
1	0	0	1									Position9	12-36	12-37	Speed 9																																																																																																																																											
1	0	1	0									Position10	12-38	12-39	Speed 10																																																																																																																																											
1	0	1	1									Position11	12-40	12-41	Speed 11																																																																																																																																											
1	1	0	0	Position12	12-42	12-43	Speed 12																																																																																																																																																			
1	1	0	1	Position13	12-44	12-45	Speed 13																																																																																																																																																			
1	1	1	0	Position14	12-46	12-47	Speed 14																																																																																																																																																			
1	1	1	1	Position15	12-48	12-49	Speed 15																																																																																																																																																			
12-21 P.451	Number of pulses position command1	0	-30000~30000																																																																																																																																																							
12-22 P.452	Number of turns position command2	0	-30000~30000																																																																																																																																																							
12-23 P.453	Number of pulses position command2	0	-30000~30000																																																																																																																																																							
12-24 P.454	Number of turns position command3	0	-30000~30000																																																																																																																																																							
12-25 P.455	Number of pulses position command3	0	-30000~30000																																																																																																																																																							
12-26 P.456	Number of turns position command4	0	-30000~30000																																																																																																																																																							
12-27 P.457	Number of pulses position command4	0	-30000~30000																																																																																																																																																							
12-28 P.458	Number of turns position command5	0	-30000~30000																																																																																																																																																							
12-29 P.459	Number of pulses position command5	0	-30000~30000																																																																																																																																																							

Parameter	Name	Factory Value	Setting Range	Content
12-30 P.460	Number of turns position command6	0	-30000~30000	
12-31 P.461	Number of pulses position command6	0	-30000~30000	
12-32 P.462	Number of turns position command7	0	-30000~30000	
12-33 P.463	Number of pulses position command7	0	-30000~30000	
12-34 P.464	Number of turns position command8	0	-30000~30000	
12-35 P.465	Number of pulses position command8	0	-30000~30000	
12-36 P.466	Number of turns position command9	0	-30000~30000	
12-37 P.467	Number of pulses position command9	0	-30000~30000	
12-38 P.468	Number of turns position command10	0	-30000~30000	
12-39 P.469	Number of pulses position command10	0	-30000~30000	
12-40 P.470	Number of turns position command11	0	-30000~30000	---
12-41 P.471	Number of pulses position command11	0	-30000~30000	---
12-42 P.472	Number of turns position command12	0	-30000~30000	---
12-43 P.473	Number of pulses position command12	0	-30000~30000	---
12-44 P.474	Number of turns position command13	0	-30000~30000	---
12-45 P.475	Number of pulses position command13	0	-30000~30000	---
12-46 P.476	Number of turns position command14	0	-30000~30000	---
12-47 P.477	Number of pulses position command14	0	-30000~30000	---
12-48 P.478	Number of turns position command15	0	-30000~30000	---
12-49 P.479	Number of pulses position command15	0	-30000~30000	---

Setting Position command

Position control parameter 12

- ◆ When 12-04=1, 2, set terminal function to REX, RH, RM and RL, and the position command is decided by parameter and digital input terminal state.
- ◆ The position control acceleration/deceleration time is set by 01-06 and 01-07.
- ◆ The position command comes from the parameter position control, and the motor operation direction is decided by position command and forward/reverse rotation command. The target position is related to parameter 09-02 Encoder input type1.

For example: set 09-01 to 1024, the encoder number of pulses 1 is 1024; Set 12-20 to 1, number of turns position command1 is 1 turn; Set 12-21 to 1024, number of pulses position command1 is 1024,
If 09-02=1 or 2, encoder input type 1 is Phase A/B pulse input, the position command is: 1 turn + 1/4 turn.
If 09-02=3 or 4, encoder input type 1 is Phase A pulse input, Phase B is a direction input, position command is: 1 turn+1 turn.

Note: RL, RM, RH and REX here are the function names of "Multi-function digital input terminal". Please refer to 03-00~03-06 and 03-09 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

5.14 Special adjustment parameter group13

Group	Parameter Number	Name	Setting Range	Factory Value	Page
13-00	P.89	Slip compensation coefficient	0 ~ 10	0	294
13-01	P.246	Modulation coefficient	0.90 ~ 1.20	1.00	294
13-02	P.285	Low frequency vibration inhibition factor	0 ~ 8	5	294
13-03	P.286	High frequency vibration inhibition factor	XX00 ~ XX15	509	295
			00XX ~15XX		

5.14.1 Slip compensation V/F

- This parameter can be used to set compensation frequency and reduce the slip to close the setting speed when the motor runs in the rated current to raise the speed control accuracy.

Parameter	Name	Factory Value	Setting Range	Content
13-00 P.89	Slip compensation coefficient	0	0 ~ 10	0: Slip compensation is forbidden. 10: The compensation value is 3% of the target frequency.


Note: 1.This function is only valid under the V/F mode(00-21="0").

2. During slip compensation, the output frequency may be larger than the setting frequency.

5.14.2 Modulation coefficient

- It is used to determine the ratio between the maximum output voltage and the input voltage.

Parameter	Name	Factory Value	Setting Range	Content
13-01 P.246	Modulation coefficient	1.00	0.90 ~ 1.20	The maximum output voltage ="13-01"× the input voltage

 Modulation coefficient

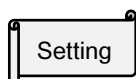
- ◆ The users can use this parameter to obtain an output voltage that is higher than the input voltage.
- ◆ But the output voltage waveform at this point will generate distortion and contain assorted harmonics. It may also increase the motor torque harmonics and noises.

5.14.3 Vibration inhibition

- Inhibit the great vibration of inverter output current and motor rotation speed and the motor vibration.

Parameter	Name	Factory Value	Setting Range	Content
13-02 P.285	Low frequency vibration inhibition factor	5	0 ~ 8	If motor vibration is generated at lower frequency, adjust the set value of 13-02.

Parameter	Name	Factory Value	Setting Range	Content
13-03 P.286	High frequency vibration inhibition factor	509	XX00~XX15 00XX~15XX	If motor vibration is generated at higher frequency, adjust the set value of 13-03. Gradually increase the set value by the unit of 1. 13-03 two high and low two set the range of 0 ~ 15



Vibration inhibition factor

- ◆ For the actual application, use the vibration-generating frequency that is lower or higher than half of the motor rated frequency to determine whether the occurred vibration is a low-frequency vibration or a high-frequency vibration. i.e:

If the rated frequency on the name plate of the motor is 50Hz,

And the vibration-generating frequency is lower than 25Hz, then this is a low-frequency vibration.

On the other hand, if the vibration-generating frequency is higher than 25Hz, then this is a high-frequency vibration.

Note: When the motor load is light, current flow may happen at certain specific operation frequency. This situation may cause the motor to vibrate slightly. The user can neglect it if this trivial vibration has no impact on the application.

5.15 Tension control parameter group 14

Group	Parameter Number	Name	Setting Range	Factory Value	Page
14-00	P.600	The tension control selection	0: The tension control is invalid	0	299
			1: Open-loop torque control mode(in the mode of close-loop vector control)		
			2: Close-loop speed control mode		
			3: Close-loop torque control mode (in the mode of close-loop vector control)		
			4: Constant line speed control mode.		
14-01	P.601	The curling mode	0: Wind-up	0	299
			1: Roll-down		
14-02	P.602	Selection of inverse take-up during roll-down	0: Active inverse material take-up is not allowed during startup.	0	299
			1: Active inverse material take-up is allowed.		
14-03	P.603	Mechanical transmission ratio	0 ~ 300.00	1.00	299
14-04	P.604	Tension setting source	0: The parameter 14-05(P.605) setting.	0	300
			1: The analog value or PULSE input setting.		
			2: Communication setting.		
14-05	P.605	Tension setting	0 ~ 30000N	0N	300
14-06	P.606	Maximum tension	0 ~ 30000N	0N	300
14-07	P.607	Zero-speed tension increase	0 ~ 50.0%	0.0%	300
14-08	P.608	Zero-speed threshold	0 ~ 30.00Hz	0.00Hz	300
14-09	P.609	Tension taper	0 ~ 100.0%	0%	300
14-10	P.654	Taper compensation correction	0 ~ 10000mm	0mm	300
14-11	P.610	Curling radius calculation method selection	0: Calculation through line speed.	0	301
			1: Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.		
			2: Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal HDI.		
			3: Analog value or pulse input.		
14-12	P.650	Curling radius memory control when calculation through thickness accumulation	0: It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.	0	301
			1: It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate.		
14-13	P.611	Maximum curling radius	0 ~ 10000mm	500mm	302

Group	Parameter Number	Name	Setting Range	Factory Value	Page
14-14	P.612	Winding shaftdiameter	0 ~ 10000mm	100mm	302
14-15	P.613	Initial curling radius source	0: Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616).	0	302
			1: Initial curling radius is set by the analog value.		
14-16	P.614	Initial curling radius1	1 ~ 10000mm	100mm	302
14-17	P.615	Initial curling radius 2	1 ~ 10000mm	100mm	302
14-18	P.616	Initial curling radius 3	1 ~ 10000mm	100mm	302
14-19	P.617	Curling radius filtering time	0 ~ 1000ms	0ms	302
14-20	P.618	Current value of curling radius	0 ~ 10000mm	0mm	302
14-21	P.619	Number of pulses each turn	1 ~ 60000	1	302
14-22	P.620	Number of turns each layer	1 ~ 10000	1	302
14-23	P.621	Material thickness setting source	0: The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625).	0	302
			1: The material thickness is set by the analog value.		
14-24	P.622	Material thickness0	0.01 ~ 100.00mm	0.01mm	302
14-25	P.623	Material thickness1	0.01 ~ 100.00mm	0.01mm	302
14-26	P.624	Material thickness2	0.01 ~ 100.00mm	0.01mm	302
14-27	P.625	Material thickness3	0.01 ~ 100.00mm	0.01mm	302
14-28	P.626	Maximum thickness	0.01 ~ 100.00mm	1.00mm	302
14-29	P.627	Line speed inputsource	0: No line speed input.	0	304
			1: The analog value or pulse input		
			2: The communication setting.		
14-30	P.628	Maximum line speed	0.1 ~ 6500.0m/min	1000.0m/min	304
14-31	P.629	Minimum line speed for calculation R.	0.1 ~ 6500.0m/min	200.0m/min	304
14-32	P.630	Actual line speed	0 ~ 6500.0m/min	0.0m/min	304
14-33	P.633	Mechanical inertia compensationcoefficient	0 ~ 65535	0	305
14-34	P.634	Material density	0 ~ 60000kg/ m ³	0kg/ m ³	305
14-35	P.635	Material width	0 ~ 60000mm	0mm	305
14-36	P.636	Fiction compensation coefficient	0 ~ 50.0%	0.0%	305
14-37	P.637	Material supplyinterrupt auto detection function	0: Material supply interrupt auto detection is inactive.	0	306
			1: Material supply interrupt auto detection function1		
			2:Material supply interrupt auto detection function 2		
			3:Material supply interrupt auto detection function 3		
14-38	P.638	Auto detection minimum line speed	0.1 ~ 6500.0m/min	200.0m/mn	306
14-39	P.639	Auto detection error range	0.1 ~ 100.0%	10.0%	306

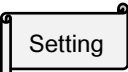
Tension control parameter group 14

Group	Parameter Number	Name	Setting Range	Factory Value	Page
14-40	P.640	Auto detection judgment delay	0.1 ~ 60.0s	2.0s	306
14-41	P.645	Pre-drive speed gain	-50.0% ~ 50.0%	0.0%	307
14-42	P.646	Pre-drive torque increase	-50.0% ~ 50.0%	0.0%	307
14-43	P.647	Pre-drive torque delay time	0 ~ 65535ms	0ms	307
14-44	P.656	Line speed setting source	0: The line speed setting is invalid.	0	309
			1: The line speed is obtained by analog value or pulse input.		
			2: The line speed is obtained by communication mode.		
14-45	P.657	Line speed setting	0 ~ 6500.0m/min	0.0m/min	309
14-46	P.658	Tension closed-loop limit amplitude of benchmark	0: amplitude limiting is based on the motor rated power	0	309
			1: amplitude limiting is based on system real-time line speed		
14-47	P.659	Tension in closed-loop limit amplitude of the bias	0.0% ~ 100.0%	0.0%	309

5.15.1 Tension control mode selection

- Select the control method for tension control.

Parameter	Name	Factory Value	Setting Range	Content
14-00 P.600	The tension control selection	0	0	The tension control is invalid
			1	Open-loop torque control mode(in the mode of close-loop vector control)
			2	Close-loop speed control mode
			3	Close-loop torque control mode (in the mode of close-loop vector control)
			4	Constant line speed control mode.
14-01 P.601	The curling mode	0	0	Wind-up
			1	Roll-down
14-02 P.602	Selection of inverse take-up during roll-down	0	0	Active inverse material take-up is not allowed during startup.
			1	Active inverse material take-up is allowed.
14-03 P.603	Mechanical transmission ratio	1.00	0 ~ 300.00	Mechanical transmission ratio

 Setting Tension control mode

- ◆ When 14-00=0, the tension control is inactive, and the inverter is used as general inverter.
- ◆ When 14-00=1, the open-loop torque control mode is active. The inverter controls the constant tension through controlling the motor output torque. No tension feedback is required. The speed encoder must be installed when the inverter works in the mode of close-loop vector control.
- ◆ When 14-00=2, the close-loop speed control mode is active. The controlling result is to make the tension (position) feedback signal stable at the value given by PID.

Close loop means that the tension (position) detection feedback forms a close loop for adjustment. Speed control mode means that the inverter realizes the control by adjusting the output frequency according to the feedback signal. This mode can work in any motor control mode, that is to say 00-21 can be set to 0~4.

- ◆ When 14-00=3, the close-loop torque control mode is active. The tension feedback close-loop adjustment is added on the basis of open-loop tension control. The tension signal fed back by the tension detection device and the tension setting value constitute the PID close-loop adjustment which is used to adjust the inverter output Torque reference. The control method of it works in the mode of close-loop vector control method, and the speed encoder must be installed.
- ◆ When 14-00=4, the constant line speed control method is active. It is a special application to realize constant line speed control without PID adjustment, which is more stable than general close-loop control and applicable to the filed requiring smooth operation rather than fast line speed adjustment. This mode can work in any motor control mode, that is to say 00-21 can be set to 0~4.
- ◆ 14-01 is used to select the curling mode which can be combined with the switching terminal of wind-up and

Tension control parameter group 14

roll-down. If the switching terminal of wind-up and roll-down is inactive, the set of actual curling mode is the same with the function mode. If it is valid, the set of the actual curling mode is the same with the switching terminal of wind-up and roll-down.

- ◆ 14-02 is used to select whether support active take-up of material through inverse running of motor. If “not allowed” is selected, during the roll-down control, the inverter can only output torque when material is running forward. During the roll-down, the frequency for inverse take-up can be limited by setting the upper limit frequency.
- ◆ 14-03 is the mechanical transmission ratio. Mechanical transmission ratio=motor rotation speed/winding shaft rotation speed, the mechanical transmission ratio must be correctly set during the tension control.

5.15.2 Tension setting

- The parameters in this part are only applicable in open-loop torque mode. Close-loop speed mode is set by PID setting source.

Parameter	Name	Factory Value	Setting Range	Content
14-04 P.604	Tension setting source	0	0	The parameter 14-05(P.605) setting.
			1	The analog value or PULSE input setting.
			2	Communication setting.
14-05 P.605	Tension setting	0N	0 ~ 30000N	---
14-06 P.606	Maximum tension	0N	0 ~ 30000N	---
14-07 P.607	Zero-speed tension increase	0.0%	0 ~ 50.0%	---
14-08 P.608	Zero-speed threshold	0.00Hz	0 ~ 30.00Hz	---
14-09 P.609	Tension taper	0.0%	0 ~ 100.0%	---
14-10 P.654	Taper compensation correction	0mm	0 ~ 10000mm	---

Setting Tension setting

- ◆ The parameters in this part are only applicable in open-loop torque mode.
- ◆ When 14-04=0, the tension is set by the parameter14-05.
- ◆ When 14-04=1, the tension is set by the analog value or pulse input terminal. If set the tension through this mode, the maximum tension 14-06 must be set. In general, the maximum value set by analog value and set in maximum pulse both correspond to the maximum tension. The pulse can be set by terminal HDI.
- ◆ When 14-04=2, the tension is set by communication. If perform the control with upstream equipment, the tension

can be set by communication. There are two ways to realize communication setting of tension: 1) Change value of 14-05, then 14-04 shall be set to 0; 2) Set the tension through Modbuscommunication address H100C, 14-04 shall be set to 2 and the Modbuscommunication address H100Cshall be set from 0 to 30000.

- ◆ 14-07is the zero-speed tension increase. It is used to set the tension of the system when it is at zero-speed. It is mainly for overcoming static friction when startup or keep certain tension when the system is at zero-speed. If the control tension is small and it is hard to start, it is allowed to properly increase the setting value of the parameter.
- ◆ 14-08is the zero-speed threshold. When the running speed of the inverter is below the set speed of the parameter, it is considered that the inverter is under zero-speed operation status.
- ◆ 14-09is the tension taper. The parameter is only used for wind-up control. For the wind-up control, sometimes, it is needed to reduce the tension while increasing the curling radius to ensure a good curling of the material.

Formula of tension taper:
$$F=F0*\{1-K*[1-(D0+D1)/(D+D1)]\}$$

Wherein, F is the actual tension, F0 is the setting tension, D0 is the diameter of winding shaft, D is the actual curling radius, D1 is the taper compensation correction of 14-10 set tension, and K is the tension taper.

- ◆ 14-10is the taper compensation correction of tension which can relay the reduction curvature of tension.

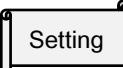
5.15.3 Curling radius calculation

- The output torque is controlled by curling radius in open-loop torque mode. The output frequency corresponded to line speed is gained by curling radius in close-loop speed mode.

Parameter	Name	Factory Value	Setting Range	Content
14-11 P.610	Curling radius calculation method selection	0	0	Calculation through line speed.
			1	Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.
			2	Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal HDI.
			3	Analog value or pulse input.
14-12 P.650	Curling radius memory control when calculation through thickness accumulation	0	0	It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.

Tension control parameter group 14

Parameter	Name	Factory Value	Setting Range	Content
14-12 P.650	Curling radius memory control when calculation through thickness accumulation	0	1	It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate.
14-13 P.611	Maximum curling radius	500mm	1 ~ 10000mm	---
14-14 P.612	Winding shaft diameter	100mm	1 ~ 10000mm	---
14-15 P.613	Initial curling radius sourceInitial curling radius source	0	0	Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616).
			1	Initial curling radius is set by the analog value.
14-16 P.614	Initial curling radius1	100mm	1 ~ 10000mm	---
14-17 P.615	Initial curling radius 2	100mm	1 ~ 10000mm	---
14-18 P.616	Initial curling radius 3	100mm	1 ~ 10000mm	---
14-19 P.617	Curling radius filtering time	0ms	0 ~ 1000ms	---
14-20 P.618	Current value of curling radius	0mm	0 ~ 10000mm	---
14-21 P.619	Number of pulses each turn	1	1 ~ 60000	---
14-22 P.620	Number of turns each layer	1	1 ~ 10000	---
14-23 P.621	Material thickness setting source	0	0	The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625).
			1	The material thickness is set by the analog value.
14-24 P.622	Material thickness0	0.01mm	0.01 ~ 100.00mm	---
14-25 P.623	Material thickness1	0.01mm	0.01 ~ 100.00mm	---
14-26 P.624	Material thickness2	0.01mm	0.01 ~ 100.00mm	---
14-27 P.625	Material thickness3	0.01mm	0.01 ~ 100.00mm	---
14-28 P.626	Maximum thickness	1.00mm	0.01 ~ 100.00mm	---

 Curling radius calculation

◆ In every tension control method, the curling radius is needed to be calculated. The curling radius can be acquired

through the curling radius calculation module built in the inverter or through the external curling radius sensor.

- ◆ 14-11=0, the calculation through line speed: the curling radius is calculated by the system current line speed and the inverter output frequency. The equation is as follows:

$$D = (i \times V) / (\pi \times n)$$

Wherein D is the curling radius, i is the mechanical transmission ratio, V is the line speed, n is the motor speed.

When the system operation speed is slow, the line speed of material and the output frequency of the inverter will be low. Then a little detection error will cause a big error in the curling radius calculation, so that a lowest line speed 14-31 must be set. When the line speed of material is lower than 14-31, the curling radius is stopped to calculate and the current value of curling radius remains unchanged. The value should be set below the normal working line speed.

- ◆ 14-11=1, the calculation of thickness accumulation: the curling radius is worked out through the encoder on the motor side and the gear feedback. In this condition, connect the pulse signal to A1/B1 on PG card and set the encoder input mode setup (09-02), the mechanical transmission ratio (14-03), the number of pulses per revolution of the encoder (09-01), the number of turns each layer (14-22) and the material thickness (14-24).
- ◆ 14-11=2, the calculation through thickness accumulation: the curling radius is worked out through the encoder on the winding shaft. In this condition, connect the pulse signal to the terminal HDI of the inverter and calculate the curling radius through the number of pulses each turn (14-21), the number of turns each layer (14-22) and the material thickness 0 (14-24).
- ◆ 14-11=3, when testing the curling radius with curling radius test sensor, the input channel of curling radius sensor can be the analog value or the pulse input.
- ◆ 14-13 is used to set the maximum curling radius. When 14-11=3, the parameter must be set and the maximum of the analog value or pulse signal corresponds to the set value of the parameter 14-13.
- ◆ 14-14 is used to set the winding shaft diameter. The curling radius calculated by the curling radius calculation module of the inverter is limited by 14-13 and 14-14.
- ◆ 14-15 is used to select the input channel of initial curling radius.
 1. When 14-15=0, the initial curling radius is set by the parameter 14-16~14-18. The initial value of curling radius can be determined through two multi-function digital input terminals, the selection of initial curling radius is as follows:

Digital input terminal 1	Digital input terminal 2	Initial curling radius source
0	0	14-14
0	1	14-16
1	0	14-17
1	1	14-18

2. When 14-15=1, the initial curling radius is determined by the analog value. When the initial curling radius does not count from the hollow curling radius, the initial curling radius can be selected by the digital input terminal. For wind-up control, the system default initial curling radius is the diameter of winding shaft (14-14). For roll-down control, the system default initial curling radius is the maximum curling radius (14-13).

Tension control parameter group 14

- ◆ 14-19 is used to set the curling radius filtering coefficient to avoid fast change of curling radius calculation (or input) result.
- ◆ 14-20 is used to display the current curling radius in real time. It is able to know the current actual curling radius through the parameter.
- ◆ Only when 14-11=1 or 14-11=2, the parameters 14-21~14-28 are related to the parameter.
 1. 14-21 represents pulse number when winding shaft turns a round. It needs to be set when 14-11=2.
 2. 14-22 shows the rounds of winding shaft turning after the material wraps one layer. It is used for wire.
 3. When the material thickness is analog input (14-23=1), the maximum analog input corresponds to the set value of 14-28.
 4. When 14-23 =0, the system default material thickness is determined by the parameter 14-24. The different material thickness source can also be selected by the combination of digital input terminals and 14-24~14-27, the selection relationship is as follows:

Digital input terminal 1	Digital input terminal 2	Initial thickness source
0	0	14-24
0	1	14-25
1	0	14-26
1	1	14-27

5.15.4 Line speed input

- If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal.

Parameter	Name	Factory Value	Setting Range	Content
14-29 P.627	Line speed input source	0	0	No line speed input.
			1	The analog value or pulse input
			2	The communication setting.
14-30 P.628	Maximum line speed	1000.0 m/min	0.1 ~ 6500.0m/min	Maximum line speed
14-31 P.629	Minimum line speed for calculation R.	200.0 m/min	0.1 ~ 6500.0m/min	Minimum line speed for calculation R.
14-32 P.630	Actual line speed	0.0 m/min	0 ~ 6500.0m/min	Actual line speed

Setting Line speed input

- ◆ If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal. In general, the convenient way for obtaining line speed is through analog output of operation frequency of traction (constant speed) inverter. The operation frequency of traction inverter corresponds with the line speed in linear. It only needs to set the maximum line speed (14-30) to the

corresponding line speed of maximum frequency of operation frequency of traction (constant speed) inverter.

- ◆ 14-29 is used to select the way or channel for obtaining line speed.
 1. When 14-29=0, no line speed is input.
 2. When the line speed is obtained through the analog value or pulse input (14-29=1), the maximum line speed 14-30 must be correctly set. The maximum value of analog or pulse input corresponds with the maximum line speed.
 3. When the line speed is obtained through the communication method (14-29=2), it is set by the Modbus communication address H100A and the setting range is 0.1~6500.0m/min.
- ◆ 14-31 is used to set the minimum speed for starting calculation of curling radius. When the inverter detects that the line speed is lower than the value, inverter will stop curling radius calculation. Correct setting of the value will effectively avoid great deviation of curling radius calculation when the speed is reduced. In general, the value shall be set to over 20% of maximum line speed.
- ◆ 14-32 is used to display the actual line speed in real time. The current actual line speed can be known by the parameter.

5.15.5 Tension compensation

- It is only relevant to the open-loop torque mode.

Parameter	Name	Factory Value	Setting Range	Content
14-33 P.633	Mechanical inertia compensation coefficient	0	0 ~ 65535	Mechanical inertia compensation coefficient
14-34 P.634	Material density	0kg/m ³	0 ~ 60000kg/m ³	Material density
14-35 P.635	Material width	0mm	0 ~ 60000mm	Material width
14-36 P.636	Fiction compensation coefficient	0.0%	0 ~ 50.0%	Fiction compensation coefficient

Setting Tension compensation

- ◆ When the tension control adopts the open loop torque mode, during the system acceleration/deceleration, additional torque shall be provided to overcome the rotation inertia of the whole system. Otherwise, too small tension upon wind-up acceleration and too large tension upon deceleration, or too large tension upon roll-down acceleration and too small tension upon deceleration will be caused.
- ◆ 14-33 is used to set the mechanical inertia compensation coefficient. It is used to compensate the rotation inertia

Tension control parameter group 14

of the system, including inertia of the motor, rotation system and the shaft. Such inertias are fixed and independent of the curling radius. This parameter can be obtained automatically by the system inertia self learning or manually set based on the actual working situation.

- ◆ 14-34 and 14-35 are relevant to the material inertia compensation. The inverter will automatically calculate the material inertia compensation value according to the parameter and the curling radius.
- ◆ 14-36 is used to set the friction compensation coefficient. Take wind-up as an example. Because of the frictional resistance, the material tension reduces, which is more obvious upon small roll, and the tension will be nonlinear. This situation can be improved by setting the parameter.

5.15.6 Material supply interrupt detection

- It is an auxiliary function, and not in all situations can the material supply interrupt be detected effectively.

Parameter	Name	Factory Value	Setting Range	Content
14-37 P.637	Material supply interrupt auto detection function	0	0	Material supply interrupt auto detection is inactive.
			1	Material supply interrupt auto detection function 1
			2	Material supply interrupt auto detection function 2
			3	Material supply interrupt auto detection function 3
14-38 P.638	Auto detection minimum line speed	200.0 m/min	0.1 ~ 6500.0m/min	Material supply interrupt auto detection minimum line speed.
14-39 P.639	Auto detection error range	10.0%	0.1 ~ 100.0%	Material supply interrupt auto detection error range.
14-40 P.640	Auto detection judgment delay	2.0s	0.1 ~ 60.0s	Material supply interrupt auto detection judgment delay.

Setting Material supply interrupt detection

- ◆ The group of parameters is used for the inverter to automatically detect the material supply interrupt. It is an auxiliary function. Only when line speed is used for curling radius calculation can the inverter have the material supply interrupt detection basis. And not in all situations can the material supply interrupt be detected effectively. If good result can not be achieved after proper effort, set 14-37 to 0.
- ◆ If the system line speed is higher than 14-38, and the abnormal change of the curling radius (the variation range of the curling radius calculated in the current corresponding to the last one is too large) exceeds the setting range of 14-39, and the lasting time of the abnormal change of the curling radius exceeds the delay time set by 14-40, the inverter reports material supply interrupt failure (bEb).

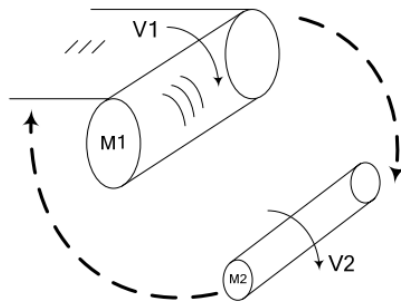
5.15.7 Pre-drive control

- Roll alternation during operation can avoid causing too large shock.

Parameter	Name	Factory Value	Setting Range	Content
14-41 P.645	Pre-drive speed gain	0.0%	-50.0% ~ 50.0%	Pre-drive speed gain
14-42 P.646	Pre-drive torque increase	0.0%	-50.0% ~ 50.0%	Pre-drive torque increase proportion
14-43 P.647	Pre-drive torque delay time	0ms	0 ~ 65535ms	Pre-drive torque increase delay time

Setting Pre-drive control

- ◆ The diagram of auto roll alternation is as follows, there are two inverters to control the replacing upper roll and replacing lower roll.



M1 is “replacing lower roll”, M2 is “replacing upper roll” or “pre-drive roll”

- ◆ To enhance productivity, generally, the winding shaft will be switched without stopping the machine (auto winding up and rolling down the material). To realize the smooth and well-off auto roll alternation and avoid causing too large shock, it is necessary to rotate the wind-up roll (roll-down roll) in advance and the rotating line speed shall be consistent with the line speed of the materials in operation ($V1 \approx V2$). This is the pre-drive function.
- ◆ Auto roll alternation control logic

On the occasion of continuous working, the auto roll alternation control logic is used to alternate the roll smoothly to enhance productivity. The auto roll alternation function is realized with the cooperation of the control signal provided by external controller. Wherein, the motion of B, C and D is only active when the replacing lower roll inverter works in the close loop vector control mode (00-21=4).

1. Pre-drive process

When the replacing upper roll inverter receives the pre-drive reference, no matter what value 14-00 is set, it will operate according to the matching frequency calculated by the given line speed and the initial curling radius until the line speed of replacing upper roll is consistent with the system line speed. When the pre-drive signal disappears, the control mode switches to the setting tension control mode.

2. Torque memory signal

Before replacing the roll, the torque memory signal makes the replacing lower roll inverter remember the current output torque for the use of later process.

3. Torque memory enable

When the replacing upper roll has contacted with the material and the replacing lower roll hasn't been replaced, no matter which torque control mode is adopted, the replacing lower roll inverter will be switched to the torque control mode by the torque memory enable signal. The given Torque reference is the torque remembered by the previous inverter.

4. Torque increase function

When the torque memory enable signal is valid, the inverter will control the torque according to the memory torque. After the setting torque increase delay time, the output torque will increase according to the setting torque increase proportion to keep a large line tension at the moment for easy cutting off.

At the end of roll alternation, the pre-drive signal of the replaced upper roll inverter is revoked. Then the replaced upper roll inverter operates in the setting tension control mode. The process of roll alternation is end after the replacing lower roll inverter stops.

◆ The pre-drive reference, torque memory signal and torque memory enable signal mentioned above in the point 3 are realized all by setting the corresponding function of digital input terminals.

◆ 14-41 is used to set the pre-drive speed gain. For meeting the technological requirements and revising the line speed error, it can be adjusted on the basis of synchronous matching frequency. The adjustment formula:

$$V2 = V1 * (1 + 14-41).$$


When 14-41 < 0, the line speed of pre-drive roll will be lower than the material line speed.

◆ In the process of auto roll alternation, when the torque memory enable signal is valid, the replacing lower roll inverter will control the torque according to the memory torque at first. And then after the delay time set by 14-43, the output torque will be increased according to the torque increase proportion set by 14-42.

5.15.8 Constant line speed mode

- In constant line speed control mode(14-00="4"), it is used to select the method for acquiring the target speed of constant line speed.

Parameter	Name	Factory Value	Setting Range	Content
14-44 P.656	Line speed setting source	0	0	Parameter 14-45(P.657) setting
			1	The line speed is obtained by analog value or pulse input.
			2	The line speed is obtained by communication mode.
14-45 P.657	Line speed setting	0.0 m/min	0 ~ 6500.0m/min	Line speed setting value

 Line speed setting source

- ◆ When 14-44=0, line speed is set by parameter 14-45.
- ◆ The line speed is obtained by analog value or pulse input.(14-44="1")
The maximum line speed 14-30(P.628) must be set correctly now. The maximum of analog value or pulse input corresponds to the maximum line speed.
- ◆ The line speed is obtained by communication mode.(14-44="2")
It is set by the Modbuscommunication address H100B which setting range is 0~6500.0m/min.

5.15.9 Tension closed-loop limiter

- The closed-loop speed control mode (14-00 = "2"), is used to select the PID regulator output limit benchmark and limiting bias.

Group	Parameter Number	Name	Setting Range	content
14-46 P.658	Tension closed-loop limite amplitude of benchmark	0	0:amplitude limitingis based on the motor rated power	---
			1:amplitude limitingis based on system real-time line speed	---
14-47 P.659	Tension in closed-loop limite amplitude of the bias	0.0%	0.0% ~ 100.0%	---

- ◆ Under the closed-loop speed control mode, PID regulator limiter bias is set by the 14-47. If this parameter is set to 0, when the system is zero velocity, the controller will not work. So setting bias is appropriate, which can avoid this problem.

5.16 User parameter group15

Group	Parameter Number	Name	Setting Range	Factory Value	Page
15-00	P.900	User registered parameter1	P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99	99999	311
15-01	P.901	User registered parameter2		99999	311
15-02	P.902	User registered parameter3		99999	311
15-03	P.903	User registered parameter4		99999	311
15-04	P.904	User registered parameter5		99999	311
15-05	P.905	User registered parameter6		99999	311
15-06	P.906	User registered parameter7		99999	311
15-07	P.907	User registered parameter8		99999	311
15-08	P.908	User registered parameter9		99999	311
15-09	P.909	User registered parameter10		99999	311
15-10	P.910	User registered parameter11		99999	311
15-11	P.911	User registered parameter12		99999	311
15-12	P.912	User registered parameter13		99999	311
15-13	P.913	User registered parameter14		99999	311
15-14	P.914	User registered parameter15		99999	311
15-15	P.915	User registered parameter16		99999	311
15-16	P.916	User registered parameter17		99999	311
15-17	P.917	User registered parameter18		99999	311
15-18	P.918	User registered parameter19		99999	311
15-19	P.919	User registered parameter20		99999	312


5.16.1 User registered parameter

- The user parameter group is used to register the parameter numbers for the parameters which do not need to be restored to the factory value.

Parameter	Name	Factory Value	Setting Range	Content
15-00 P.900	User registered parameter 1	99999	P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99	---
15-01 P.901	User registered parameter 2	99999		---
15-02 P.902	User registered parameter 3	99999		---
15-03 P.903	User registered parameter 4	99999		---
15-04 P.904	User registered parameter 5	99999		---
15-05 P.905	User registered parameter 6	99999		---
15-06 P.906	User registered parameter 7	99999		---
15-07 P.907	User registered parameter 8	99999		---
15-08 P.908	User registered parameter 9	99999		---
15-09 P.909	User registered parameter 10	99999		---
15-10 P.910	User registered parameter 11	99999		---
15-11 P.911	User registered parameter 12	99999		---
15-12 P.912	User registered parameter 13	99999		---
15-13 P.913	User registered parameter 14	99999		---
15-14 P.914	User registered parameter 15	99999		---
15-15 P.915	User registered parameter 16	99999		---
15-16 P.916	User registered parameter 17	99999		---
15-17 P.917	User registered parameter 18	99999		---
15-18 P.918	User registered parameter 19	99999		---

User parameter group15

Parameter	Name	Factory Value	Setting Range	Content
15-19 P.919	User registered parameter 20	99999	P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99	---

 User registered parameter

- ◆ The parameters in this group will not be restored to the factory value when executing 00-02=5/6.
- ◆ The parameter values set in this group are the parameter numbers that user need to register. The parameter values with registered number will not be restored to the factory value when 00-02=5/6.
- ◆ For the setting of restoring the factory value, please refer to Section 5.1.2 for the parameter management part.

Note: please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between. Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7; In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106. Note: please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between. Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7; In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106.

6. INSPECTION AND MAINTENANCE

6.1 Inspection item

6.1.1 Daily inspection item

➤ The inverter is a unit mainly consisting of semiconductor devices. Daily inspection must be performed to prevent any fault from occurring due to the adverse effects of the operating environment, such as temperature, humidity, dust, dirt and vibration, changes in the parts with time, service life, and other factors.

1. Check whether the surrounding conditions are normal (including temperature, humidity, dust density, etc.) at the place of the installation.
2. Check whether the power supply voltage is normal (the voltage between R/L1, S/L2 and T/L3).
3. Check whether the wiring is secured (whether the external wiring for the main-circuit board and the control-board terminal are secured).
4. Check whether the cooling system is normal (whether there's any abnormal noise during the operation and whether the wiring is well secured).
5. Check whether the indicator lamp is normal (whether the indicator lamp of the control board and of the parameter unit and the LED monitor of the parameter unit are normal).
6. Check whether the operation is as expected.
7. Check whether there is any abnormal vibration, noise or odor during the operation.
8. Check whether there is any leakage from the filter capacitor.

**Notice**

Be careful in inspection!

6.1.2 Periodical inspection items

➤ Check the areas inaccessible during operation and requiring periodic inspection.

1. Check the connectors and wiring (whether the connectors and wiring between the main-circuit board and control board are secured and without damage).
2. Check whether the components on the main-circuit board and the control board are overheated.
3. Check whether the electrolytic capacitors on the main-circuit board and control board have leakage.
4. Check the IGBT module on the main-circuit board.
5. Clean the dust and foreign substance on the circuit board.
6. Check the insulation resistor.
7. Check whether the cooling system is normal (whether the wiring of fan is secured; clean the air filter, etc.)
8. Check the screws and belts.
9. Check the external wires and the terminal banks for damage.

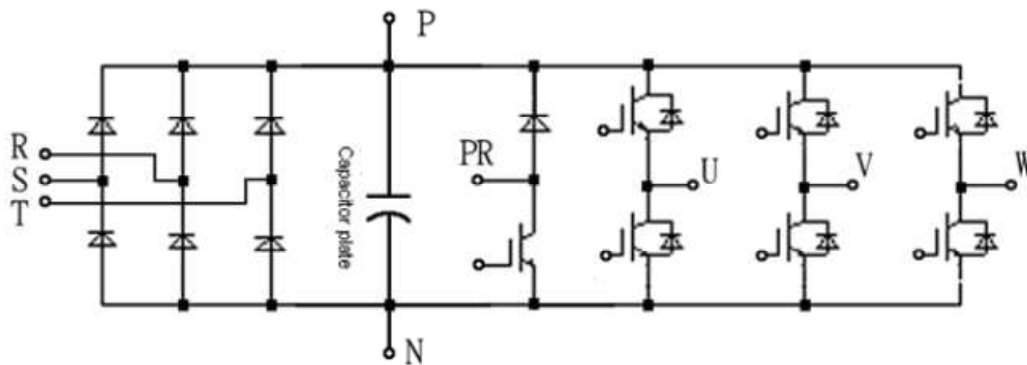
**Notice**

Be careful in inspection!

6.1.3 Checking the converter and inverter modules

- Before conducting test, first dismantle the external wires from the main-circuit terminals(R/L1、S/L2、T/L3、U/T1、V/T2、W/T3). Then set the multi-meter to the ohm-testing position.

	Positive voltage	Negative voltage	Normal result		Positive voltage	Negative voltage	Normal result
Terminal mark	R/L1	+/P	Conductive	Terminal mark	U/T1	+/P	Conductive
	S/L2	+/P	Conductive		V/T2	+/P	Conductive
	T/L3	+/P	Conductive		W/T3	+/P	Conductive
	+/P	R/L1	Non-conductive		+/P	U/T1	Non-conductive
	+/P	S/L2	Non-conductive		+/P	V/T2	Non-conductive
	+/P	T/L3	Non-conductive		+/P	W/T3	Non-conductive
	R/L1	-/N	Non-conductive		U/T1	-/N	Non-conductive
	S/L2	-/N	Non-conductive		V/T2	-/N	Non-conductive
	T/L3	-/N	Non-conductive		W/T3	-/N	Non-conductive
	-/N	R/L1	Conductive		-/N	U/T1	Conductive
	-/N	S/L2	Conductive		-/N	V/T2	Conductive
	-/N	T/L3	Conductive		-/N	W/T3	Conductive



Note: The diagram above takes Frame A as an example.

6.1.4 Cleaning

- Always run the inverter in a clean status.
- ◆ Use a soft brush to remove the dust and sundry on the fan blade, fan cover, and radiator, keeping the inverter in good heat dissipation.
- ◆ Gently wipe dirty areas of the cover with a soft cloth immersed in neutral detergent.

Note: 1. Do not use solvent, such as acetone, benzene, toluene and alcohol, as these will cause the inverter surface paint to peel off.
 2. The display, etc. of the parameter unit (PU301, PU301C) are vulnerable to detergent and alcohol. Therefore, avoid using them for cleaning.

6.1.5 Replacement of parts

- The inverter consists of many electronic parts such as semiconductor devices.
- The following parts may deteriorate with age because of their structures or physical characteristics, leading to reduced performance or fault of the inverter. For preventive maintenance, the parts must be replaced periodically.
- Use the life check function as a guidance of parts replacement.

Part name	Estimated lifespan	Description
Cooling fan	2 years	For the axle of a fan, the standard lifetime is about 10 – 35 thousand hours. Assuming that the fan operates 24 hours per day, the fan should be replaced every 2 years.
Filter capacitor	5 years	The filter capacitor is an electrolytic capacitor that deteriorates with time. The deterioration speed is contingent on the ambient conditions. Generally, it should be replaced every 5 years.
Relay	---	If bad contact occurs, please replace it immediately.

Note: 1. Please send the inverters to the factory for complement replacement.
 2. For the replacement of cooling fan, please refer to Section 3.10.

6.2 Measurement of main circuit voltages, currents and powers

6.2.1 Selection of instruments for measurement

- Since the voltages and currents on the inverter input sides and output sides include harmonics, measurement data depends on the instruments used and circuits measured. When instruments for commercial frequency are used for measurement, measure the circuits with the following instruments.

	Voltage(V)	Current(A)	Power(kW)
Input side(R/L1, S/L2, T/L3)	Moving-iron type	Moving-iron type	Electrodynamic type
DC side(+P, -/N)	Moving-coil type	---	---
Output side(U/T1, V/T2, W/T3)	Rectifier type	Moving-iron type	Electrodynamic type

Note: 1. Please pay attention to the instrument range and polarity;
2. Look out for safety.

6.2.2 Measurement of voltages

- Inverter input side

As the input side voltage has a sine wave and it is extremely small in distortion, accurate measurement can be made with an ordinary AC meter.

- Inverter output side

Since the output side voltage has a PWM-controlled rectangular wave, always use a rectifier type voltmeter.

A needle type tester cannot be used to measure the output side voltage as it indicates a value much greater than the actual value.

A moving-iron type meter indicates an effective value which includes harmonics and therefore the value is larger than that of the fundamental wave.

The value monitored on the parameter unit is the inverter-controlled voltage itself. Hence, that value is inaccurate and it is recommended to monitor values (analog output) using the parameter unit.

6.2.3 Measurement of currents

- Use moving-iron type meters on both the input and output sides of the inverter. However, if the carrier frequency exceeds 5kHz, do not use that meter since an overcurrent losses produced in the internal metal parts of the meter will increase and the meter may burn out. In this case, use an approximate-effective value type.
- Since current on the inverter input side tends to be unbalanced, measurement of three phases is recommended. Correct value cannot be obtained by measuring only one or two phases. On the other hand, the unbalanced ratio of each phase of the output side current should be within 10%.
- When a clamp ammeter is used, always use an effective value detection type. A mean value detection type produces a large error and may indicate an extremely smaller value than the actual value. The value monitored on the parameter unit is inaccurate if the output frequency varies, and it is recommended to monitor values (provide analog output) using the parameter unit.

6.2.4 Measurement of power

- Use digital power meters (for inverter) for the both of inverter input and output side. Alternatively, measure using electrodynamic type single-phase wattmeters for the both of inverter input and output side in two-wattmeter or three-wattmeter method. As the current is liable to be imbalanced especially in the input side, it is recommended to use the three-wattmeter method.

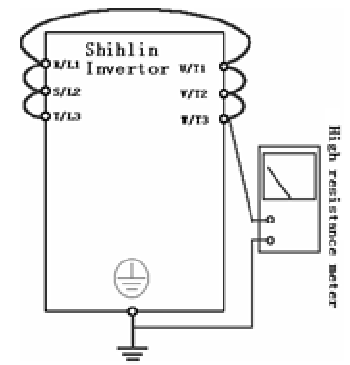
6.2.5 Measurement of frequency

- The factory setting of HDO terminal is FM function, a pulse train proportional to the output frequency is output across the pulse train output terminals HDO and SD of the inverter. This pulse train output can be counted by a frequency counter, or a meter (moving-coil type voltmeter) can be used to read the mean value of the pulse train output voltage.
- Please refer to Section 5.3.9.

6.2.6 Measurement of insulation resistance

➤ Inverter insulation resistance

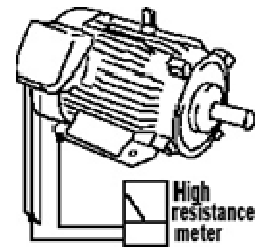
1. Before measuring the inverter insulation resistance, first dismantle the “wiring of all the main-circuit terminals” and the “control board.” Then execute the wiring as shown in the right picture.
2. The measurement is only suitable for the main circuit. It is prohibited to use a high-resistance meter for measuring terminals on the control board.
3. The value of the insulation resistance shall be greater than $5M\Omega$.



Notew: Please use a 500 VDC megger.

➤ Motor insulation resistance

1. Before the measurement, please dismantle the motor, and execute the wiring as shown in the diagram on the right.
2. The value of the insulation resistance shall be greater than $5M\Omega$.



Notew: Please use a suitable megger.

6.2.7 Hi-pot test

- Do not conduct a hi-pot test. Deterioration may occur on the internal semiconductor components of the inverter.

7. APPENDIX

7.1 Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.0	01-10	Torque boost	0.75K/1.5KF types: 0 ~ 30.0%	6.0%	104
			1.5K/2.2KF ~ 3.7K/5.5KF types: 0 ~ 30.0%	4.0%	
			5.5K/7.5KF ~ 7.5K/11KF types: 0 ~ 30.0%	3.0%	
			11K/15KF ~ 55K/75KF types: 0 ~ 30.0%	2.0%	
			75K/90KF and types above: 0 ~ 30.0%	1.0%	
P.1	01-00	Maximum frequency	55K/75KF and types below: 0.00 ~ 01-02(P.18)Hz	120HZ	101
			75K/90KF and types above: 0.00 ~ 01-02(P.18)Hz	60.00Hz	
P.2	01-01	Minimum frequency	0 ~ 120.00Hz	0.00Hz	101
P.3	01-03	Base frequency	50Hz system setting: 0 ~ 650.00Hz	50.00Hz	101
			60Hzsystem setting: 0 ~ 650.00Hz	60.00Hz	
P.4	04-00	Speed1(high speed)	0 ~ 650.00Hz	60.00Hz	164
P.5	04-01	Speed2(mediumspeed)	0 ~ 650.00Hz	30.00Hz	164
P.6	04-02	Speed3(low speed)	0 ~ 650.00Hz	10.00Hz	164
P.7	01-06	Acceleration time	3.7K/5.5KFandtypesbelow:0~360.00s/0~3600.0s	5.00s	102
			5.5K/7.5KFandtypesabove:0~360.00s/0~3600.0s	20.00s	
P.8	01-07	Deceleration time	3.7K/5.5KFandtypesbelow:0~360.00s/0~3600.0s	5.00s	102
			5.5K/7.5KF~7.5K/11KF types:0~360.00s/0~3600.0s	10.00s	
			11K/15KF andtypesabove:0~360.00s/0~3600.0s	30.00s	
P.9	06-00	Electronic thermal relay capacity	0~500.00A: Types below Frame G	According to type	184
			0~5000.0A: Frame G and types above		
P.10	10-00	DC injection brake operation frequency	0 ~ 120.00Hz	3.00Hz	250
P.11	10-01	DC injection brake operation time	0 ~ 60.0s	0.5s	250
P.12	10-02	DC injection brake operation voltage	0 ~ 30.0%: 7.5K/11KF and types below	4.0%	250
			0 ~ 30.0%: 11K/15KF ~ 55K/75KF types	2.0%	
			0 ~ 30.0%: 75K/90KF and types above	1.0%	
P.13	01-11	Starting frequency	0 ~ 60.00Hz	0.50Hz	105
P.14	01-12	Load pattern selection	0: Applicable to constant torque loads(convey belt, etc.)	0	105
			1: Applicable to variable torque loads (fans and pumps, etc.)		
			2, 3: Applicable to ascending / descending loads.		
			4: Multipoint VF curve.		
			5 ~ 13: Special two-point VF curve.		
			14: V/F complete detached mode		
			15: V/F semidetached mode		
P.15	01-13	JOG frequency	0 ~ 650.00Hz	5.00Hz	108
P.16	01-14	JOG acceleration/ decelerationtime	0 ~ 360.00s/0 ~ 3600.0s	0.50s	108

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.17	02-20	4-5 signal selection	0: The effective range of signal sampling is 4~20mA.	0	130
			1: The effective range of signal sampling is 0 ~ 10V.		
			2: The effective range of signal sampling is 0 ~ 5V.		
P.18	01-02	High-speed maximum frequency	01-00(P.1) ~ 650.00Hz	120.00Hz	101
P.19	01-04	Base frequency voltage	0 ~ 1000.0V	99999	101
			99999: Change according to the input voltage		
P.20	01-09	Acceleration/deceleration reference frequency	50Hz system setting: 1.00 ~ 650.00Hz	50.00Hz	102
			60Hz system setting: 1.00 ~ 650.00Hz	60.00Hz	
P.21	01-08	Acceleration/deceleration time increments	0: Time increment is 0.01s	0	102
			1: Time increment is 0.1s		
P.22	06-01	Stall prevention operation level	0 ~ 400.0%	150.0%	185
P.23	06-02	Compensation factor at level reduction	0 ~ 150.0%	99999	185
			99999: Stall prevention operation level is the setting value of 06-01(P.22).		
P.24	04-03	Speed 4	0 ~ 650.00Hz	99999	164
			99999: Function invalid		
P.25	04-04	Speed 5	Same as 04-03	99999	164
P.26	04-05	Speed 6	Same as 04-03	99999	164
P.27	04-06	Speed 7	Same as 04-03	99999	164
P.28	01-15	Output frequency filter time	0 ~ 1000ms	0ms	109
P.29	01-05	Acceleration/deceleration curve selection	0: Linear acceleration /deceleration curve	0	102
			1: S pattern acceleration /deceleration curve 1		
			2: S pattern acceleration /deceleration curve 2		
			3: S pattern acceleration /deceleration curve 3		
P.30	06-05	Regenerative brake function selection	0: If regenerative brake duty is fixed at 3%, parameter06-06(P.70) will be invalid.	0	186
			1: The regenerative brake duty is the value of 06-06(P.70).		
			2: External braking unit protection function (D framework and the above models)	2	
P.31	00-12	Soft-PWM carrier operation selection	0: None Soft-PWM operation	0	91
			1: When 00-11(P.72)< 5, Soft-PWM is valid (only apply to V/F control)		
P.32	07-02	COM1 Serial communication Baud rate selection	0: Baud rate:4800bps	1	205
			1: Baud rate:9600bps		
			2: Baud rate:19200bps		
			3: Baud rate:38400bps		
			4: Baud rate:57600bps		
			5: Baud rate:115200bps		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.33	07-00	COM1 Communication protocol selection	0: Modbus protocol	1	205
			1: Shihlin protocol		
			2 : PLC protocol (Effective when using the shilin built-in PLC)		
P.34	07-11	Communication EEPROM write selection	0: When parameter write is performed, write them to RAM and EEPROM.	0	223
			1: When parameter write is performed, write them to RAM only.		
P.35	00-19	Communication mode instruction selection	0: Incommunication mode, operating instruction and setting frequency is set by communication.	0	93
			1: Incommunication mode, operating instruction and setting frequency is set by external.		
P.36	07-01	COM1 Inverter station number	0 ~ 254	0	205
P.37	00-08	Speed display	0: Display output frequency(the mechanical speed is not displayed)	0	90
			0.1~5000.0		
			1~50000		
P.38	02-09	2-5 maximum operation frequency	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	124
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
P.39	02-21	The maximum operation frequency of terminal 4-5	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	130
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
P.40	03-10	SO1-SE function	0: RUN(inverter running)	1	151
			1: SU(reaching the output frequency)		
			2: FU(output frequency detection)		
			3: OL(overload detection)		
			4: OMD(zero current detection)		
			5: ALARM(alarm detection)		
			6: PO1(programmed operation section detection)		
			7: PO2(programmed operation periodical detection)		
			8: PO3(programmed operation pause detection)		
			9: BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output)		
			10: GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)		
			11: OMD1(zero current detection)		
			12 ~ 15: Reserve		
			16: Abnormal signal of fan		
			17: RY(the accomplishment of inverter running preparation)		
			18: Maintenance alarm detection		
19: OL2 (Over torque alarm output)					

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.40	03-10	SO1-SE function	20: Capacitor lifetime abnormal	1	151
			21: Position control position attained		
			22 : Tension control curl pattern detection		
			23 : Power marker detection		
P.41	03-20	Up-to-frequency sensitivity	0 ~ 100.0%	10.0%	155
P.42	03-21	Output frequency detection for forward rotation	0 ~ 650.00Hz	6.00Hz	155
P.43	03-22	Output frequency detection for reverse rotation	0 ~ 650.00Hz	99999	155
			99999: Same as the setting of 03-21(P.42)		
P.44	01-22	The second acceleration time	0 ~ 360.00s/0 ~ 3600.0s	99999	110
			99999: Not selected		
P.45	01-23	The second deceleration time	0 ~ 360.00s/0 ~ 3600.0s	99999	110
			99999: Not selected		
P.46	01-24	The second torque boost	0 ~ 30.0%	99999	110
			99999: Not selected		
P.47	01-25	The second base frequency	0 ~ 650.00Hz	99999	110
			99999: Not selected		
P.48	07-03	COM1 Data length	0: 8bit	0	205
			1: 7bit		
P.49	07-04	COM1 Stop bit length	0: 1bit	0	205
			1: 2bit		
P.50	07-05	COM1 Parity check selection	0: No parity verification	0	205
			1: Odd		
			2: Even		
P.51	07-06	COM1 CR/LFselection	1: CR only	1	205
			2: Both CR and LF		
P.52	07-08	COM1 Number of communication retries	0 ~ 10	1	205
P.53	07-09	COM1 Communication check time interval	0 ~ 999.8s: Use the set value for the communication overtime test.	99999	205
			99999: No communication overtime test.		
P.54	02-04	Function of terminal AM1 output	0: Output frequency, the frequency display reference 02-51 (P.55) is 100%.	0	121
			1: Output frequency, the frequency display reference 02-52 (P.56) is 100%.		
			2: Output DC bus voltage, the OV level is 100%.		
			3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.		
			4: Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.		
5: Target frequency, the frequency display reference 02-51(P.55) is 100%.					

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.54	02-04	Function of terminal AM1 output	6: Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539)	0	121
			7: Output voltage, the inverter rated voltage is 100%		
			8: Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)		
			9: Output torque, two times motor rated torque is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)		
			10: Output power, two times motor rated power is 100%.		
			11: The high-speed pulse, 100.00KHz is 100%.		
			12: Motor speed, to display the level of 02-51(P.55) is 100%		
			13 : PLC analog output, details please refer to SA3 embedded PLC instructions		
P.55	02-51	Frequency display reference at the analog output	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	137
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
P.56	02-52	Current monitoring reference at the analog output	0~500.00A: Types below Frame G	According to type	137
			0~5000.0A: Frame G and types above		
P.57	10-09	Restart coasting time	0 ~ 30.0s	99999	253
			99999: No restart function.		
P.58	10-10	Restart cushion time	0 ~ 60.0s: 7.5K/11KF (included) and types below.	5.0s	253
			0 ~ 60.0s: 11K/15KF ~ 55K/75KF types	10.0s	
			0 ~ 60.0s: 75K/90KF (included) and types above.	20.0s	
P.59	00-10	Reserve	Reserve	---	78
P.60	02-10	2-5 filter time	0 ~ 2000ms	30ms	124
P.61	10-11	Remote setting functionselection	0: No remote setting function.	0	255
			1: Remote setting function, frequency setup storage is available.		
			2: Remote setting function, frequency setup storage is not available.		
			3: Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR "turn off".		
P.62	03-23	Zero current detection level	0 ~ 200.0%	5.0%	156
			99999: Function invalid		
P.63	03-24	Zero current detection time	0 ~ 100.00s	0.50s	156
			99999: Function invalid		
P.64	02-45	AM1 output signal selection	0: 0~10V voltage can be output across terminal AM1-5.	0	135
			1: Reserve		
			2: 0~20mA current can be output across AM1-5.		
			3: 4~20mA current can be output across AM1-5.		
P.65	10-12	Retry selection	0: Retry is invalid.	0	257

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.65	10-12	Retry selection	1: Over-voltage occurs, the inverter will perform the retry function.	0	257
			2: Over-current occurs, the inverter will perform the retry function.		
			3: Over-voltage or over-current occurs, the inverter will perform the retry function.		
			4: All the alarms have the retry function.		
P.66	06-03	Stall prevention operation reduction starting frequency	50Hz system: 0 ~ 650.00Hz	50.00Hz	185
			60Hz system: 0 ~ 650.00Hz	60.00Hz	
P.67	10-13	Number of retries at alarm occurrence	0: Retry is invalid.	0	257
			1 ~ 10: The setting value of 10-13(P.67) is exceeded, the inverter will not perform the retry function.		
P.68	10-14	Retry waiting time	0 ~ 360.0s	1.0s	257
P.69	10-15	Retry accumulation time at alarm	Read	0	257
P.70	06-06	Special regenerative brake duty	0 ~ 100.0%	0.0%	186
P.71	00-13	Idling braking / DC braking	0: Idling braking	1	91
			1: DC braking		
P.72	00-11	Carrier frequency	Frame A/B: 1~15 kHz	5 kHz	91
			Frame C: 1~9 kHz	5 kHz	
			Frame D/E: 1~9 kHz	4 kHz	
			Frame F/G: 1~9 kHz	2 kHz	
			Frame H: 1~6 kHz	2 kHz	
P.73	02-08	2-5 signal selection	0: The valid range of signal sampling is 0~5V.	1	124
			1: The valid range of signal sampling is 0~10V.		
			2: The valid range of signal sampling is 0~ -5V.		
			3: The valid range of signal sampling is 0~ -10V.		
			4: The valid range of signal sampling is -5 ~ +5V.		
			5: The valid range of signal sampling is -10 ~ +10V.		
P.74	02-43	HDO frequency multiplication coefficient	0: Select FM function as the output function of terminal HDO.	0	134
			1 ~ 9000: Select the square-wave pulse which is 02-43(P.74) times of running frequency as the output of terminal.		
P.75	00-14	Stop function selection	0: Press STOP button and stop the operation only in the PU and H2 mode	1	91
			1: Press STOP button and stop the operation in all mode.		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.77	00-03	Selection of parameterswrite protection	0: Parameters can be written only when the motor stops.	0	85
			1: Parameters cannot be written.		
			2: Parameters can also be written when the motor is running.		
			3: Parameters cannot be written when in password protection.		
P.78	00-15	Forward/reverse rotation prevention selection	0: Forward rotation and reverse rotation are both permitted.	0	92
			1: Reverse rotation is prohibited (Press the reverse reference to decelerate and stop the motor).		
			2: Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor).		
P.79	00-16	Operation mode selection	0: "PU mode", "external mode" and "Jog mode" are interchangeable.	0	93
			1: "PU mode" and "JOG mode" are interchangeable.		
			2: "External mode" only		
			3: "Communication mode" only		
			4: "Combined mode 1"		
			5: "Combined mode 2"		
			6: "Combined mode 3"		
			7: "Combined mode 4"		
			8: "Combined mode 5"		
99999: The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97)					
P.80	03-03	M0 function selection	Same as 03-00	2	147
P.81	03-04	M1 function selection	Same as 03-00	3	147
P.82	03-05	M2 function selection	Same as 03-00	4	147
P.83	03-00	STF function selection	0: STF(the inverter runs forward)	0	145
			1: STR(the inverter runs reverse)		
			2: RL(Multi-speed low speed)		
			3: RM(Multi-speed medium speed)		
			4: RH(multi-speed high speed)		
			5: Analog terminal 4-5 priority		
			6: The external thermal relay operation		
			7: MRS(the instantaneous stopping of the inverter output)		
			8: RT(the inverter second function)		
9: EXT(external JOG)					

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.83	03-00	STF function selection	10: STF+EXJ	0	145
			11: STR+EXJ		
			12: STF+RT		
			13: STR+RT		
			14: STF+RL		
			15: STR+RL		
			16: STF+RM		
			17: STR+RM		
			18: STF+RH		
			19: STR+RH		
			20: STF+RL+RM		
			21: STR+RL+RM		
			22: STF+RT+RL		
			23: STR+RT+RL		
			24: STF+RT+RM		
			25: STR+RT+RM		
			26: STF+RT+RL+RM		
			27: STR+RT+RL+RM		
			28: RUN(the inverter runs forward)		
			29: STF/STR(it is used with RUN, when STF/STR is "on", the inverter runs reverse ; when STF/STR is "off", the inverter runs forward)		
30: RES(external reset function)					
31: STOP(it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)					
32: REX(multi-speed set (16 levels))					
33: PO(in "external mode", programmed operation mode is chosen)					
34: RES_E (external reset become valid only when the alarm goes off.)					
35: MPO (in "external mode" the manually operation cycle mode is chosen.)					
36: TRI(triangle wave function is chosen)					
37: GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)					
38: CS(Manual switch to commercial power supply)					
39: STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.					

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.83	03-00	STF function selection	40: P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input)	0	145
			41: PWM setting frequency		
			42: Reserve		
			43: RUN_EN (the digital input terminal running enable)		
			44: PID_OFF (the digital input terminal stopping PID enable)		
			45: The second mode		
			46: Initial curling radius selection terminal 1		
			47: Initial curling radius selection terminal 2		
			48: Thickness selection terminal 1		
			49: Thickness selection terminal 2		
			50: Wind-up roll-down switching		
			51: Predrive reference		
			52: Torque memory		
			53: Torque memory enable		
			54: Turn counting signal (note1)		
			55: Switch speed/Torque control		
			56: Curling radius restore		
			57: High-speed pulse input function (note1)		
			58: Analog terminal 2-5 priority		
			59: Analog terminal 3-5 priority		
			60: Starting/Stopping of PLC		
			61: Origin retry enable function SHOM		
			62: Origin retry setting origin ORGP		
			63: Switch position/Speed control		
			64: External switch zero-servo		
			65: External accelerate/decelerate pause		
66: External forced stop					
67 : coil diameter calculation Stop					
68 : Single point positioning can make					
69 : Multipoint positioning can make					
70 : entire position control pulse input command can make					
71 : External torque command polarity reverse					
99999 : Not choose in addition of terminal function					
P.84	03-01	STR function selection	Same as 03-00	1	146
P.85	03-11	A1-B1-C1 function	Same as 03-10	5	151
P.86	03-02	RES function selection	Same as 03-00	30	147
P.87	03-14	Multi-function terminal digital input negative/positive logic	0 ~ 1023	0	153
P.88	03-15	Multi-function terminal digital output negative/positive logic (noumenon and slot3)	0 ~ 4095	0	153
P.89	13-00	Slip compensation coefficient	0 ~ 10	0	294
P.90	00-00	The inverter model	Read	Read	82

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.91	01-16	Fequency jump 1A	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.92	01-17	Fequency jump 1B	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.93	01-18	Fequency jump 2A	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.94	01-19	Fequency jump 2B	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.95	01-20	Fequency jump 3A	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.96	01-21	Fequency jump 3B	0 ~ 650.00Hz	99999	109
			99999: invalid		
P.97	00-17	The second target frequency selection	0: Frequency set by parameter unit	0	93
			1: Frequency set by Communication RS485		
			2: Frequency set by the analog		
			3: Frequency set by communication Expansion card		
			4: Frequency set by PG board A2B2		
			5: Frequency set by HDIpulse		
P.98	01-26	Middle frequency 1	0 ~ 650.00Hz	3.00Hz	111
P.99	01-27	Output voltage 1 of middle frequency	0 ~ 100.0%	10.0%	111
P.100	04-15	Minute/second selection	0: The minimum increment of run time is 1 minute.	1	166
			1: The minimum increment of run time is 1 second.		
P.101	04-27	Programmed operation mode speed 1 operating time	0 ~ 6000.0s	0.0s	166
P.102	04-28	Programmed operation mode speed 2 operating time	0 ~ 6000.0s	0.0s	166
P.103	04-29	Programmed operation mode speed3 operating time	0 ~ 6000.0s	0.0s	166
P.104	04-30	Programmed operation mode speed 4 operating time	0 ~ 6000.0s	0.0s	166
P.105	04-31	Programmed operation mode speed 5 operating time	0 ~ 6000.0s	0.0s	167
P.106	04-32	Programmed operation mode speed 6 operating time	0 ~ 6000.0s	0.0s	167

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.107	04-33	Programmed operation mode speed 7 operating time	0 ~ 6000.0s	0.0s	167
P.108	04-34	Programmed operation mode speed 8 operating time	0 ~ 6000.0s	0.0s	167
P.109	00-18	The second start signal selection	0: Operating signal set by parameter unit 1: Operating signal set by digital input terminal 2: Operating signal set by Communication RS485 3: Operating signal set by communication expansion card	0	93
P.110	00-06	Parameter unit monitoring selection	X0: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency. X1: When the inverter starts, the screen of the parameter unit displays the target frequency. X2: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system. 0X : Boot screen to monitor model output frequency 1X : Boot screen to set the target frequency mode 2X : Boot screen to monitor model of output current 3X : Boot screen to monitor mode of the output voltage	1	89
P.111	04-35	Programmed operation mode speed 1 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.112	04-36	Programmed operation mode speed 2 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.113	04-37	Programmed operation mode speed 3 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.114	04-38	Programmed operation mode speed 4 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.115	04-39	Programmed operation mode speed 5 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.116	04-40	Programmed operation mode speed 6 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.117	04-41	Programmed operation mode speed 7 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.118	04-42	Programmed operation mode speed 8 Acc/Dec time	0 ~ 600.00s/0 ~ 6000.0s	0.00s	167
P.119	10-16	The dead time of positive and reverse rotation	0 ~ 3000.0s	0.0s	258

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.120	03-16	Output signal delay time	0 ~ 3600.0s	0.0s	154
P.121	04-16	Run direction in each section	0 ~ 255	0	166
P.122	04-17	Cycle selection	0: Cycle function invalid	0	166
			1 ~ 8: Run circularly from the settingsection.		
P.123	04-18	Acceleration/deceleration time setting selection	0: The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8).	0	166
			1: The acceleration and deceleration time is both determined by 04-35(P.111) ~ 04-42(P.118).		
P.124	09-13	Expansion card version	Read	Read	244
P.125	00-26	Expansion card type	Read	Read	97
P.126	03-06	M3 function selection	Same as 03-00	5	147
P.127	03-07	M4 function selection	Same as 03-00	8	147
P.128	03-08	M5 function selection	Same as 03-00	7	147
P.129	03-12	SO2-SE function	Same as 03-10	2	151
P.130	03-13	A2-B2-C2 function	Same as 03-10	0	151
P.131	04-19	Programmed operation mode speed 1	0 ~ 650.00Hz	0.00Hz	166
P.132	04-20	Programmed operation mode speed 2	0 ~ 650.00Hz	0.00Hz	166
P.133	04-21	Programmed operation mode speed3	0 ~ 650.00Hz	0.00Hz	166
P.134	04-22	Programmed operation mode speed 4	0 ~ 650.00Hz	0.00Hz	166
P.135	04-23	Programmed operation mode speed 5	0 ~ 650.00Hz	0.00Hz	166
P.136	04-24	Programmed operation mode speed 6	0 ~ 650.00Hz	0.00Hz	166
P.137	04-25	Programmed operation mode speed 7	0 ~ 650.00Hz	0.00Hz	166
P.138	04-26	Programmed operation mode speed 8	0 ~ 650.00Hz	0.00Hz	166
P.139	02-11	The bias rate of 2-5 voltage signal	-100.0%~100.0%	0.0%	124
P.142	04-07	Speed8	Same as 04-03	99999	164
P.143	04-08	Speed9	Same as 04-03	99999	164
P.144	04-09	Speed10	Same as 04-03	99999	164
P.145	04-10	Speed11	Same as 04-03	99999	164
P.146	04-11	Speed12	Same as 04-03	99999	164
P.147	04-12	Speed13	Same as 04-03	99999	164
P.148	04-13	Speed14	Same as 04-03	99999	164
P.149	04-14	Speed15	Same as 04-03	99999	164
P.150	10-08	Restart mode selection	XX0: No frequency search.	0	253
			XX1: Direct frequency search		
			XX2: Decrease voltage mode		
			X0X: Power on once.		
			X1X: Start each time.		
			X2X: Only instantaneous stop and restart		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.150	10-08	Restart mode selection	0XX: No rotation direction detection.	0	253
			1XX: Rotation direction detection.		
			2XX:00-15(P.78)=0, rotation direction detection ; 00-15(P.78)=1/2, no rotation direction detection.		
P.151	10-03	Zero-speed control function selection	0: There is no output at zero-speed.	0	251
			1: The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.		
			2: The zero-servo running is carried out in close-loop vector mode.		
P.152	10-04	Voltage at zero-speed control	0 ~ 30.0%: 7.5K/11KF and types below	4.0%	251
			0 ~ 30.0%: Types from 11K/15KF to 55K/75KF	2.0%	
			0 ~ 30.0%: 75K/90KF and types above	1.0%	
P.153	07-10	COM1Communication error handling	0: Warn and call to stop	0	205
			1: No warning and keep running		
P.154	07-07	COM1 Modbus communication format	0: 1, 7, N, 2 (Modbus, ASCII)	4	205
			1: 1, 7, E, 1 (Modbus, ASCII)		
			2: 1, 7, O, 1 (Modbus, ASCII)		
			3: 1, 8, N, 2 (Modbus, RTU)		
			4: 1, 8, E, 1 (Modbus, RTU)		
			5: 1, 8, O, 1 (Modbus, RTU)		
P.155	06-08	Over torque detection level	0 ~ 200.0%	0.0%	189
P.156	06-09	Over torque detection time	0.1 ~ 60.0s	1.0s	189
P.157	03-17	Digital input terminal filter time	0 ~ 2000ms	4ms	154
P.158	03-18	Digital input terminal power enable	0: Digital input terminal power unable	0	155
			1: Digital input terminal power enable	0	
P.159	10-17	Energy-saving control function	0: Normal running mode.	0	258
			1: Energy-saving running mode.		
P.160	06-11	Stall level when restart	0 ~ 150.0%	100.0%	190
P.161	00-07	Multi-function display	0: Output voltage (V)	0	89
			1: Inverter voltage between (+/P) and (-/N) terminals. (V)		
			2: Temperature rising accumulation rate of inverter (%)		
			3: Target pressure of the constant pressure system (%)		
			4: Feedback pressure of the constant pressure system (%)		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.161	00-07	Multi-function display	5: Operation frequency (Hz)	0	89
			6: Electronic thermal accumulation rate (%)		
			7: Signal value (V) of 2-5 simulating input terminals.		
			8: Signal value (mA) of 4-5 simulating input terminals (mA/V).		
			9: Output power (kW).		
			10: PG card's feedback rotation speed. (Hz)		
			11: Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state.		
			12: NTC temperature (°C)		
			13: Electronic thermal accumulation rate of motor (%)		
			14: Reserve.		
			15: Input frequency of terminal HDI. (kHz)		
			16: Real-time curling radius value. (mm)		
			17: Real-time line speed. (m/min)		
			18: Output torque of inverter (%)		
			19: Digital terminal input state		
			20: Digital terminal output state		
			21: Actual working carrier frequency		
			22: Signal value (mA) of 3-5 simulating input terminals. (mA/V)		
			23: Synchronous motor rotor pole position		
			24 : Current target frequency		
25 : PTC Enter the percentage					
26 : Target pressure and feedback the constant pressure system					
27 : motor speed					
P.162	01-28	Middle frequency 2	0 ~ 650.00Hz	99999	111
			99999: Not selected		
P.163	01-29	Output voltage 2 of middle frequency	0 ~ 100.0%	0.0%	111
P.164	01-30	Middle frequency 3	0 ~ 650.00Hz	99999	111
			99999: Not selected		
P.165	01-31	Output voltage 3 of middle frequency	0 ~ 100.0%	0.0%	111
P.166	01-32	Middle frequency 4	0 ~ 650.00Hz	99999	111
			99999: Not selected		
P.167	01-33	Output voltage 4 of middle frequency	0 ~ 100.0%	0.0%	111
P.168	01-34	Middle frequency 5	0 ~ 650.00Hz	99999	111
			99999: Not selected		
P.169	01-35	Output voltage 5 of middle frequency	0 ~ 100.0%	0.0%	111

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.170	08-00	PID function selection	0: PID function non-selected	0	227
			0X: Parameter 08-03(P.225) sets target value.		
			1X: Take the input of terminal 2-5 as target source		
			2X: Take the input of terminal 4-5 as target source		
			3X: Take the input of terminal 3-5 as target source		
			4X: Take the input of terminal HDI as target source		
			X1: Take the input of terminal 2-5 as feedback source		
			X2: Take the input of terminal 4-5 as feedback source		
			X3: Take the input of terminal 3-5 as feedback source		
P.171	08-01	PID feedback control method	0: Negative feedback control.	0	227
			1: Positive feedback control.		
P.172	08-04	Proportion gain	0.1% ~ 1000.0%	20.0%	228
P.173	08-05	Integral time	0 ~ 60.00s	1.00s	228
P.174	08-06	Differential time	0 ~ 10000ms	0ms	228
P.175	08-07	Abnormal deviation	0 ~ 100.0%	0.0%	228
P.176	08-08	Exception duration time	0 ~ 600.0s	30.0s	228
P.177	08-09	Exception handling mode	0: Free stop	0	228
			1: Decelerate and stop		
			2: Continue to run when the alarm goes off		
P.178	08-10	Sleep detects deviation	0 ~ 100.0%	0.0%	228
P.179	08-11	Sleep detects duration time	0 ~ 255.0s	1.0s	228
P.180	08-12	Revival level	0 ~ 100.0%	90.0%	228
P.181	08-13	Outage level	0 ~ 120.00Hz	40.00Hz	228
P.182	08-14	Integral upper limit	0 ~ 200.0%	100.0%	228
P.183	08-15	Deceleration step length with stable pressure	0 ~ 10.00Hz	0.50Hz	228
P.184	02-24	4-5 disconnection selection	0: No disconnection selection is available.	0	130
			1: Decelerate to 0Hz, the digital output terminal will set off the alarm		
			2: The inverter will stop immediately, and the panel will display the "AEr" alarm.		
			3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.		
P.185	02-06	Proportion linkage gain	0 ~ 100%	0%	122

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.186	00-23	Motor types selection	0: Normal Duty (ND), apply to the fans and water pump type duty.	1	95
			1: Heavy Duty (HD), apply to other duties.		
P.187	02-59	FM calibration parameter	0 ~ 9998	450	139
P.188	00-01	Firmware version	Read	Read	82
P.189	00-24	50Hz/60Hz switch selection	0: The frequency parameter default value is 60Hz system.	0	96
			1: The frequency parameter default value is 50Hz system.	1	
P.190	02-47	AM1 output bias	0 ~ 5000	80	135
P.191	02-46	AM1 output gain	0 ~ 5000	3210	135
P.192	02-12	The minimum input positive voltage of 2-5	0 ~ 10.00V	0.00V	124
P.193	02-13	The maximum input positive voltage of 2-5	0 ~ 10.00V	10.00V	124
P.194	02-14	The percentage corresponding to the minimum positive voltage of terminal 2-5	-100.0% ~ 100.0%	0.0%	124
			-400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.195	02-15	The percentage corresponding to the maximum positive voltage of terminal 2-5	-100.0% ~ 100.0%	100.0%	124
			-400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.196	02-27	The percentage corresponding to the minimum input current/voltage of terminal 4-5	-100.0 ~ 100.0%	0.0%	130
			-400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.197	02-28	The percentage corresponding to the maximum input current/voltage of terminal 4-5	-100.0 ~ 100.0%	100.0%	130
			-400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.198	02-25	The minimum input current/voltage of terminal 4-5	0 ~ 20.00mA	4.00mA	130
P.199	02-26	The maximum input current/voltage of terminal 4-5	0 ~ 20.00mA	20.00mA	130
P.220	06-04	Current stall selection of time of acceleration and deceleration	0: According to the current time of Acc/Dec	3	185
			1: According to the first time of Acc/Dec		
			2: According to the second time of Acc/Dec		
			3: Automatically calculate the best time of acceleration/deceleration		
P.221	08-16	Minimum pressure sampling value	0 ~ 65535	0	229

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.222	08-17	Maxmum pressure sampling value	0 ~ 65535	0	229
P.223	08-18	Analog feedback bias pressure	0 ~ 100.0%	0.0%	229
P.224	08-19	Analog feedback gain pressure	0 ~ 100.0%	100.0%	229
P.225	08-03	PID targer value panel reference	0 ~ 100.0%	20.0%	228
P.229	10-18	Dwell function selection	0: None.	0	259
			1: Backlash compensation function.		
			2: Acceleration and deceleration interrupt waiting function.		
P.230	10-19	Dwellfrequency at acceleration	0 ~ 650.00Hz	1.00Hz	259
P.231	10-20	Dwelltime at acceleration	0 ~ 360.0s	0.5s	259
P.232	10-21	Dwellfrequency at deceleration	0 ~ 650.00Hz	1.00Hz	259
P.233	10-22	Dwelltime at deceleration	0 ~ 360.0s	0.5s	259
P.234	10-23	Triangular wave function selection	0: None.	0	261
			1: External TRIs turned on,triangular wave function will be valid.		
			2: The triangular wave function is effective at any given time.		
P.235	10-24	Maximum amplitude	0 ~ 25.0%	10.0%	261
P.236	10-25	Amplitude compensation for deceleration	0 ~ 50.0%	10.0%	261
P.237	10-26	Amplitude compensation for acceleration	0 ~ 50.0%	10.0%	261
P.238	10-27	Amplitude acceleration time	0 ~ 360.00s/0 ~ 3600.0s	10.00s	261
P.239	10-28	Amplitude deceleration time	0 ~ 360.00s/0 ~ 3600.0s	10.00s	261
P.240	02-07	Auxiliary frequency	0: No auxiliary frequency function is available.	0	123
			1: operation frequency = basic frequency + auxiliaryfrequency (given by the 2-5 terminal)		
			2: operation frequency = basic frequency + auxiliaryfrequency (given by the 4-5 terminal)		
			3: operation frequency = basic frequency - auxiliary frequency (given by the 2-5 terminal)		
			4: operation frequency = basic frequency - auxiliary frequency (given by the 4-5 terminal)		
			5: operation frequency = given by the terminal 2-5 as the proportion linkage signal		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.240	02-07	Auxiliary frequency	6: operation frequency = given by the terminal 4-5 as the proportion linkage signal	0	123
			7: operation frequency = given by the terminal 3-5 as the proportion linkage signal		
			8: operation frequency = basic frequency + auxiliary frequency (given by the terminal 3-5)		
			9: operation frequency = basic frequency - auxiliary frequency (given by the terminal 3-5)		
P.241	08-02	Sampling period by PID	0 ~ 6000ms	20ms	228
P.242	10-05	DC injection brake function before start	0: DC injection brake function is not available before starting.	0	252
			1: DC brake injection function is selected before starting.		
P.243	10-06	DC injection brake time before start	0 ~ 60.0s	0.5s	252
P.244	10-07	DC injection brake voltage before start	0 ~ 30.0%: 7.5K/11KF(included) and types below	4.0%	252
			0 ~ 30.0%: 11K/15KF ~ 55K/75KF types	2.0%	
			0 ~ 30.0%: 75K/90KF (included) and types above.	1.0%	
P.245	06-12	Cooling fan operation	0X: Fan alarm for abnormal fan	0	190
			1X: No fan alarm for abnormal fan, but the output of terminal alarm.		
			X0: The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.		
			X1: Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too.		
			X2: The fan will be turned on if the temperature of the heat sink is higher than 40°C. When the power is turned off, the fan will be turned off, too.		
			X3: The fan will be turned on when the temperature of the heat sink is higher than 60°C. When it is lower than 40°C, the fan will be turned off.		
P.246	13-01	Modulation coefficient	0.90 ~ 1.20	1.00	294
P.247	10-29	MC switchover interlock time	0.1 ~ 100.0s	1.0s	262
P.248	10-30	Start waiting time	0.1 ~ 100.0s	0.5s	262
P.249	10-31	Switchover frequency from inverter to commercial power supply frequency	0 ~ 60.00Hz	99999	262
			99999: No automatic switchover order.		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.250	10-32	Automatic switchover frequency range	0 ~ 10.00Hz: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.	99999	262
			99999: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.		
P.255	01-36	S pattern time at the beginning of acceleration	0 ~ 25.00s/0 ~ 250.0s	0.20s	112
P.256	01-37	S pattern time at the end of acceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		
P.257	01-38	S pattern time at the beginning of deceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		
P.258	01-39	S pattern time at the end of deceleration	0 ~ 25.00s/0 ~ 250.0s	99999	112
			99999: Not selected		
P.259	00-09	Speed unit selection	0: Speed display selection unit is 1	1	90
			1: Speed display selection unit is 0.1		
P.260	06-10	Over torque detection selection	0: The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.	1	189
			1: The OL2 alarm is reported after the over torque detection, and the inverter stops.		
P.261	06-17	Maintenance alarm function	0: No maintenance alarm	0	193
			1 ~ 9998day: Used to set time when maintenance alarm sends out signal		
P.262	06-20	Output phase failure protection	0: No output phase failure protection selection	0	194
			1: Output phase failure protection, the parameter unit will display the "LF" abnormal alarm and the inverter will stop the output.		
P.263	06-07	Decrease carrier protection setting	0: Rated carrier frequency, limit load current according to the setting carrier.	0	187
			1: Rated current, limit carrier according to the load current and temperature.		
P.264	10-51	Overexcitation deceleration	0: Overexcitation deceleration is invalid.	0	268
			1: Overexcitation deceleration is valid.		
P.265	10-52	Overexcitation current level	0 ~ 150.0%	100.0%	268
P.266	10-53	Overexcitation gain	1.00 ~ 1.40	1.10	268

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.267	10-45	Regeneration and avoidance operation selection	0: Regeneration avoidance function is invalid.	0	267
			1: Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action)		
			2: Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)		
			11:Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))		
			12: Regeneration and avoidance function only in constant speed (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))		
P.268	10-46	Regeneration and avoidance DC bus voltage level	155 ~ 400V: 220V types	380V	268
			310 ~ 800V: 440V types	760V	268
P.269	10-47	DC bus voltage detection sensitivity at deceleration	0: Disables regeneration avoidance due to bus voltage change rate.	0	268
			1 ~ 5: Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity.		
P.270	10-48	Regeneration and avoidance frequency compensation value	0 ~ 10.00Hz: Set the limit value of frequency which rises at activation of regeneration avoidance function.	6.00Hz	268
			99999: Frequency limit invalid.		
P.271	10-49	Regeneration avoidance voltage gaincoefficient	0 ~ 200.0%	100.0%	268
P.272	10-50	Regeneration avoidance frequency gain coefficient	0 ~ 200.0%	100.0%	268
P.273	10-33	Power failure stop selection	0: Power failure time deceleration-to-stopfunction disabled.	0	265
			1: No undervoltage avoidance (If an undervoltage or power failureoccurs, the motordecelerates to a stop.)		
			2: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.273	10-33	Power failure stop selection	11: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)	0	265
			12: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)		
P.274	10-34	Subtracted frequency at deceleration start	0 ~ 20.00Hz	3.00Hz	265
P.275	10-35	Subtraction starting frequency	0 ~ 120.00Hz: When output frequency \geq 10-35(P.275), The motor decelerates from the "output frequency - 10-34(P.274)"; When output frequency < 10-35(P.275), deceleration from output frequency	50.00Hz	265
			99999: The motor decelerates from the "output frequency - 10-34(P.274)"		
P.276	10-36	Power-failure deceleration time 1	0 ~ 360.00s/0 ~ 3600.00s	5.00s	265
P.277	10-37	Power-failure deceleration time 2	0 ~ 360.00s/0 ~ 3600.00s: Set the Dec time starting at 10-38(P.278) and downward.	99999	265
			99999: Set the Dec time to the setting frequency of 10-38(P.278).		
P.278	10-38	Power failure deceleration time switchover frequency	0 ~ 650.00Hz	50.00Hz	265
P.279	10-39	UV avoidance voltage gain	0 ~ 200.0%	100.0%	265
P.280	06-18	Short circuit detection when starting	0: No short circuit detection when starting	0	194
			1: Short circuit detection when starting		
P.281	06-13	Input phase failure protection	0: No Phase Failure Protection	0	191
			1: Phase failure protection, the parameter unit will display the "IPF" alarm and the output stops.		
P.282	06-19	Operation GF detection level	280K/315KF types below: 0~100.0%	50.0%	194
			315K/355K/F type: 0~100.0%	70.0%	
P.285	13-02	Low frequency vibration inhibition factor	0 ~ 8	5	294
P.286	13-03	High frequency vibration inhibition factor	XX00 ~ XX15	509	295
			00XX ~ 15XX		
P.287	06-14	SCP Short circuit protection function	0: No the output end short-circuits protection function.	1	191
			1: If output end is short, the parameter unit will display the "SCP" alarm and the output stops.		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.288	06-40	Alarm code query	0 ~ 12	1	196
P.289	06-41	Alarm code display	Read	Read	196
P.290	06-42	Alarm message query	0 ~ 10	0	197
P.291	06-43	Alarm message display	Read	Read	197
P.292	06-27	Accumulative motor operation time (minutes)	0 ~ 1439min	0min	196
P.293	06-28	Accumulative motor operation time (days)	0 ~ 9999day	0day	196
P.294	00-04	Decryption parameter	0~65535	0	85
P.295	00-05	Password setup	2~65535	0	85
P.296	06-29	Accumulative motor power time (minutes)	0 ~ 1439min	0min	196
P.297	06-30	Accumulative motor power time (days)	0 ~ 9999day	0day	196
P.300	00-21	Motor control mode selection	0: Induction motor V/F control	0	94
			1: Induction motor close-loop V/F control (VF + PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motor PG vector control		
			6: Synchronous motor without PG vector control		
P.301	05-00	Motor parameter auto-tuning function selection	0: Parameter auto-tuning function with no motor	0	173
			1: Induction motor parameter auto-tuning measuring the running motor		
			2: Induction motor parameter auto-tuning measuring the stopped motor		
			3: Induction motoronline auto-tuning function		
			4: Induction motorthe system inertia auto-tuning measuring in the mode of closed loop vector control		
			5 : Induction motor parameters automatic measurement [Measurement of motor is not running]		
			8: Synchronous motor parameter auto-tuning function		
			9: Synchronous motor Phase Z position auto-tuning function		
			10: Synchronous motorthe rotation inertia auto-tuningfunction.		
P.302	05-01	Motor rated power	0 ~ 650.00kW	0.00kW	176
P.303	05-02	Motor poles	0 ~ 48	4	176
P.304	05-03	Motor rated voltage	440 Voltage : 0 ~ 510V	According to voltage	176
			220 Voltage : 0~255V		
P.305	05-04	Motor rated frequency	50Hz system: 0 ~ 650.00Hz	50.00Hz	176
			60Hz system: 0 ~ 650.00Hz	60.00Hz	

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.306	05-05	Motor rated current	0~500.00A: Types below Frame G	According to type	176
			0~5000.0A: Frame G and types above		
P.307	05-06	Motor rated rotation speed	50Hz system: 0 ~ 65000r/min	1410 r/min	176
			60Hzsystem: 0 ~ 65000r/min	1710 r/min	
P.308	05-07	Motor excitation current	0~500.00A: Types below Frame G	According to type	176
			0~5000.0A: Frame G and types above		
P.309	05-08	IM motor stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
P.310	05-09	IM motor rotor resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
P.311	05-10	IM motor leakage inductance	0 ~ 6500.0mH: 45K/55KF and types below	According to type	176
			0 ~ 650.00mH: 55K/75KF and types above		
P.312	05-11	IM motor mutual inductance	0 ~ 6500.0mH: 45K/55KF and types below	According to type	176
			0 ~ 650.00mH: 55K/75KF and types above		
P.313	05-12	PM motor stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	According to type	176
			0 ~ 650.00mΩ: 55K/75KF and types above		
P.314	05-13	PM motor d-axis inductance	0 ~ 650.00mH	According to type	176
P.315	05-14	PM motor q-axis inductance	0 ~ 650.00mH	According to type	176
P.316	05-15	PM motor Back-EMF coefficient	0 ~ 6500.0V/krpm	According to type	176
P.317	05-16	PM motor PhaseZ origin pulse compensation	0 ~ 359.9°	0.0°	176
P.318	05-17	Rotation inertia	0 ~ 6.5000kg.m ² :5.5K/7.5KF and types below	According to type	176
			0 ~ 65.000kg.m ² : 7.5K/11KF~ 90K/110KF types		
			0 ~ 650.00kg.m ² : 110K/132KF and types above		
P.320	11-00	Speed control proportion coefficient 1	0 ~ 2000.0	100.0	274
P.321	11-01	Speed control integral time1	0 ~ 20.00s	0.30s	274
P.322	11-02	PI coefficient switching frequency 1	0 ~ 11-05 (P.325) Hz	5.00Hz	274
P.323	11-03	Speed control proportion coefficient 2	0 ~ 2000.0	100.0	274
P.324	11-04	Speed control integral time 2	0 ~ 20.00s	0.30s	274
P.325	11-05	PI coefficient switching frequency 2	11-02 (P.322) ~ 650.00Hz	10.00Hz	274
P.326	11-06	Current control proportion coefficient	0 ~ 20	0	274
P.327	11-07	PM motor types	0: SPM	0	275
			1: IPM		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.328	11-08	PM initial motor position detection selection	0: Pull in.	0	275
			1: High frequency pulse		
P.329	11-09	PM motor acceleration id	0 ~ 200%	80%	275
P.330	11-10	PM motor constant speed id	0 ~ 200%	0%	275
P.331	11-11	PM motor estimated rotation speed filter time	0 ~ 1000ms	2ms	275
P.332	05-22	The second motor rated power	0 ~ 650.00kW	99999	178
			99999		
P.333	05-23	The second motor poles	0 ~ 48	99999	178
			99999		
P.334	05-24	The second motor rated voltage	440Voltage : 0 ~ 510V	99999	178
			220Voltage : 0~255V		
			99999		
P.335	05-25	The second motor rated frequency	0 ~ 650.00Hz	99999	178
			99999		
P.336	05-26	The second motor rated current	0~500.00A: Types below Frame G	99999	178
			0~5000.0A: Frame G and types above		
			99999		
P.337	05-27	The second motor rated rotation speed	0 ~ 65000r/min	99999	178
			99999		
P.338	05-28	The second motor excitation current	0~500.00A: Types below Frame G	99999	178
			0~5000.0A: Frame G and types above		
			99999		
P.339	05-29	The second motor (IM)stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	179
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
P.340	05-30	The second motor (IM)rotor resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	179
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
P.341	05-31	The second motor (IM)leakage inductance	0 ~ 6500.0mH: 45K/55KF and types below	99999	179
			0 ~ 650.00mH: 55K/75KF and types above		
			99999		
P.342	05-32	The second motor (IM)mutual inductance	0 ~ 6500.0mH: 45K/55KF and types below	99999	179
			0 ~ 650.00mH: 55K/75KF and types above		
			99999		
P.343	05-33	The second motor (PM) stator resistance	0 ~ 65000mΩ: 45K/55KF and types below	99999	179
			0 ~ 650.00mΩ: 55K/75KF and types above		
			99999		
P.344	05-34	The second motor (PM) d-axis inductance	0 ~ 650.00mH	99999	179
			99999		
P.345	05-35	The second motor (PM)q-axis inductance	0 ~ 650.00mH	99999	179
			99999		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.346	05-36	The second motor (PM) Back-EMF coefficient	0 ~ 6500.0V/krpm	99999	179
			99999		
P.347	05-37	The second motor (PM) PhaseZ origin pulse compensation	0 ~ 359.9°	99999	179
			99999		
P.348	05-38	The second motor rotation inertia	0 ~ 6.5000kg.m ² : 5.5K/7.5KF and types below	99999	179
			0 ~ 65.000kg.m ² : Types from 7.5K/11KF to 90K/110KF		
			0 ~ 650.00kg.m ² : 110K/132KF and types above		
			99999		
P.349	09-00	PG type selection	0: ABZ	0	239
			1: ABZ (Synchronous motor dedicated)		
			2: Resolver 1x Synchronous motor standard encoder		
			3: ABZ/UVW Synchronous motor standard encoder		
P.350	09-01	Number 1 of the encoder pulses	0 ~ 20000	1024	239
P.351	09-02	Encoder input mode setup 1	0: No function	0	239
			1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.		
			2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.		
			3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.		
			4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.		
P.352	09-03	PG abnormality detection time	0 ~ 100.0s	1.0s	241
P.353	09-04	Over-speed detection frequency	0 ~ 30.00Hz	4.00Hz	241
P.354	09-05	Over-speed detection time	0 ~ 100.0s	1.0s	241
P.355	09-06	Number 2 of the encoder pulses	0 ~ 20000	2500	241
P.356	09-07	Encoder input mode 2	0: No function	0	241
			1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.		
			2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.356	09-07	Encoder input mode 2	3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.	0	241
			4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.		
P.357	09-08	Dividing frequency output setting	1 ~ 255	1	242
P.358	09-09	Dividing frequency filter coefficient	0 ~ 255	0	242
P.359	09-10	Electronic gear ratio	0 ~ 300.00	1.00	243
P.360	09-11	Prevent reverse rotation detection pulse number	0 ~ 65535	0	243
P.361	09-12	Reverse rotation detection number	0 ~ 65535	0	243
P.362	10-54	Short-circuit brake time at PM motor start	0~60.0s	0.0s	269
P.363	09-14	Phase Z adjust margin	0.0°Do not adjust	15.0°	244
			0.1°~360.0° : Phase Z impulse adjust		
P.364	09-15	Phase Z DV1/DV2 alarm-enabled	0 : Phase Z DV1/DV2 alarm is not valid	1	244
			1 : Phase Z DV1/DV2 alarm is valid		
P.370	00-22	The second motor control mode selection	0: Induction motor V/Fcontrol	99999	94
			1: Induction motor V/F close-loop control (VF+PG)		
			2: Induction motor simple vector control		
			3: Induction motorsensorless vector control		
			4: Induction motor PG vector control		
			5: Synchronous motor PG vector control		
			6: Synchronous motor without PG vector control		
99999: The second motor control mode is not selected.					
P.371	11-30	The second motor speed control proportion coefficient 1	0 ~ 2000	100	279
			99999		
P.372	11-31	The second motor Speed control integral time1	0 ~ 20.00s	0.30s	279
			99999		
P.373	11-32	The second motor PI coefficient switchingfrequency 1	0 ~ 11-35 (P.376)Hz	5.00Hz	279
			99999		
P.374	11-33	The second motor speed control proportion coefficient 2	0 ~ 2000	100	279
			99999		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.375	11-34	The second motor Speed control integral time 2	0 ~ 20.00s 99999	0.30s	279
P.376	11-35	The second motor PI coefficient switching frequency 2	11-32(P.373)~650.00Hz 99999	10.00Hz	279
P.377	11-36	The second motor current control proportion coefficient	0 ~ 20 99999	0	279
P.378	11-37	The second PM motor types	0: SPM 1: IPM 99999	0	280
P.379	11-38	The second PM initial motor position detection selection	0: Pull in. 1: High frequency pulse 99999	0	280
P.380	11-39	The second PM motor acceleration id	0 ~ 200% 99999	80%	280
P.381	11-40	The second PM motor constant speed id	0 ~ 200% 99999	0%	280
P.382	11-41	The second PM motor estimated rotation speed filter time	0 ~ 1000ms 99999	2ms	280
P.365	11-42	PM motor speed estimation observer source of PI parameters	0 : manual operation 1 : automatic calculation	0	281
P.366	11-43	PM motor speed estimation observer Kp	0 ~ 65000	10	281
P.367	11-44	PM motor speed estimation observer Ki	0 ~ 65000	376	281
P.383	11-45	PMZero speed motor current loop bandwidth coefficient	0 ~ 100	40	281
P.384	11-46	PM Motor current loop bandwidth coefficient at low speed	0 ~ 100	40	281
P.385	11-47	PMMotor current loop bandwidth coefficient at a high speed	0 ~ 100	40	281
P.386	09-16	PG302 Hardware break line detection	0 : Break line detection invalid 1 : Break line detection effective	1	241
P.400	00-20	Control mode selection	0: Speed control 1: Torque control 2: Position control	0	94
P.401	11-12	PM motor estimated rotation speed filter time	-400.0 ~ 400.0%	0.0%	276
P.402	11-13	Torque reference	-120% ~ 120%	0%	276
P.403	11-14	Speed limit bias	0 ~ 120%	10%	276
P.404	11-15	Torque filter time	0 ~ 1000ms	0ms	276
P.405	11-16	Torque setting source	0: Given by the 11-12(P.401). 1: Given by the analog or pulse input. 2: Given by the communication mode.	0	276
P.406	11-17	Selection of speed limit	0:The speed is limited according to 11-13(P.402) and 11-14(P.403) 1: Frequency reference source(it is decided according to 00-16(P.79))	0	276
P.407	11-18	Unidirectional speed limit bias	0: Unidirectional speed limit bias is invalid. 1: Unidirectional speed limit bias is valid.	1	276

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.408	11-19	Forward motor torque limit	0 ~ 400.0%	200.0%	278
P.409	11-20	Reverse regenerative torque limit	0 ~ 400.0%	200.0%	278
P.410	11-21	Reverse motor torque limit	0 ~ 400.0%	200.0%	278
P.411	11-22	Forward regenerative torque limit	0 ~ 400.0%	200.0%	278
P.412	11-23	Zero velocity ratio	0~2000.0	100.0	274
P.413	11-24	Zero speed integration time	0~20.00s	0.30s	274
P.414	11-25	Zero speed switching frequency	0~650.00Hz	5.00Hz	274
P.420	12-00	Homing mode	0 ~ 2123	0	284
P.421	12-01	The first high speed of Homing	0 ~ 650.00Hz	10.00Hz	284
P.422	12-02	The second high speed of Homing	0 ~ 650.00Hz	2.00Hz	284
P.423	12-03	origin pulse offset	-30000~30000	0	284
P.424	12-04	Position instruction source	0: External pulse.	0	287
			1: Relative position.		
			2: Absolute position.		
P.425	12-05	Position control proportion gain	0 ~ 65535	10	287
P.426	12-06	Position control feed forward gain	0 ~ 65535	0	287
P.427	12-07	Position control feed forward low pass filter time	0 ~ 65535ms	100ms	287
P.428	12-08	External pulse position control speed limit	0 ~ 650.00Hz	10.00Hz	287
P.429	12-09	Position reaching margin	0 ~ 65535	40	287
P.430	12-10	Zero servo gain	0 ~ 100	5	289
P.431	12-11	Single point positioning location	0~65535	0	289
P.432	12-12	Frequency of single point locating	0~650.00Hz	0.00Hz	289
P.433	12-13	Zero velocity threshold	0~650.00Hz	0.50Hz	287
P.434	12-14	Position command response options	0~2	0	287
P.450	12-20	Number of turns position command1	-30000~30000	0	290
P.451	12-21	Number of pulses position command1	-30000~30000	0	290
P.452	12-22	Number of turns position command2	-30000~30000	0	290
P.453	12-23	Number of pulses position command2	-30000~30000	0	290
P.454	12-24	Number of turns position command3	-30000~30000	0	290
P.455	12-25	Number of pulses position command3	-30000~30000	0	290
P.456	12-26	Number of turns position command4	-30000~30000	0	290
P.457	12-27	Number of pulses position command4	-30000~30000	0	290
P.458	12-28	Number of turns position command5	-30000~30000	0	290
P.459	12-29	Number of pulses position command5	-30000~30000	0	290
P.460	12-30	Number of turns position command6	-30000~30000	0	291
P.461	12-31	Number of pulses position command6	-30000~30000	0	291

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.462	12-32	Number of turns position command7	-30000~30000	0	291
P.463	12-33	Number of pulses position command7	-30000~30000	0	291
P.464	12-34	Number of turns position command8	-30000~30000	0	291
P.465	12-35	Number of pulses position command8	-30000~30000	0	291
P.466	12-36	Number of turns position command9	-30000~30000	0	291
P.467	12-37	Number of pulses position command9	-30000~30000	0	291
P.468	12-38	Number of turns position command10	-30000~30000	0	291
P.469	12-39	Number of pulses position command10	-30000~30000	0	291
P.470	12-40	Number of turns position command11	-30000~30000	0	291
P.471	12-41	Number of pulses position command11	-30000~30000	0	291
P.472	12-42	Number of turns position command12	-30000~30000	0	291
P.473	12-43	Number of pulses position command12	-30000~30000	0	291
P.474	12-44	Number of turns position command13	-30000~30000	0	291
P.475	12-45	Number of pulses position command13	-30000~30000	0	291
P.476	12-46	Number of turns position command14	-30000~30000	0	291
P.477	12-47	Number of pulses position command14	-30000~30000	0	291
P.478	12-48	Number of turns position command15	-30000~30000	0	291
P.479	12-49	Number of pulses position command15	-30000~30000	0	291
P.500	02-00	Function selection of terminal 2-5	0: Non-function	1	120
			1: Frequency reference		
			2: Torque reference		
			3: PID target value		
			4: PID feedback signal		
			5: Target tension setting		
6: Line speed setting					

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.500	02-00	Function selection of terminal 2-5	7: Feedback line speed	1	120
			8: Real-time curling radius		
			9: Initial curling radius		
			10: Material thickness		
			11: PTC		
			12: PT100		
			13: VF detached function		
			14: Positive torque limit		
			15: Negative torque limit		
			16: Positive/Negative torque limit		
			17: Retrogradetorque limit		
P.501	02-01	Function of terminal 4-5	Same as 02-00	1	120
P.503	02-03	Function of terminal HDI	Same as 02-00	0	120
P.504	02-02	Function of terminal 3-5	Same as 02-00	0	120
P.505	02-23	The bias rate of 4-5 current/voltage signal	-100.0% ~ 100.0%	0.0%	130
P.507	02-32	The bias rate of 3-5 current/voltage signal	-100.0% ~ 100.0%	0.0%	132
P.508	02-30	The maximum operation frequency of terminal 3-5	50Hz system: 1.00 ~ 650.00Hz	50.00Hz	132
			60Hz system: 1.00 ~ 650.00Hz	60.00Hz	
P.510	02-18	The percentage corresponding to the minimum negative voltage of terminal 2-5	-100.0 ~ 100.0%	0.0%	124
			400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.511	02-19	The percentage corresponding to the maximum negative voltage of terminal 2-5	-100.0 ~ 100.0%	0.0%	124
			400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.512	02-16	The minimum input negative voltage of 2-5	0 ~ 10.00V	0.00V	124
P.513	02-17	The maximum input negative voltage of 2-5	0 ~ 10.00V	0.00V	124
P.522	02-41	The percentage corresponding to HDI input minimum frequency	-100.0% ~ 100.0%	0.0%	133
			400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.523	02-42	The percentage corresponding to HDI input maximum frequency	-100.0% ~ 100.0%	100.0%	133
			400.0% ~ 400.0% (P.500 = 2/14/15/16/17)		
P.524	02-39	HDI input minimum frequency	0 ~ 100.00kHz	0.00kHz	133
P.525	02-40	HDI input maximum frequency	0 ~ 100.00kHz	100.00kHz	133
P.526	02-38	HDI filter time	0 ~ 2000ms	10ms	133

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.527	02-31	3-5 filter time	0 ~ 2000ms	30ms	132
P.528	02-22	4-5 filter time	0 ~ 2000ms	30ms	130
P.531		3-5 signal selection	0: The valid range of signal sampling is 4 ~ 20mA 1: The valid range of signal sampling is 0 ~ 10V 2: The valid range of signal sampling is 为 0 ~ 5V	1	132
P.533	06-15	The process mode of PTC alarm	0: Alarm and continue to run 1: Alarm and decelerate to stop 2: Alarm and stop freely 3: No alarm	0	192
P.534	06-16	The percentage of PTC level	0 ~ 100.0%	0.0%	192
P.535	02-50	AM2 output bias	0 ~ 5000	80	137
P.536	02-49	AM2 output gain	0 ~ 5000	3210	137
P.537	02-05	Function of terminal AM2 output	6: Steady level output, voltage or current output level is set by 02-53(P.539). 0~5, 7~13: Same as 02-04.	0	121
P.538	02-48	AM2 output signal selection	Same as 02-45	0	137
P.539	02-53	AM2 fixed output level	0 ~ 100.0%	0.0%	138
P.541	02-54	AM1/FM fixed output level	0 ~ 100.0%	0.0%	138
P.543	02-44	FM output function selection	0: Output frequency, the frequency display reference 02-51(P.55) is 100%. 1: Output current, the current monitoringreference02-52(P.56)is 100%. 2: Output DC bus voltage, the OV level is 100%. 3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%. 4: Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%. 5: Target frequency, the frequency display reference02-51 (P.55) is 100%. 6: Fixed voltage output, voltage output level is set by 02-54 (P.541). 7: Output voltage, the inverter rated voltage is100%. 8: Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6) 9: Output torque, two times motor rated torque is 100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)	0	135

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.543	02-44	FM output function selection	10: Output power, two times motor rated power is 100%.	0	135
			11: The high-speed pulse, 100.00KHz is 100%.		
			12: Motor speed, to display the level of 02-51 (P.55) is 100%.		
P.545	02-33	3-5 disconnection selection	0: No disconnection selection.	0	132
			1: Decelerate to 0Hz,the digital output terminal will set off the alarm.		
			2: The inverter will stop immediately, and the panel will display the "AEr" alarm.		
			3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm.		
P.546	02-36	The percentage corresponding to the minimum input current/ voltage of terminal 3-5	-100.0% ~ 100.0%	0.0%	132
			-400.0% ~ 400.0% (P.504 = 2/14/15/16/17)		
P.547	02-37	The percentage corresponding to the maximum input current/ voltage of terminal 3-5	-100.0% ~ 100.0%	100.0%	132
			-400.0% ~ 400.0% (P.504 = 2/14/15/16/17)		
P.548	02-34	The minimum input current/ voltage of terminal 3-5	0 ~ 10.00V	0.00V	132
P.549	02-35	The maximum input current/ voltage of terminal 3-5	0 ~ 10.00V	10.00V	132
P.550	03-09	HDI terminal function	Same as 03-00	57	147
P.551	03-25	Expanded digital input terminal M10(Slot3)	Same as 03-00	99999	157
P.552	03-26	Expanded digital input terminal M11(Slot3)	Same as 03-00	99999	157
P.553	03-27	Expanded digital input terminal M12(Slot3)	Same as 03-00	99999	157
P.554	03-28	Expanded digital input terminal M13(Slot3)	Same as 03-00	99999	157
P.555	03-29	Expanded digital input terminal M14(Slot3)	Same as 03-00	99999	157
P.556	03-30	Expanded digital input terminal M15(Slot3)	Same as 03-00	99999	157
P.559	03-33	Expanded digital input terminal M10(Slot2)	Same as 03-00	99999	157
P.560	03-34	Expanded digital input terminal M11(Slot2)	Same as 03-00	99999	157

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.561	03-35	Expanded digital input terminal M12(Slot2)	Same as 03-00	99999	157
P.562	03-36	Expanded digital input terminal M13(Slot2)	Same as 03-00	99999	157
P.563	03-37	Expanded digital input terminal M14(Slot2)	Same as 03-00	99999	157
P.564	03-38	Expanded digital input terminal M15(Slot2)	Same as 03-00	99999	157
P.567	03-41	Expanded digital input terminal negative/ positive logic (Slot2&3)	0 ~ 65535	0	158
P.568	03-42	Expanded digital output terminal A10(Slot3)	Same as 03-10	99999	158
P.569	03-43	Expanded digital output terminal A11(Slot3)	Same as 03-10	99999	158
P.570	03-44	Expanded digital output terminal A12(Slot3)	Same as 03-10	99999	158
P.571	03-45	Expanded digital output terminal A13(Slot3)	Same as 03-10	99999	158
P.572	03-46	Expanded digital output terminal A14(Slot3)	Same as 03-10	99999	158
P.573	03-47	Expanded digital output terminal A15(Slot3)	Same as 03-10	99999	158
P.574	03-48	Expanded digital output terminal A16(Slot3)	Same as 03-10	99999	158
P.575	03-49	Expanded digital output terminal A17(Slot3)	Same as 03-10	99999	158
P.576	03-50	Expanded digital output terminal A10(Slot2)	Same as 03-10	99999	159
P.577	03-51	Expanded digital output terminal A11(Slot2)	Same as 03-10	99999	159
P.578	03-52	Expanded digital output terminal A12(Slot2)	Same as 03-10	99999	159
P.579	03-53	Expanded digital output terminal A13(Slot2)	Same as 03-10	99999	159
P.580	03-54	Expanded digital output terminal A14(Slot2)	Same as 03-10	99999	159
P.581	03-55	Expanded digital output terminal A15(Slot2)	Same as 03-10	99999	159
P.582	03-56	Expanded digital output terminal A16(Slot2)	Same as 03-10	99999	159
P.583	03-57	Expanded digital output terminal A17(Slot2)	Same as 03-10	99999	159

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.584	03-58	Expanded digital output terminal negative/positive logic (Slot2)	0 ~ 255	0	159
P.585	03-59	Monitor noumenon digital input terminal state	Read	Read	160
P.586	03-60	Monitor noumenon and expanded Slot3 output terminal state	Read	Read	160
P.587	03-61	Monitor expanded Slot2&3 digital input terminal state	Read	Read	160
P.588	03-62	Monitor expanded Slot2 digital output terminal state	Read	Read	160
P.592	02-55	PT100 voltage level 1	0 ~ 10.00V	5.00V	138
P.593	02-56	PT100 voltage level 2	0 ~ 10.00V	7.00V	138
P.594	02-57	PT100 level 1 starting frequency	0 ~ 650.00Hz	0.00Hz	138
P.595	02-58	Starting PT100 level1 delay time	0 ~ 6000s	60s	138
P.600	14-00	The tension control selection	0: The tension control is invalid	0	299
			1: Open-loop torque control mode(in the mode of close-loop vector control)		
			2: Close-loop speed control mode		
			3: Close-loop torque control mode (in the mode of close-loop vector control)		
			4: Constant line speed control mode.		
P.601	14-01	The curling mode	0: Wind-up	0	299
			1: Roll-down		
P.602	14-02	Selection of inverse take-up during roll-down	0: Active inverse material take-up is not allowed during startup.	0	299
			1: Active inverse material take-up is allowed.		
P.603	14-03	Mechanical transmission ratio	0 ~ 300.00	1.00	299
P.604	14-04	Tension setting source	0: The parameter 14-05(P.605) setting.	0	300
			1: The analog value or PULSE input setting.		
			2: Communication setting.		
P.605	14-05	Tension setting	0 ~ 30000N	0N	300
P.606	14-06	Maximum tension	0 ~ 30000N	0N	300
P.607	14-07	Zero-speed tension increase	0 ~ 50.0%	0.0%	300
P.608	14-08	Zero-speed threshold	0 ~ 30.00Hz	0.00Hz	300
P.609	14-09	Tension taper	0 ~ 100.0%	0.0%	300
P.610	14-11	Curling radius calculation method selection	0: Calculation through line speed.	0	301

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.610	14-11	Curling radius calculation method selection	1: Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.	0	301
			2: Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal HDI.		
			3: Analog value or pulse input.		
P.611	14-13	Maximum curling radius	1 ~ 10000mm	500mm	302
P.612	14-14	Winding shaft diameter	0 ~ 10000mm	100mm	302
P.613	14-15	Initial curling radius source	0: Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616).	0	302
			1: Initial curling radius is set by the analog value.		
P.614	14-16	Initial curling radius1	1 ~ 10000mm	100mm	302
P.615	14-17	Initial curling radius 2	1 ~ 10000mm	100mm	302
P.616	14-18	Initial curling radius 3	1 ~ 10000mm	100mm	302
P.617	14-19	Curling radius filtering time	0 ~ 1000ms	0ms	302
P.618	14-20	Current value of curling radius	0 ~ 10000mm	0mm	302
P.619	14-21	Number of pulses each turn	1 ~ 60000	1	302
P.620	14-22	Number of turns each layer	1 ~ 10000	1	302
P.621	14-23	Material thickness setting source	0: The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625).	0	302
			1: The material thickness is set by the analog value.		
P.622	14-24	Material thickness0	0.01 ~ 100.00mm	0.01mm	302
P.623	14-25	Material thickness1	0.01 ~ 100.00mm	0.01mm	302
P.624	14-26	Material thickness2	0.01 ~ 100.00mm	0.01mm	302
P.625	14-27	Material thickness3	0.01 ~ 100.00mm	0.01mm	302
P.626	14-28	Maximum thickness	0.01 ~ 100.00mm	1.00mm	302
P.627	14-29	Line speed inputsource	0: No line speed input.	0	304
			1: The analog value or pulse input		
			2: The communication setting.		
P.628	14-30	Maximum line speed	0.1 ~ 6500.0m/min	1000.0 m/min	304
P.629	14-31	Minimum line speed for calculation R.	0.1 ~ 6500.0m/min	200.0 m/min	304
P.630	14-32	Actual line speed	0 ~ 6500.0m/min	0.0m/min	304
P.631	05-18	Inertia self-learning setting T1	0 ~ 05-19 (P.632)%	30.0%	178
P.632	05-19	Inertia self-learning setting T2	05-18(P.631) ~ 100.0%	60.0%	178
P.633	14-33	Mechanical inertia compensation coefficient	0 ~ 65535	0	305

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.634	14-34	Material density	0 ~ 60000kg/m ³	0kg/m ³	305
P.635	14-35	Material width	0 ~ 60000mm	0mm	305
P.636	14-36	Fiction compensation coefficient	0 ~ 50.0%	0.0%	305
P.637	14-37	Material supply interrupt auto detection function	0: Material supply interrupt auto detection is inactive.	0	306
			1: Material supply interrupt auto detection function1		
			2: Material supply interrupt auto detection function 2		
			3: Material supply interrupt auto detection function 3		
P.638	14-38	Auto detection minimum line speed	0.1 ~ 6500.0m/min	200.0 m/min	306
P.639	14-39	Auto detection errorrange	0.1 ~ 100.0%	10.0%	306
P.640	14-40	Auto detection judgment delay	0.1 ~ 60.0s	2.0s	306
P.641	08-20	PID proportion Gain P2	0.1% ~ 1000.0%	20.0%	232
P.642	08-21	Integral time I2	0 ~ 60.00s	1.00s	232
P.643	08-22	Differential time D2	0 ~ 10000ms	0ms	232
P.644	08-23	Auto adjustment for PID parameters	0: PID parameters 1 are active.	0	232
			1: Adjust according to the curling radius.		
			2: Adjust according to the operation frequency		
			3: Adjust according to the operation frequency		
P.645	14-41	Pre-drive speed gain	-50.0% ~ 50.0%	0.0%	307
P.646	14-42	Pre-drive torque increase	-50.0% ~ 50.0%	0.0%	307
P.647	14-43	Pre-drive torque delay time	0 ~ 65535ms	0ms	307
P.650	14-12	Curling radius memory control when calculation through thickness accumulation	0: It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.	0	301
			1: It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate.		
P.654	14-10	Taper compensation correction	0 ~ 10000mm	0mm	300
P.656	14-44	Line speed setting source	0: The line speed setting is invalid.	0	309
			1: The line speed is obtained by analog value or pulse input.		
			2: The line speed is obtained by communication mode.		
P.657	14-45	Line speed setting	0 ~ 6500.0m/min	0.0m/min	309
P.658	14-46	Tension closed-loop limite amplitude of benchmark	0:amplitude limitingis based on the motor rated power	0	309
P.659	14-47	Tension in closed-loop limite amplitude of the bias	1:amplitude limitingis based on system real-time line speed	0.0%	309
			0.0% ~ 100.0%		
P.700	10-40	VF separated voltage source	0: Given by digital 10-41(P.701).	0	266
			1: Given by analog or HDI pulse.		

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.701	10-41	VF separated voltage digital	0 ~ 440.00V/0~220.00V	According to voltage	266
P.702	10-42	VF separated voltage Acc time	0 ~ 1000.0s	0.0s	266
P.703	10-43	VFseparated voltage Dec time	0 ~ 1000.0s	0.0s	266
P.704	10-44	VF separated Stop selection	0: Frequency/voltage independentlydecreases to 0.	0	266
			1: After the voltage decreases to 0, frequency decreases.		
P.705	06-21	Low voltage level	155 ~ 220V: 220V inverter type	155V	195
			310 ~ 440V: 440V inverter type	310V	
P.706	06-22	Regenerative brake operation level	205 ~ 400V: 220V inverter type	360V	195
			410 ~ 800V: 440V inverter type	720V	
P.707	06-23	Voltage stall level	205 ~ 400V: 220V inverter type	380V	195
			410 ~ 800V: 440V inverter type	760V	
P.708	06-24	Capacitor lifetime detection	0: No capacitor lifetime detection.	0	196
			1: When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit.		
P.709	06-25	Capacitor lifetime detection level	0 ~ 100.0%	100.0%	196
P.710	06-26	Capacitor lifetime detection result	0: No abnormal signal.	Read	196
			1: Electrolytic capacitor abnormal.		
P.711	08-24	PID target signal filter time	0 ~ 650.00s	0.00s	233
P.712	08-25	PID feedback signal filter time	0 ~ 60.00s	0.00s	233
P.713	08-26	PIDoutput signal filter time	0 ~ 60.00s	0.00s	233
P.714	08-27	PID deviation control limit	0 ~ 100.00%	0.00%	233
P.715	08-28	Integral separated property	0: Integral not separated	0	234
			1: Integral separated		
P.716	08-29	Integral separated point	0 ~ 100.00%	50.00%	234
P.717	08-30	PID differential limit	0 ~ 100.00%	0.10%	234
P.718	08-31	PID output in forward directiondeviation limit	0 ~ 100.00%	100.00%	234
P.719	08-32	PID output in reverse direction deviation limit	0 ~ 100.00%	100.00%	234
P.720	08-33	PID parameter switchover operation selection	0: No PID parameter switchover.	0	235
			1: PID parameter switchover based ondeviation.		
P.721	08-34	PID parameter switchover deviation lower limit	0 ~ 100.00%	20.00%	235
P.722	08-35	PID parameter switchover deviation upper limit	0 ~ 100.00%	80.00%	235

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.723	08-36	PID wire-break operation selection1	0: When PID wire-break, select to no need to operate to the upper limit value.	1	235
			1: When PID wire-break, select to need to operate to the upper limit value.		
P.726	08-39	PID operation at stop	0: No PID operation at stop.	0	235
			1: PID Stop operation		
P.727	08-40	PID enable reverse run operation	0: PID reverse run is not allowed.	0	236
			1: PID reverse run is allowed.		
P.728	08-41	PID in reverse direction integral limit	0 ~ 100.0%	0.0%	236
P.729	08-42	PID minimum output frequency	0 ~ 10.00Hz	0.00Hz	236
P.740	06-44	E1	Read	Read	199
P.741	06-45	E2	Read	Read	199
P.742	06-46	E3	Read	Read	199
P.743	06-47	E4	Read	Read	199
P.744	06-48	E5	Read	Read	199
P.745	06-49	E6	Read	Read	199
P.746	06-50	E7	Read	Read	199
P.747	06-51	E8	Read	Read	199
P.748	06-52	E9	Read	Read	199
P.749	06-53	E10	Read	Read	199
P.750	06-54	E11	Read	Read	199
P.751	06-55	E12	Read	Read	199
P.752	06-56	E1 alarm output frequency	Read	Read	200
P.753	06-57	E1 alarm output current	Read	Read	200
P.754	06-58	E1 alarm output voltage	Read	Read	200
P.755	06-59	E1 alarm the temperature rising accumulation rate	Read	Read	200
P.756	06-60	E1 alarm PN voltage	Read	Read	200
P.757	06-61	E1 alarm the time of the inverter has run	Read	Read	200
P.758	06-62	E1 alarm the inverter operation status code	Read	Read	200
P.759	06-63	E1 alarm(years/months)	Read	Read	200
P.760	06-64	E1 alarm (days/hours)	Read	Read	200
P.761	06-65	E1 alarm(minutes/seconds)	Read	Read	200
P.766	06-70	E2 alarm output frequency	Read	Read	201
P.767	06-71	E2 alarm output current	Read	Read	201
P.768	06-72	E2 alarm output voltage	Read	Read	201
P.769	06-73	E2 alarm the temperature rising accumulation rate	Read	Read	201

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.770	06-74	E2 alarm PN voltage	Read	Read	201
P.771	06-75	E2 alarm the time of inverter has run	Read	Read	201
P.772	06-76	E2 alarm the inverter operation status code	Read	Read	201
P.773	06-77	E2 alarm (years/months)	Read	Read	201
P.774	06-78	E2 alarm (days/hours)	Read	Read	201
P.775	06-79	E2 alarm(minutes/seconds)	Read	Read	201
P.780	10-55	PLC Action choice	0:PLCFunction invalid	0	270
			1:PLCFunction effective,PLC RUN signal from the external terminal input signal or 10-56 (P.781)。		
			2 : PLCFunction effective,PLC RUNsignal from the external terminal input signal		
P.781	10-56	PLC Run	0: No effect		270
			1: PLC RUN		
P.782	10-57	PLC erase	0: invalid		270
			1: Erase the PLC program, after the success of the erasure parameter value is 0		
P.783	10-58	PLC Monitor choosing component	0~326	0	270
P.784	10-59	PLCComponent monitoring value	Read	Read	270
P.800	07-15	CANopen slave address	0 ~ 127	0	223
P.801	07-16	CANopen speed	0: 1Mbps	0	223
			1: 500Kbps		
			2: 250Kbps		
			3: 125Kbps		
			4: 100Kbps		
			5: 50 Kbps		
P.802	07-17	CANopen communication status	0: Node reset state	0	223
			1: Com reset state		
			2: Boot up state		
			3: Pre operation state		
			4: Operation state		
			5: Stop state		
P.803	07-18	CANopen control status	0: Not ready for use state	0	223
			1: Inhibit start state		
			2: Ready to switch on state		
			3: Switched on state		
			4: Enable operation state		
			7: Quick stop active state		
			13: Err reaction activation state		
			14: Error state		

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.810	07-25	PUCommunication protocol selection	0 : Modbus protocol	1	205
			1 : shilin protocol		
			2 : PLC protocol (Effective when using the shilin built-in PLC)		
P.811	07-26	PUconverter stations	0 ~ 254	0	205
P.812	07-27	PUSerial communication baud rate	0 : Baud rate 4800bps	1	206
			1 : Baud rate 9600bps		
			2 : Baud rate 19200bps		
			3 : Baud rate 38400bps		
			4 : Baud rate 57600bps		
5 : Baud rate 115200bps					
P.813	07-28	PU data length	0 : 8bit	0	206
			1 : 7bit		
P.814	07-29	PU stop bit	0 : 1bit	0	206
			1 : 2bit		
P.815	07-30	PU Parity check option	0 : no odd-even check	0	206
			1 : odd check		
			2 : even check		
P.816	07-31	PU CR/LFchoose	1 : only CR	1	206
			2 : CR,LF Both		
P.817	07-32	PU Modbus communication format	0 : 1, 7, N, 2 (Modbus, ASCII)	4	206
			1 : 1, 7, E, 1 (Modbus, ASCII)		
			2 : 1, 7, O, 1 (Modbus, ASCII)		
			3 : 1, 8, N, 2 (Modbus, RTU)		
			4 : 1, 8, E, 1 (Modbus, RTU)		
5 : 1, 8, O, 1 (Modbus, RTU)					
P.818	07-33	PU Communication exception permit number	0 ~ 10	1	206
P.819	07-34	PU Communication between permissible time	0 ~ 999.8s : To set data communication timeout inspection	99999	206
			99999 : No time out inspection		
P.820	07-35	PUCommunication error handling	0 : Alarm and stop idling	1	206
			1 : no alarm and keep on running		
P.826	07-41	Outside enlarge communication cartoon - exception permit number	0 ~ 10	1	206
P.827	07-42	Outside enlarge communication cartoon - error handling	0 : Alarm and stop idling	1	206
			1 : no alarm and keep on running		
P.828	07-43	Outside enlarge communication cartoon dispatch interval allowable time	0 ~ 999.8s : set data communication timeout inspection	99999	206
			99999 : No timeout inspection		
P.829	07-44	EP301 Communication expansion card version number	read	read	224

Parameter Number	Group	Name	Setting Range	Factory Value	Page	
P.830	07-45	IP allocation	0 : calm IP	0	224	
			1 : move IP			
P.831	07-46	IP Add 1	0~255	192	224	
P.832	07-47	IP Add 2	0~255	168	224	
P.833	07-48	IP Add 3	0~255	2	224	
P.834	07-49	IP Add 4	0~255	102	224	
P.835	07-50	Subnet mask 1	0~255	255	224	
P.836	07-51	Subnet mask 2	0~255	255	224	
P.837	07-52	Subnet mask 3	0~255	255	224	
P.838	07-53	Subnet mask 4	0~255	0	224	
P.839	07-54	default gateway 1	0~255	192	224	
P.840	07-55	default gateway 2	0~255	168	224	
P.841	07-56	default gateway 3	0~255	2	224	
P.842	07-57	default gateway 4	0~255	100	224	
P.900	15-00	User registered parameter1	P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99	99999	311	
P.901	15-01	User registered parameter2		99999	311	
P.902	15-02	User registered parameter3		99999	311	
P.903	15-03	User registered parameter4		99999	311	
P.904	15-04	User registered parameter5		99999	311	
P.905	15-05	User registered parameter6		99999	311	
P.906	15-06	User registered parameter7		99999	311	
P.907	15-07	User registered parameter8		99999	311	
P.908	15-08	User registered parameter9		99999	311	
P.909	15-09	User registered parameter10		99999	311	
P.910	15-10	User registered parameter11		99999	311	
P.911	15-11	User registered parameter12		P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99	99999	311
P.912	15-12	User registered parameter13			99999	311
P.913	15-13	User registered parameter14			99999	311
P.914	15-14	User registered parameter15			99999	311
P.915	15-15	User registered parameter16			99999	311
P.916	15-16	User registered parameter17			99999	311
P.917	15-17	User registered parameter18			99999	311
P.918	15-18	User registered parameter19			99999	311
P.919	15-19	User registered parameter20			99999	312

Appendix 1 Parameter table

Parameter Number	Group	Name	Setting Range	Factory Value	Page
P.990	00-25	Parameter mode setting	0: Parameter is displayed as "group mode"	1	96
			1: Parameter is displayed as "conventional P mode"		
P.996 ~ P.999	00-02	Parameter restoration	0: Non-function	0	83
			1: Alarm history clear (P.996=1)		
			2: Inverter reset (P.997=1)		
			3: Restoring all parameters to default values (P.998=1)		
			4: Restoring some parameters to default values1 (P.999=1)		
			5: Restoring some parameters to default values2 (P.999=2)		
6: Restoring some parameters to default values3 (P.999=3)					

7.2 Appendix 2 Alarm code list

Code	Screen display	Cause	Troubleshooting
ERROR	<i>Error</i>	<ol style="list-style-type: none"> Under-voltage for power supply The reset function "RES" is on Bad connection between the parameter unit and main machine Internal circuit malfunction Wrong CPU operation 	<ol style="list-style-type: none"> Provide a normal power supply Shut off "RES" Ensure firm connection between the parameter unit and the main machine Replace the inverter. Restart the inverter
OC0 Over-current when stop	<i>OC0</i>	The output current is two times larger than the rated current of the inverter.	Please restart the inverter. If the alarm repeated, please send the inverter back to the factory.
OC1 Over-current during acceleration	<i>OC1</i>		<ol style="list-style-type: none"> In case the time for acceleration or deceleration is too short, extend it as necessary. Avoid abrupt increase of load. Check Terminals U/T1, V/T2 and W/T3 for short circuit.
OC2 Over-current at constant speed	<i>OC2</i>		
OC3 Over-current during deceleration	<i>OC3</i>		
OV0 Over-voltage when stop	<i>OV0</i>	Over-voltage between Terminals P and N.	Check whether the power supply is normal or abnormal.
OV1 Over-voltage during acceleration	<i>OV1</i>		<ol style="list-style-type: none"> In case the time for acceleration or deceleration is too short, extend it as necessary. Check the brake resistor between Terminals +/P and PR for loose connection. Check whether the values of 06-05(P.30) and 06-06(P.70) are correct or not.
OV2 Over-voltage at constant speed	<i>OV2</i>		
OV3 Over-voltage during deceleration	<i>OV3</i>		

Appendix 2 Alarm code list

Code	Screen display	Cause	Troubleshooting
THT Overheated IGBT module	THT	IGBT module thermal accumulation relay operation	Avoid prolonged inverter operation when overloaded.
THN Overheated motor	THN	Electronic thermal relay operation	<ol style="list-style-type: none"> 1. Check whether the set value of 06-00(P.9) is correct or not (according to the externally connected motor). 2. Reduce load.
FAN Cooling fan alarm	FAN	Cooling fan failure	<ol style="list-style-type: none"> 1. The cooling fan is damaged. Please replace it with a new fan. 2. Please clean the fan if it is blocked by foreign substances. 3. Check if fans wiring is broken/loose, or replace it with a new fan.
OHT External thermal relay operation	OHT	External thermal relay operation	<ol style="list-style-type: none"> 1. Check whether the capacity of the external thermal relay and of the motor coordinates well. 2. Reduce the load.
OPT Abnormal peripheral devices	OPT	<ol style="list-style-type: none"> 1. Abnormal communication; Exceeding the number of communication retries 2. Interrupted communication; Exceeding the permitted communication time interval 	Correctly set the communication parameters.
PUE PUCommunication mouth peripheral anomalies	PUE		
CbE Outside enlarge communication mouth peripheral anomalies	CbE		
EEP Abnormal memory	EEP	ROM malfunction	Send the inverter back to the factory if this type of alarm happens frequently.
PID Abnormal PID	PID	<ol style="list-style-type: none"> 1. Insufficient inverter and motor capacity 2. PID target value or feedback value set unreasonably 3. Peripheral devices malfunction 	<ol style="list-style-type: none"> 1. Enlarge the inverter and motor capacity. 2. Check the feedback gain setup. Reset the target value according to the feedback. 3. Check the system's peripheral feedback devices (e.g., sensors, potentiometer) and whether the wiring is correct.
CPU Abnormal CPU	CPU	Serious peripheral electromagnetic interference	Reduce peripheral interference.
OLS Stall prevention and protection	OLS	Over-loaded motor	<ol style="list-style-type: none"> 1. Reduce motor load. 2. Increase 06-01(P.22) value.

Code	Screen display	Cause	Troubleshooting
SCP Short circuit over-current	SCP	Output-end short circuit	Check whether the inverter output has short circuit (e.g., the motor wiring).
NTC Overheated module	NTC	The temperature of the inverter IGBT module is too high.	
NTC2 Overheated module2	NTC2		
NTC3 Overheated module3	NTC3		
NTC4 Overheated module4	NTC4	The temperature of the converter IGBT module is too high.	<ol style="list-style-type: none"> 1. Reduce the environment temperature and improve the air condition. 2. Check whether the fan of the inverter is running normally.
NTC5 Overheated module5	NTC5		
NTC6 Overheated module6	NTC6		
NTC7 Overheated electrolytic capacitor	NTC7	The environment temperature of electrolytic capacitor is too high.	
NTC8 Overheated start resistor	NTC8	Rectifier side of the relay is not pull-in, which leads to the overheat of the start resistor.	Confirm whether the rectifier side of the relay is pull-in.
OL2 Abnormal over-torque	OL2	<ol style="list-style-type: none"> 1. Over-loaded motor 2. 06-08(P.155),06-09 (P.156) set unreasonably. 	<ol style="list-style-type: none"> 1. Reduce motor load. 2. Adjust the set value of 06-08(P.155), 06-09(P.156) properly.
BE Abnormal brake-resistor (Abnormal relay)	BE	Abnormal brake-resistor (Abnormal relay)	Return it to the factory for repair.
IPF Abnormal power supply input	IPF	Abnormal power supply input	Check whether power supply input is normal.

Code	Screen display	Cause	Troubleshooting
CPR Abnormal CPU	C P r	Abnormal CPU procedures	<ol style="list-style-type: none"> 1. Check the wiring. 2. Check the parameter setup. 3. Reduce peripheral interference.
AEr Abnormal 4-5/3-5 terminal	A E r	Abnormal disconnection of 4-5/3-5 terminal's analog output	Please refer to the description for 02-24(P.184)/02-33(P.545).
PG0 PG cartoon - error	P G 0	PG Abnormal communication	<ol style="list-style-type: none"> 1. Check the PG card connection with encoder 2. Confirm whether the encoder can work normally
PG1 Abnormal encoder model	P G 1	Abnormal encoder model	Check the set value of 09-02(P.351).
PG2 Abnormal PG card feedback signals	P G 2	Abnormal PG card feedback signals	Please refer to the feedback control parameter description for 09-01~09-05 / P.350~P.354.
PG3 Too large speed deviation under closed-loop control	P G 3	Too large speed deviation under closed-loop control	Please refer to the feedback control parameter description for 09-01~09-05/P.350~P.354.
PTC Overheated motor	P T C	Overheated motor	<ol style="list-style-type: none"> 1. Reduce motor load 2. Amend 06-16(P.534)
BEB Material line breaking	b E b	Material line breaking	Detect whether the material feedback signal line is broken.
DV1 Z pulse fault	d v 1	<ol style="list-style-type: none"> 1. PG encoder is not connected, not wired properly 2. Encoder is damaged 	Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV2 Z pulse noise detection	d v 2	<ol style="list-style-type: none"> 1. PG cable is not wired properly. Noise interference along the PG cable. 2. PG option card or encoder is damaged 	<ol style="list-style-type: none"> 1. Separate the PG cable lines from the source of the noise. 2. Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV3 Inversion detection	d v 3	<ol style="list-style-type: none"> 1. Z pulse position default. 2. 09-02(P.351) setting default 3. PG cable is not wired properly. Noise interference along the PG cable. 	<ol style="list-style-type: none"> 1. Start auto-tuning on Z pulse. 2. Set 09-02(P.351) correctly. 3. Make sure the PG encoder is properly connected and all shielded lines are properly grounded.
DV4 Inversion prevention detection	d v 4		

Code	Screen display	Cause	Troubleshooting
rAE Relay operation abnormal		Relay on the main circuit is abnormal.	Return it to the factory for repair.
GF		Output ground fault	Please check whether motor ground short circuit is normal or not.
SAF Safety circuit abnormal		Safety circuit is disconnected.	<ol style="list-style-type: none"> 1. Please check whether the short circuit jump piece between S1-SC is firmly connected; 2. When using the safety stop function, please check safety relay unit and the wire connection.
LF		Three- phase output abnormal	Please check whether UVWthree-phase output normal or not.
HDC Hardware detection error		Error in hardware detection	Return it to the factory for repair.
ADE Three-phase current sampling abnormal		Error in three-phase current sampling circuit.	Return it to the factory for repair.
EbE1 Expansion cardSLOT1 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.
EbE2 Expansion cardSLOT2 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.
EbE3 Expansion cardSLOT3 abnormal		Inverter automatically detects the first results are not consistent with the result next time	Check the connection of the expansion card.

7.3 Appendix 3 Troubles and solutions

Troubles	Check points	
Motionless motor	Main circuit	<ul style="list-style-type: none"> •Check whether the power supply voltage between Terminals R/L1, S/L2 and T/L3 is normal. •Check whether the Power light is on. •Check whether the wiring between the inverter and the motor is correct.
	Load	<ul style="list-style-type: none"> •Check whether the load is too heavy. •Check whether the motor rotor is locked.
	Parameters Setting	<ul style="list-style-type: none"> •Check whether the starting frequency (01-11(P.13)) is set too big. •Check whether the operation mode (00-16(P.79)) is correct. •Check whether the maximum frequency (01-00(P.1)) is zero. •Check whether the reverse rotation prevention (00-15(P.78)) is restricted. •Check whether the bias and gain (02-12~02-15, 02-25~02-28 / P.192~P.199) setting is correct. •Check that the frequency jump (01-16~01-21 / P.91~P.96) setting is correct.
	Control circuit	<ul style="list-style-type: none"> •Check whether the output stop signal "MRS" is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09(P.550)) •Check whether the "RES" function is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09(P.550)) •Check whether the external thermal relay is operating or not. •Check whether the reset has been performed or not after the set-off of the alarm (the ALARM light in on). •Check whether the voltage/current signals are correctly wired. •Check whether the functions of STF and STR are correct. (Related parameter 03-00~03-05/P.80~P.84, P.86, 03-06(P.126), 03-09(P.550)) •Check whether the wiring for the control circuit is disconnected or has a poor contact.
Reversed motor rotation	<ul style="list-style-type: none"> •Check whether the phase sequence of output terminals U/T1, V/T2 and W/T3 is correct. •Check whether the start signal (STF and STR) are connected correctly. 	
Failure to increase the rotation speed of the motor	<ul style="list-style-type: none"> •Check whether the load is too heavy. •Check whether the stall prevention level (06-01(P.22)) is correct. •Check whether the torque boost (01-10(P.0)) is set too high. •Check whether the maximum frequency (01-00(P.1)) is effective. 	
Unsmoothed acceleration / deceleration	<ul style="list-style-type: none"> •Check whether the acceleration / deceleration time (01-06(P.7), 01-07(P.8)) is correct. •Check whether the acceleration / deceleration curve selection (01-05(P.29)) is correct. •Check whether the voltage / current input signals are affected by noises. 	
Overlarge motor current	<ul style="list-style-type: none"> •Check whether the load is too heavy. •Check whether the capacity of the inverter and of the motor are well matched. •Check whether the torque boost (01-10(P.0)) is set too high. 	
Speed variation during the operation	<ul style="list-style-type: none"> •Check whether the voltage / current input signals are affected by noises. •Check whether the load varies. •Check whether the wiring length of the main circuit is too long. 	

7.4 Appendix 4 Optional equipment

7.4.1 Communication card

➤ PD301: Profibuscommunication card

Terminal form	Terminal name	Function name	Description
DB9	1	---	---
	2	---	---
	3	Rxd/Txd-P	Receive/transmit data-P
	4	CNTR-P 2)	Control-P
	5	DGND	Data ground
	6	VP 1)	Positive voltage
	7	---	---
	8	Rxd/Txd-N	Receive/transmit data-N
	9	---	---

1) The signal is only needed in bus cable endpoint station.

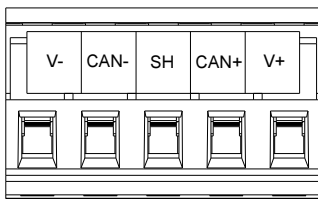
2) The signal is alternative.

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	PD301	PD301 card	LNKPD301

➤ DN301: Devicenet communication card

◆ Devicenet ports definition

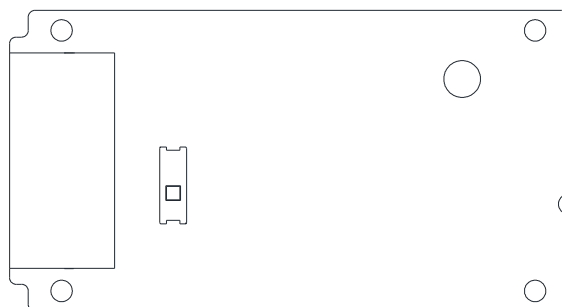


Terminal	Signal	Description
V+	V+	DC24V
CAN+	CAN+	Positive Signal wire
SH	SHIELD	Ground wire
CAN-	CAN-	Complex signal wire
V-	V-	0V

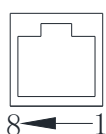
◆ Ordering code:

NO.	Type	Name	Ordering Code
1	DN301	DN301 card	LNKDN301

➤ CP301: Canopencommunication card



◆ RJ-45Pin Definition



Socket

Pin	Symbol	Description
1	CAN_H	CAN_Hbus line (dominant high)
2	CAN_L	CAN_L bus line (dominant low)
3	CAN_GND	Ground /0V/V-
7	CAN_GND	Ground /0V/V-

◆ Function and specification

Connector	RJ-45
Port	2 Port
Transmission	CAN
Transmission	Using CAN standard line
Transmission	1M 500k 250K/280KF 125k 100k 50k
Protocol	CANopen Protocol

◆ CANopen communication wiring

Type: LNKCBLxxT (xxstands for 01,03,05)

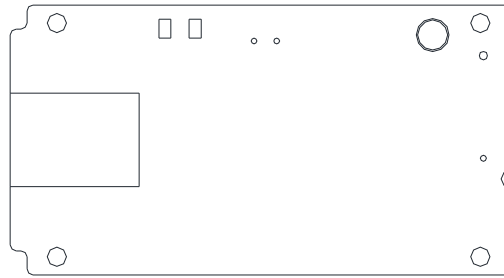


Item No.	Part No.	L(mm)
1	LNKSSCBL01T	1000
2	LNKSSCBL03T	3000
3	LNKSSCBL05T	5000

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	CP301	CP301 card	LNKCP301

➤ EP301 : Canopen communication card



◆ Electric specification



Terminal form	Terminal name	Function name	Description
RJ45	1	Tx+	transmit data +
	2	Tx-	transmit data -
	3	RX+	Receive data +
	4	---	---
	5	---	---
	6	RX-	Receive data -
	7	---	---
	8	---	---

◆ CANopen communication wiring

Type : LNKCBLxxT (xxstands for 01,03,05)



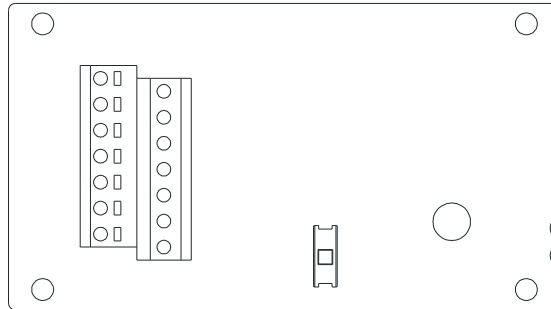
Item No.	Part No.	L(mm)
1	LNKSSCBL01T	1000
2	LNKSSCBL03T	3000
3	LNKSSCBL05T	5000

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	EP301	EP301 card	LNKEP301

7.4.2 I/Ocard

➤ EB362R

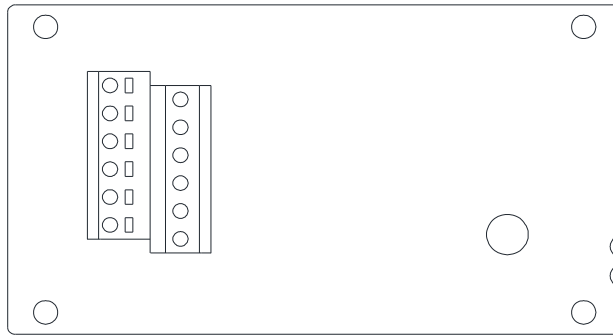


Terminal form	Terminal name	Function instructions	Terminal specification
Switch signal input	M10	There are totally 6 multi-function expanded control terminals. (Sink/Source can be switched)	Input impedance: 4.7 kΩ Action current: 5mA Voltage range: 10~28VDC Maximum frequency: 1kHz
	M11		
	M12		
	M13		
	M14		
	M15		
Relay output	A10, C10	Multi-function relay outputs 2 groups; A-C is the normally open contact	Maximum voltage: 30VDC or 250VAC Maximum current: Resistive load: 5A NO Inductive load: 2A NO (cosΦ=0.4)
	A11, C11		
Public terminal	SD	The common terminal of Terminal M10~M15(SINK).	---
	PC	The common terminal of Terminal M10~M15 (SOURCE).	Output voltage: 24VDC±20% Maximum current: 200mA(share with control board)

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	EB362R	EB362R card	LNKEB362R

➤ EB308R



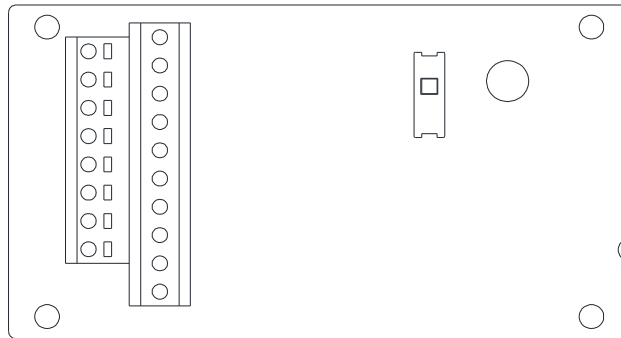
Terminal form	Terminal name	Function instructions	Terminal specification
Relay outputs	A10, C1	Multi-function relay outputs 8 groups; A-C is the normally open contact.	Maximum voltage: 30VDC or 250VAC Maximum current: Resistive load:5A NO Inductive load: 2A NO ($\cos\Phi=0.4$)
	A11, C1		
	A12, C2		
	A13, C2		
	A14, C3		
	A15, C3		
	A16, C4		
A17, C4			

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	EB308R	EB308R card	LNKEB308R

7.4.3 PGcard

➤ PG301C

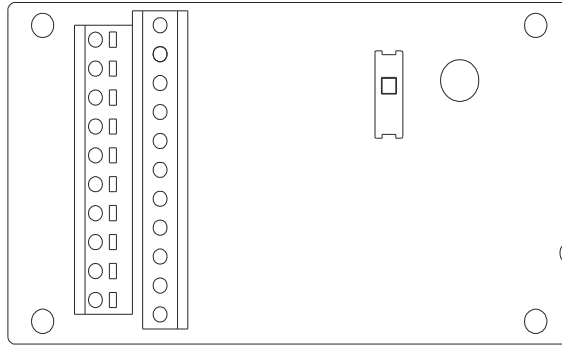


Terminal	Terminal Symbols	Function instruction	Terminal specification
Input	A1, B1, Z1	The input of the encoder signal supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	$\overline{\text{A1}}$, $\overline{\text{B1}}$, $\overline{\text{Z1}}$		
	A2, B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	$\overline{\text{A2}}$, $\overline{\text{B2}}$		
Output	A10	The open collector dividing frequency output is 1~255 times dividing frequency. The maximum output current is 50mA.	Maximum frequency: 500KP/Sec Maximum current: 50mA It can switch pull-up resistors under different voltages.
	B10		
	Z10		
	DCM		
Power	12V	12V Power	Voltage: $\pm 5\%$ Current: 200mA MAX
	5V	5V Power	
	DCM	Power grounding	

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	PG301C	PG301C card	LNKPG301C

➤ PG301L



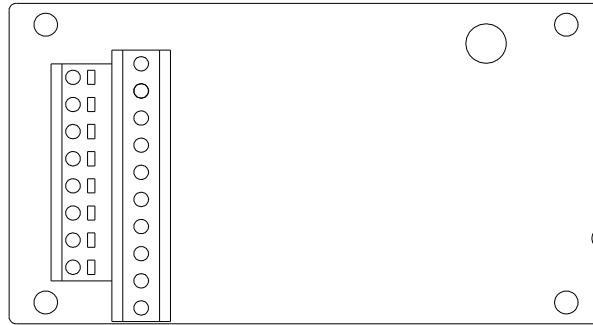
Terminal	Terminal Symbols	Function instruction	Terminal specification
Input	A1、B1、Z1	The input of the encoder signal supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	$\overline{A1}$ 、 $\overline{B1}$ 、 $\overline{Z1}$		
	A2、B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type.	Maximum frequency: 500KP/Sec
	$\overline{A2}$ 、 $\overline{B2}$		
Output	AO、BO、ZO	The line-drive dividing frequency output is 1 ~ 255 times dividing frequency.	Maximum output voltage: 5V Maximum current: 50mA Maximum frequency: 500KP/Sec
	\overline{AO} 、 \overline{BO} 、 \overline{ZO}		
Power	12V	12V Power	Voltage: $\pm 5\%$ Current: 200mA MAX
	5V	5V Power	
	DCM	Power grounding	

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	PG301L	PG301L card	LNKPG301L

Appendix 4 Optional equipment

➤ PG302L



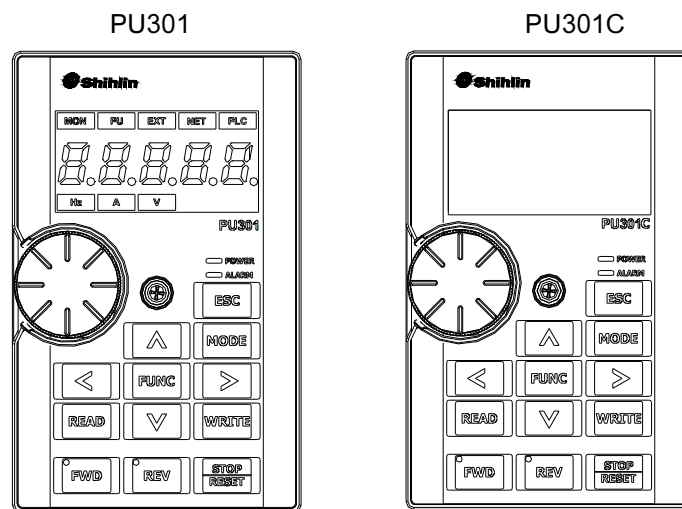
Terminal	Name	Function instruction	Terminal specification
Input	S1、S2	Resolver signal input	3.5±0.175Vrms , 10kHz
	$\overline{S3}$ 、 $\overline{S4}$		
	A2、B2	The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type, the maximum is 500K.	Maximum frequency: 500KP/Sec
$\overline{A2}$ 、 $\overline{B2}$			
Output	AO、BO、ZO	The line-drive dividing frequency output is 1 ~ 255 times dividing frequency.	Maximum output voltage: 5V Maximum current: 50mA Maximum frequency: 500KP/Sec
	\overline{AO} 、 \overline{BO} 、 \overline{ZO}		
Power	R1-R2	Resolver power output	7Vrms, 10KHz

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	PG302L	PG302L card	LNKPG302L

7.4.4 Parameter unit

- PU301, PU301C appearance

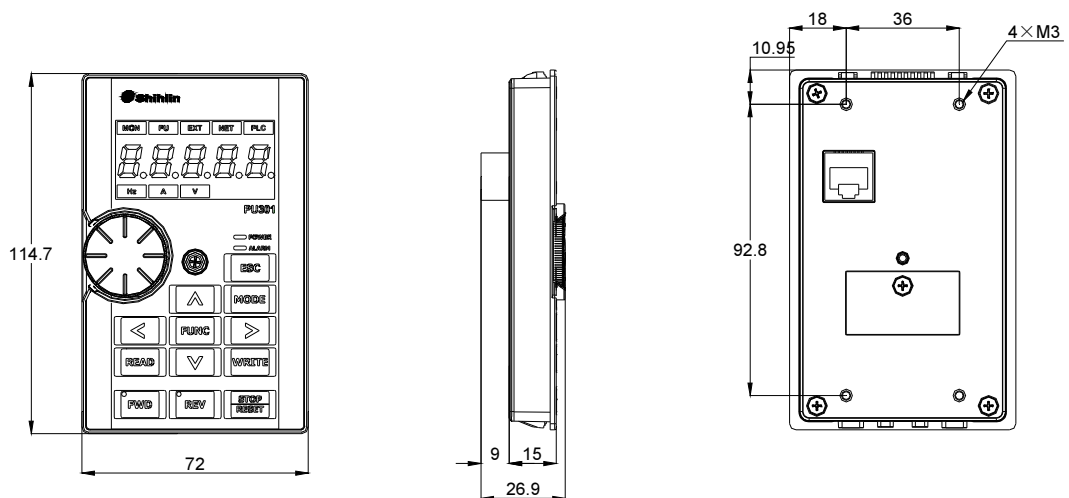


- ◆ Ordering code:

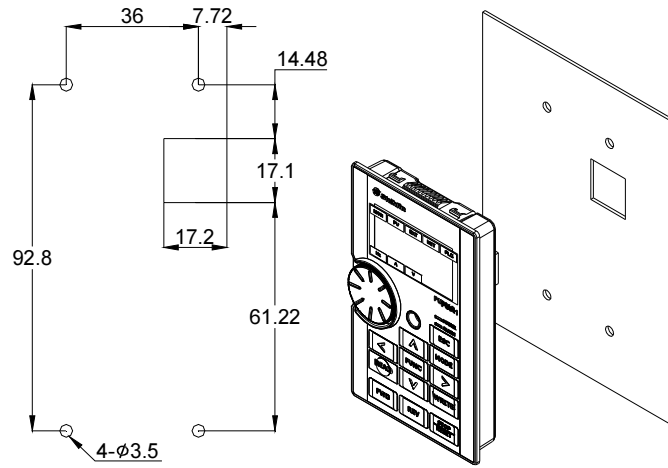
NO.	Type	Name	Ordering Code
1	PU301	LED parameter unit	LNKPU301
2	PU301C	LCDparameter unit	LNKPU301C

- ◆ Appearance and dimensions

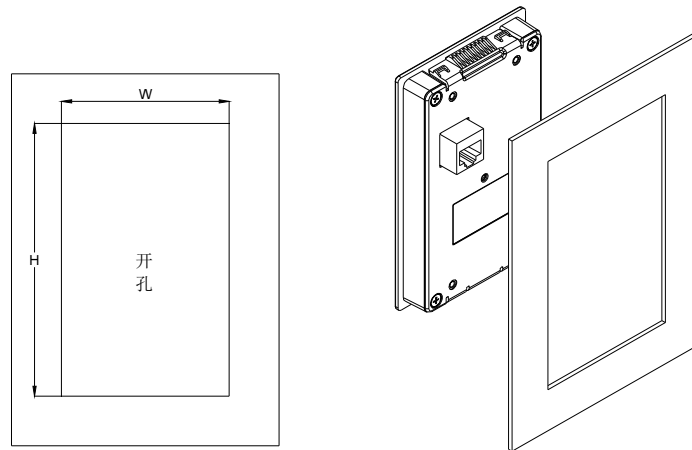
<Outline drawing>



- ◆ Panel mouting cutout dimension



◆ Snap mounting cutout dimension

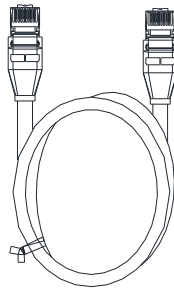


Panel thickness	1.2mm	1.6mm	2.0mm
W	66.4		
H	110.2	111.3	112.5

*Allowable error:±0.15mm

***If customer cutout accuracy cannot meet the allowable error, please purchase SMK301 (Snap Mounting Kit) for installation.**

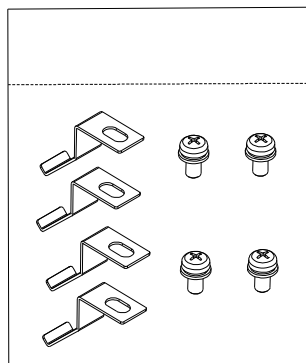
7.4.5 Data transmission line



◆ Ordering code:

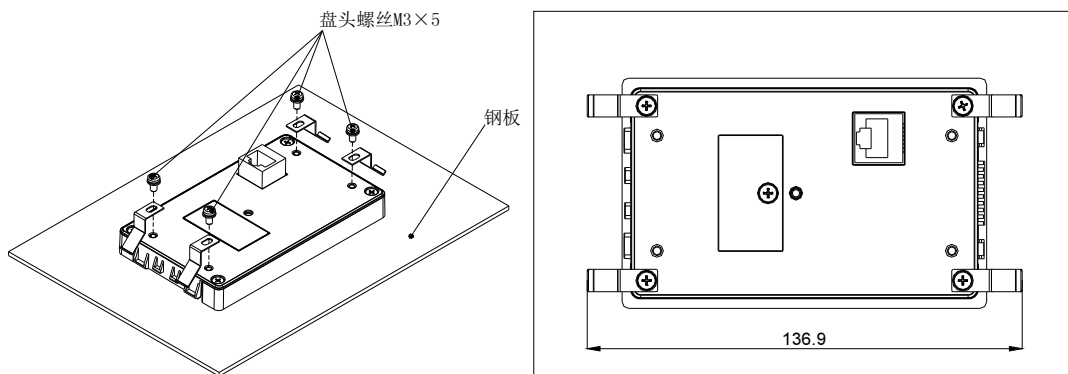
NO.	Type	Name	Ordering Code
1	SSCBL01T	The data transmission line (1 m)	LNKSSCBL01T
2	SSCBL03T	The data transmission line (3 m)	LNKSSCBL03T
3	SSCBL05T	The data transmission line (5 m)	LNKSSCBL05T

7.4.6 Snap mountingkit



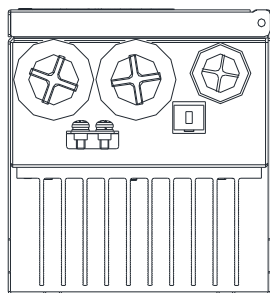
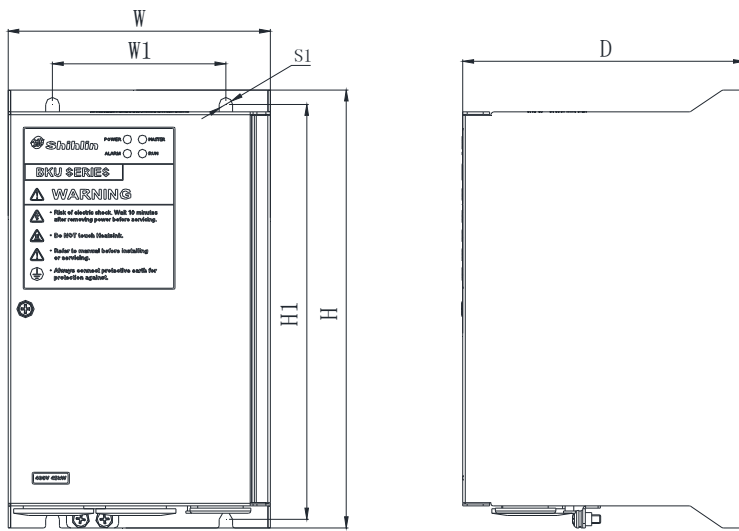
◆ Ordering code:

NO.	Type	Name	Ordering Code
1	SMK301	PU301, PU301Csnap mounting kit	LNKSMK301



7.4.7 BKU Brake unit

➤ BKU



Terminal		Name	Function instruction	Terminal specification	H1	D	S1
A	BKU-020-37K	121	80	200	189.5	130	6.4
	BKU-040-45K						
B	BKU-020-110K	233.5	193.5	343	329	190	6.4
	BKU-040-160K						

◆ Ordering code:

NO.	Type	Name	Ordering Code
1	BKU-020-37K	200V 37KW Brake unit	LNKBKU02037K
2	BKU-020-110K	200V 110KW Brake unit	LNKBKU020110K
3	BKU-040-45K	400V 45KW Brake unit	LNKBKU04045K
4	BKU-040-160K	400V 160KW Brake unit	LNKBKU040160K

7.5 Appendix 5 European Specification Compatibility Description

This inverter qualifies the CE label. Specifications:

Low Voltage Directive 2014/35/EU & Electromagnetic Compatibility Directive 2014/30/EU.

1. Electromagnetic compatibility command (EMC):

(1). EMC compatibility description:

For system integration, inverter is not a functionally independent device unit. It is usually a unit in the control box. It is combined with other devices to control a machine or equipment. Therefore, our company does not consider that all the EMC commands should be directly applied on the inverter. As a result, the CE label of this inverter is not extensible.

(2). Compatibility:

The inverter does not need to cover all the EMC commands. Yet, for certain machine equipment that needs to use EMC commands and the inverter, the machine has to be equipped with CE label. In addition, the company can provide the electromagnetic inspection data and operation manual that covers the required electromagnetic compatibility specifications for a quick and easy installation of the machine equipment of this inverter.

(3). Installation outline:

Please follow the following notes for installing the inverter:

*Use a noise filter qualifying the EU standard to coordinate with the inverter.

*The wire between the motor and the inverter has to be stored in shielded cable or metal tube. In addition, ground the motor terminal and the inverter terminal together. Please shorten the wire as much as possible.

*Please put this inverter in a metal cabinet that is already grounded. It can prevent radiation interference.

*The line-to-line noise filter at the power source terminal and the online magnetic iron core at the control row are used for suppressing noises.

All the signals and the EU-qualified filter specifications are described in details in the operation manual. Please contact your agent.

2. Low-voltage command (LVD):

(1). Low-voltage command compatibility description:

This inverter is compatible with low-voltage commands.

(2). Compatibility:

Our company qualifies the low-voltage command specification.

(3). Description:

*Do not rely on leakage protection only for preventing electric shocks. Grounding is required for the protection.

*Ground each inverter individually (do not connect more than two (including two) ground cables).

*Please use non-fuse switch and electromagnetic contactor that qualify EN or IEC specifications.

*Please use the inverter under an environment of over-voltage level-2 condition with contamination level 2 or better.

*For the style and dimensions of the input- and output-end of the inverter cable, please refer to the specifications listed in the operation manual.

EU-Declaration of Conformity

<i>Herewith we(manufacture):</i>	
Name:	Suzhou Shihlin Electric & Engineering Corporation
Address:	NO.88, Guangdong St., Suzhou New District, Jiangsu, China.

Declare that the following Appliance complies with the appropriate basic safety and health requirements of the EU Directives(see Item 4) and the relevant Union harmonisation legislation based on its design and type, as brought into circulation by us.

The object of the declaration is identification of electrical equipment allowing traceability.

The declaration relates exclusively to Shihlin products in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

This declaration of conformity is issued under the sole responsibility of the manufacture.

1	Product name:	Inverter
2	Model/Type:	SA3 Series (Reference the attached list of catalogue numbers)
3	Batch or Serial number:	Reference the attached list of catalogue numbers
4	Application EU Directives:	Low voltage Directive 2014/35/EU EMC directive 2014/30/EU
5	Used harmonized Standards:	LVD: EN61800-5-1:2007 EMC: EN61800-3:2004+A1:2012
6	Signed for and on behalf of:	Suzhou Shihlin Electric & Engineering Corporation
7	Print Name, Function(Title of Signature)	Alex Chen, Senior Vice President
8	Signature	
9	Place and date of issue	Suzhou of China, 2017. 11.22
<p>Manufacturer Statement:</p> <p>√ We shall give the manufacturer full name and address, registered trade name or registered trade mark, and true Batch/series no., "xxxx-xxxx" in the EU declaration and on the product(marking plate), or where that is not possible, on its packaging or in a document accompanying the product.</p> <p>√ We shall keep the technical documentation referred to in Annex III and the EU declaration of conformity for 10 years after the electrical equipment has been placed on the market.</p>		

Catalogue numbers:

Series name	Model name	Serial number ¹
SA3-043 Series	SA3-043-0.75K/1.5KF-xy, SA3-043-1.5K/2.2KF-xy, SA3-043-2.2K/3.7KF-xy, SA3-043-3.7K/5.5KF-xy, SA3-043-5.5K/7.5KF-xy, SA3-043-7.5K/11KF-xy, SA3-043-11K/15KF-xy, SA3-043-15K/18.5KF-xy, SA3-043-18.5K/22KF-xy, SA3-043-22K/30KF-xy, SA3-043-30K/37KF-xy, SA3-043-37K/45KF-xy, SA3-043-45K/55KF-xy, SA3-043-55K/75KF-xy, SA3-043-75K/90KF-xy, SA3-043-90K/110KF-xy, SA3-043-110K/132KF-xy, SA3-043-132K/160KF-xy, SA3-043-160K/185KF-xy, SA3-043-185K/220KF-xy, SA3-043-220K/250KF-xy, SA3-043-250K/280KF-xy, SA3-043-280K/315KF-xy, SA3-043-315K/355KF-xy	/
SA3-023 Series	SA3-023-0.75K/1.5KF-xy, SA3-023-1.5K/2.2KF-xy, SA3-023-2.2K/3.7KF-xy, SA3-023-3.7K/5.5KF-xy, SA3-023-5.5K/7.5KF-xy, SA3-023-7.5K/11KF-xy, SA3-023-11K/15KF-xy, SA3-023-15K/18.5KF-xy, SA3-023-18.5K/22KF-xy, SA3-023-22K/30KF-xy, SA3-023-30K/37KF-xy, SA3-023-37K/45KF-xy, SA3-023-45K/55KF-xy, SA3-023-55K/75KF-xy, SA3-023-75K/90KF-xy, SA3-023-90K/110KF-xy, SA3-023-110K/132KF-xy	/

- 1) If no series number is given, then all series are covered
2) xy: denote any alphanumeric suffix

8. REVISION RECORD

Published Date	Edition of the Manual	Revision Content
2015.04	V1.00	First Edition
2015.08	V1.01	<p>Modify</p> <p>1. Part of the gap parameter value and set the scope of the correction</p> <p>Add</p> <p>1.Parameters of the new links 2.Add Parameters 09-14(P.363) , 09-15(P.364) , 11-42(P.365),11-43(P.366) , 11-44(P.367) , 14-46(P.658),14-47(P.659) , 10-54 (P.362) , 14-45 (P.657) . 3. Optional accessories operation panel, telecommunication lines, shrapnel installation package.</p>
2015.02	V1.02	<p>Modify</p> <p>1.Single standard to double standard 2.Modify 3.6.4Reactor</p>
2016.02	V1.03	<p>Modify</p> <p>1.Single standard to double standard 2.correction3.6.4ACspecifications</p>
2017.02	V1.04	<p>Modify</p> <p>1. 3.7.1 Maincircuit Terminals 2. Part of the gap parameter value and set the scope of the correction.</p> <p>Add</p> <p>220V Frame G 90K/110KF , 110K/132KF 7.4.4 BKU Brake unit 5.8.4 Communication expansion card version number 5.11.17 Built-in PLC 5.12.8 PM PM Motor current loop controller parameters 5.13.4 Single point positioning function 7.5 Appendix 6 European Specification Compatibility Description</p>
2017.07	V1.05	<p>Modify</p> <p>Modify 3.7 Terminal wire arrangement content</p>
2017.08	V1.06	<p>Modify</p> <p>Modify 3.6.4 AC input reactor</p>
2017.08	V1.07	<p>Add</p> <p>EP301 : Canopen communication card</p>
2017.11	V1.07+	<p>Modify</p> <p>7.5 Appendix 6 European Specification Compatibility Description 5.13.4 Single point positioning function : M0=67→ M0=68</p>
2018.01	V1.08	<p>Modify</p> <p>Nameplate instruction</p>