INOVANCE

User Guide

IS580 Series AC Drive

Closed Loop Pressure and Flow Control

User Guide

A05
Data code 19010395

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Safety Information and Precautions

This guide is packaged together with the product. It contains basic information for quick start of the drive. For safety and more information, please refer to IS580 Servo Drive Advanced User Guide, which can be Downloaded on website: http://www.inovance.cn.

■ Electrical Safety

Extreme care must be taken at all times when working with the servo drive or within the area of the servo drive. The voltages used in the servo drive can cause severe electrical shock or burns and is potentially lethal. Only authorized and qualified personnel should be allowed to work on servo drives.

■ Machine/System Design and Safety of Personnel

Machine/system design, installation, commissioning startups and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and the contents of this manual. If incorrectly installed, the servo drive may present a safety hazard.

The servo drive uses high voltages and currents (including DC), carries a high level of stored electrical energy in the DC bus capacitors even after power OFF. These high voltages are potentially lethal.

The servo drive is NOT intended to be used for safety related applications/functions. The electronic “STOP & START” control circuits within the servo drive must not be relied upon for the safety of personnel. Such control circuits do not isolate mains power voltages from the output of the servo drive. The mains power supply must be disconnected by an electrical safety isolation device before accessing the internal parts of the servo drive.

Safety risk assessments of the machine or process system which uses an servo drive must be undertaken by the user and or by their systems integrator/designer. In particular the safety assessment/design must take into consideration the consequences of the servo drive failing or tripping out during normal operation and whether this leads to a safe stop position without damaging machine, adjacent equipment and machine operators/users. This responsibility lies with the user or their machine/process system integrator.

System integrator/designer must ensure the complete system is safe and designed according to the relevant safety standards. Inovance Technology and Authorized Distributors can provide recommendations related to the servo drive to ensure long term safe operation.

The installer of the AC Drive is responsible for complying with all relevant regulations for wiring, circuit fuse protection, earthing, accident prevention and electromagnetic (EMC regulations). In particular fault discrimination for preventing fire risk and solid earthing practices must be adhered to for electrical safety (also for good EMC practice). Within the European Union, all machinery in which this product is used must comply with required directives.

■ Electrical Installation - Safety

Electrical shock risk is always present within an servo drive including the output cable leading to the motor terminals. Where dynamic brake resistors are fitted external to the servo drive, care must be taken with regards to live contact with the brake resistors, terminals which are at high DC voltage and potentially lethal. Cables from the servo drive to the dynamic brake resistors should be double insulated as DC voltages are typically 600 to 700 VDC.

Mains power supply isolation switch should be fitted to the servo drive. The mains power supply must be disconnected via the isolation switch before any cover of the servo drive can be removed or before any servicing work is undertaken stored charge in the DC bus capacitors of the PWM servo drive is potentially lethal after the AC supply has been disconnected. The AC supply must be isolated at least 10 minutes before any work can be undertaken as the stored charge will have been discharged through the internal bleed resistor fitted across the DC bus capacitors.

Whenever possible, it is good practice to check DC bus voltage with a VDC meter before accessing the servo drive bridge. Where the servo drive input is connected to the mains supply with a plug and socket, then upon disconnecting the plug and socket, be aware that the plug pins may be exposed and internally connected to DC bus capacitors (via the internal bridge rectifier in reversed bias). Wait 10 minutes to allow stored charge in the DC bus capacitors to be dissipated by the bleed resistors before commencing work on the servo drive.

■ Electrical Shock Hazard

Ensure the protective earthing conductor complies with technical standards and local safety regulations. Because the leakage current exceeds 3.5 mA in all models, IEC 61800-5-1 states that either the power supply must be automatically disconnected in case of discontinuity of the protective earthing conductor or a protective earthing conductor with a cross-section of at least 10 mm^2 (Cu) or 16 mm2 (Al) must be used. Failure to comply may result in death or serious injury.

When using an earth leakage circuit breaker, use a residual current operated protective device (RCD) of type B (breaker which can detect both AC and DC). Leakage current can cause unprotected components to operate incorrectly. If this is a problem, lower the carrier frequency, replace the components in question with parts protected against harmonic current, or increase the sensitivity amperage of the leakage breaker to at least 200 mA per drive.

Factors in determining leakage current:

- Size of the AC drive
- AC drive carrier frequency
- Motor cable type and length
- EMI/RFI filter

■ Approvals

Certification marks on the product nameplate indicate compliance with the corresponding certificates and standards.

Certification	Mark	Directives		Standard
CE	CE	EMC directives	2014/30/EU	EN 61800-3
		LVD directives	2014/35/EU	EN 61800-5-1
		RoHS directives	2011/65/EU	EN 50581
UL	c UL us LISTED	-		UL508C/UL61800-5-1
				C22.2 No.14-13

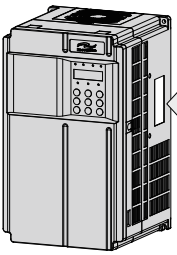
Note	
	· The above EMC directives are complied with only when the EMC electric installation requirements are strictly observed. · Machines and devices used in combination with this drive must also be CE certified and marked. The integrator who integrates the drive with the CE mark into other devices has the responsibility of ensuring compliance with CE standards and verifying that conditions meet European standards. · The installer of the drive is responsible for complying with all relevant regulations for wiring, circuit fuse protection, earthing, accident prevention and electromagnetic (EMC regulations). In particular fault discrimination for preventing fire risk and solid earthing practices must be adhered to for electrical safety (also for good EMC practice). · For more information on certification, consult our distributor or sales representative.

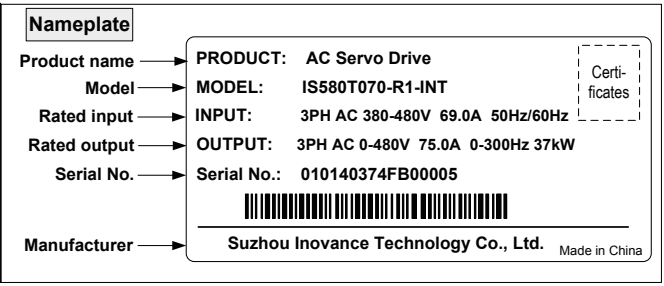
■ Motor Thermal Protection

Motor thermal protection is not assessed by UL.

1. Product Information

1.1 Nameplate and Designation Rule





IS580 — IS580 series hydraulic servo drive

T

Mark	Voltage Class
T	Three-phase 380 to 480 V
-2T	Three-phase 220 V

070

Mark	20	30	35	…	300	…
Rated output current(A)	25	32	37	…	304	…

-R1

Mark	Type of PG card
-R1	Resolver (S58-PG-B1)
-D	Differential ABZ encoder (MD38PGMD)

-INT

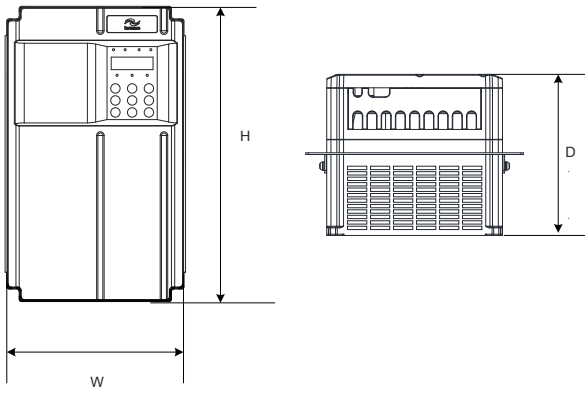
Mark	Version
-INT	International
-(a)	Other variants

Note (a): The model number may include a suffix "XXXXXXXXXX", Where "XXXXXXXXXX" can be blank or combination of any alphanumeric and/or symbols that represents customer identity.

1.2 General Specifications

Voltage class			Three-phase 380 to 480 VAC												
Model: IS580Txxx			020	030	035	040	050	070	080	100	140	170	210	250	300
Frame size			T5				T6		T7		T8			T9	
Dimension(1)		Height Width Depth	[H]: 350 mm [W]: 210 mm [D]: 192 mm				[H]: 400 mm [W]: 250 mm [D]: 220 mm		[H]: 540 mm [W]: 300 mm [D]: 275 mm		[H]: 580 mm [W]: 338 mm [D]: 320 mm			[H]: 915 MM [W]: 400 MM [D]: 320 MM	
Drive Output	Rated power, [kW]		11	15	18.5	22	30	37	45	55	75	90	110	132	160
	Rated output current, [A]		25	32	37	45	60	75	91	112	150	176	210	253	304
	Default carrier frequency, [kHz]		6	6	4	4	4	4	4	3	2	2	2	2	2
	Carrier frequency range, [kHz]		1 to 8												
	Overload capacity		150% for 60 sec & 180% for 2 sec												
	Max. output voltage		Three-phase 380 to 480 VAC (proportional to input voltage)												
	Max. output frequency		300 Hz												
Drive Input	Rated input voltage		Three-phase 380 to 480v, -15% to +10%												
	Rated input current, [A]		36.3	45.1	49.5	59	57	69	89	106	139	164	196	240	287
	Rated input frequency		50/60 Hz, ±5%												
Power capacity, [kVA]			30	39	45	54	52	63	81	97	127	150	179	220	263
Braking Resistor	Recommended power, [kW]		0.8	1	1.3	1.5	2.5	3.7	4.5	5.5	7.5	9	5.5 x 2	6.5 x 2	16
	Min. Resistance, [Ω]		43	32	25	22	16	16	16	16	12	8	12 x 2	8 x 2	2.5
Enclosure			IP20												

(1) the dimensions are shown below.



Voltage class			Three-phase 220 VAC										
Model: IS580-2Txxx			020	030	040	050	070	080	100	140	170	210	300
Frame size			T5			T6		T7		T8			T9
Dimension[1]		Height Width Depth	[[H]: 350 MM [W]: 210 MM [D]: 192 MM			[H]: 400 MM [W]: 250 MM [D]: 220 MM		[H]: 540 MM [W]: 300 MM [D]: 275 MM		[H]: 580 MM [W]: 338 MM [D]: 315 MM			[H]: 915 MM [W]: 400 MM [D]: 320 MM
Drive Output	Rated power, [kW]		5.5	7.5	11	15	18.5	22	30	37	45	55	80
	Rated output current, [A]		25	32	45	60	75	91	112	150	176	210	304
	Default carrier frequency, [kHz]		6	6	4	4	4	4	4	3	2	2	2
	Carrier frequency range, [kHz]		1 to 8										
	Overload capacity		150% for 60 sec & 180% for 2 sec										
	Max. output voltage		Three-phase 220 VAC (proportional to input voltage)										
	Max. output frequency		300 Hz										
Drive Input	Rated input voltage		Three-phase 380 to 480v, -15% to +10%										
	Rated input current, [A]		36.3	45.1	59	57	69	89	106	139	164	196	287
	Rated input frequency		50/60 Hz, ±5% rated input frequency										
Power capacity, [kVA]			30	39	54	52	63	81	97	127	150	179	263
Braking Resistor	Recommended power, [kW]		0.8	1.0	1.5	2.5	3.7	4.5	5.5	7.5	9	11	8 x 2
	Min. Resistance, [Ω]		22	16	11	8	8	8	6	6	4	4	6 x 2
Enclosure			IP20										

2 Wiring

2.1 Terminal Description

■ Terminals of Main circuit

Figure 2-1 Terminals of IS580T020 to IS580T040, and IS580-2T020 to IS580-2T040

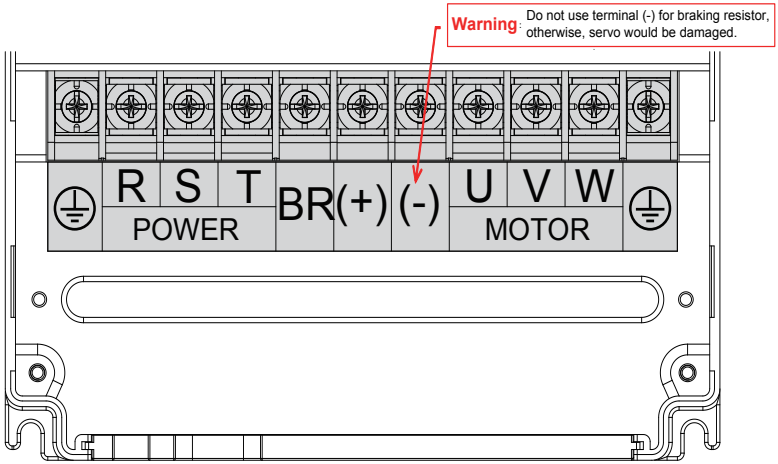


Figure 2-2 Terminals of IS580T050 and IS580T070, and IS580-2T050 to IS580-2T070

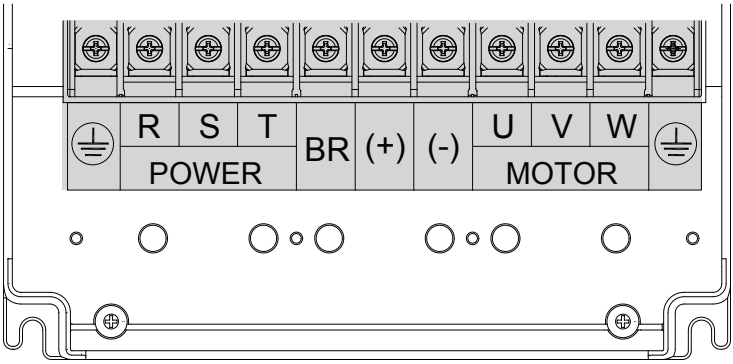


Figure 2-3 Terminals of IS580T080 and IS580T100, and IS580-2T080 and IS580-2T100

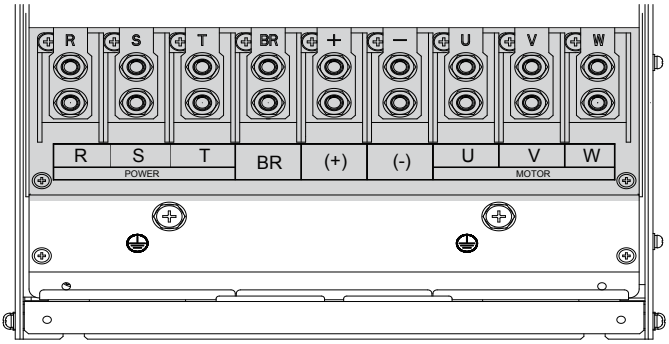
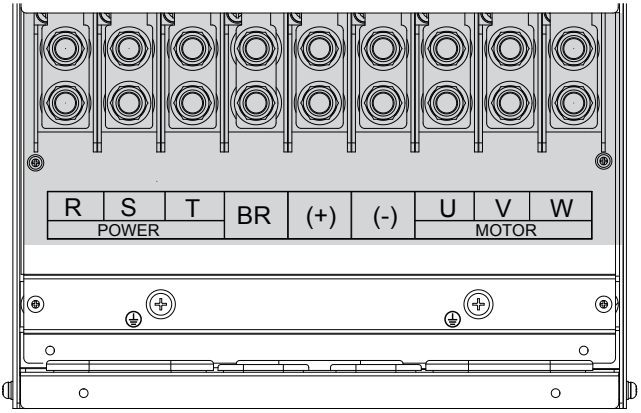
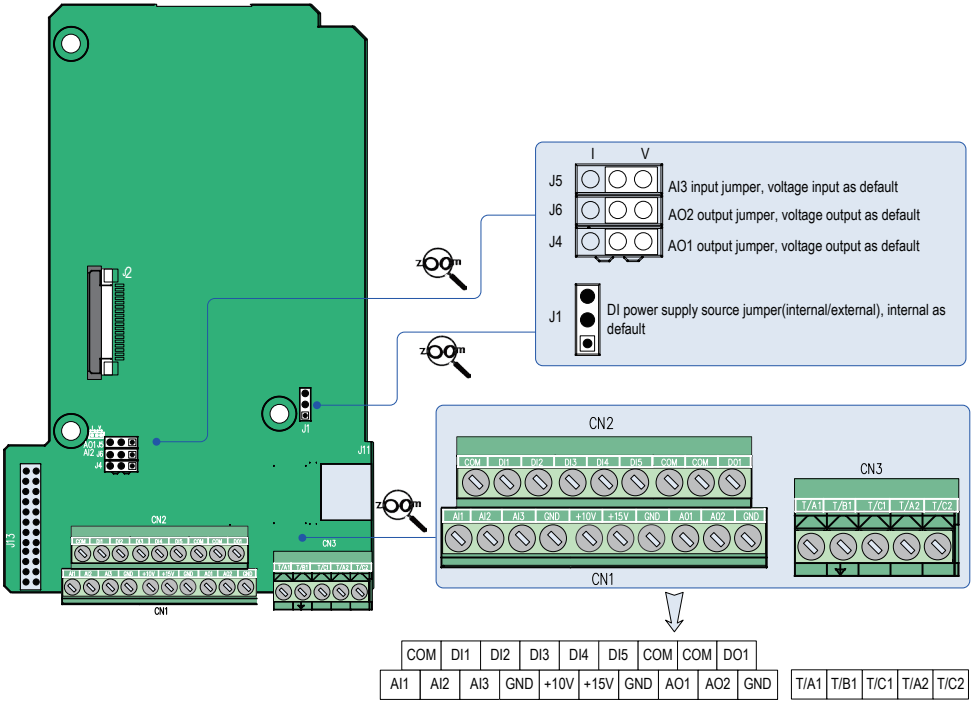


Figure 2-4 Terminals of IS580T140 to IS580T210, and IS580-2T140 to IS580-2T210



Terminal	Terminal name	Description
R, S, T	Three-phase supply input	Connect to the three-phase ac power supply.
(-), (+)	DC bus terminals	Connected to external braking unit (MDBUN) with servo drive units of 90 kW and above.
BR, (+)	Braking resistor connection	Connected to external braking resistor for servo drive units of 75 kW and below.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Ground (PE)	Grounding connection.

■ Terminals of Main Control Board



Terminal	Terminal name	Description
+10V-GND	+10 VDC power supply	Internal 10 VDC power supply
+15V-GND	+15 VDC power supply	Internal 15 VDC power supply can be used for pressure sensor Max. Output current: 10 mA
AI1-GND	Analog input 1	1. Input voltage range: 0 to 10 VDC 2. Input impedance: 22 kΩ
AI2-GND	Analog input 2	
AI3-GND	Analog input 3	1. Input voltage range: 0 to 10 VDC/0 to 20 mA, selected by J5 jumper 2. Input impedance: 22 kΩ (voltage input), 500 Ω (current input)
DI1- COM	Digital input 1	1. Optically-coupled isolation compatible with dual-polarity inputs, input frequency less than 100 Hz 2. Power supply source determined by jumper J1 3. Input impedance: 1.39 kΩ 4. Voltage range for inputs: 9 to 30 V
DI2- COM	Digital input 2	
DI3- COM	Digital input 3	
DI4- COM	Digital input 4	
DI5- COM	Digital input 5	
AO1-GND	Analogue output 1	1. Either a voltage or a current output, Determined by jumper J4. 2. Max. Load resistance: 500 Ω 3. Output voltage range: 0 to 10 V 4. Output current range: 0 to 20 mA.
AO2-GND	Analogue output 1	1. Either a voltage or a current output, determined by jumper J6. 2. Max. Load resistance: 500 Ω 3. Output voltage range: 0 to 10 V 4. Output current range: 0 to 20 mA.

Terminal	Terminal name	Description
DO1-COM	Digital output 1	1. Optically-coupled isolation, dual-polarity open-collector output 2. Output voltage range: 0 to 24 V 3. Output current range: 0 to 50 mA. 4. DO1 can only be driven by external power supply
T/A1-T/B1	Relay(normally closed)	250 VAC, 3 A, COSØ = 0.4 30 VDC, 1 A
T/A1-T/C1	Relay(normally open)	
T/A2-T/C2	Relay(normally open)	
J13	Extension card interface	28-pin connector , to connect with extension cards (I/O, plc card, bus communication cards)
J2	PG card interface	PG card interface
J11	External keypad interface	External keypad interface
J1	Jumper	DC power supply source selection
J4	Jumper	Voltage/current selection
J6	Jumper	Voltage/current selection
J5	Jumper	Voltage/current selection

2.2 Terminals of PG Card and Speed Sensor Cable

■ Resolver PG Card S58-PG-B1

Table 2-1 Terminal Function Description of S58-PG-B1

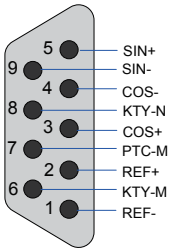
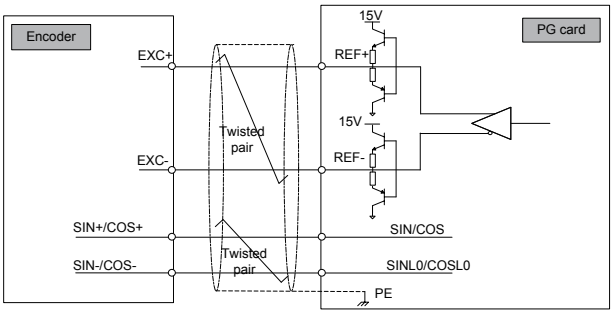
Terminal	Pin No.	Pin Definition	Function Description	Terminal Arrangement
J3	1	REF-	Resolver excitation negative	
	2	REF+	Resolver excitation positive	
	3	COS+	Resolver feedback COS positive	
	4	COS-	Resolver feedback COS negative	
	5	SIN+	Resolver feedback SIN positive	
	6	KTY-M	KTY resistor positive	
	7	PTC-M	PTC resistor positive	
	8	KTY-N	KTY or PTC resistor negative	
	9	SIN-	Resolver feedback SIN negative	
CN1	18-pin FFC interface, connecting J2 of control board of the drive			

Table 2-2 Description of S58-PG-B1 indicator status

Indicator	S58-PG-B1 Status	Possible Causes and Solutions
	Normal	-
	Phase-locked loop failure	Generally, it is caused by too large lag in phase of resolver selected.
	Signal SIN/COS amplitude exceeding upper limit	Generally, it is caused by interference. In this case, ground the motor well and connect the grounding point of the PG card to the PE terminal of the drive.
	Signal SIN/COS amplitude too small.	Generally, this is because DB9 connector is not connected, is wrongly connected or even wire breaking occurs. If the conditions described here does not occur, check whether the resolver selected matches S58-PG-B1.

Figure 2-5 S58-PG-B1 interface circuit

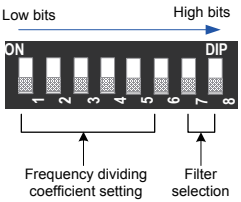


■ Differential ABZ PG card MD38PGMD

The following figure describes terminals of MD38PGMD

Terminal		Function Description
CN2	A+	Encoder output signal A positive
	A-	Encoder output signal A negative
	B+	Encoder output signal B positive
	B-	Encoder output signal B negative
	Z+	Encoder output signal Z positive
	Z-	Encoder output signal Z negative
	5V/15V	Encoder 5V/15V power supply
	COM	Encoder power ground
	PE	Shield connecting point
J7	OA+	Differential frequency dividing output signal A positive
	OA-	Differential frequency dividing output signal A negative
	OB+	Differential frequency dividing output signal B positive
	OB-	Differential frequency dividing output signal B negative
	OZ+	Differential frequency dividing output signal Z positive
	OZ-	Differential frequency dividing output signal Z negative
	GND	Frequency dividing output reference ground
	OA	Open-collector frequency dividing output signal A
	OB	Open-collector frequency dividing output signal B
	OZ	Open-collector frequency dividing output signal Z
CN1	18-pin FFC interface, connecting to J4 on the control board of the AC drive	

· DIP switch setting

Filter Selection		Definition	Address Setting						Value	Frequency Dividing Coefficient	DIP Switch
8	7		6	5	4	3	2	1			
0	0	Non-self-adaptive filter	0	0	0	0	0	0	Reserved	No output	
			0	0	0	0	0	1	1	Frequency divided by 1	
0	1	Self-adaptive filter	0	0	0	0	1	0	2	Frequency divided by 2	
			0	0	0	0	1	1	3	Frequency divided by 3	
1	0	Fixed inter-lock	...								
			1	1	1	1	0	1	61	Frequency divided by 61	
1	1	Automatic inter-lock	1	1	1	1	1	0	62	Frequency divided by 62	
			1	1	1	1	1	1	63	Frequency divided by 63	

· Indicators

Indicator	Indication	State	Description
D1/D2/D3	Encoder input signal indicator	ON or flash	The encoder has signal input.
		OFF	The encoder does not have signal input.
D6	Power indicator	ON	Normal.
		OFF	Power is not connected.
LED1	Encoder input signal quality indicator	ON	Input signal is slightly instable, which occurs when motor accelerates/decelerates or encoder signal input suffers slight interference.
		OFF	Input signal is normal, speed is stable and there is no interference.
		Flash slowly	Input signal is moderately instable, which occurs when motor accelerates/decelerates or encoder signal input suffers moderate interference.
		Flash quickly	Input signal is seriously instable, which occurs when motor accelerates/decelerates quickly or encoder signal input suffers severe interference.
LED2	Signal processing quality indicator	ON	Signal is slightly instable, which occurs when motor accelerates/decelerates or interference during signal input is not completely filtered (The number of interference pulses that are not filtered is less than 10 per time unit).
		OFF	Signal processing is normal, speed is stable and there is no interference.
		Flash slowly	Signal is moderately instable, which occurs when motor accelerates/decelerates or interference during signal input is not completely filtered (The number of interference pulses that are not filtered is less than 30 per time unit).
		Flash quickly	Signal is seriously instable, which occurs when motor accelerates/decelerates or interference during signal input is not completely filtered (The number of interference pulses that are not filtered is more than 30 per time unit).
LED3	Inter-lock state indicator	ON	Inter-lock enabled.
		OFF	Inter-lock disabled.
LED4	System state indicator	ON	Normal.
		OFF	The system is not operating or abnormal.
		Flash	The encoder cable breaks.

■ Cable Connector of ISMG Motor

Figure 2-6 Wiring with military spec. (applicable to the second generation ISMG motor)

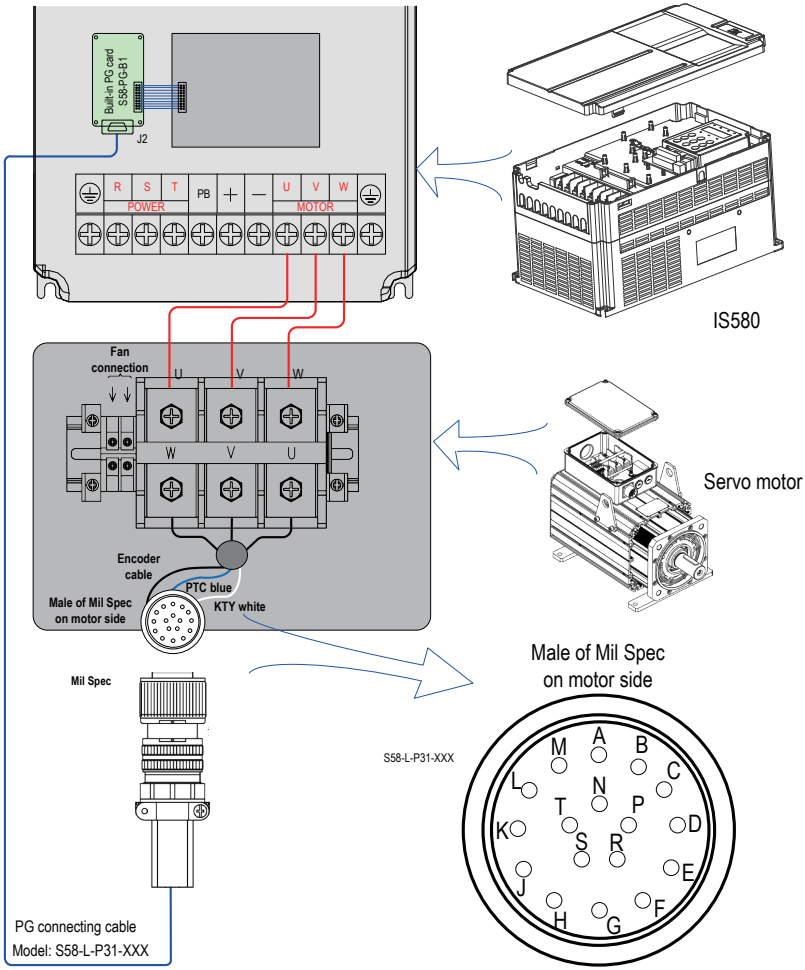


Table 2-4 Pin colour definition with military spec. (applicable to the second generation ISMG motor)

17P Mil Spec.	A	B	C	D	E	F	G	H	L	K	J
D-type Connector 9-pin	1	2	3	4	5	9	7	8		6	Housing
Signal Definition	REF+	REF-	Cos+	Cos-	Sin+	Sin-	PTC-M	KTY-N	PTC-N	KTY-M	Shielding
Wire Colour	Yellow/White	Red/White	Red	Black	Yellow	Blue	Brown	Orange		Grey	Shielding
Remark	One pair		One pair		One pair			KTY, PTC common			

Figure 2-7 Wiring without military spec. (applicable to the first generation ISMG motor)

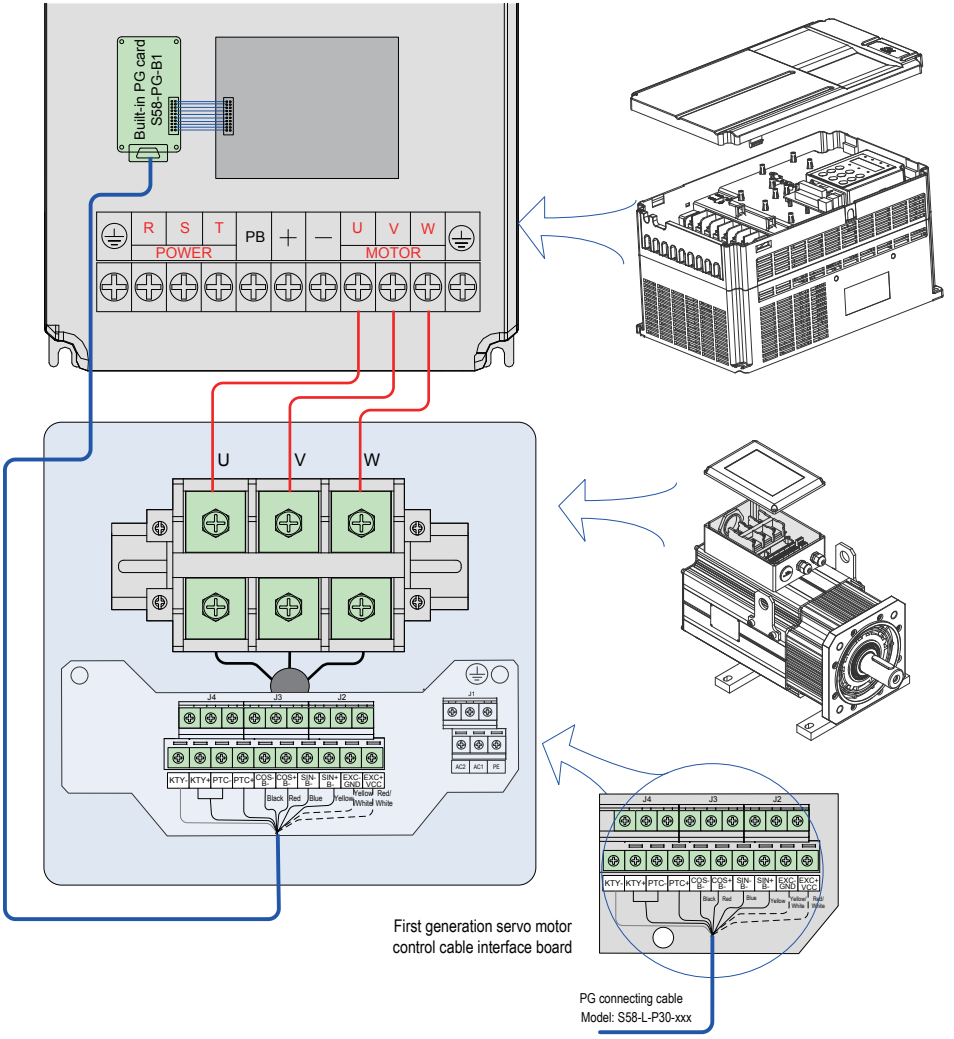


Table 2-5 Pin colour definition without military spec. (applicable to the first generation ISMG motor)

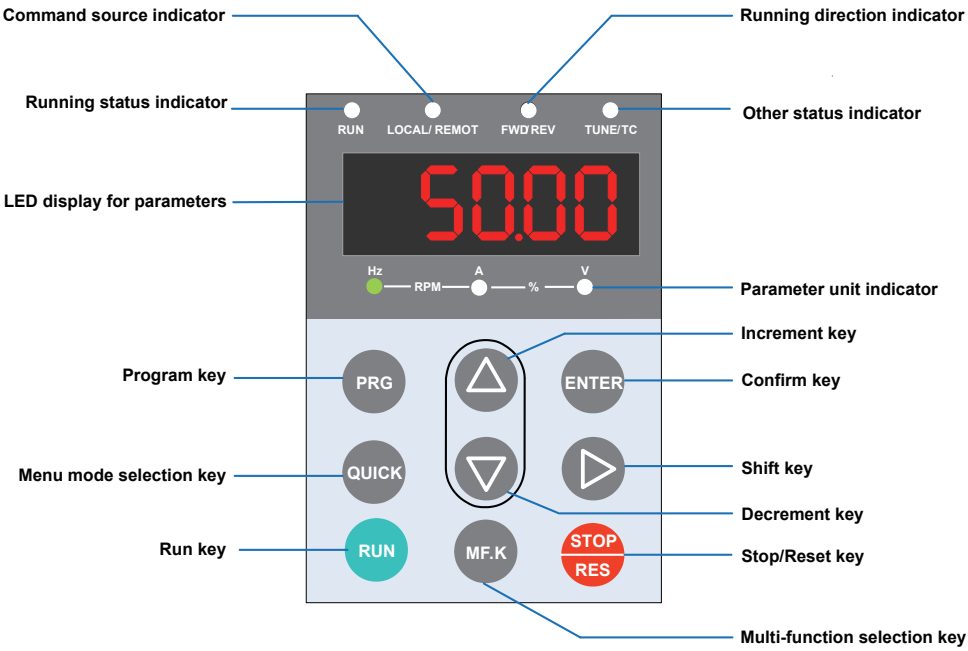
D-type Connector 9-pin	1	2	3	4	5	9	7	8	6
Signal Definition	REF-	REF+	Cos+	Cos-	Sin+	Sin-	PTC-M	KTY-N/PTC-N	KTY-M
Wire Colour	Yellow/White	Red/White	Red	Black	Yellow	Blue	Brown	Orange	Grey
Remark	One pair		One pair		One pair		-	KTY, PTC common	-

2.3 Wiring

Please refer to the fold-out at the end of this chapter.

3. Operating Panel (Keypad & Display)

3.1 Overview

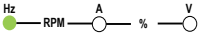
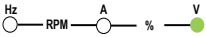
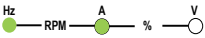


■ Status Indicators

There are four red led status Indicators at the top of the operating panel.

Indicator	Indication
○ RUN	Off indication the stop status.
	On indication the running status.
○ LOCAL/REMOT	Off indication under operating panel control.
	On indication under terminal control.
	Flashing indication under serial communication control.
○ FWD/REV	Off indication reverse motor rotation.
	On indication forward motor rotation.
○ TUNE/TC	On indication torque control mode.
	Flashing slowly (once a second) indication auto-tuning status.
	Flashing quickly (four times a second) indication a fault condition.

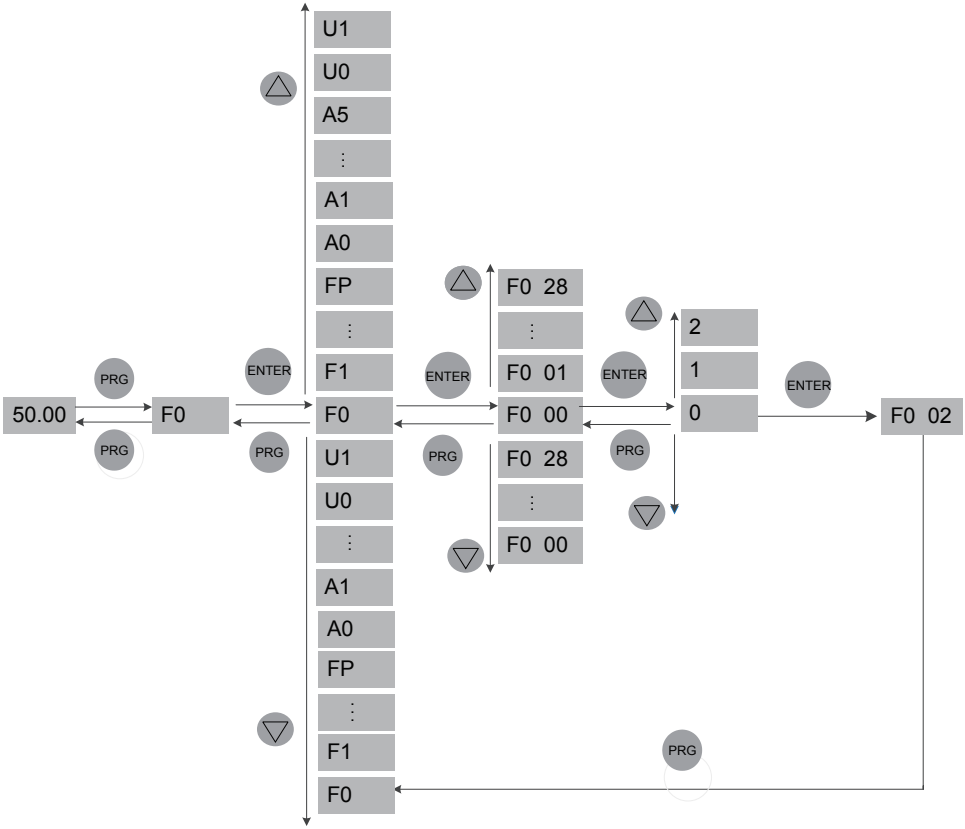
■ Parameter Unit Indicator

Indicator appearance	Meaning
	Hz for frequency
	A for current
	V for voltage
	Rpm for motor speed
	Percentage

■ Keys on Operation Panel

Key	Key name	Function
PRG	Programming	Enter or exit level i menu. Return to the previous menu.
ENTER	Confirm	Enter each level of menu interface. Confirm displayed parameter setting.
△	Increment	When navigating a menu, it moves the selection up through the screens available. When editing a parameter value, it increases the displayed value. When the servo drive is in run mode, it increases the speed.
▽	Decrement	When navigating a menu, it moves the selection down through the screens available. When editing a parameter value, it decreases the displayed value. When the servo drive is in running mode, it decreases the speed.
▷	Shift	Select the displayed parameter in the stop or running status. Select the digit to be modified when modifying a parameter value
RUN	Run	Start the servo drive when using the operating panel control mode. It is inactive when using the terminal or communication control mode.
STOP RES	Stop/reset	Stop the servo drive when the drive is in the running status. Perform a reset operation when the drive is in the fault status. Note: the functions of this key can be restricted by using function F7-02.
MF.K	Multifunction	Perform a function switchover as defined by the setting of F7-01, for Example to quickly switch command source or direction.
QUICK	Menu mode selection	Press it to switch over between menu modes as defined by the setting of FP-03.

3.2 Operations of Parameters

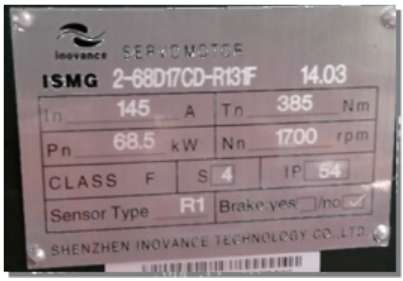


■ Parameter arrangement

Function Code Group	Description
F0 to FF	Basic control parameters
A0 to A5	Hydraulic control parameters
U0 to U1	Status monitoring

4. Quick Setup

4.1 Hydraulic Application Setup Flowchart

Start	Para.	Parameter name	Default	Commissioning
Disable servo drive				
	Note: usually if any DI is set as forward or reverse run and the signal is active, then some operations cannot succeed, such as restoring parameters, changing command source, which are necessary steps for setup. So it's seriously recommended to disable servo drive at the beginning of commissioning.			
Restore parameters	FP-01	Parameter operation	0	1
	0: no operation 1: restore factory parameters Note: usually users have no idea what parameters have been changed, so it's seriously recommended to restore parameters to default at the beginning of commissioning.			
Set motor parameters		Motor nameplate		
				
	F1-01	Rated motor power	Model dependent	
	Unit: kW			
	F1-02	Rated motor voltage	Model dependent	
	Unit: V Note: please follow motor technical specifications to set this parameter, otherwise motor would probably run with vibration.			
	F1-03	Rated motor current	Model dependent	
	Unit: A			
	F1-04	Rated motor frequency	Model dependent	
	Unit: Hz Note: please follow motor nameplate to set this parameter, otherwise motor auto-tuning would fail and get E45. Here is the formula for motor frequency: Frequency = number of motor poles * speed (rpm) / 120.			
	F1-05	Rated motor speed	Model dependent	
	Unit: rpm.			

Continued	Para.	Parameter name	Default	Commissioning

Continued	Para.	Parameter name	Default	Commissioning
Select command source	F0-02	Command source selection	0	0
		0: operation panel control (Indicator 'local/remote' off) 1: terminal control (Indicator 'local/remote' on) 2: communication control (Indicator 'local/remote' blinking)		
Perform motor auto tuning	F1-16	Auto-tuning selection	0	1
		0: no auto-tuning 1: static auto-tuning 1 (runs at very low speed) 2: complete dynamic auto-tuning (runs very fast) Note: when user Doesn't know back EMF of motor, this auto-tuning method is necessary. Bear in mind that better DO it without load, if with load, please confirm that valves are set correctly and motor running does not hurt hydraulic pump. 3: static auto-tuning 2 (runs at very low speed) Auto-tuning steps: set F1-16 = 1 and press RUN and ENTER, then auto-tuning starts, the whole process will take about 1 minute.		
Set IS580 as hydraulic controller	A3-00	Hydraulic control mode selection	0	2
		0: non-hydraulic control mode 1: hydraulic control mode (can commands used) 2: hydraulic control mode(AI commands used) 3: can hydraulic control mode (customized-can-control mode) 4: reserved Note: as a result of setting A3-00 as 2, some parameters are set automatically by firmware. Here is the list:		

F0-02	Command source selection	1: Terminal control
F0-03	Main frequency source X selection	If A3-00 = 2, set F0-03 to 3 (AI2). If A3-00 = 1 or 3, set F0-03 to 9 (Communication setting).
F0-17	Acceleration time1	0.0s
F0-18	Deceleration time1	0.0s
F1-00	Motor type	2: PMSM
F4-00	DI1 function selection	1: Forward RUN (FWD, pump enabled)
F4-01	DI2 function selection	48: Servo pump PID selection terminal 1
F4-02	DI3 function selection	53: Slave pump address selection terminal 1
F4-03	DI4 function selection	9: Fault reset (RESET)
F4-04	DI5 function selection	50: CAN communication enabled
F5-01	Control board relay (T/A1-T/B1-T/C1) function selection	2: Fault output
F5-02	Control board relay (T/A2-T/C2) function selection	23: Double-discharge plunger pump sloping switchover (NO)
F5-03	Control board relay (T/A3-T/C3) function selection	24: Hydraulic control NC output

Continued	Para.	Parameter name	Default	Commissioning

Continued	Para.	Parameter name	Default	Commissioning
Set speed command upper limit	A3-01	Maximum rotational speed	2000	
↓		Unit: rpm; Note: for hydraulic control mode, A3-01 is seen as 100% speed command, and now F0-10 has nothing to DO with speed command.		
Set pressure command upper limit	A3-02	System hydraulic pressure	175.0	
↓		Unit: kg/cm^2; range from 0.0 to maximum hydraulic pressure (A3-03). Note: A3-02 is maximum pressure of press machine, for example, 1000ton press is 265.0 kg/cm^2. Also bear in mind A3-02 is seen as 100% pressure command.		
Set pressure feedback upper limit	A3-03	Maximum hydraulic pressure	250.0	
↓		Unit: kg/cm^2; range from 0.0 to 500.0 kg/cm^2. Note: A3-03 is maximum pressure of press sensor feedback.		
Set DI function	F4-00	DI1 function selection	1	
↓		0: no function 1: forward run (FWD) 2: reverse run (REV) 4: forward jog (FJOG) 5: reverse jog (RJOG) 9: fault reset (reset) 11: external fault normally open (NO) input 33: external fault normally closed (NC) input Setting range: 0 to 59;		
	F4-01	DI2 function selection	0	
		Setting range same as DI1;		
	F4-02	DI3 function selection	0	
		Setting range same as DI1		
	F4-03	DI4 function selection	9	
		Setting range same as DI1.		
	F4-04	DI5 function selection	0	
		Setting range same as DI1;		

Continued	Para.	Parameter name	Default	Commissioning

Continued

Para.	Parameter name	Default	Commissioning
	Set AI1 range: pressure command		
F4-18	AI curve 1 minimum input	0.00	0.00
	-11.00 to11.00 v;		
F4-19	Corresponding setting of AI1minimum input	0.0	0.0
	-100.0% to 100.0% Note: 0v pressure command is designed by press plc to represent 0% pressure.		
F4-20	AI1 maximum input	10.00	5.00
	-11.00 to 11.00 v		
F4-21	Corresponding setting of AI1maximum input	100.0	100.0
	-100.0% to 100.0%		
	Set AI2 range: flow command		
F4-23	AI curve 2 minimum input	0.00	0.00
	-11.00 to11.00 v;		
F4-24	Corresponding setting of AI2 minimum input	0.0	0.0
	-100.0% to 100.0%		
F4-25	AI2 maximum input	10.00	10.00
	-11.00 to 11.00 v		
F4-26	Corresponding setting of AI2 maximum input	100.0	100.0
	-100.0% to 100.0%		
	Set AI3 range: pressure feedback		
F4-28	AI curve 3 minimum input	0.00	0.00
	-11.00 to11.00 v;		
F4-29	Corresponding setting of AI3minimum input	0.0	0.0
	-100.0% to 100.0%		
F4-30	AI3 maximum input	10.00	10.00
	-11.00 to 11.00 v		
F4-31	Corresponding setting of AI3maximum input	100.0	100.0
	-100.0% to 100.0% Note: 10v pressure feedback represents 100% pressure feedback. This is related to A3-03.		

Note: AI 1 is fixed as pressure command input, AI2 is fixed as speed/flow command input, and AI3 is fixed as pressure sensor feedback input. This configuration can't be changed!

Continued

Para.	Parameter name	Default	Commissioning

Continued	Para.	Parameter name	Default	Commissioning
other hydraulic basic settings	A3-08	Maximum reverse motor speed	20.0	
		Range from 0.0% to 100.0%.		
	A3-09	Minimum flow	0.5	
		Range from 0.0 to 50.0%. Note: both A3-09 and A3-10 are for keeping hydraulic circuit some pressure, even if pressure or flow command is zero, because usually there is oil leakage which leads to air penetration which causes running noise and pressure vibration. But if user thinks it unnecessary, then set it 0.		
	A3-10	Minimum pressure	0.5	
		Range from 0.0 to 50.0 kg/cm^2. Note: both A3-09 and A3-10 are for keeping hydraulic circuit some pressure, even if pressure or flow command is zero, because usually there is oil leakage which leads to air penetration which causes running noise and pressure vibration. But if user thinks it unnecessary, then set it 0.		
pressure response commissioning	A3-05	Hydraulic pressure control proportional gain kp1	210.0	
		Range from 0.0 to 800.0. Note: the larger the kp1, the shorter the rise time of pressure, at the same time, large kp1 may cause too large overshoot.		
	A3-06	Hydraulic pressure control integral time ti1	0.100	
		Range from 0.001 to 10.000sec. Note: the smaller the ti1, the smaller the static error of pressure, at the same time, small ti1 may cause too large overshoot. Static error means the difference between command and feedback when feedback reaches steady state.		
	A3-07	Hydraulic pressure control derivative time td1	0.000	
		Range from 0.000 to 1.000sec. Note: the larger the td1, the smaller the overshoot and the shorter the adjusting time. At the beginning of pressure response commissioning, A3-07 is unnecessary, only when overshoot is not easy to overcome by adjusting kp1 and ti1.		
Backup user's parameters	FP-05	User's parameter backup operation	0	
		0: no operation 1: backup user's parameters Note: every time when finish this quick setup, please use FP-05 to back up the above parameters, which is useful especially when it is not sure what parameter changes have happened. Besides, it's easy to restore user's parameters by setting FP-01=3.		
OVER				

5. Parameter List

5.1 Introduction

Groups F and A include basic and hydraulic function parameters. Group U includes the monitoring function parameters and extension card communication parameters.

The parameter description tables in this chapter use the following symbols. The symbols in the parameter table are described as follows:

Symbol	Meaning
☆	It is possible to modify the parameter with the drive in the stop or in the run status.
★	It is not possible to modify the parameter with the drive in the run status.
•	The parameter is the actual measured value and cannot be modified.
*	The parameter is a factory parameter and can be set only by the manufacturer.

5.2 Hydraulic Control and Basic Control Parameter List

Para. No.	Para. Name	Setting Range	Unit	Default	Property
Group A0: Flux Weakening Control					
A0-00	Flux weakening method selection	0: by calculation 1: auto adjusted	1	1	★
A0-01	Flux weakening current factor	0 to 500	1	5	☆
A0-02	Pm motor flux weakening depth	0 to 50	%	5	☆
A0-03	Factor of pm motor max. output torque	20 to 300	%	100	☆
A0-04	Factor of pm motor field current	40 to 200	%	100	☆
Group A1: PG Card					
A1-00	PG card type selection	0: resolver 1: reserved 2: ABZ encoder	1	0	★
A1-02	Encoder installation angle	0.0 to 359.9	°	0	☆
A1-03	Speed feedback direction	0: same 1: reverse	1	-	★
A1-04	Number of resolver pole-pairs	1 to 50	1	Model dependent	★
A1-05	Resolver fault detection time	0.000 to 60.000	Sec	2.000	☆
A1-06	Encoder resolution	0 to 65535	1	1024	★
A1-08	Speed sensor interference counts	0 to 60000	1	0	☆
Group A2: CAN Communication					
A2-00	Baud rate	0: 20 1: 50 2: 125 3: 250 4: 500 5: 1024	kHz	4	☆
A2-01	CANLink address	1 to 64	1	1	☆
A2-02	CANLink continuous communication time	0.1 to 600.0	sec	0.3	☆
A2-03	CANLink multi-pump mode selection	0: broadcast 1: multi masters	1	0	☆
A2-04	CANLink slave address 1	0 to 65535	1	0	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
A2-05	CANLink slave address 2	0 to 65535	1	0	☆
A2-06	CANLink slave address 3	0 to 65535	1	0	☆
A2-07	CANLink slave address 4	0 to 65535	1	0	☆
A2-09	Can protocol selection in speed control mode	0: original 1: CANOpen 2: CANLink	1	0	★
Group A3: Basic Hydraulic Control					
A3-00	Pressure control mode	0: non-hydraulic 1: hydraulic control mode 1 by can 2: hydraulic control mode 2 by AI 3: can hydraulic control mode 4: EST mode(original) 5: EST mode(new) 6: CANOpen mode 7: CANLink3.0 mode	1	0	★
A3-01	Max. Motor speed	1 to 30000	rpm	2000	★
A3-02	System pressure	0.0 to A3-03	kg/cm^2	175.0	☆
A3-03	Max. Pressure	A3-02 to 500.0	kg/cm^2	250.0	☆
A3-04	Pressure command acceleration time 1	0 to 2000	ms	20	☆
A3-05	Pressure loop proportional gain kp 1	0.0 to 800.0		210.0	☆
A3-06	Pressure loop integral time ti 1	0.001 to 10.000	S	0.100	☆
A3-07	Pressure loop differential time td 1	0.000 to 1.000	S	0.000	☆
A3-08	Max. Reverse motor speed	0.0 to 100.0	%	10.0	☆
A3-09	Minimum flow	0.0% to 50.0%	%	0.5	☆
A3-10	Minimum pressure	0.0 to 50.0 kg/cm^2	kg/cm^2	0.5	☆
A3-11	Pressure loop proportional gain kp 2	0.0 to 800.0	0.1	210.0	☆
A3-12	Pressure loop integral time ti 2	0.001s to 10.000s	S	0.100	☆
A3-13	Pressure loop differential time td 2	0.000s to 1.000s	S	0.000	☆
A3-14	Pressure loop proportional gain kp 3	0.0 to 800.0	0.1	210.0	☆
A3-15	Pressure loop integral time ti 3	0.001s to 10.000s	S	0.100	☆
A3-16	Pressure loop differential time td 3	0.000s to 1.000s	0.001s	0.000	☆
A3-17	Pressure loop proportional gain kp 4	0.0 to 800.0	0.1	210.0	☆
A3-18	Pressure loop integral time ti 4	0.001s to 10.000s	0.001s	0.100	☆
A3-19	Pressure loop differential time td 4	0.000s to 1.000s	0.001s	0.000	★
A3-20	AI zero drift self-adjusting enable	0: disable 1: enable	1	0	☆
A3-21	Pressure sensor fault detection time	0.001s to 60.000s	0.001s	0.500	☆
A3-22	Max. flow in pressure control state	0.0% to 100.0%	0.1%	10.0	☆
A3-23	Min. Pressure in pressure control state	0.0% to 100.0%	0.1%	60.0	☆
A3-24	Output delay in pressure control state	0.001s to 10.000s	0.001s	0.100s	☆
A3-25	Pressure command s-curve acceleration filter time 1	0.001s to 1.000s	0.001s	0.030s	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
A3-26	Pressure command s-curve deceleration filter time 1	0.001s to 1.000s	0.001s	0.030s	☆
A3-27	Overshoot suppression detection factor 1	0 to 2000	1	200	☆
A3-28	Overshoot suppression factor 1	0 to 3.000	0.001	0.200	☆
A3-29	Pressure loop gain factor	0.20 to 5.00	0.01	1.00	☆
A3-30	Max. torque during switch from pressure control to flow control state	50.0% to 250.0%	0.1%	160.0%	☆
A3-31	Pressure command delay time 1	0.000s to 0.500s	0.001s	0.000s	☆
A3-32	Slave drive min. Input	0.0% to A3-34	0.1%	0.0%	☆
A3-33	Slave drive min. Input frequency.	-100.0% to 100.0%	0.1%	0.0%	☆
A3-34	Slave drive mid-point input	A3-32 to A3-36	0.1%	0.0%	☆
A3-35	Slave drive mid-point input frequency.	-100.0% to 100.0%	0.1%	0.0%	☆
A3-36	Slave drive max. Input	A3-34 to 100.0%	0.1%	100.0%	☆
A3-37	Slave drive max. Input frequency.	-100.0% to 100.0%	0.1%	100.0%	☆
A3-38	Multi-pump host check whether to enable slave pump	0: slave enable forbidden 1: slave enable permitted	1	0	☆
A3-39	Multi-pump confluence mode pressure holding gain	20 to 800	1	100	☆
A3-40	Multi-pump injection state acceptable pressure error during gain decrease	0.0 to 50.0 kg	0.1kg	5.0kg	☆
A3-41	Multi-pump injection state acceptable min. Flow during gain decrease	0 to 30000 rpm	1 rpm	0 rpm	☆
A3-42	Multi-pump injection state flow detection time during gain decrease	0.200 to 2.000s	0.001s	0.400s	☆
A3-43	Multi-pump CANLink state pressure error threshold to Disable slave pump	0 to 50.0 kg	0.1 kg	5.0 kg	☆
A3-44	Multi-pump CANLink state min. flow to Disable slave pump	-100.0% to 100.0%	0.1%	0.0%	☆
A3-45	Withdrew speed command slave pump delays to stop	0.100 to 5.000s	0.001s	1.000s	☆
A3-46	Withdrew speed command slave pump deceleration time	0.001 to 5.000s	0.001s	0.200s	☆
A3-47	Valve decompression enable delay	0.001 to 5.000s	0.001s	0.100s	☆
A3-48	Valve decompression Disable delay	0.001 to 5.000s	0.001s	0.100s	☆
A3-49	Pressure error lower threshold for valve decompression enable	0.0 to A3-02 (system pressure)	0.1 kg	0.0 kg	☆
A3-50	Pressure command lower threshold for valve decompression enable	0.0 to A3-02 (system pressure)	0.1 kg	0.0 kg	☆
A3-51	Current lower threshold for pressure sensor fault detection	20 to 300%	1%	100%	☆
A3-52	Speed upper threshold for pressure sensor fault detection	20 to 100%	1%	50.0%	☆
A3-53	Deceleration time of second set high flow	0.000 to 5.000s	0.001s	0.100s	☆
A3-54	Threshold of second set high flow	0 to 100.0%	0.1%	100.0%	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
A3-55	Pressure difference of stop valve pressure relief	0.0 to A3-02	0.1 V	0.0	☆
A3-56	Torque lower limit in zero torque mode	0.0 to 250.0	0.1	0.0	☆
A3-57	Upper threshold of pressure sensor fault	A3-58 to 11.000 V	0.001 V	10.000 V	☆
A3-58	Lower threshold of pressure sensor fault	0.000 V to A3-57	0.001 V	0 V	☆
A3-59	Judging time of voltage exceeding limit of pressure sensor	0.000s to 60.000s	0.001s	0s	☆
A3-60	Output signal selection of pressure sensor	0: 0 to 10 V/4 to 20 mA (need check the jumper) 1: 1 to 5 V 2: 1 to 6 V 3: 1 to 10 V 4: 0.25 to 10.25 V	1	0	☆
Group A4: Hydraulic Advanced					
A4-00	Current filter	0.000s to 5.000s	0.001s	0.005s	☆
A4-01	Speed filter	0.000s to 5.000s	0.001s	0.010s	☆
A4-02	Pressure command deceleration time 1	0.001s to 2.000s	0.001s	0.020s	☆
A4-03	Flow command acceleration time 1	0 to 5.000s	0.001s	0.100	☆
A4-04	Flow command deceleration time 1	0 to 5.000s	0.001s	0.100	☆
A4-06	Flow leakage compensation	0.0% to 50.0%	0.1%	0.0%	☆
A4-08	Reverse decompression min. pressure	0.0 kg/cm^2 to A3-02	0.1 kg/cm^2	0.0 kg/cm^2	☆
A4-09	Reverse decompression protection time	0.0s to 500.0s	0.1s	0.000s	☆
A4-10	Pressure command s-curve acceleration filter time 2	0.001s to 1.000s	0.001s	0.030s	☆
A4-11	Pressure command s-curve deceleration filter time 2	0.001s to 1.000s	0.001s	0.030s	☆
A4-12	Flow command acceleration time 2	0.001 to 5.000s	0.001s	0.100	☆
A4-13	Flow command deceleration time 2	0.001 to 5.000s	0.001s	0.100	☆
A4-14	Pressure command acceleration time 2	0.001 to 2.000s	0.001s	0.020s	☆
A4-15	Pressure command deceleration time 2	0.001 to 2.000s	0.001s	0.020s	☆
A4-16	Overshoot suppression detection factor 2	1 to 2000	1	200	☆
A4-17	Overshoot suppression factor 2	0.001 to 3.000s	0.001s	0.200s	☆
A4-18	Pressure command delay time 2	0.000s to 0.500s	0.001s	0.000s	☆
A4-22	Pressure error threshold for pressure suppression Disabling	0 to A3-02	0.1 kg	10.0 kg	☆
A4-23	Pressure error threshold for integral limitation	0 to A3-02	0.1 kg	45.0 kg	☆
A4-24	Integral limitation mode selection	0 to 1	1	0	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
A4-25	Increase of pressure loop max. Output	0 to 50.0	0.1s	2. 0	☆
A4-26	Pressure control PID switching mode selection	0: original algorithm 1: algorithm 1 2: algorithm 2 3: algorithm 3	1	3	★
A4-33	Integral factor 1 of algorithm 3	0 to 1.00	0.01	0.08	☆
A4-34	Integral factor 2 of algorithm 3	0 to 1.00	0.01	0.08	☆
A4-35	Integral factor 3 of algorithm 3	0 to 1.00	0.01	0.08	☆
A4-36	Integral factor 4 of algorithm 3	0 to 1.00	0.01	0.08	☆
Group F0: Basic Control					
F0-00	G/p selection	1: g 2: p	1	1	•
F0-01	Control mode	0: SVC 1: Closed loop vector control 2: V/F	1	1	★
F0-02	Command source selection	0: keypad 1: terminals 2: communication	1	0	☆
F0-03	Main frequency source x selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI1 3: AI2 4: AI3 5 to 8: reserved 9: communication	1	0	★
F0-08	Preset frequency	0.00 to F0-10	0.01 Hz	50.00 Hz	☆
F0-09	Running direction	0: same 1: reverse	1	0	★
F0-10	Max. frequency	50.00 to 300.00 Hz	0.01 Hz	200.00 Hz	★
F0-11	Frequency upper limit source	0: F0-12 1: AI1 2: AI2 3: AI3 4: reserve 5: communication	1	0	★
F0-12	Frequency upper limit	F0-14 to F0-10	Hz	200.00	☆
F0-13	Frequency upper limit offset	0.00 to F0-10	Hz	0.00	☆
F0-14	Frequency lower limit	0.00 to F0-12	Hz	0.00	☆
F0-15	Carrier frequency	1 to 8.0	kHz	Model dependent	☆
F0-16	Carrier frequency auto adjusting selection	0: Disable 1: enable	1	1	☆
F0-17	Acceleration time 1	0.0s to 6500.0s	0.1s	20.0s	☆
F0-18	Deceleration time 1	0.0s to 6500.0s	0.1s	20.0s	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
Group F1: Motor Parameters					
F1-00	Motor type selection	0: induction motor 1: frequency variable induction motor 2: PMSM	1	2	★
F1-01	Rated power	0.4 to 1000.0 kW	0.1 kW	Model dependent	★
F1-02	Rated voltage	0 to 480 V	1 V	Model dependent	★
F1-03	Rated current	0.0 to 6500.0 A	0.1 A	Model dependent	★
F1-04	Rated frequency	0.00 Hz to F0-10	0.01 Hz	Model dependent	★
F1-05	Rated rotating speed	0 to 30000 rpm	1 rmp	Model dependent	★
F1-11	D-axis inductance	0 to 65.535 mH	0.001 mh	Model dependent	★
F1-12	Q-axis inductance	0 to 65.535 mG	0.001 mh	Model dependent	★
F1-13	Stator resistance	0 to 65.535	0.001 Ω	Model dependent	★
F1-14	Motor manufacturer selection	0: none 1: manual motor angle input (A1-02) 2: reserved 3: Inovance motor 4: PHASE motor 5: HAI TIAN motor	1	0	☆
F1-15	Back-EMF	0 to 65535 V	1 V	Model dependent	★
F1-16	Motor auto-tuning method selection	0: no auto-tuning 1: no-load static 2: no-load dynamic, reverse running fast 3: with-load static 4: with-load dynamic, reverse running fast 5: no-load dynamic, forward running fast 6: no-load dynamic and short time, forward running fast	1	0	★
Group F2: Vector Control					
F2-00	Speed loop proportional gain kp1	1 to 400	1	60	☆
F2-01	Speed loop integral gain ki1	0.01s to 10.00s	0.01s	0.3s	☆
F2-02	Switching frequency 1 for speed loop gains	0.00 Hz to F2-05	0.01 Hz	5.00 Hz	☆
F2-03	Speed loop proportional gain kp2	1 to 400	1	60	☆
F2-04	Speed loop integral gain ki1	0.01s to 10.00s	0.01s	0.3s	☆
F2-05	Switching frequency 2 for speed loop gains	F2-02 to F0-10	0.01 Hz	10.00 Hz	☆
F2-07	Speed loop filter time	0.5 to 10.0 ms	0.1 ms	1.0 ms	☆
F2-08	Torque upper limit enable	0: speed control 1: torque control	0	0	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F2-09	Torque upper limit source selection	0: F2-10 1: AI1 2: AI2 3: AI3 4: reserved 5: communication	0	0	☆
F2-10	Torque upper limit	0.0% to 250.0%	0.1%	200.0%	☆
F2-29	Back EMF compensation	0: disable 1: enable	1	0	★
Group F3: V/F Control					
F3-00	V/F curve setting	0: linear V/F 1: multi-point V/F 2: square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: reserved 10: V/F complete separation 11: V/F half separation	0	0	★
F3-01	Torque boost	0.0% to 30.0%	0.1%	1.0%	☆
F3-02	Cut-off frequency of torque boost	0.00 Hz to F0-10	0.01 Hz	50.00 Hz	★
F3-03	Multi-point V/F frequency 1	0.00 Hz to F3-05	0.01 Hz	0.00 Hz	★
F3-04	Multi-point V/F voltage 1	0.0% to 100.0%	0.1%	0.0%	★
F3-05	Multi-point V/F frequency 2	0.00 Hz to F3-07	0.01 Hz	0.00 Hz	★
F3-06	Multi-point V/F voltage 2	0.0% to 100.0%	0.1%	0.0%	★
F3-07	Multi-point V/F frequency 3	0.00 Hz to F1-04	0.01 Hz	0.00 Hz	★
F3-08	Multi-point V/F voltage 3	0.0% to 100.0%	0.1%	0.0%	★
F3-09	V/F slip compensation	0.0% to 200.0%	0.1%	0.0%	☆
F3-10	V/F over-excitation gain	0 to 200	1	64	☆
F3-11	V/F oscillation suppression gain	0 to 100	1	40	☆
F3-12	V/F oscillation suppression mode selection	0 to 3	1	3	★
F3-13	Voltage source for V/F separation	0 to 8	1	0	★
F3-14	Digital setting of voltage for V/F separation	0 to F1-02	0	0	★
F3-15	Voltage rise time of V/F separation	0 to 1000.0	0.1	0	☆
F3-16	Voltage decline time of V/F separation	0 to 1000.0	0.1	0	★
F3-17	Stop mode selection for V/F separation	0 to 1	1	0	★
F3-18	Current limit level	0 to 200	1	130	★
F3-19	Current limit selection	0 to 1	1	1	☆
F3-20	Current limit gain	0 to 100	1	20	☆
F3-21	Compensation factor of speed multiplying current limit level	50 to 200	1	50	★
F3-22	Voltage limit	650.0 to 800.0 V	0.1 V	780.0 V	★

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F3-23	Voltage limit selection	0 to 1	1	1	★
F3-24	Frequency gain for voltage limit	0 to 100	1	30	☆
F3-25	Voltage gain for voltage limit	0 to 100	1	30	☆
F3-26	Frequency rise threshold during voltage limit	0 to 50	1	5	★
F3-27	Slip compensation time constant	0.1 to 10.0	0.1	0.5	☆
F3-28	Auto frequency boost enable	0 to 1	1	0	★
F3-29	Minimum torque current	10 to 100	1	50	★
F3-30	Maximum torque current	10 to 100	1	20	★
F3-31	Auto frequency boost kp	0 to 100	1	50	☆
F3-32	Auto frequency boost kp	0 to 100	1	50	☆
F3-33	Online torque compensation gain	80 to 150	1	100	★
Group F4: Input Terminals					
F4-00	DI1 function selection	0: no function 1: Forward run (FWD) (oil pump enable) 2: Reverse run (REV) 3: 3 wire control 4: jog forward 5: jog reverse 6 to 7: reserved 8: coast to stop 9: fault reset 10: reserved 11: external fault(normally open) 12 to 17: reserved 18 frequency source switch 19 to 32: reserved 33: external fault(normally closed) 34 to 38: reserved 39: switch from frequency source x to preset frequency 40: switch from frequency source y to preset frequency 41 to 47: reserved 48: PID selection 1 49: PID selection 2 50: can communication enable 51: slave pump enable 52: switch from pressure mode to speed mode (torque upper limit = AI1/max. voltage x A3-30) 53: slave pump address selection 1 54: slave pump address selection 2 55: switch from injection to pressure holding 56: error reset(except overcurrent) 57: switch from pressure mode to speed mode (torque upper limit = F2-10)	1	1	★
F4-01	DI2 function selection		1	48	★
F4-02	DI3 function selection		1	53	★
F4-03	DI4 function selection		1	9	★
F4-04	DI5 function selection		1	50	★
F4-05	Reserved		1	0	★
F4-06	Reserved		1	0	★
F4-07	Reserved		1	0	★
F4-15	DI filter time	1 to 10	1	4	☆
F4-18	AI1 min. Input	-11.00 to 11.00 V	0.01 V	0.02 V	☆
F4-19	AI1 min. Input frequency	-100.0% to 100.0%	0.1%	0.0%	☆
F4-20	AI1 max. Input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
F4-21	AI1 max. Input frequency	-100.0% to 100.0%	0.1%	100.0%	☆
F4-22	AI1 filter time	0.000s to 10.000s	0.001s	0.01s	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F4-23	AI2 min. Input	-11.00 to 11.00 V	0.01 V	0.02 V	☆
F4-24	AI2 min. Inp frequency	-100.0% to 100.0%	0.1%	0.0%	☆
F4-25	AI2 max. Input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
F4-26	AI2 max. Input frequency	-100.0% to 100.0%	0.1%	100.0%	☆
F4-27	AI2 filter time	0.000s to 10.000s	0.001s	0.005s	☆
F4-28	AI3 min. Input	-11.00 to 11.00 V	0.01 V	0.02 V	☆
F4-29	AI3 min. Input frequency	-100.0% to 100.0%	0.1%	0.0%	☆
F4-30	AI3 max. Input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
F4-31	AI3 max. Input frequency	-100.0% to 100.0%	0.1%	100.0%	☆
F4-32	AI3 filter time	0.000s to 10.000s	0.001s	0.000s	☆
F4-43	AI1 Display value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-44	AI1 measured value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-45	AI1 Display value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F4-46	AI1 measured value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F4-47	AI2 Display value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-48	AI2 measured value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-49	AI2 Display value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F4-50	AI2 measured value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F4-51	AI3 Display value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-52	AI3 measured value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F4-53	AI3 Display value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F4-54	AI3 measured value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
Group F5: Output Terminals					
F5-01	T/a1-t/b1-t/c1 function selection	0: no function 1: drive is running 2: fault output 3 to 5: reserved 6: motor overload warning 7: drive overload warning 8 to 11: reserved 12: time is out 13 to 14: reserved 15: drive is ready 16: abs AI1 value is bigger than abs AI2 value after correction 17 to 19: reserved 20: communication control 21 to 22: reserved 23: Displacement switch of dual displacements piston pump (normally open) 24: pressure control (normally close) 25: slave pump warning 26: Displacement switch of dual Displacements piston pump (normally open) 27: DC bus voltage established 28: business preset running time out 29: business preset running time less than 24 hours 30: maximum reverse speed 31: warning 32: KTY temperature reached	1	2	☆
F5-02	T/a2-t/c2 function selection		1	23	☆
F5-03	DO1 function selection		1	24	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F5-10	AO1 function selection	0: running frequency 1: frequency reference 2: output current 3: output torque 4: output power 5: output voltage 6: reserved 7: AI1 8: AI2 9: AI3 10: feedback speed 11: feedback pressure 14: by communication control 12 to 16: reserved	1	10	☆
F5-11	AO2 function selection		1	11	☆
F5-14	AO1 offset factor	-100.0% to 100.0%	0.1%	0.0%	☆
F5-15	AO1 gain	-10.00 to 10.00	0.01	1.00	☆
F5-16	AO2 offset factor	-100.0% to 100.0%	0.1%	0.0%	☆
F5-17	AO2 gain	-10.00 to 10.00	0.01	1.00	☆
F5-23	AO1 measured value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F5-24	AO1 calculated value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F5-25	AO1 measured value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F5-26	AO1 calculated value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F5-27	AO2 measured value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F5-28	AO2 calculated value 1	-9.999 to 9.999 V	0.001 V	2.000 V	☆
F5-29	AO2 measured value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
F5-30	AO2 calculated value 2	-9.999 to 9.999 V	0.001 V	8.000 V	☆
Group F6: Stopping					
F6-10	Stopping mode	0: deceleration to stop 1: coast to stop	1	0	☆
Group F7: Keypad and Display					
F7-02	The function of stop/reset key on keypad	0: only the key can stop motor 1: in terminal control, the key can stop motor 2.in terminal control, the key can reset fault 3: in terminal control, the key can stop motor and reset fault	1	2	☆
F7-06	Load linear speed display factor	0.0001 to 6.5000	0.0001	1.0000	☆
F7-07	IGBT temperature	-1000°C to 1000°C	1°C		●
F7-09	Total running time	0 to 65535 h	1 h	-	●
F7-10	Firmware version 1	-	-	-	●
F7-11	Firmware version 2	-	-	-	●
F7-12	Temporary firmware version 1	-	-	-	●
F7-13	Temporary firmware version 2	-	-	-	●

Para. No.	Para. Name	Setting Range	Unit	Default	Property
Group F8: Auxiliary Functions					
F8-17	Preset running time	0 to 65000 h	1 h	0 h	☆
F8-18	Protection enable upon startup	0: Disable 1: enable	1	0	☆
F8-22	Ground fault detection enable upon power on	0: Disable 1: enable	1	1	☆
F8-23	Selection for reactions of preset running time out	0: Disable 1: enable	1	0	☆
F8-24	Undervoltage level(the voltage of input)	148.5 to 321.7 V	0.1 V	247.5 V	☆
F8-25	Braking operation duration limit	0.0s to 3600.0s	0.1s	5.0s	☆
F8-26	Braking resistor protection	0: Disable 1: enable	1	1	☆
F8-27	Output ground fault protection upon starting	0: Disable 1: enable	1	0	☆
F8-28	Output phase loss protection upon starting	0: Disable 1: enable	1	1	☆
F8-29	Braking resistor overload protection	0: Disable 1: enable	0 to 1	1	☆
Group F9: Protection and Fault					
F9-00	Motor overload protection	0: disable 1: enable	1	0	☆
F9-01	Motor overload protection factor	0.20 to 10.00	0.01	2.00	☆
F9-08	Braking level	700 to 800 V	1 V	750 V	☆
F9-12	Input phase loss detection enable	0: disable 1: enable	1	1	☆
F9-13	Output phase loss detection enable	0: Disable 1: enable	1	1	☆
F9-14	Speed error protection threshold	0.50 to 50.00 Hz	0.01 Hz	10.00 Hz	☆
F9-15	Speed error protection time	0.0s to 20.0s	0.1s	10.0s	☆
F9-16	Motor temperature protection enable	0: Disable 1: enable	1	1	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F9-18	The third last fault	0: no fault 1: reserved 2: overcurrent (E02) 3: overcurrent (E03) 4: overcurrent (E04) 5: overvoltage (E05) 6: overvoltage (E06) 7: overvoltage (E07) 8: reserved 9: undervoltage (E09) 10: drive overload (E10) 12: input phase loss (E12) 13: output phase loss (E13) 14: heatsink overheat (E14) 15: external fault (E15) 16: modbus fault (E16) 17: contactor fault (E17) 18: current sensing fault (E18) 19: motor tuning fault (E19) 20: reserved (E20) 21: EEPROM fault (E21) 22: reserved (E22) 23: ground fault (E23) 24 to 25: reserved 26: time is out (E26) 27: bussiness time is out (E27) 28 to 39: reserved 40: multi times overcurrent (E40) 41: reserved 42: can communication fault (E42) 43: resolver tuning fault (E43) 44: speed error protection fault (E44) 45: motor overheat (E45) 46: pump sensor fault (E46) 47: slave fault warning (E47) 48: can address conficting (E48) 49: resolver loose wiring (E49) 52: multi masters fault (E52) 58: user parameter restore fault (E58) 59: back EMF error (E59) 61: braking overtime (E61) 62: braking IGBT fault (E62) 63: reverse running time out (E63) 66: braking resistor fault (E66) 67: function code initialization fault (E67)	1	-	●
F9-19	The second last fault		1	-	●
F9-20	The last fault		1	-	●
F9-21	Frequency upon the last fault	-	-	-	●
F9-22	Current upon the last fault	-	-	-	●
F9-23	Bus voltage upon the last fault	-	-	-	●
F9-24	DI status upon the last fault	-	-	-	●
F9-25	DO status upon the last fault	-	-	-	●
F9-26	The subtype of the last fault	-	-	-	●
F9-30	Frequency upon the second last fault	-	-	-	●
F9-31	Current upon the second last fault	-	-	-	●
F9-32	Bus voltage upon the second last fault	-	-	-	●
F9-33	DI status upon the second last fault	-	-	-	●
F9-34	DO status upon the second last fault	-	-	-	●

Para. No.	Para. Name	Setting Range	Unit	Default	Property
F9-35	The subtype of the second last fault	-	-	-	●
F9-39	Frequency upon the third last fault	-	-	-	●
F9-40	Current upon the third last fault	-	-	-	●
F9-41	Bus voltage upon the third last fault	-	-	-	●
F9-42	DI status upon the third last fault	-	-	-	●
F9-43	DO status upon the third last fault	-	-	-	●
F9-44	The subtype of the third last fault	-	-	-	●
F9-48	KTY temperature reached	0 to 300.0	0.1	0	☆
F9-58	KTY temperature	-40.0 to 300.0	0.1	-	●
F9-59	KTY overheat fault threshold	-40.0 to 300.0	0.1	130.0	☆
Group FA: Business Countdown Function					
FA-00	Password of first countdown setting	0 to 65535	1	0	☆
FA-01	First countdown	0 to 65535 h	1 h	0	☆
FA-02	Password of second countdown setting	0 to 65535	1	0	☆
FA-03	Second countdown	0 to 65535 h	1 h	0	☆
FA-04	Password of third countdown setting	0 to 65535	1	0	☆
FA-05	Third countdown	0 to 65535 h	1 h	0	☆
FA-06	Password of forth countdown setting	0 to 65535	1	0	☆
FA-07	Forth countdown	0 to 65535 h	1 h	0	☆
FA-08	Business running time in total(hour)	0 to 65535 h	1 h	0	●
FA-09	Business running time in total(second)	0s to 3600s	1s	0	●
Group FB Optimization					
FB-04	Overcurrent prevention enable	0: Disable 1: enable	1	1	★
Group FC: Multi-point Calibration					
FC-00	Multi-point AI calibration enable	0: no calibration 1: AI1 enable 2: AI2 enable 3: AI1 and AI2 enable	0	0	★
FC-01	Minimum AI1 input	-11.00 to 11.00 V	0.01 V	0.02 V	☆
FC-02	Correspondent value of minimum AI1 input	-100.0% to 100.0%	0.1%	0.0%	☆
FC-03	AI1 point 1 input	-11.00 to 11.00 V	0.01 V	1.00 V	☆
FC-04	Correspondent value of AI1 point 1 input	-100.0% to 100.0%	0.1%	10.0%	☆
FC-05	AI1 point 2 input	-11.00 to 11.00 V	0.01 V	2.00 V	☆
FC-06	Correspondent value of AI1 point 2 input	-100.0% to 100.0%	0.1%	20.0%	☆
FC-07	AI1 point 3 input	-11.00 to 11.00 V	0.01 V	3.00 V	☆
FC-08	Correspondent value of AI1 point 3 input	-100.0% to 100.0%	0.1%	30.0%	☆
FC-09	AI1 point 4 input	-11.00 to 11.00 V	0.01 V	4.00 V	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
FC-10	Correspondent value of AI1 point 4 input	-100.0% to 100.0%	0.1%	40.0%	☆
FC-11	AI1 point 5 input	-11.00 to 11.00 V	0.01 V	5.00 V	☆
FC-12	Correspondent value of AI1 point 5 input	-100.0% to 100.0%	0.1%	50.0%	☆
FC-13	AI1 point 6 input	-11.00 to 11.00 V	0.01 V	6.00 V	☆
FC-14	Correspondent value of AI1 point 6 input	-100.0% to 100.0%	0.1%	60.0%	☆
FC-15	AI1 point 7 input	-11.00 to 11.00 V	0.01 V	7.00 V	☆
FC-16	Correspondent value of AI1 point 7 input	-100.0% to 100.0%	0.1%	70.0%	☆
FC-17	AI1 point 8 input	-11.00 to 11.00 V	0.01 V	8.00 V	☆
FC-18	Correspondent value of AI1 point 8 input	-100.0% to 100.0%	0.1%	80.0%	☆
FC-19	AI1 point 9 input	-11.00 to 11.00 V	0.01 V	9.00 V	☆
FC-20	Correspondent value of AI1 point 9 input	-100.0% to 100.0%	0.1%	90.0%	☆
FC-21	AI1 point 10 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-22	Correspondent value of AI1 point 10 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-23	AI1 point 11 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-24	Correspondent value of AI1 point 11 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-25	AI1 point 12 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-26	Correspondent value of AI1 point 12 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-27	AI1 point 13 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-28	Correspondent value of AI1 point 13 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-29	AI1 point 14 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-30	Correspondent value of AI1 point 14 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-31	AI1 point 15 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-32	Correspondent value of AI1 point 15 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-33	AI1 point 16 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-34	Correspondent value of AI1 point 16 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-35	AI1 point 17 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-36	Correspondent value of AI1 point 17 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-37	Maximum AI1 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-38	Correspondent value of maximum AI1 input	-100.0% to 100.0%	0.1%	100.0%	☆
FC-39	Minimum AI1 input	-11.00 to 11.00 V	0.01 V	0.02v	☆
FC-40	Correspondent value of minimum AI2 input	-100.0% to 100.0%	0.1%	0.0%	☆
FC-41	AI2 point 1 input	-11.00 to 11.00 V	0.01 V	1.00v	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
FC-42	Correspondent value of AI2 point 1 input	-100.0% to 100.0%	0.1%	10.0%	☆
FC-43	AI2 point 2 input	-11.00 to 11.00 V	0.01 V	2.00v	☆
FC-44	Correspondent value of AI2 point 2 input	-100.0% to 100.0%	0.1%	20.0%	☆
FC-45	AI2 point 3 input	-11.00 to 11.00 V	0.01 V	3.00v	☆
FC-46	Correspondent value of AI2 point 3 input	-100.0% to 100.0%	0.1%	30.0%	☆
FC-47	AI2 point 4 input	-11.00 to 11.00 V	0.01 V	4.00v	☆
FC-48	Correspondent value of AI2 point 4 input	-100.0% to 100.0%	0.1%	40.0%	☆
FC-49	AI2 point 5 input	-11.00 to 11.00 V	0.01 V	5.00v	☆
FC-50	Correspondent value of AI2 point 5 input	-100.0% to 100.0%	0.1%	50.0%	☆
FC-51	AI2 point 6 input	-11.00 to 11.00 V	0.01 V	6.00v	☆
FC-52	Correspondent value of AI2 point 6 input	-100.0% to 100.0%	0.1%	60.0%	☆
FC-53	AI2 point 7 input	-11.00 to 11.00 V	0.01 V	7.00v	☆
FC-54	Correspondent value of AI2 point 7 input	-100.0% to 100.0%	0.1%	70.0%	☆
FC-55	AI2 point 8 input	-11.00 to 11.00 V	0.01 V	8.00v	☆
FC-56	Correspondent value of AI2 point 8 input	-100.0% to 100.0%	0.1%	80.0%	☆
FC-57	AI2 point 9 input	-11.00 to 11.00 V	0.01 V	9.00v	☆
FC-58	Correspondent value of AI2 point 9 input	-100.0% to 100.0%	0.1%	90.0%	☆
FC-59	Maximum AI2 input	-11.00 to 11.00 V	0.01 V	10.00 V	☆
FC-60	Correspondent value of maximum AI2 input	-100.0% to 100.0%	0.1%	100.0%	☆
Group FD: Bus communication and PC Software Setting					
FD-00	Baud rate	0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps	1	5	☆
FD-01	Data format symbol	0: no parity check (8-n-2) 1: even parity check 2: odd parity check 3: no parity check (8-n-1)	1	0	☆
FD-02	Local address	0 to 247	1	1	☆
FD-03	Response delay	0 to 20 ms	1 ms	2 ms	☆
FD-04	Communication timeout	0.0s to 60.0s	0.1s	0.0s	☆
FD-30	PC software communication enable	0: Disable 1: enable	1	0.0	☆
FD-31	Channel 1 selection	0 to 999	1	10	☆

Para. No.	Para. Name	Setting Range	Unit	Default	Property
FD-32	Channel 1 selection	0 to 999	1	10	☆
FD-33	Channel 1 selection	0 to 999	1	10	☆
FD-34	Channel 1 selection	0 to 999	1	10	☆
FD-35	Sampling period	0 to 65535	1	1	☆
FD-36	Object of trigger a	0 to 999	1	1	☆
FD-37	Condition of trigger a	0 to 2	1	0	☆
FD-38	Level of trigger a	0 to 65535	1	0	☆
FD-39	Object of trigger b	0 to 999	1	1	☆
FD-40	Condition of trigger b	0 to 2	1	0	☆
FD-41	Level of trigger b	0 to 65535	1	0	☆
FD-42	Switch of trigger a/b	0: a 1: b	1	0	☆
FD-43	Carrier period of data saving	0 to 65535	1	0	★
FD-44	Fault code	0 to 65535	1	0	★
FD-45	Setting value of data saving	0 to 2	1	0	☆
FD-46	Data retrieve area selection	0: ram 1: flash	1	0	☆
FD-47	Flash rewritten selection	0 to 1	1	1	☆
Group FE: User-defined Parameters					
FE-00	User-defined parameter 0	F0.00 to FP.xx A0.00 to A4.xx U0.00 to U1.xx	-	-	☆
FE-01	User-defined parameter 1		-	-	☆
FE-02	User-defined parameter 2		-	-	☆
FE-03	User-defined parameter 3		-	-	☆
FE-04	User-defined parameter 4		-	-	☆
FE-05	User-defined parameter 5		-	-	☆
FE-06	User-defined parameter 6		-	-	☆
FE-07	User-defined parameter 7		-	-	☆
FE-08	User-defined parameter 8		-	-	☆
FE-09	User-defined parameter 9		-	-	☆
FE-10	User-defined parameter 10		-	-	☆
FE-11	User-defined parameter 11		-	-	☆
FE-12	User-defined parameter 12		-	-	☆
FE-13	User-defined parameter 13		-	-	☆
FE-14	User-defined parameter 14		-	-	☆
FE-15	User-defined parameter 15		-	-	☆
Group FP: Password and Parameter Operation					
FP-00	User password	0 to 65535	1	0	☆
FP-01	Parameter initialization	0: no operation 1: restore factory parameters 2: clear records 3: restore back-up user parameter 4: restore factory parameters except A2-01 5: restore factory parameters except FA and FP	1	0	★

Para. No.	Para. Name	Setting Range	Unit	Default	Property
FP-02	Motor model number	0 to 65535	1	0	★
FP-04	User parameter password	0 to 65535	1	0	☆
FP-05	Back up user parameters	0: no operation 1: back up	1	0	★
FP-06	Bilingual (EN/CH) HMI specification	0 to 65535	1	0	☆
Group AF: Communication Process Data (Visible onlu in CANopen)					
AF-00	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-02	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-04	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-06	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-08	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-10	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-12	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-14	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-16	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-18	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-20	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-22	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-24	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-26	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-28	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-30	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-32	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-34	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-36	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-38	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-40	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-42	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-44	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-46	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-48	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-50	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-52	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-54	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-56	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-58	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-60	Communication process data	0 to 0xffffffff	1	H.0000	☆
AF-62	Communication process data	0 to 0xffffffff	1	H.0000	☆

5.3 Monitoring Parameter List

Para. No.	Para. Name	Setting range	Unit
Group U0: Drive Status Monitoring			
U0-00	Running frequency	-650.00 to 650.00	0.01 Hz
U0-01	Frequency reference	-650.00 to 650.00	0.01 Hz
U0-02	DC bus voltage	0.0 to 1000.0 V	0.1 V
U0-03	Output voltage	0 V to F02.03	1 V
U0-04	Output current	0.1 to 6553.5 A	0.1 A
U0-05	Output power	0.4 to 1000.0 kW	0.1 kW
U0-06	Output torque	0% to 200%	0.1
U0-07	Basic DI/DO status	-	-
U0-08	Extended DI/DO status	-	-
U0-09	AI1 voltage(after correction)	-10.00 to 10.000 V	0.001 V
U0-10	AI2 voltage(after correction)	-10.00 to 10.000 V	0.001 V
U0-11	AI3 voltage(after correction)	-10.00 to 10.000 V	0.001 V
U0-12	Resolver mechanical angle	1 to 4096	1
U0-13	Reserved	-	-
U0-14	Motor speed	-9999 to 32767 rpm	1
U0-15 to U0-18	Reserved	-	-
U0-19	Speed reference	-9999 to 32767 rpm	1rmp
U0-20	Frequency feedback of motor (q15 format)	0 to 65535	1
U0-21 to U0-24	Reserved	-	-
U0-25	Overload value in total	0 to 36000	1.0
U0-28	Current upon overcurrent fault	0.01 to 655.35 A	0.01 A
U0-29	Overcurrent fault type	1: hardware 2: firmware	1
U0-30	AI1 voltage(before correction)	-10.000 to 10.000 V	0.001 V
U0-31	AI2 voltage(before correction)	-10.000 to 10.000 V	0.001 V
U0-32	AI3 voltage(before correction)	-10.000 to 10.000 V	0.001 V
U0-33	Reserved	-	-
U0-34	AO1 voltage	0.000 to 10.000 V	0.001 V
U0-35	AO2 voltage	0.000 to 10.000 V	0.001 V
U0-36	Motor e-angle	0.0° to 359.9°	0.1°
U0-37	Pressure command	0.0 kg/cm^2 to A3-02	0.1 kg/cm^2
U0-38	Pressure feedback	0.0 kg/cm^2 to A3-02	0.1kg/cm^2
U0-39	Speed command	-9999 to 30000 rpm	1 rmp
U0-40	Speed feedback	-9999 to 30000 rpm	1 rmp
U0-41	Motor speed feedback	0 to 65535	1
U0-42	Resolver interference status	0 to 65535	1
U0-43	Reserved	-	-
U0-44	Reserved	-	-
U0-45	Motor KTY temperature	-40.0°C to 200.0 °C	-
U0-46	Received can frames	0 to 65535	1
U0-47	Faulty frames of can sending	0 to 65535	1
U0-48	Faulty frames of can receiving	0 to 65535	1

Para. No.	Para. Name	Setting range	Unit
U0-49	Off-line times of can bus	0 to 65535	1
U0-55	Extension card type	0 to 65535	1
U0-56	Extension card firmware version	0 to 65535	1
Group U1: Hydraulic Pressure Monitoring			
U1-00	Electrical angle	0.0° to 359.9°	0.1°
U1-01	Pressure command	0.0 kg/cm^2 to A3-02	0.1
U1-02	Pressure feedback	0.0 kg/cm^2 to A3-02	0.1
U1-03	Motor speed feedback	-9999 to 30000 rpm	1 rmp
U1-04	AI1 voltage	-9.999 to 9.999 V	0.001 V
U1-05	AI2 voltage	-9.999 to 9.999 V	0.001 V
U1-06	AI3 voltage	-9.999 to 9.999 V	0.001 V
U1-07	AI1 zero drift	-9.99 to 9.99 V	0.01 V
U1-08	AI2 zero drift	-9.99 to 9.99 V	0.01 V
U1-09	AI3 zero drift	-9.99 to 9.99 V	0.01 V
U1-10	Flow command	0.00 Hz to F0-10	0.01 Hz
U1-11	Resolver signal interference extent	0 to 1000 (off-line)	1
U1-12	Pressure command from host computer	0.0 kg/cm^2 to A3-02	0.1
U1-13	CANLink communication interference extent	0 to 128 (off-line)	1

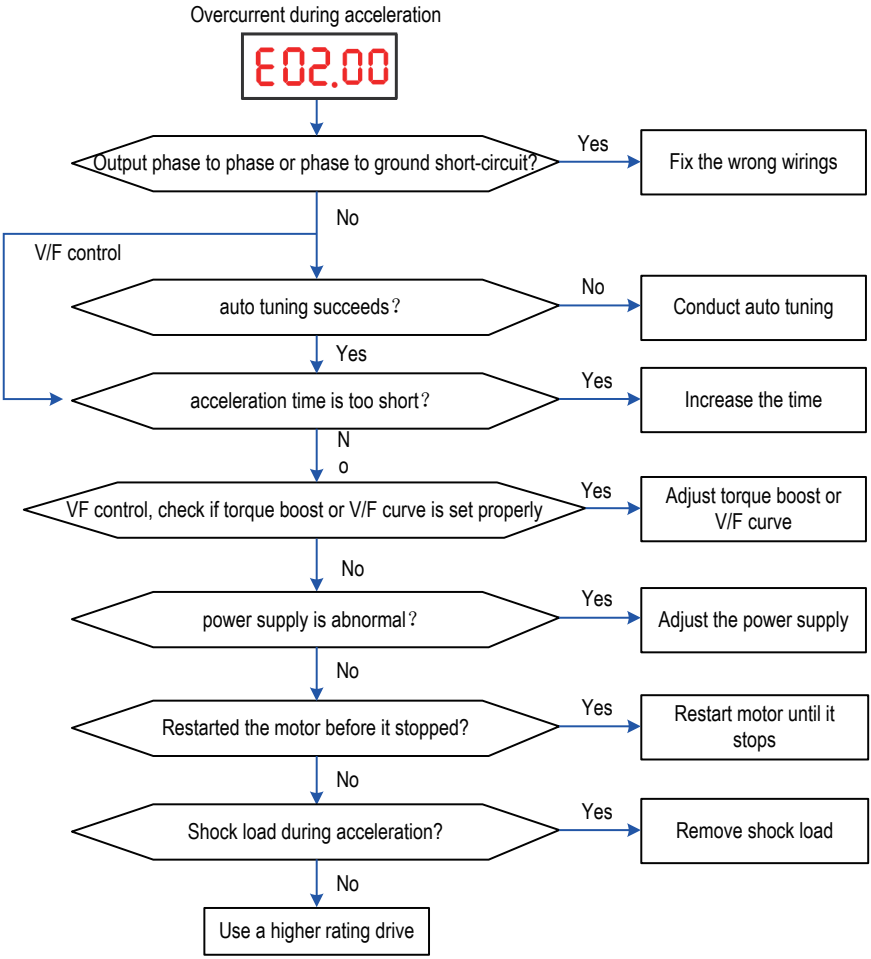
6 Troubleshooting

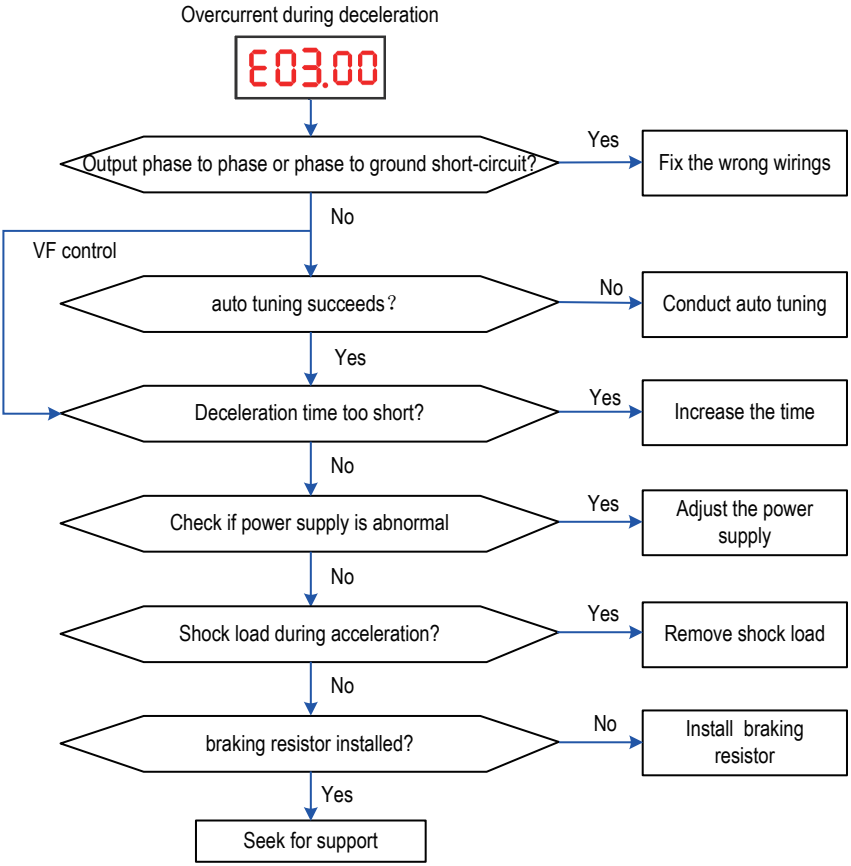
6.1 Servo Fault Codes and Solutions

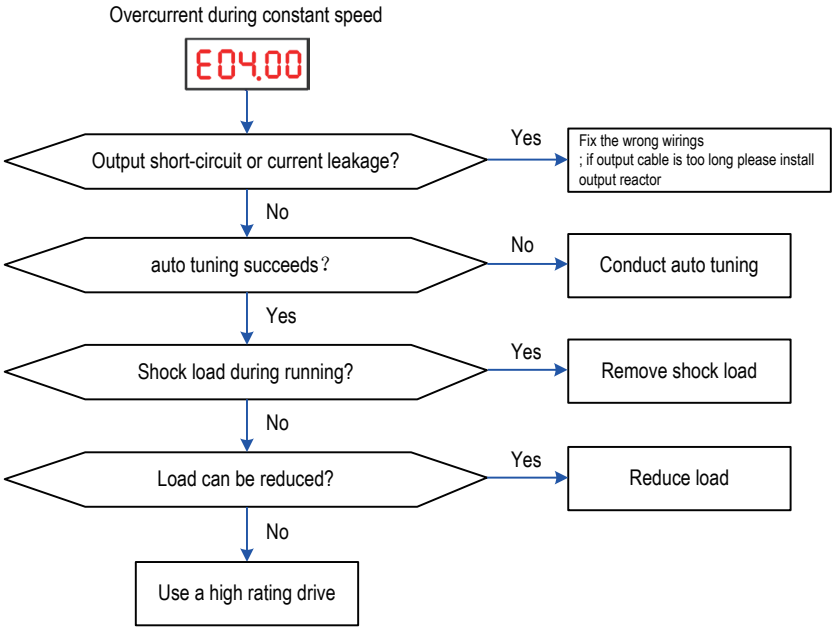
Fault name	Display	Reasons	Solutions
Overcurrent during acceleration		Output current exceeds hardware limit	Please refer to following diagram
Overcurrent during deceleration		Output current exceeds hardware limit	Please refer to following diagram
Overcurrent during constant speed		Output current exceeds hardware limit	Please refer to following diagram
Overvoltage during acceleration		DC BUS voltage exceeds overvoltage level	Please refer to following diagram
Overvoltage during deceleration		DC BUS voltage exceeds overvoltage level	Please refer to following diagram
Overvoltage during constant speed		DC BUS voltage exceeds overvoltage level	Please refer to following diagram
Pre-charge resistor fault		Pre-charge resistor works more than once in short period	disconnect power supply and seek for maintenance
Undervoltage		DC BUS voltage lower than undervoltage level	Please refer to following diagram
Drive overload		Drive is overloaded	Please refer to following diagram
		Speed sensor is faulty	Set A1-05=2s and start speed sensor self check
Input phase loss		RST power supply loses one phase or is unbalance	Please refer to following diagram
Output phase loss		Output phases lost upon starting	Please refer to following diagram
IGBT overheat		IGBT overheat	Please refer to following diagram
External fault		External fault input(through DI)	Please refer to following diagram
Communication fault		MODBUS communication fault	Please refer to following diagram
Pre-charge relay fault		Pre-charge relay fault	Disconnect power supply and seek for maintenance
Current sensing fault		Current sensing is abnormal	Disconnect power supply and seek for maintenance
Motor auto tuning overtime		Auto tuning is overtime	Please refer to following diagram
Auto tuning speed feedback fault		Auto tuning speed feedback fault	Please refer to following diagram
EEPROM fault		EEPROM is broken	Disconnect power supply and seek for maintenance
Motor ground fault		Overcurrent during power on	1.check if motor winding is short-circuit to ground, consider change motor cable or even motor. 2.disconnect power supply and seek for maintenance

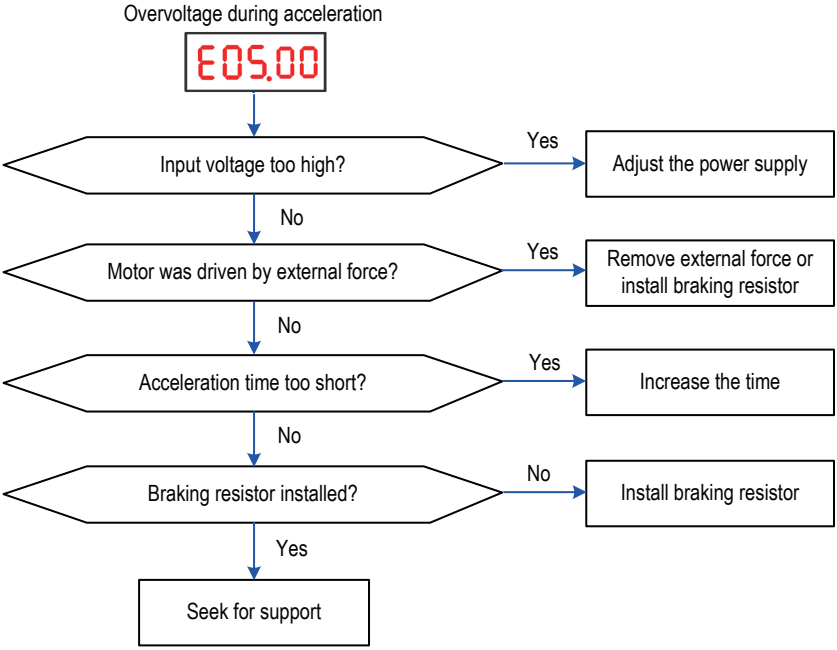
Fault name	Display	Reasons	Solutions
Motor ground fault		Motor runs fast during power on	Do not connect power supply until motor stops
Output phase to phase short-circuit fault		Output phase to phase is short-circuited	Please check the outputs
Time out		Time is out	Please refer to following diagram
Business time out		Business setting time is out	Please refer to following diagram
Overcurrent multi prevention fault		Overcurrent multi prevention fault	Please refer to following diagram
CAN communication fault		Communication gets interrupted	1. check if BUS wirings have loose connection or wrong connection 2.check if BUS shielding is well connected, or if BUS cable is longer than limit
		Commnunication gets interfered	
		The communication never gets online	1.check if A2-00.A2-01 are setting correctly 2.check if BUS wirings have loose connection or wrong connection
		BUS card fault	Disconnect power supply and seek for maintenance
		Canlink address conflicts	Set address A2-01 correctly
		Canlink address setting fault	Set address A2-01 correctly
		Canopen fault	Sisconnect power supply and seek for maintenance
Speed sensor fault during motor auto-tuning		Speed sensor fault during motor auto tuning	Please refer to following diagram
Speed error fault		Speed error exceeds limit	Please refer to following diagram
		Drive parameter setting fault	Increase F2-10
		Speed sensor fault	Disconnect power supply and seek for maintenance
		Drive parameter setting fault and speed sensor fault	1.Increase F2-10 2.Disconnect power supply and seek for maintenance
Motor temperature fault		Motor PTC overheat	Please refer to following diagram
		Temperature sensor disconnected	Check if motor temperature sensor is connected
		PG card flat cable fault	1.check if PG card flat cable is well connected 2.check if motor temperature sensor is short-circuit
		Motor KTY overheat	Please refer to following diagram

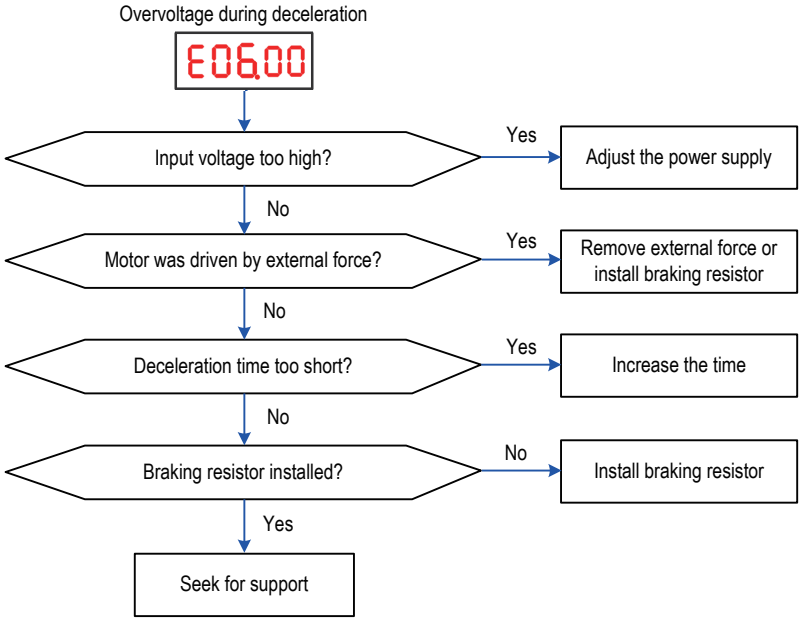
Fault name	Display	Reasons	Solutions
Pressure sensor fault		Pressure sensor is faulty	Please refer to following diagram
		Motor rotor gets locked or pump gets stuck	1.check if rotor can be turned by hand 2.check if F2-10 sets properly 3.check if auto tuning can be conducted
		Pressure sensor calibration fault	1.check if pressure feedback is around zero 2.check if pressure sensor is well connected 3.check if F4-28 to 31 are set properly
		Pressure sensor output is beyond setting range	Pressure sensor output is beyond setting range [A3-55, A3-56], please check the sensor
Slave fault		Slave fault	Refer to <multi pumps solution> in User manual
Communication address conflict		Communication address conflict	Refer to <multi pumps solution> in User manual
Speed sensor fault		Speed sensor disconnected	Please refer to following diagram
		Speed sensor interfered	
Multi-master fault		Multi masters	Refer to <multi pumps solution> in User manual
User parameter restoring fault		Restore without saving user parameters	Please refer to following diagram
Back EMF fault during auto tuning		From dynamic tuning, back EMF is smaller than lower limit	Please refer to following diagram
Braking IGBT works overtime		Braking IGBT works overtime	Please refer to following diagram
		Braking resistor disconnected	Check if braking resistor is well connected, and set F8-26 to start self check
Braking IGBT overload		Braking IGBT short-circuit	Disconnect power supply and seek for maintenance
		Braking IGBT gets overloaded	1. check if braking resistor is shirt-circuit, and if the resistance is proper □ 2. Check if DC BUS voltage is normal□ 3. Disconnect power supply and seek for maintenance
Reverse running time out		Reverse running time reaches A4-09	Please refer to following diagram
Braking resistor fault		Braking resistor disconnected	1. Check wirings 2. If braking resistor is unnecessary, then set F8-26 = 0
		Braking resistor resistance smaller than minimum	1.replace with a proper resistor
Parameter initialization fault		Parameter initialization fault	Disconnect power supply and seek for maintenance

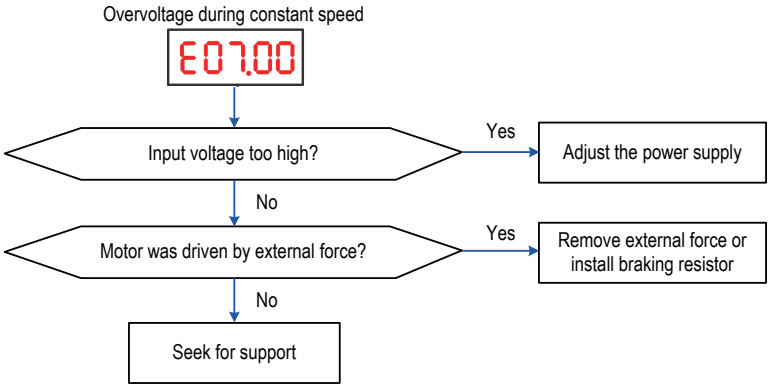

Overcurrent during acceleration
E02.00
Output phase to phase or phase to ground short-circuit?
Yes
Fix the wrong wirings
No
V/F control
auto tuning succeeds?
No
Conduct auto tuning
Yes
acceleration time is too short?
Yes
Increase the time
N
o
VF control, check if torque boost or V/F curve is set properly
Yes
Adjust torque boost or V/F curve
No
power supply is abnormal?
Yes
Adjust the power supply
No
Restarted the motor before it stopped?
Yes
Restart motor until it stops
No
Shock load during acceleration?
Yes
Remove shock load
No
Use a higher rating drive

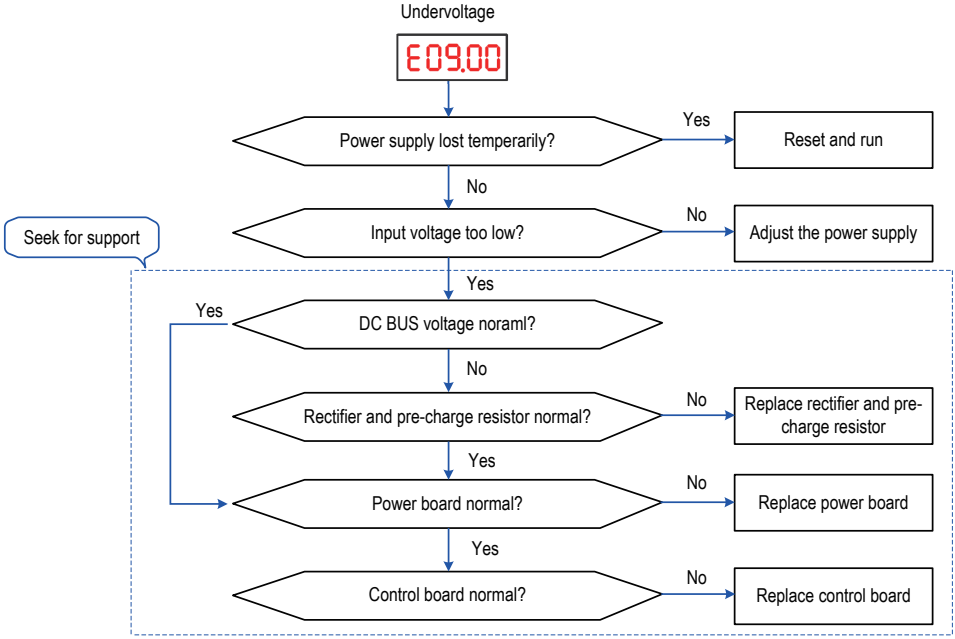

Overcurrent during deceleration
E03.00
Output phase to phase or phase to ground short-circuit?
Yes
Fix the wrong wirings
No
VF control
auto tuning succeeds?
No
Conduct auto tuning
Yes
Deceleration time too short?
Yes
Increase the time
No
Check if power supply is abnormal
Yes
Adjust the power supply
No
Shock load during acceleration?
Yes
Remove shock load
No
braking resistor installed?
No
Install braking resistor
Yes
Seek for support

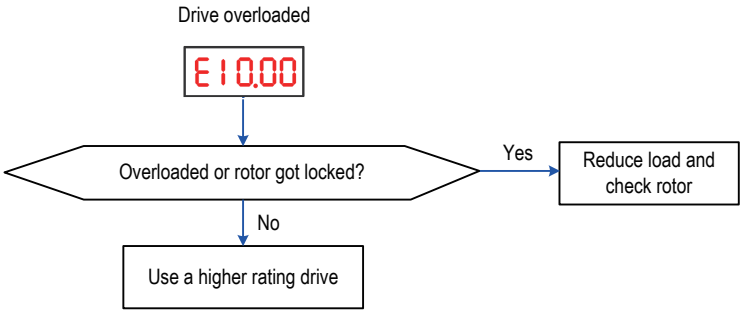

Overcurrent during constant speed
E04.00
Output short-circuit or current leakage?
Yes
Fix the wrong wirings
; if output cable is too long please install output reactor
No
auto tuning succeeds?
No
Conduct auto tuning
Yes
Shock load during running?
Yes
Remove shock load
No
Load can be reduced?
Yes
Reduce load
No
Use a high rating drive

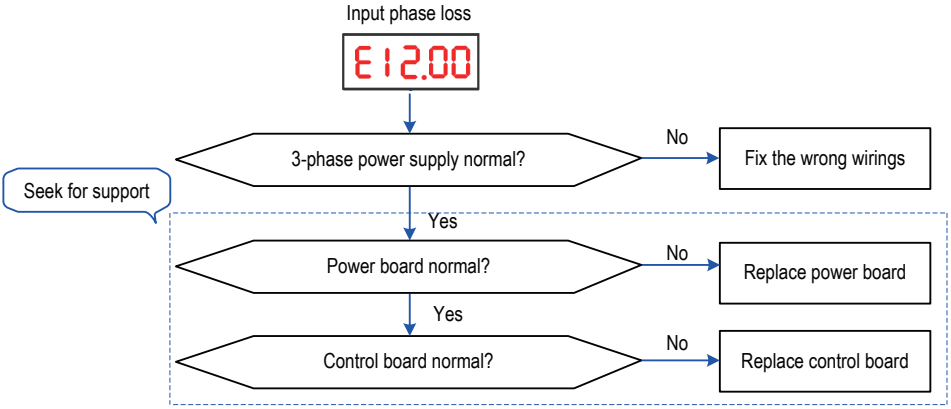

Overvoltage during acceleration
E05.00
Input voltage too high?
Yes
Adjust the power supply
No
Motor was driven by external force?
Yes
Remove external force or install braking resistor
No
Acceleration time too short?
Yes
Increase the time
No
Braking resistor installed?
No
Install braking resistor
Yes
Seek for support

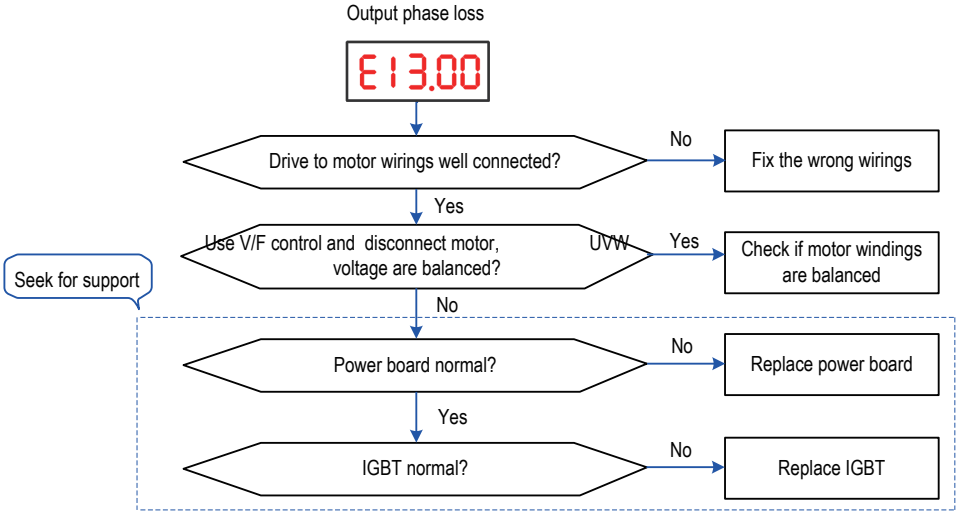

Overvoltage during deceleration
E06.00
Input voltage too high?
Yes
Adjust the power supply
No
Motor was driven by external force?
Yes
Remove external force or install braking resistor
No
Deceleration time too short?
Yes
Increase the time
No
Braking resistor installed?
No
Install braking resistor
Yes
Seek for support

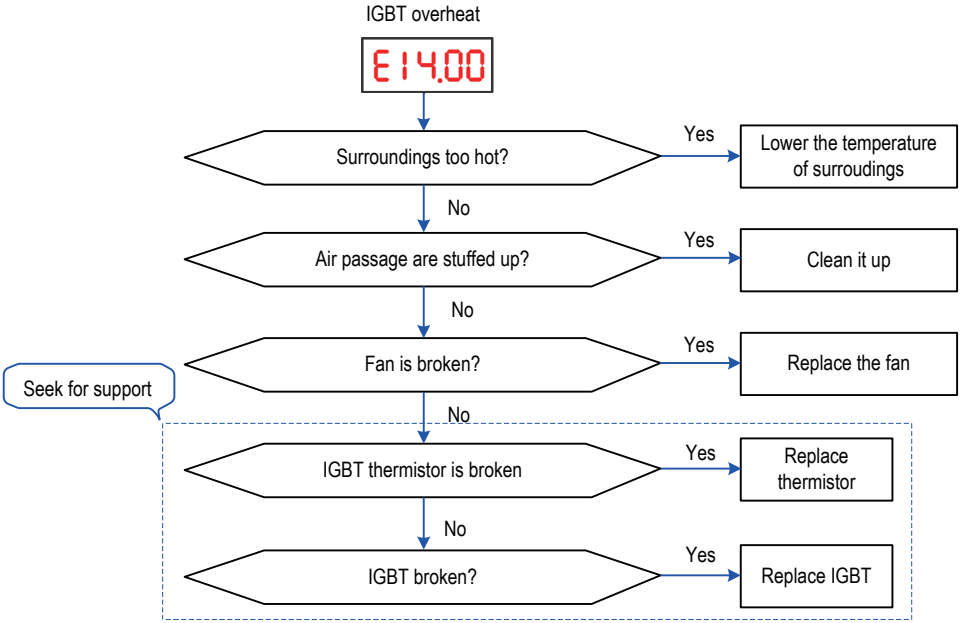

Overvoltage during constant speed
E07.00
Input voltage too high?
Yes
Adjust the power supply
No
Motor was driven by external force?
Yes
Remove external force or install braking resistor
No
Seek for support

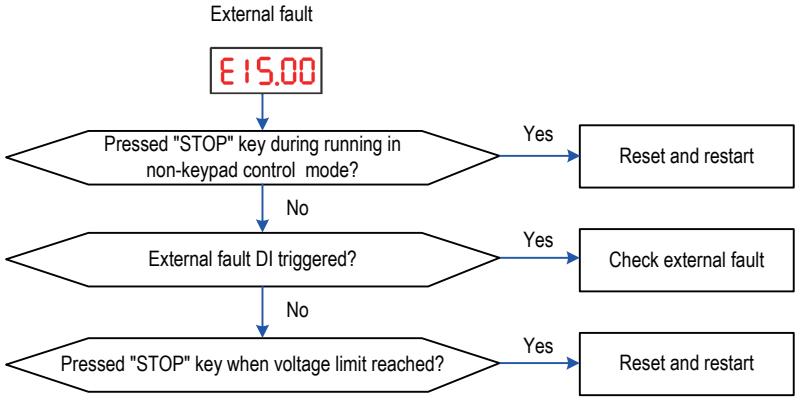

Undervoltage
E09.00
Power supply lost temperarily?
Yes
Reset and run
No
Input voltage too low?
No
Adjust the power supply
Seek for support
Yes
DC BUS voltage noraml?
Yes
No
Rectifier and pre-charge resistor normal?
No
Replace rectifier and pre-charge resistor
Yes
Power board normal?
No
Replace power board
Yes
Control board normal?
No
Replace control board

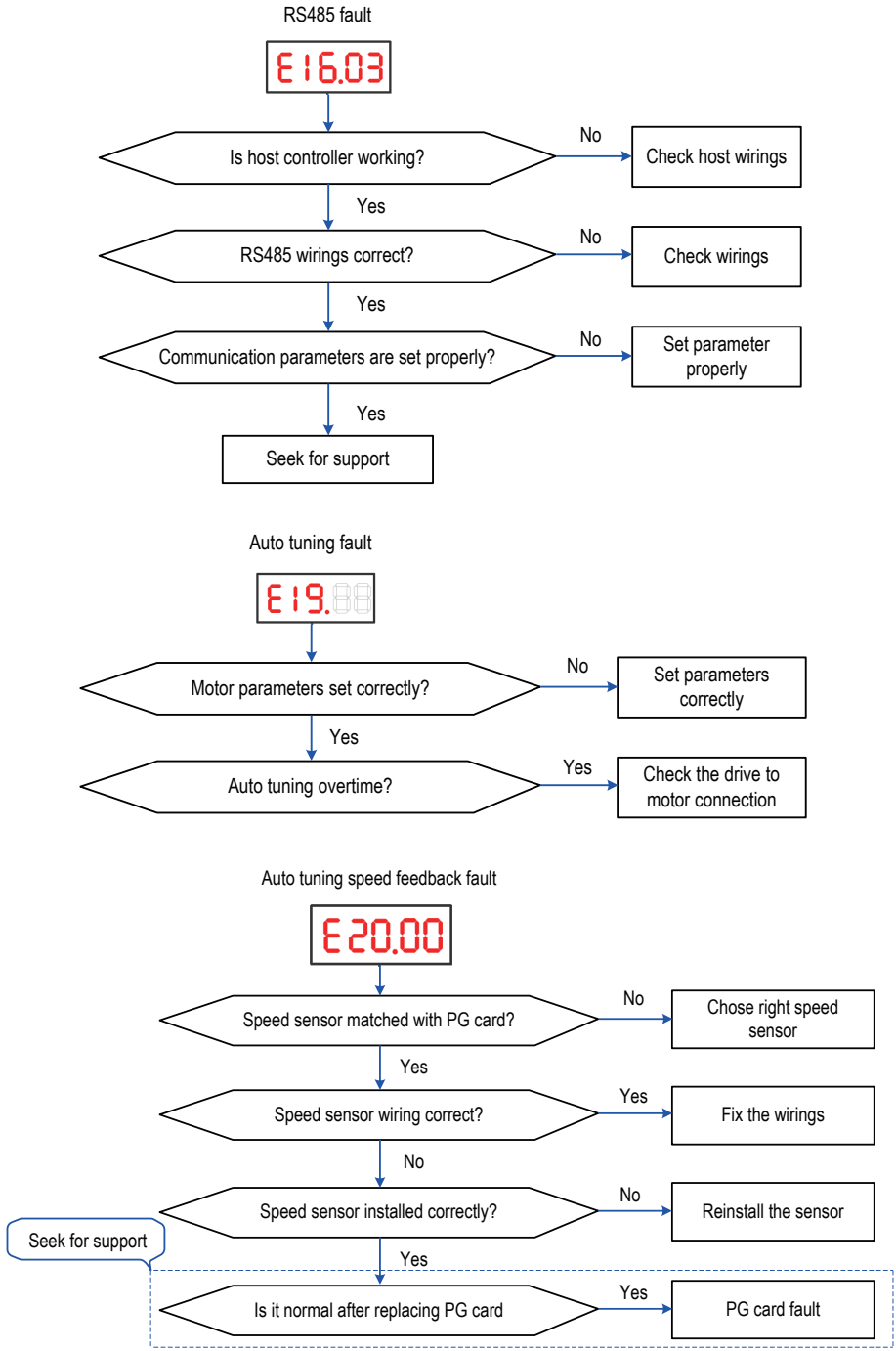

Drive overloaded
E10.00
Overloaded or rotor got locked?
Yes
Reduce load and check rotor
No
Use a higher rating drive

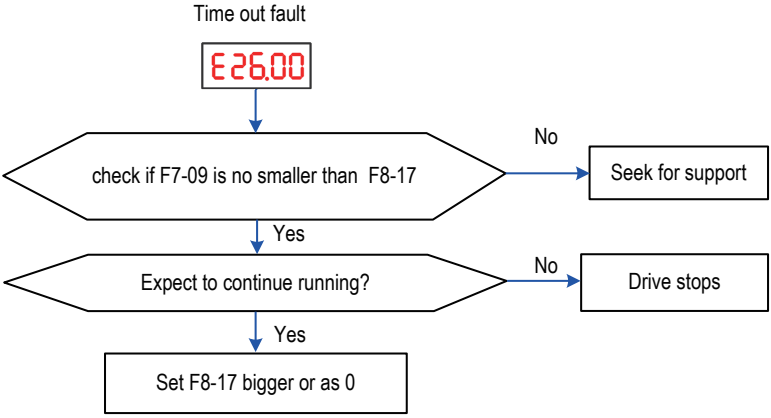

Input phase loss
E12.00
3-phase power supply normal?
No
Fix the wrong wirings
Seek for support
Yes
Power board normal?
No
Replace power board
Yes
Control board normal?
No
Replace control board

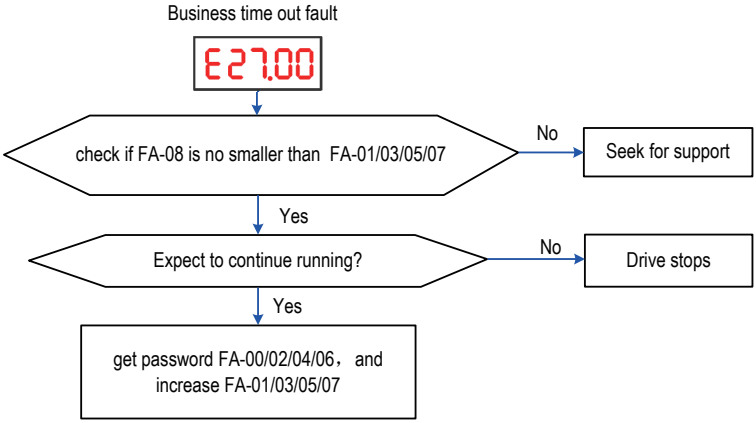

Output phase loss
E13.00
Drive to motor wirings well connected?
No
Fix the wrong wirings
Yes
Use V/F control and disconnect motor, voltage are balanced?
UVW
Yes
Check if motor windings are balanced
Seek for support
No
Power board normal?
No
Replace power board
Yes
IGBT normal?
No
Replace IGBT

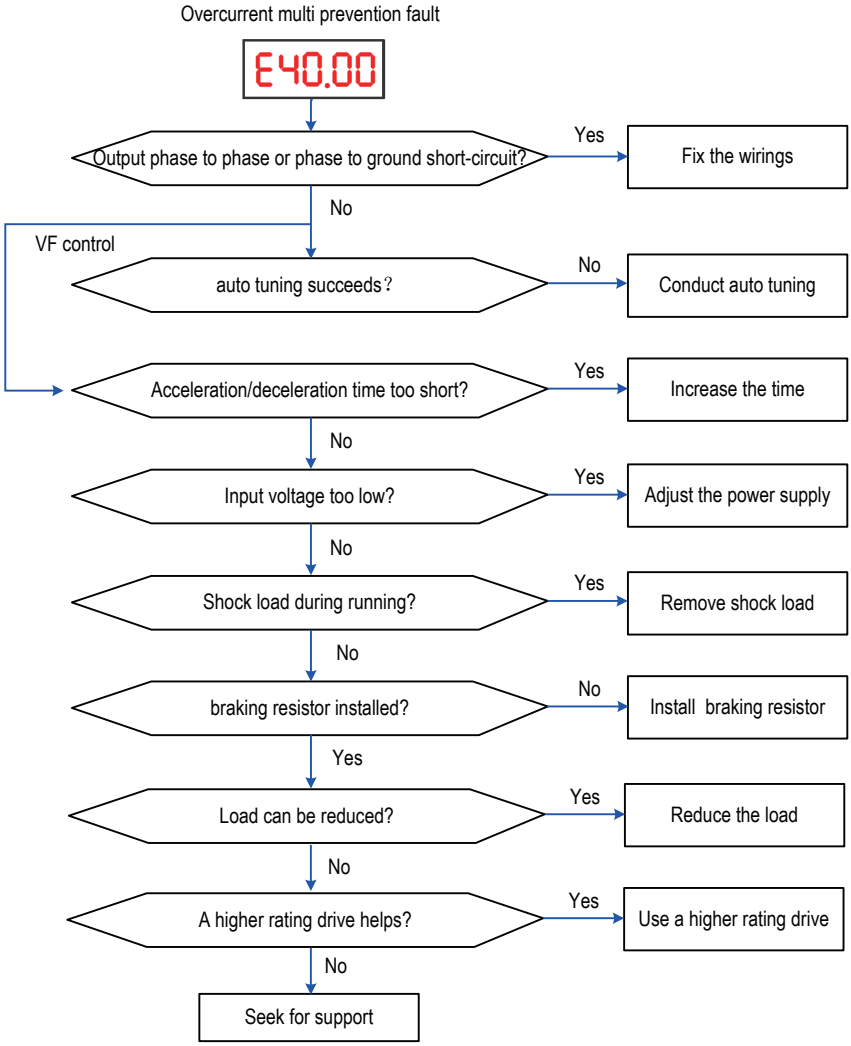

IGBT overheat
E14.00
Surroundings too hot?
Yes
Lower the temperature of surroudings
No
Air passage are stuffed up?
Yes
Clean it up
No
Fan is broken?
Yes
Replace the fan
Seek for support
No
IGBT thermistor is broken
Yes
Replace thermistor
No
IGBT broken?
Yes
Replace IGBT


External fault
E15.00
Pressed "STOP" key during running in non-keypad control mode?
Yes
Reset and restart
No
External fault DI triggered?
Yes
Check external fault
No
Pressed "STOP" key when voltage limit reached?
Yes
Reset and restart

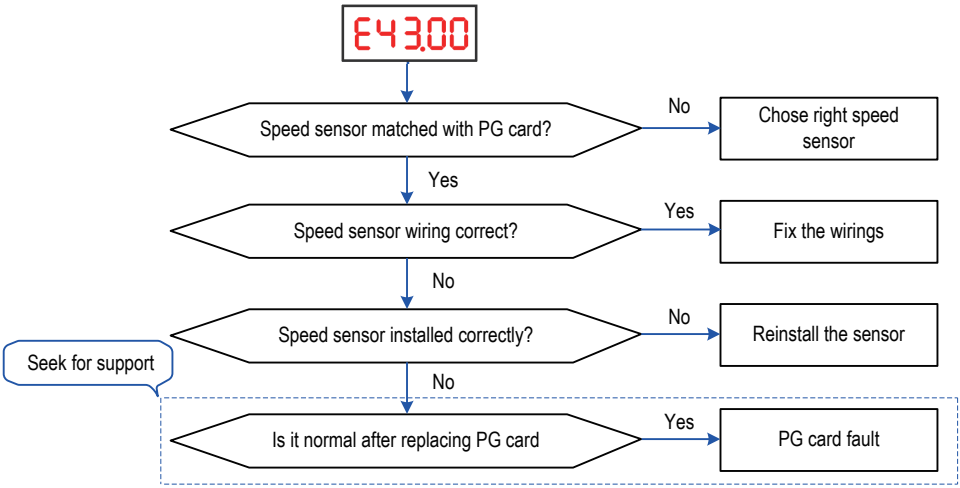

RS485 fault
E16.03
Is host controller working?
No
Check host wirings
Yes
RS485 wirings correct?
No
Check wirings
Yes
Communication parameters are set properly?
No
Set parameter properly
Yes
Seek for support
Auto tuning fault
E19.
Motor parameters set correctly?
No
Set parameters correctly
Yes
Auto tuning overtime?
Yes
Check the drive to motor connection
Auto tuning speed feedback fault
E20.00
Speed sensor matched with PG card?
No
Chose right speed sensor
Yes
Speed sensor wiring correct?
Yes
Fix the wirings
No
Speed sensor installed correctly?
No
Reinstall the sensor
Seek for support
Yes
Is it normal after replacing PG card
Yes
PG card fault


Time out fault
E26.00
check if F7-09 is no smaller than F8-17
No
Seek for support
Yes
Expect to continue running?
No
Drive stops
Yes
Set F8-17 bigger or as 0

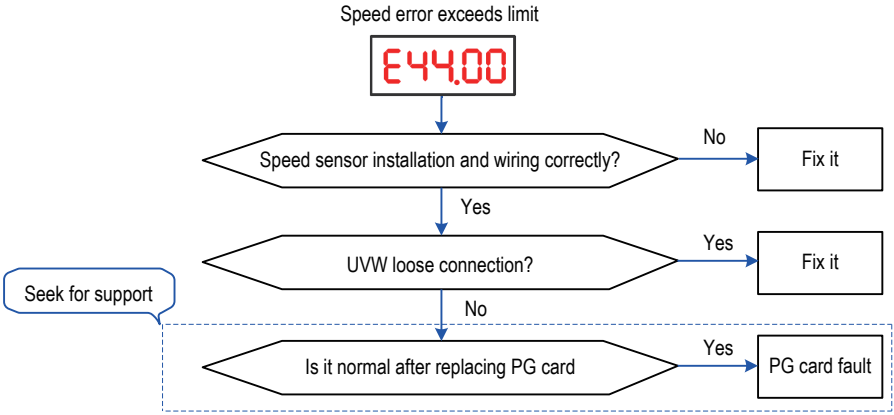

Business time out fault
E27.00
check if FA-08 is no smaller than FA-01/03/05/07
No
Seek for support
Yes
Expect to continue running?
No
Drive stops
Yes
get password FA-00/02/04/06， and
increase FA-01/03/05/07

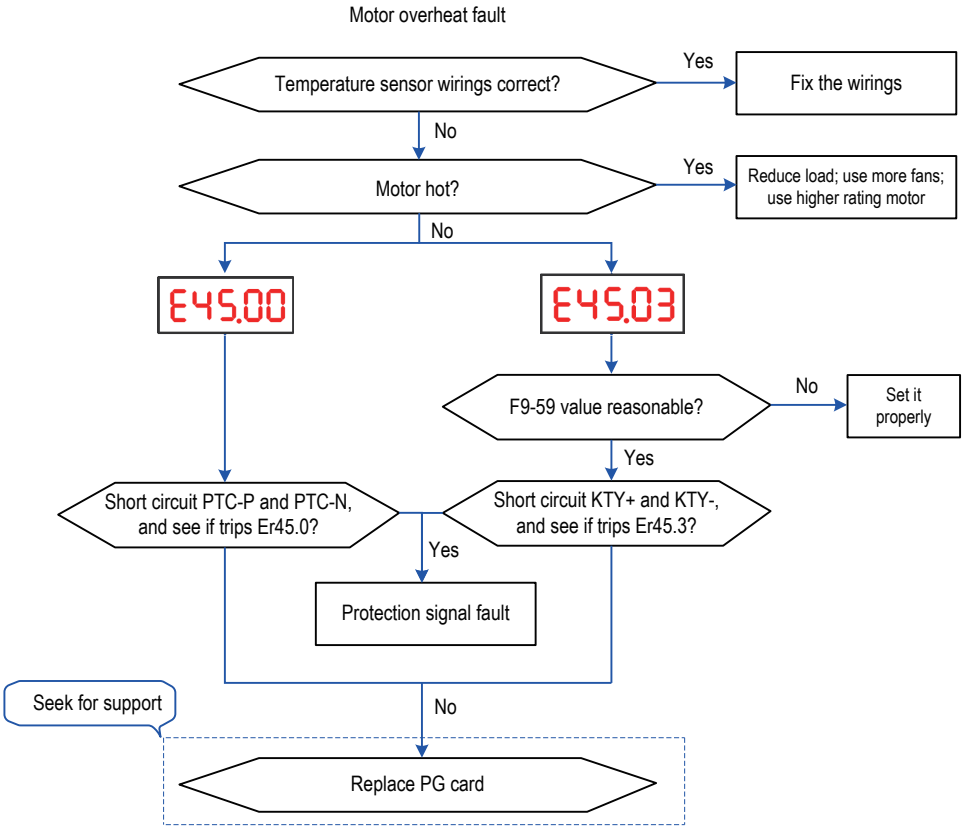

Overcurrent multi prevention fault
E40.00
Output phase to phase or phase to ground short-circuit?
Yes
Fix the wirings
No
VF control
auto tuning succeeds?
No
Conduct auto tuning
Acceleration/deceleration time too short?
Yes
Increase the time
No
Input voltage too low?
Yes
Adjust the power supply
No
Shock load during running?
Yes
Remove shock load
No
braking resistor installed?
No
Install braking resistor
Yes
Load can be reduced?
Yes
Reduce the load
No
A higher rating drive helps?
Yes
Use a higher rating drive
No
Seek for support

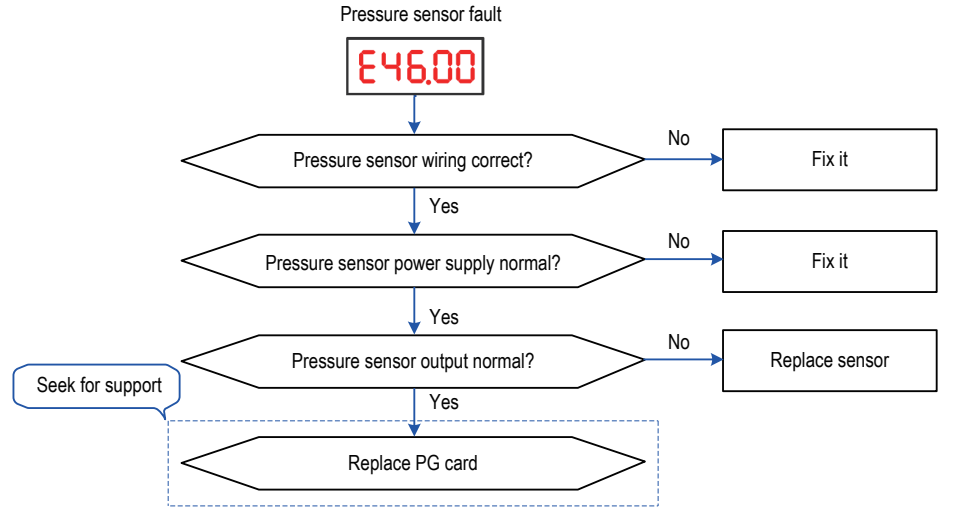
Speed sensor fault during auto tuning

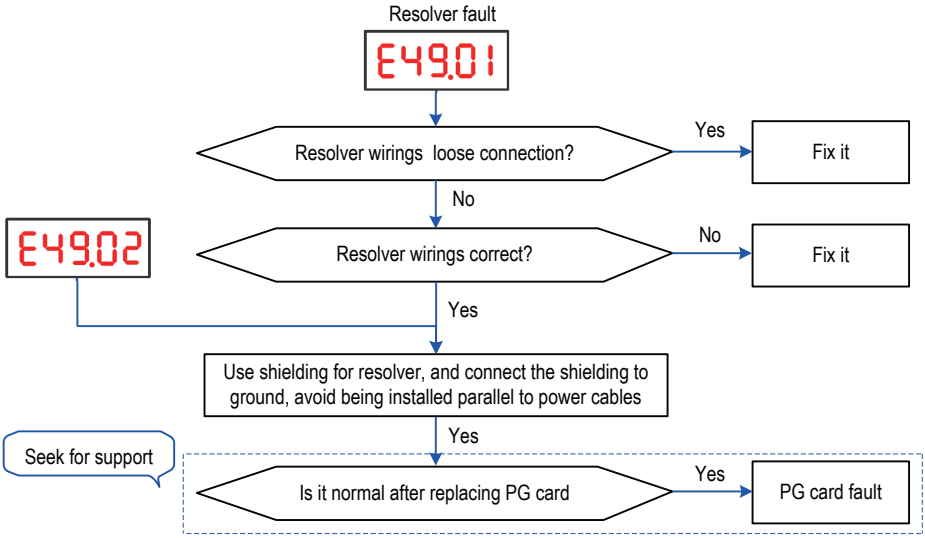


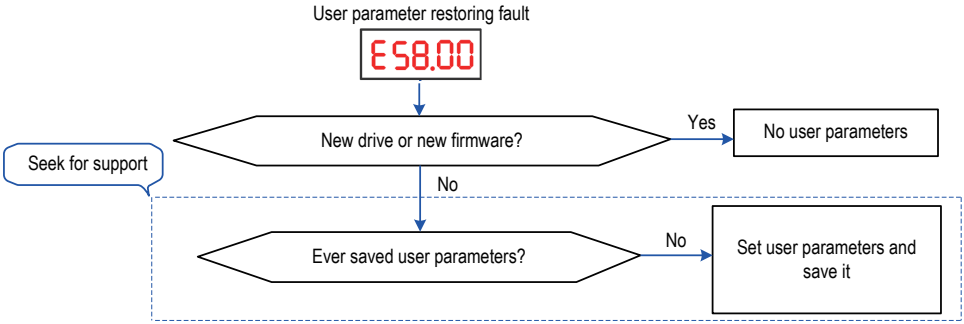
Speed error exceeds limit

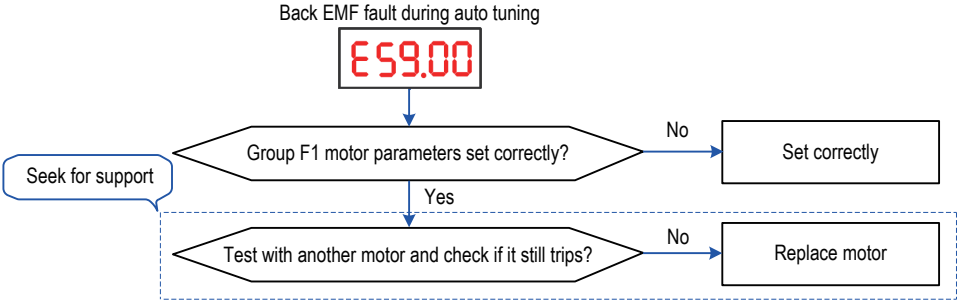


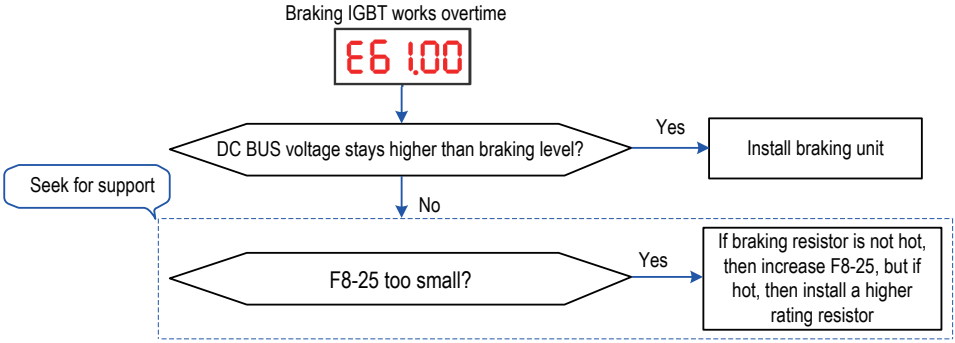

Motor overheat fault
Temperature sensor wirings correct?
Yes
Fix the wirings
No
Motor hot?
Yes
Reduce load; use more fans; use higher rating motor
No
E45.00
E45.03
F9-59 value reasonable?
No
Set it properly
Yes
Short circuit PTC-P and PTC-N, and see if trips Er45.0?
Short circuit KTY+ and KTY-, and see if trips Er45.3?
Yes
Protection signal fault
Seek for support
No
Replace PG card

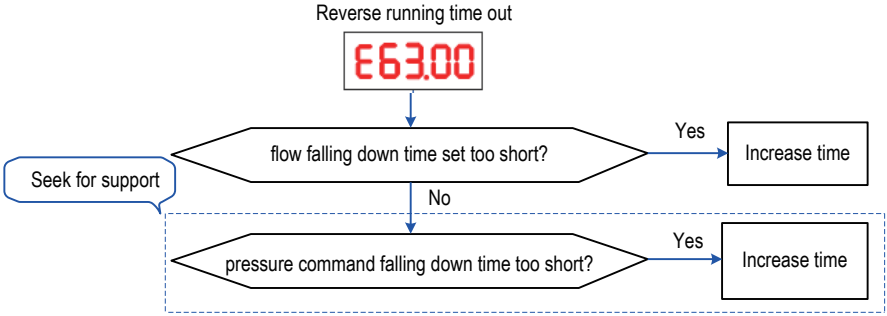

Pressure sensor fault
E46.00
Pressure sensor wiring correct?
No
Fix it
Yes
Pressure sensor power supply normal?
No
Fix it
Yes
Pressure sensor output normal?
No
Replace sensor
Seek for support
Yes
Replace PG card


Resolver fault
E49.01
Resolver wirings loose connection?
Yes
Fix it
No
E49.02
Resolver wirings correct?
No
Fix it
Yes
Use shielding for resolver, and connect the shielding to ground, avoid being installed parallel to power cables
Yes
Seek for support
Is it normal after replacing PG card
Yes
PG card fault


User parameter restoring fault
E58.00
New drive or new firmware?
Yes
No user parameters
Seek for support
No
Ever saved user parameters?
No
Set user parameters and save it


Back EMF fault during auto tuning
E59.00
Group F1 motor parameters set correctly?
No
Set correctly
Seek for support
Yes
Test with another motor and check if it still trips?
No
Replace motor





Note	E47 and E48 are multi-pump related faults, please refer to <multi pumps solution> User Manual.

6.2 Servo Common Symptoms and Diagnostics

Fault Name	Possible Causes	Solutions
There is no display at power-on.	The Mains voltage is not input or too low.	Check the power supply.
	The switching power supply on drive board of the servo drive is faulty.	Check bus voltage. Check that the 24v output and +10v output on the control board are normal.
	Wires between control board and drive board and between control board and operating panel break.	Re-connect the 8-pin wire and 40-pin wire.
	Pre-charge resistor of the servo drive is damaged.	Contact Inovance.
	Control board or operating panel is faulty.	
	Rectifier bridge is damaged.	
HC is displayed at power-on.	Wire between drive board and control board is in poor contact.	Re-connect the 8-pin wire and 28-pin wire.
	Related components on control board are damaged	Contact Inovance.
	The motor or motor cable is short circuited to ground.	
	The hall is damaged.	
	The Mains voltage is too low.	
The display is normal upon power-on, but HC is displayed after start and the motor stops immediately.	The cooling fan is damaged or locked-rotor occurs.	Replace the fan.
	Short circuit exists in wiring of control terminals.	Eliminate short circuit fault in control circuit wiring.
The motor does not rotate after the servo drive runs.	It is motor or motor cable problem.	Check that wiring between servo drive and motor is normal.
	Related servo drive and motor parameters are set improperly.	Restore the factory parameters and re-set the following parameters properly: · Encoder parameters · Motor ratings, such as rate motor frequency and rated motor speed · Motor 1 control mode (F0-01) and command source selection (F0-02) · F3-01 (torque boost) in V/F control under heavy-load start.
	Cable connection between drive board and control board is in poor contact.	Re-connect wirings and ensure secure connection.
	The drive board is faulty.	Contact Inovance.
The DI terminals are Disabled.	Related parameters are set incorrectly.	Check and set parameters in group f4 again.
	External signals are incorrect.	Re-connect external signal cables.
	Jumper across op and +24 v becomes loose.	Re-confirm the jumper bar across op and +24 v.
	The control board is faulty.	Contact Inovance.
Motor speed Does not rise in FVC control.	Encoder is faulty.	Replace encoder and re-confirm cable connection.
	Encoder connection is incorrect or in poor contact.	Reconnect the encoder to ensure in good contact.
	PG card is faulty.	Replace the PG card.
	Drive board is faulty.	Contact Inovance.
The servo drive detects overcurrent and overvoltage frequently.	Motor parameters are set improperly.	Set motor parameters or perform motor auto-tuning again.
	Acceleration/deceleration time is improper.	Set proper acceleration/deceleration time.
	Load fluctuates.	Contact Inovance.

7. ISMG Servo Motor

7.1 Designation Rules

ISM G1-30D 15C D-R1 3 1 F A

Mark	Series No.
ISM	ISM Series servo motor

Mark	Features
G1	200 x 200 base
G2	266 x 266 base

Mark	Rated Power
2 digits + 1 letter	
A	x 1
B	x 10
C	x 100
D	x 1000
E	x 10000
Example: 15C: 1500 W 30D: 30000 W	

Mark	Rated Speed
2 digits + 1 letter	
A	x 1
B	x 10
C	x 100
D	x 1000
E	x 10000
Example: 15C: 1500 RPM 20C: 2000 RPM	

Mark	Voltage Class
D	380 V

Mark	Encoder Type
R1	Resolver

Mark	Shaft Connection
1	Plain shaft
3	Keyed + tapped hole
6	Taper shaft
A	Salient-pole motor

Mark	Brake, Gear, Oil Seal
1	Oil seal

Mark	Customized Feature
X	Naturally ventilated
F	Force ventilated

Mark	Version

Note	Motor duty types indicate the load that the motor drives, with sequential operations, involving startup, electric braking, no-load running, power-off and stop. · S1: Continuous duty The operation of a motor at a rated load may take an unspecified time period to reach thermal equilibrium. · S4: Intermittent periodic duty with start This is a sequence of identical duty cycles, each consisting load for a period, an operation at constant load period, followed by a stationary and de-energized period. This cycle has a great impact on temperature rise.

7.2 Physical Appearance and Mounting Dimensions

7.2.1 ISMG1 (200 x 200 Base/Force Ventilated)

Figure 7-1 Physical appearance and mounting dimensions of the ISMG1 (200 x 200 base/force ventilated)

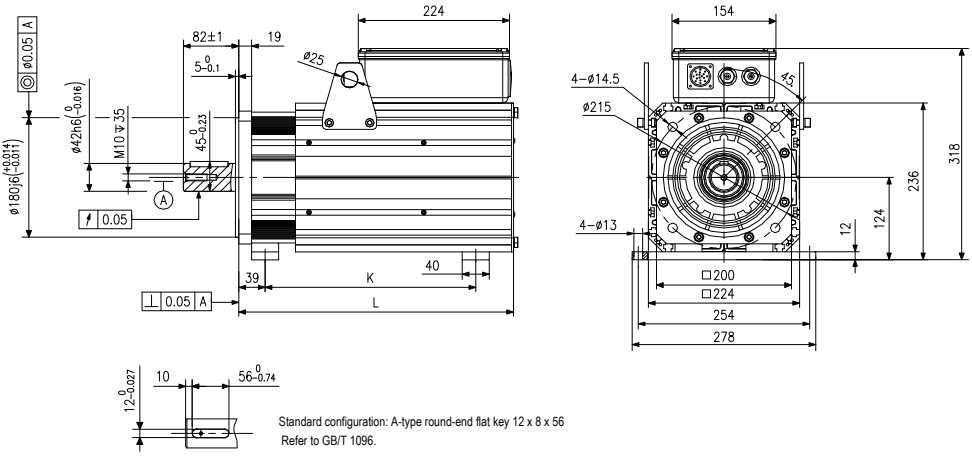


Table 7-1 Mounting dimensions of ISMG1 (200 x 200 base/force ventilated)

Servo Motor Model	ISMG1-95C15CD-R131FA	ISMG1-14D15CD-R131FA	ISMG1-17D15CD-R131FA	ISMG1-22D15CD-R131FA	ISMG1-30D15CD-R131FA
	ISMG1-11D17CD-R131FA	ISMG1-16D17CD-R131FA	ISMG1-20D17CD-R131FA	ISMG1-24D17CD-R131FA	ISMG1-34D17CD-R131FA
	ISMG1-12D20CD-R131FA	ISMG1-18D20CD-R131FA	ISMG1-23D20CD-R131FA	ISMG1-28D20CD-R131FA	ISMG1-41D20CD-R131FA
K	285	312	354	396	471
L	375	410	445	480	550

7.2.2 ISMG2 (266 x 266 Base/Force Ventilated)

Figure 7-2 Physical appearance and mounting dimensions of ISMG2 (266 x 266 base/force ventilated)

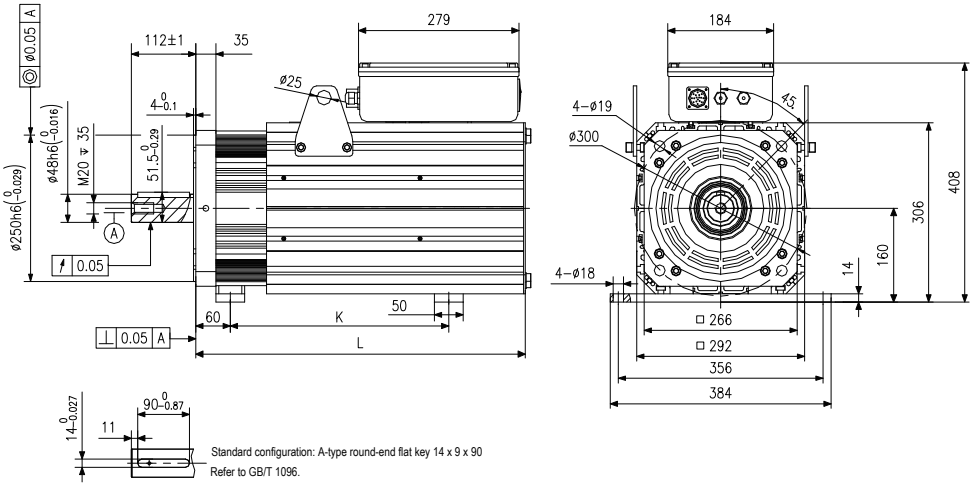


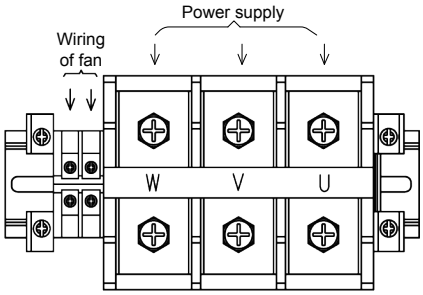
Table 7-2 Mounting dimensions of ISMG2 (266 x 266 base/force ventilated)

Servo Motor Model	ISMG2-31D15CD-R131FA	ISMG2-42D15CD-R131FA	ISMG2-60D15CD-R131FA	ISMG2-80D15CD-R1A1FA	ISMG1-30D15CD-R131FA
	ISMG2-36D17CD-R131FA	ISMG2-48D17CD-R131FA	ISMG2-68D17CD-R131FA	ISMG2-91D17CD-R1A1FA	ISMG1-34D17CD-R131FA
	ISMG2-42D20CD-R131FA	ISMG2-57D20CD-R131FA	ISMG2-80D20CD-R1A1FA	ISMG2-11E20CD-R1A1FA	ISMG1-41D20CD-R131FA
K	360	370	476	583	471
L	525	575	675	780	550

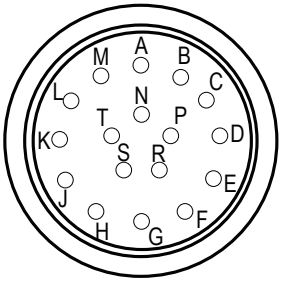
7.3 Wiring of ISMG Servo Motor

7.3.1 Layout and Wiring Description of Junction Box

Terminals of main circuit



Military spec.



Definition of IS580 supporting signal lines and military spec. pins is shown in the following table.

17P Military Spec.	A	B	C	D	E	F	G	H	L	K	J
DB9 Connector	1	2	3	4	5	9	7	8		6	Housing
Signal Definition	REF+	REF-	Cos+	Cos-	Sin+	Sin-	PTC-M	KTY-N	PTC-N	KTY-M	Shield
Wire Colour	Yellow/White	Red/White	Red	Black	Yellow	Blue	Brown	Orange		Grey	Shield
Remark	One pair		One pair		One pair		-	KTY, PTC common		-	-

■ Precautions on Wiring Servo Motor Main Circuit Terminals

When wiring main circuit terminals, ensure phase sequence conform to the terminal symbols. Connect PE terminal to the fixed screw with a special mark in the junction box.

Note	· PTC, KTY, and resolver signal cable cannot connect to the 220 V power supply. Otherwise, the motor will be damaged. · The motor has passed the IP54 experiment. At wiring, protection measures must still be taken at the cabling holes to prevent foreign matters from falling into the motor. · Sticky dust in the working environment will weaken heat dissipation of the motor. Refer to section 10.5 to clean the cooling fan.

For detailed wiring diagrams, see Figure 2-6 and Figure 2-7.

Revision History

Date	Version	Change Description
Jan. 2016	V0.0	Related firmware version
Jul. 2016	A01	Add data on three-phase 220 VAC models. Add the ISMG servo motor chapter. Related firmware version: F7-10 = 1.06
Aug. 2016	A02	Add CE certifications. Related firmware version: F7-10 = 1.06
Nov. 2016	A03	Modified Approvals, designation rule and nameplate
Jun. 2019	A04	Updated Inovance's logo
Oct. 2020	A05	Added the barcode on the back cover, and deleted the service hotline.

Shenzhen Inovance Technology Co., Ltd.
Add.: Building E, Hongwei Industry Park, Liuxian Road, Baocheng No. 70 Zone, Bao'an District, Shenzhen
Tel: +86-755-2979 9595
Fax: +86-755-2961 9897
http: //www.inovance.com

Suzhou Inovance Technology Co., Ltd.
Add.: No. 16 Youxiang Road, Yuexi Town, Wuzhong District, Suzhou 215104, P.R. China
Tel: +86-512-6637 6666
Fax: +86-512-6285 6720
http: //www.inovance.com

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