MV600J6 Electro-hydraulic Servo Drive

User Manual

Document Version: V1.1
Archive Date: 2024/01/**
BOM Code: R33010872

Shenzhen Megmeet Drive Technology Co., Ltd. provides full technical support for our customers,customers can contact local Megmeet offices or customer service centers, or directly contact Megmeet headquarters.

Shenzhen Megmeet Drive Technology Co., Ltd.

Address: 5th Floor, Block B, Unisplendor Information Harbor, Langshan Rd., Science & Technology Park, Nanshan District, Shenzhen, 518057, China

Website: www.megmeet-drivetech.com

Tel: +86-755-86600500

Fax: +86-755-86600562

Service email: driveservice@megmeet.com

Foreword

Thank you for choosing the MV600J6 electro-hydraulic servo drive of Shenzhen Megmeet Drive Technology Co., Ltd.

MV600J6 series are servo drive products designed for hydraulic equipment such as injection molding machines, die casting machines, and hydraulic presses. The product adopts high-performance vector control, and has the characteristics of energy saving, precision, high efficiency and durability. MV600J6 adopts high-performance vector control technology, which is optimized for the action characteristics in the hydraulic drive process, such as improving pressure response, improving holding pressure control accuracy and system stability, and expanding various process requirements. At the same time, functions such as software background monitoring, communication bus, multi-type encoder types and multi-pump combined control are integrated into it.

The relevant precautions during the installation, wiring, parameter setting, troubleshooting and daily maintenance will be detailed in this manual. To ensure the correct installation and operation of the MV600J6 servo drive as well as its high performance, please read carefully this user manual before installing the equipment. This manual shall be kept properly and delivered to the actual users of the drive.

We are engaged in the continuous improvement of drive. The relevant manuals provided by us are subject to change without prior notice.When the specifications are revised, please consult the agent or download the latest version from Megmeet's official website (https://www.megmeet.com/).

Precautions for unpacking inspection

Please check carefully when unpacking the product:

- Whether the product has the damage signs;
- Whether the rated value in the nameplate is consistent with your order requirement, the box contains the machine you ordered (attached with product certificate) and user operation manual (attached with product warranty card).

We have implemented strict inspection on the manufacturing, package and delivery of the product. If there is any error, please contact us or your distributor immediately.

Safety precautions

This product is a precision power electronic product. For the safety of operators and mechanical equipment, please be sure to entrust professional electrical engineering personnel to complete the relevant installation, commissioning and parameter adjustment.

DANGER Operation without following instructions can cause death or severe personal injury.

WARNING Operation without following instructions can cause medium or slight personal injury or damage to the product and other equipment.

DANGER

- Please install the product on the incombustible materials (e.g., metal), otherwise, fire may be caused.
- Do not place any combustible material near the product, otherwise, fire may be caused.
- Do not install the product in the environment with explosive gas, otherwise, explosion may be caused.
- Only qualified personnel can wire the drive, otherwise, electric shock may be caused.
- Never wire the drive unless the input AC supply is completely disconnected, otherwise, electric shock may be caused.
- The grounding terminal of the drive must be reliably grounded, otherwise, electric shock may be caused.
- The cover must be properly closed before power-up, otherwise, electric shock and explosion may be caused.
- When powering up the drive that has been stored for over 2 years, the input voltage must be gradually increased with the voltage regulator, otherwise, electric shock and explosion may be caused.
- Do not touch the terminals when the product is powered up, otherwise, electric shock may be caused.
- Do not operate the drive with wet hands, otherwise, electric shock may be caused.
- Maintaince operation can not be conducted until 10 minutes has passed after disconnecting the power supply. Meanwhile, be sure to confirm that the charge LED is completely off and the DC bus voltage is below 36V, otherwise, electric shock may be caused.
- Only qualified personnel can replace the components. Do not leave any wire or metal parts inside the drive, otherwise, fire may be caused.
- After changing the control board, the parameters must be properly set before operating the drive, otherwise, property damage may be caused.
- The bare parts of the terminal lugs in the main circuit must be wrapped with insulation tape, otherwise, electric shock may be caused.

WARNING

- When carrying the drive, protect the operation panel and the cover against any stress, otherwise, the drive may drop and cause human injury or property damage.
- Please install the drive on the place that can withstand the weight of the drive, otherwise, the drive may drop and cause human injury or property damage.
- Do not install the drive in the environment with water splash (e.g., near the water pipe), otherwise, you may suffer the property loss.
- Take care not to drop any foreign objects, such as the screws, gaskets and metal bars, into the drive, otherwise, fire and property damage may be caused.

- Do not install and operate the drive if it is damaged or its components are not complete, otherwise, fire and human injury may be caused.
- Do not install the product in the place exposed to direct sunlight, otherwise, property damage may be caused.
- Do not short circuit terminal P/B1 and terminal -DC, otherwise, fire and property damage may be caused.
- Cable lugs must be firmly connected to the terminals of main circuit, otherwise, property damage may be caused.
- Do not connect AC 220V input to the control terminals other than terminal TA, TB, TC, BRA and BRC, otherwise, property damage may be caused.

Version change

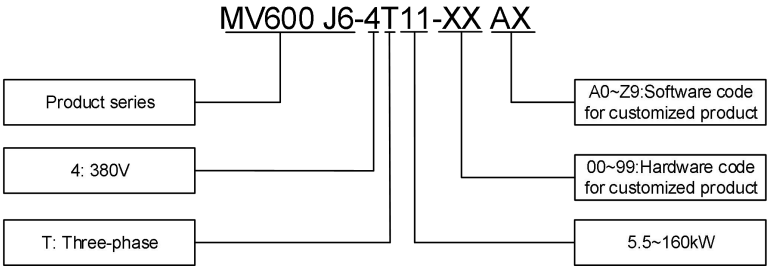
Date	Changed version	Changed content
2021-12	V0.1	The first edition
2022-07	V1.0	The Second edition
2024-01	V1.1	The third edition

Contents

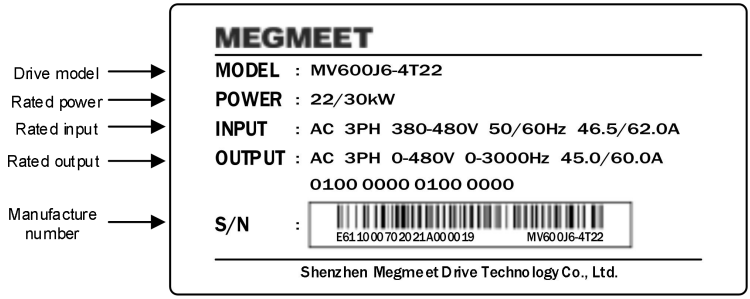
Chapter 1 Introduction of MV600J6 Servo Drive

1.1 Product model

The description of the drive model on the nameplate indicates the information of the product, such as product series, voltage class of power supply, power class, the software/hardware code of customized product, etc.



1.2 Product nameplate



1.3 Product series

Table 1-1 Name and model of drive

Enclosure model	Product model	Rated capacity (kVA)	Rated input current (A)	Rated output current (A)	Rated output power (kW)
R3	MV600J6-4T5.5	8.5	14.5	13.0	5.5
	MV600J6-4T7.5	11.0	20.5	17.0	7.5
	MV600J6-4T11	17.0	26.0	25.0	11
	MV600J6-4T15	21.0	35.0	32.0	15
R4	MV600J6-4T18.5	24.0	38.5	37.0	18.5
	MV600J6-4T22	30.0	46.5	45.0	22
	MV600J6-4T30	40.0	62.0	60.0	30
R5	MV600J6-4T37	50.0	76.0	75.0	37

	MV600J6-4T45	60.0	92.0	90.0	45
R6	MV600J6-4T55	72.0	113.0	110.0	55
	MV600J6-4T75	100.0	157.0	152.0	75
R7	MV600J6-4T90	116.0	180.0	176.0	90
R7P	MV600J6-4T110	138.0	214.0	210.0	110
	MV600J6-4T132	167.0	256.0	253.0	132
	MV600J6-4T160	200.0	307.0	304.0	160

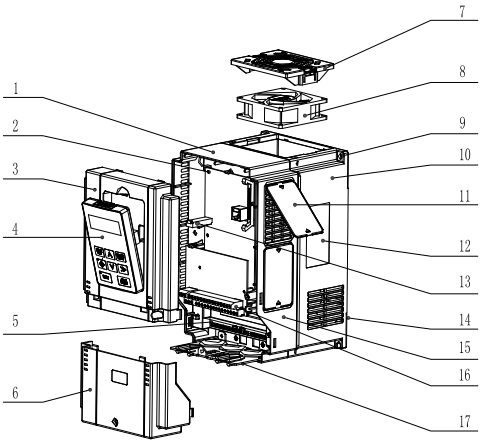
1.4 Technical specifications of product

Table 1-2 Technical specifications of drive

Basic Specifications	Input power	Rated voltage (V)	Three-phase: 380V~480V; continuous fluctuation of voltage: ±10%, transient fluctuation of voltage: -15%~+10% (i.e. the range is 323V~528V); voltage unbalance rate: <3%, the distortion rate complies with IEC61800-2
		Rated input current (A)	Please refer to Table 1-1.
		Rated frequency (Hz)	50Hz/60Hz, fluctuation range±5%
	Output power	Standard applicative motor (kW)	Please refer to Table 1-1.
		Rated capacity (kVA)	
		Rated current (A)	
		Output voltage (V)	Output with three-phase under rated input conditions, 0 ~ rated input voltage, the error is less than ±3%
		Output frequency (Hz)	V/F: 0.00~500.00Hz (unit: 0.01Hz); vector control: 0~650Hz
		Overload capacity	1 min for 150% rated current, 2s for 200% rated current
	Environment	Operating site	Indoor, away from direct sunlight, free from dust, corrosive gas, combustible gas, oil mist, water vapor, water dripping or salt
		Altitude	Used at the place lower than 1000m (derated at the place above 1000m, derated 1% for every increase of 100m)
		Ambient temperature	-10℃~+40℃ (derated when used in the ambient temperature of 40℃~50℃)
		Humidity	5%~95%RH, non-condensing
		Vibration	less than 5.9m/s^2(0.6g)
		Storage temperature	-40℃~+70℃
	Protection degree		IP20
	Cooling mode		Forced cooling
	signal Digital	DI1~DI8 input	8 multi-function input terminals, please refer to 3.2.2 control board parameters and characteristics for details
		DO1~DO2 output	2 open-collector output terminals, please refer to 3.2.2 control board parameters and characteristics for details
	signal Analog	AI1~AI3 input	1 analog input with 16-bit precision, 2 analog input with 12-bit precision
		AO1~AO2 output	2 multi-function analog outputs, please refer to 3.2.2 control board parameters and characteristics for details
	output Relay	TA/TB/TC output type	1 group of normally open and normally closed contacts; the overvoltage level of the input voltage of the relay output terminal is overvoltage level II, please refer to 3.2.2 control board parameters and characteristics for details
		BRA/BRC output type	1 group of normally open contacts; the overvoltage level of the input voltage of the relay output terminal is overvoltage level II, please refer to 3.2.2 control board

			parameters and characteristics for details
	Power supply	Output	Provide +10V, +13V and +24V reference power for external load, the maximum allowable output current is 10mA
	Communication function	CAN communication	Communicate with peripheral devices, which can realize the functions of parameter online setting, drive control, command setting, parameter uploading and downloading, etc.
		RS485 communication	
		USB communication	
	LED display panel and keyboard		12 LED indicators, 5-digit LED display, 8 function keys; used for command setting, parameter display, parameter hold setting and other functions
Control mode and product performance	Control mode		Speed control and hydraulic process control
	Pressure control input		Pressure control command input: can be set to analog input or CAN communication Speed command input: CAN communication or RS485 communication
	Multi-pump parallel control		Can control multiple pumps, three working modes (single-master and multi-slave compound distribution, single-master and multi-slave bypass/parallel flow, multi-master and multi-slave parallel flow)
	Pressure control accuracy		±1bar (screw pump)
	Flow control accuracy		±0.5%FS
	Pressure control step response		≤100ms, flow setting >70% (screw pump)
	Flow control step response		≤50ms, feedback pressure less than 10bar
	Speed command input		CAN or RS485 communication
	Speed control accuracy		±0.5%
	Torque response time		≤2ms
Protection function	Hardware fault		Overcurrent, DC overvoltage, DC undervoltage, braking resistor damage, encoder damage, module overtemperature, pressure sensor fault, DEV deviation, braking overload, etc.
	Alarm record		Can store 3 alarm records and the bus voltage, current, frequency and operation state at the latest fault time

1.5 Drive structure



1. Mid-enclosure 2. Main control board 3. Upper cover 4. Operation panel 5. Main circuit wiring terminal 6. Lower cover 7. Fan guard 8. Fan 9. Mounting holes for complete unit 10. Bottom enclosure 11. Dustproof plate 12. Nameplate 13. Connector 14. Bottom plate 15. Mid-enclosure 16. Control terminal 17. Wiring plate

Fig.1-1 Drive structure (taking R4 as an example)

1.6 Outline, mounting dimensions and gross weight of drive

The dimensions of the drive are shown in the figure below. Fig. 1-2 and Fig. 1-3 represent the front view, left view and top view of the enclosure appearance of different models of M600J6, and are marked with dimensions.

1. R3~R4 is plastic enclosure (MV600J6-4T5.5~MV600J6-4T30)

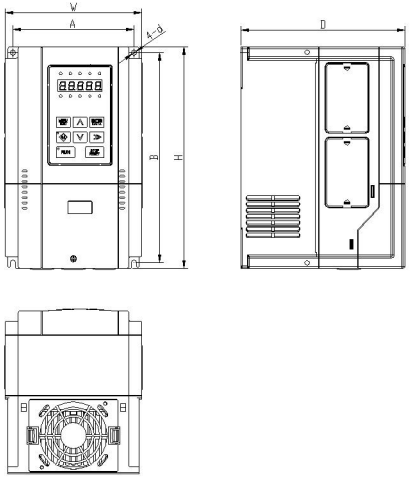


Fig.1-2 Outline, mounting dimensions for MV600J6-4T5.5~MV600J6-4T30

2. R5~R7P is sheet metal enclosure (panel is detachable, MV600J6-4T37~MV600J6-4T160)

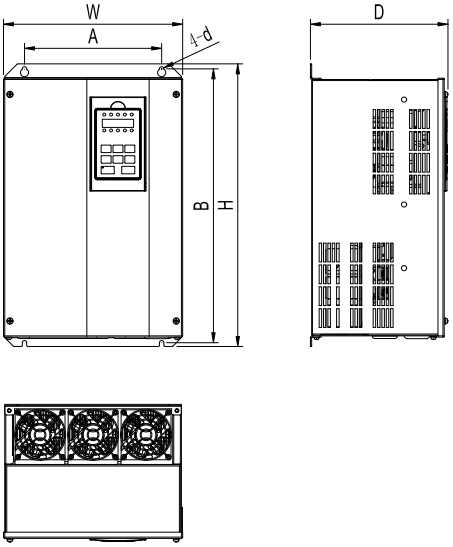


Fig.1-3 Outline, mounting dimensions for MV600J6-4T37~MV600J6-4T160

🕮 Note

The number and location of cooling fans vary by type of equipment:

- For R3 model, there is a cooling fan on top of the device;
- For R4 model, there are two cooling fans on the top of the device;
- For R5~R7P models, there are three cooling fans on the top of the device.

Table 1-3 Outline, mounting dimensions and gross weight

Enclosure model	Drive model	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Diameter of mounting aperture (mm)	Gross weight (kg)
R3	MV600J6-4T5.5	137	236	249	155	198	5.5	4
	MV600J6-4T7.5							
	MV600J6-4T11							
	MV600J6-4T15							
R4	MV600J6-4T18.5	186	314.5	330	209	206	6.5	9
	MV600J6-4T22							
	MV600J6-4T30							
R5	MV600J6-4T37	220	437.5	451.5	284.5	213	6.5	21
	MV600J6-4T45							
R6	MV600J6-4T55	270	549	570	335	262	7	41
	MV600J6-4T75							
R7	MV600J6-4T90	270	579	600	335	292	7	49
R7P	MV600J6-4T110	290	641	672	374	296	12	55
	MV600J6-4T132							
	MV600J6-4T160							

1.7 Outline and mounting dimensions of operation panel

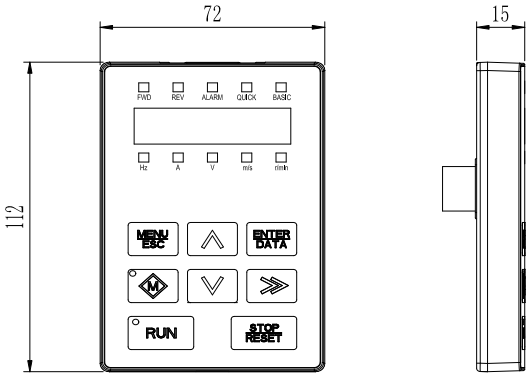


Fig.1-4 Outline and mounting dimensions of operation panel

1.8 Outline and mounting dimensions of operation panel box

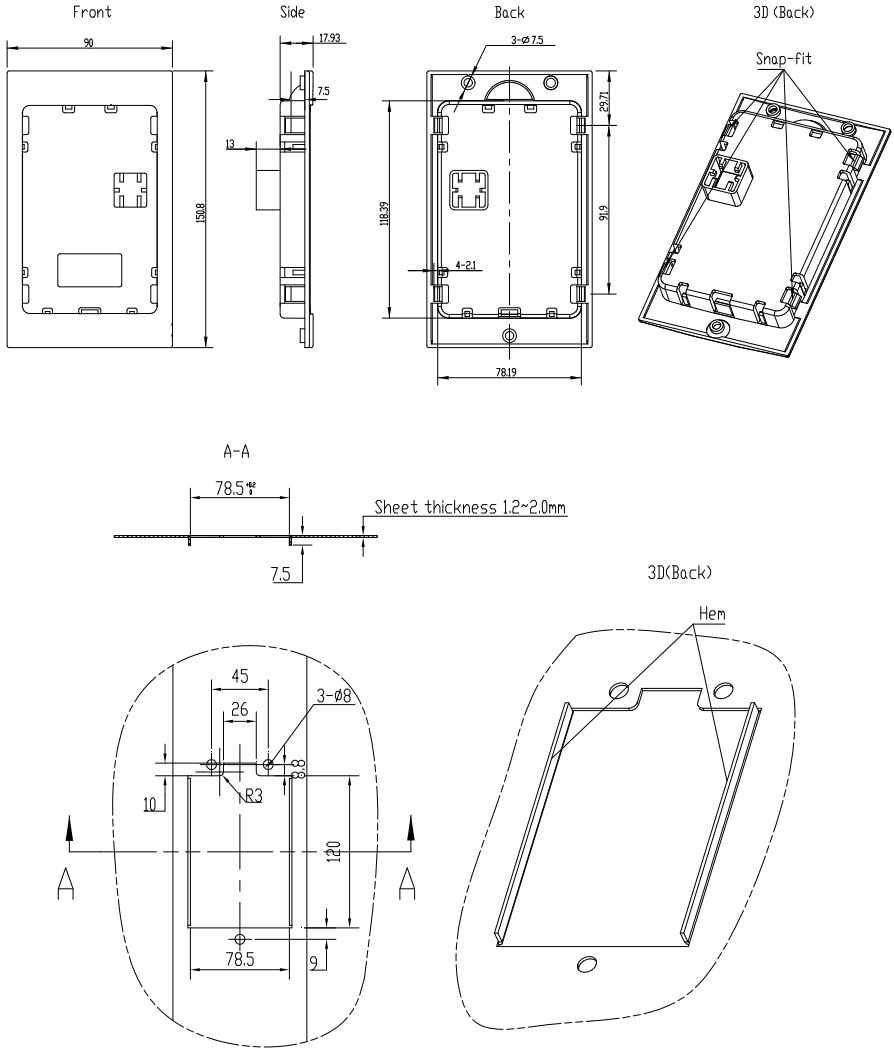


Fig.1-5 Outline and mounting dimensions of operation panel box

Chapter 2 Drive Installation

2.1 Installation environment

When selecting the installation environment, the following issues should be taken into account:

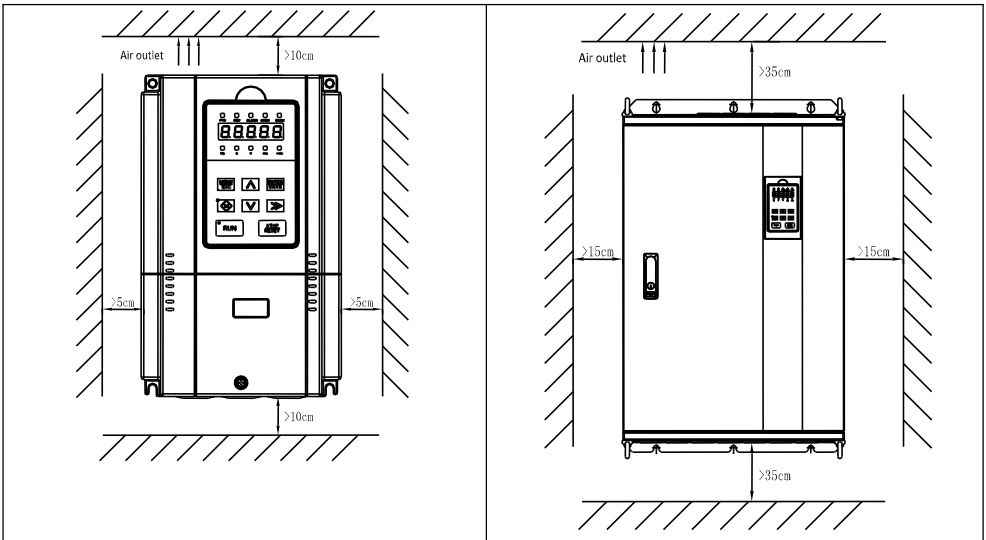
WARNING

- The ambient temperature should be within -10℃~40℃. If the temperature exceeds 40℃, external forced cooling or derating is required.
- The humidity should be less than 95%RH, non-condensing.
- The vibration at the installation place should be less than 5.9m/s^2(0.6g).
- The device should be protected from the direct sunlight.
- The device should be mounted in the location free of dust and metal powder.
- Do not install the device in the place with corrosive gas and explosive gas.

If there is any special installation requirement, please consult our company.

2.2 Mounting direction and space

The drive shall be Installed in the room, well-ventilated place. In general, the drive shall be installed vertically to avoid poor heat dissipation.For the installation spacing and distance requirement, please refer to Fig.2-1.



Installation spacing for models of 30kW and below	Installation spacing for models of 37kW and above

Fig.2-1 Installation spacing and distance

The heat is dissipated from the bottom to the top when the drive is dissipated, and multiple drives are usually installed side by side. When more than two drives are mounted in the up-down installation mode, the heat generated by the operation of the lower row of drives will cause the temperature of the upper row of equipment to rise and cause faults, the partition plate should be installed between them, so as to avoid the influence of the heat dissipation from the bottom drive on the top one, as shown in Fig.2-2.

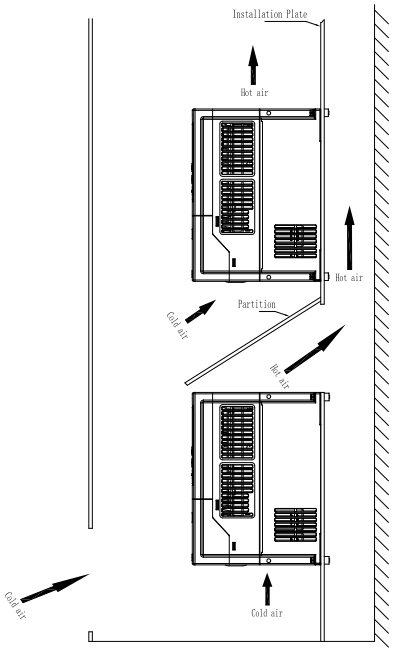
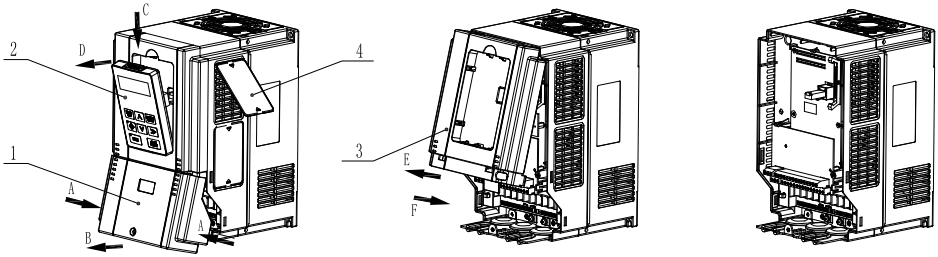


Fig.2-2 Installation of multiple drives

2.3 Removal and installation of drive components



1. Lower cover 2. Operation panel 3. Upper cover 4. Dustproof plate

Fig.2-3 Removal and installation of drive components (taking R4 as an example)

2.3.1 Removal and installation of operation panel

Removal: Insert your finger into the square hole above the operation panel, press the clip in direction C and then separate the upper section of the operation panel with the upper cover in direction D, then separate the connector with the operation panel. Now, the operation panel is removed, as shown in Fig. 2-3.

Installation: Ensure the display of the operation panel face upwards, press the operation panel into its box while keeping them parallel. Now, the operation panel is installed, as shown in Fig. 2-3.

2.3.2 Removal and installation of cover

1.Removal and installation of lower cover

Removal: Loosen the fixing bolts of the lower cover with the screwdriver, press the snap-fits on both sides in direction A, make snap-fits off with the mid-enclosure and then lift the lower cover in direction B. Now, the lower cover is removed.

Installation: Insert the insertion piece at the top of the lower cover into the upper cover, press both sides of the lower cover with both hands in direction A so that the snap-fits can enter into the mid-enclosure, then tighten the fixing bolts of the lower cover with the screwdriver. Now, the lower cover is installed.

2. Removal and installation of upper cover

Removal: Loosen the fixing bolts of the upper cover with the screwdriver, pull in direction E to separate the upper cover from the mid-enclosure (if necessary, press the snap-fits of the upper cover from its side with the straight screwdriver). Now, the upper cover is removed.

Installation: Press the lower part of the upper cover in direction F so that its snap-fits can enter into the mid-enclosure, and then tighten the fixing bolts of the upper cover with the screwdriver. Now, the upper cover is installed.

🕮 Note

Do not directly remove the upper cover with the operation panel on it. The operation panel should be removed before removing the upper cover to avoid damages to the connecting base between the operation panel and control board, which may cause unreliable contact between the operation panel and the control board.

2.3.3 Removal and installation of dustproof plate

Removal: It is recommended to push both snap-fits of the dustproof plate from the inside of the enclosure with tools, so that the snap-fits can be separated from the mid-enclosure. Now, the dustproof plate is removed.

Installation: Place the snap-fit on one end of the dustproof plate into the mid-enclosure, move the dustproof plate to another end while pressing it till the snap-fit on another end also enters into the mid-enclosure. Now, the dustproof plate is installed.

🕮 Note

Removing the dustproof plate from the outside of the enclosure directly may damage it or the mid-enclosure.

Do not press the dustproof plate forcibly if it is deformed, otherwise, it may be damaged.

Chapter 3 Wring of Drive

This chapter introduces the wiring and cable connection of drive, as well as the issues needing attention.

DANGER

- Do not open the cover until the power supply of the drive is completely disconnected for at least 10 minutes.
- Make sure that the internal wiring be conducted only when the charge LED inside the drive is off and the voltage between the main circuit terminals +DC and -DC is below 36V.
- Only the well-trained and authorized personals are allowed to perform the internal wiring of the drive.
- Check the wiring carefully when connecting the emergency stop or safety circuit.
- Check the voltage level of the drive before power-on, otherwise, human injury and death or equipment damage may be caused.

WARNING

- Check carefully whether the rated input voltage of the drive is consistent with the AC power voltage before power-on.
- The drive has passed the dielectric strength test before delivery. Do not conduct this test again.
- When connecting the external braking resistor or braking unit, please refer to Appendix A.
- Do not connect the AC supply cables to the output terminals U, V and W.
- The diameter of copper cable used as grounding wire should be bigger than 3.5mm and the grounding resistance should be less than 10Ω.
- There is leakage current inside the drive and the value of the leakage current depends on the operating conditions. To ensure the safety, the drive and the motor must be grounded and a Residual Current Detector (i.e. RCD) is required. The type B RCD is recommended. The set value of the leakage current is 300mA.
- To provide the over-current protection for the input side and facilitate the power-off maintenance, the drive should be connected to the AC supply through a circuit breaker or a fuse.

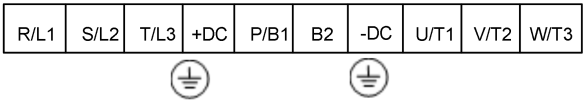
3.1 Wiring and configuration of main circuit terminals

3.1.1 Types of main circuit input/output terminals

There are five types of main circuit terminals, due to different drive models. The detailed descriptions are as follows:

Terminal type 1

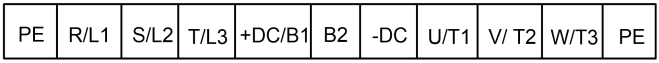
Applicable models: MV600J6-4T5.5~MV600J6-4T30



Terminal	Function
R/L1, S/L2, T/L3	Three-phase AC 380V input terminals
+DC, P/ B 1	Reserved for external DC reactor, connected with copper bus upon delivery
P/ B1, B2	Reserved for external braking resistor
-DC	DC negative bus output terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals

Terminal type 2

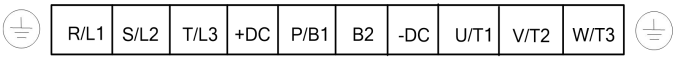
Applicable models: MV600J6-4T37~ MV600J6-4T45



Terminal	Function
R/L1, S/L2,T/L3	Three-phase AC 380V input terminals
+DC/B1, B2	Reserved for external braking resistor
-DC	DC negative bus output terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals

Terminal type 3

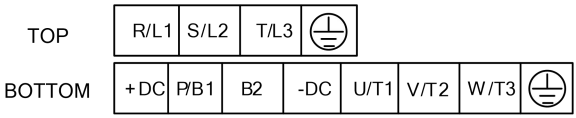
Applicable models: MV600J6-4T55~ MV600J6-4T75



Terminal	Function
R/L1, S/L2, T/L3	Three-phase AC 380V input terminals
+DC, P/ B 1	Reserved for external DC reactor, connected with copper bus upon delivery
P/ B1, B2	Reserved for external braking resistor
-DC	DC negative bus output terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals

Terminal type 4

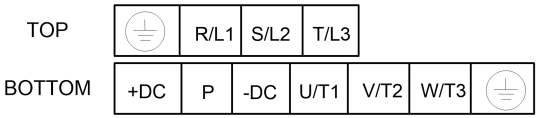
Applicable models: MV600J6-4T90



Terminal	Function
R/L1, S/L2, T/L3	Three-phase AC 380V input terminals
+DC, P/ B1	Reserved for external DC reactor, connected with copper bus upon delivery
P/ B1, B2	Reserved for external braking resistor
-DC	DC negative bus output terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals

Terminal type 5

Applicable models: MV600J6-4T110~MV600J6-4T160



Terminal	Function
R/L1, S/L2, T/L3	Three-phase AC 380V input terminals
P, +DC	Reserved for external DC reactor, connected with copper bus upon delivery
P, -DC	Reserved for external braking unit
-DC	DC negative bus output terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals

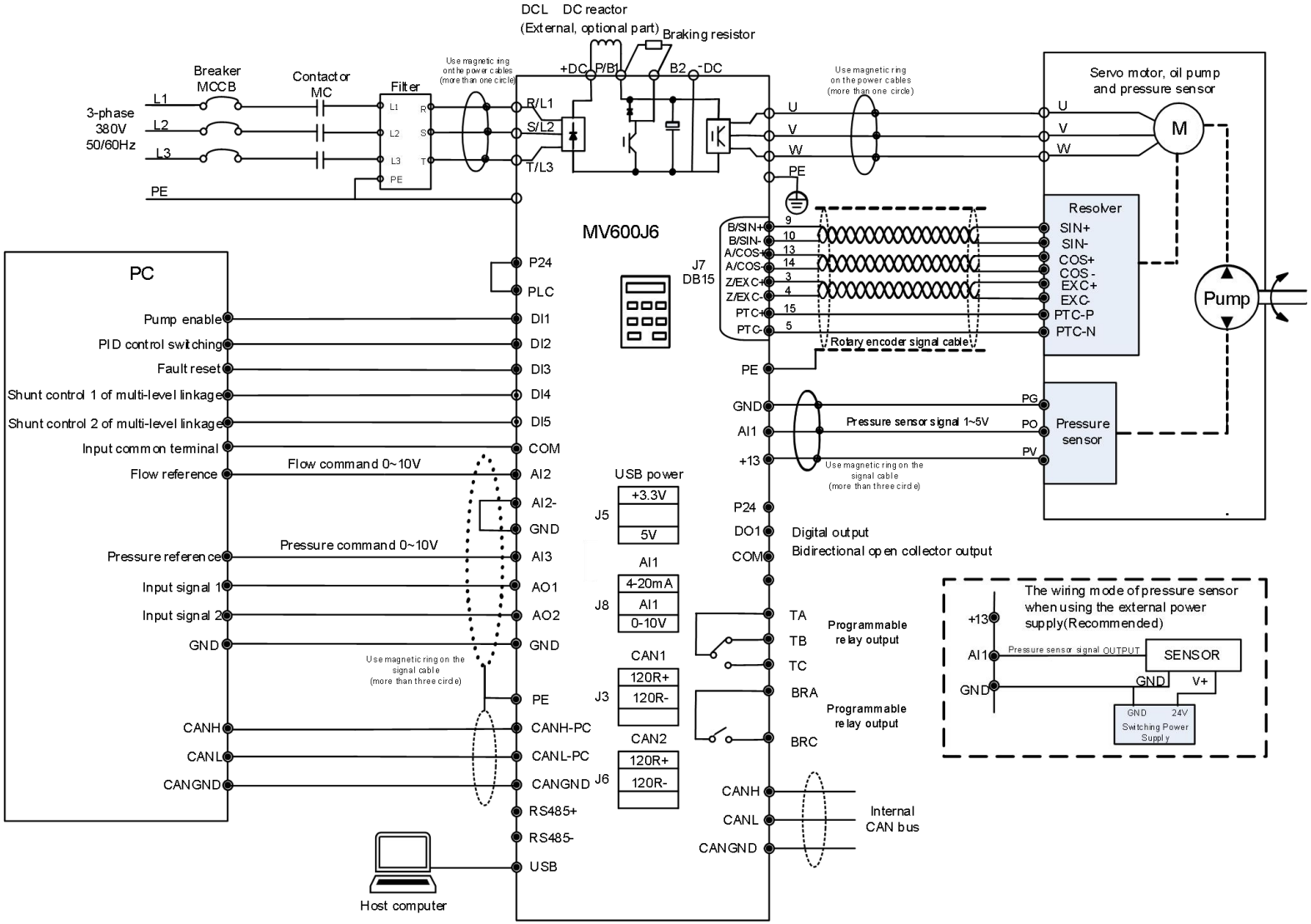
🕮 Note

1. Connect the input power cable to the drive power input terminals R/L1, S/L2, T/L3 respectively, connect the grounding conductor of the input power cable to any grounding screw (PE) of the drive, and turn the screws to proper tightness to ensure smooth connection.

2. Connect the W V U of the three-phase input terminals of the motor to the servo motor connection terminals W/T1, V/T2 and U/T3 of the drive respectively, and turn the screws to proper tightness to ensure smooth connection. Connect the motor grounding terminal to any grounding screw (PE) of the drive. Connect the motor temperature measuring resistance terminal to the drive terminal thermistor positive and negative, and turn the screws to proper tightness to ensure smooth connection. Connect the motor resolver connection terminal to the drive connector J7 and tighten the fixing screw.

3. Connect the two terminals of the braking resistor to the drive terminals P/B1 and B2, and turn the screws to proper tightness to ensure smooth connection.

3.1.2 Wiring for basic operation



Note:
1. For AI1, the input voltage signal or the current signal can be selected via the jumper. The function code P10.00 shall be changed after the hardware jumper finished selection to ensure the correct input signal.
2. If external braking components need to be configured, the braking unit and braking resistor shall be used. Please pay attention to the positive and negative polarity when connecting the braking unit.
3. " ○ " in the figure is main circuit terminal and " ● " in the figure is control circuit terminal.
4. For the usage of the control circuit terminal, please refer to section 3.2.
5. Fig. 3-1 is the wiring diagram for basic operation of model 90kW and below.

Fig.3-1 Wiring diagram for main circuit and control circuit terminals

3.2 Wiring and configuration of control circuit

3.2.1 Control circuit terminal distribution

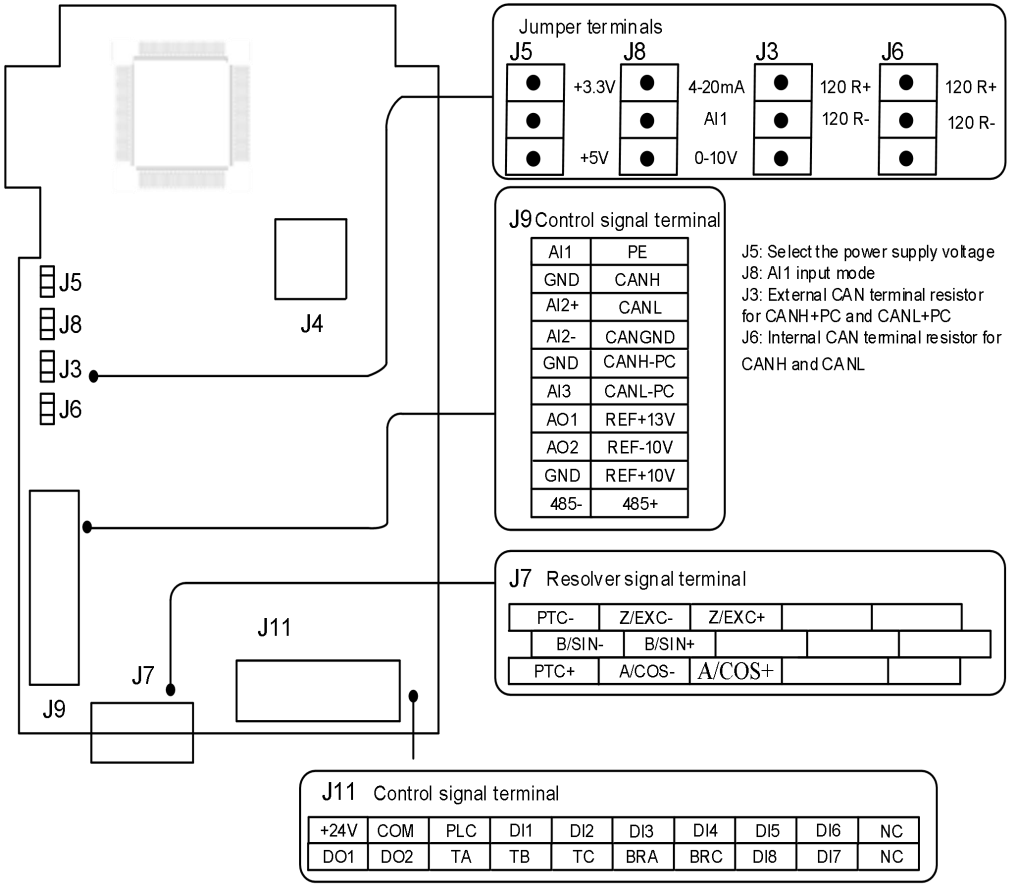


Fig.3-2 Control circuit terminal distribution

3.2.2 Control board parameters and characteristics

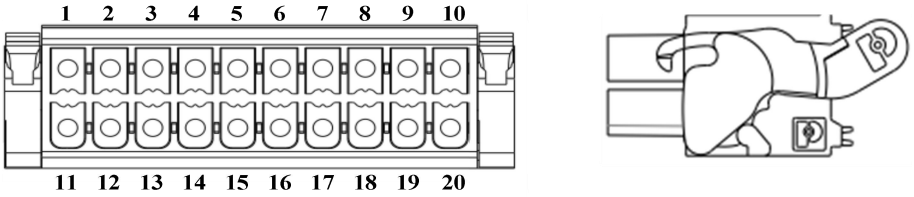
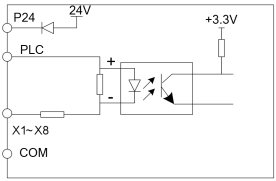


Fig.3-3 Control circuit terminal CAD drawing

Table 3-1 Control circuit terminal function table

Terminal number	Type	Terminal	Name	Function	Specification
J9	Shield	PE	Shield grounding	Used for the grounding of the shielded layer of the wire. The shielded layer of the analog signal wire, 485 communication wire, CAN communication wire and motor cable can be connected to this terminal.	Connected to the main circuit wiring terminal ⏚ internally
	Power supply	REF+10	+10V power supply	To provide +10V reference power for external load	Allowable maximum output current: 10mA
		REF-10	-10V power supply	To provide -10V reference power for external load	Allowable maximum output current: 10mA
		REF+13	+13V power supply	To provide +13V reference power for external load	Allowable maximum output current: 10mA
		GND	+10V/-10V power GND	The reference ground for analog signal ,+13V and +10V/-10V power	Internal isolated with COM
	Analog input	AI1	Analog single-end input AI1	To receive the single-end analog voltage or current input with the analog input voltage/current selected via the jumper and the corresponding input type selected by the function code P10.00 (reference grounding: GND)	Input voltage range: -10V~10V (input resistance: 20kΩ), resolution: 1/4000 Input current range: 0mA~20mA (input resistance: 246Ω), resolution: 1/2000
		AI3	Analog single-end input AI3		

		AI2+	Analog voltage differential input AI2+ or analog voltage single-end input	For the analog voltage differential input, the AI2+ is the non-inverting input terminal and the AI2- is the inverting input terminal. For the analog voltage single-end input, AI2+ is the signal input terminal and AI2- shall be connected to GND (reference grounding: GND).	Input voltage range: -10V~10V (input resistance: 15kΩ), resolution: 1/4000
		AI2-	Analog voltage differential input AI2- or analog voltage single-end input		
	Analog output	AO1	Analog output 1	Provide analog voltage/current output. The analog output of the voltage/current is selected via the jumper, and the output range of the analog voltage/current is selected in the function code P10.68 (reference grounding: GND).	Voltage output range: 0/2~10V Current output range: 0/4~20mA
		AO2	Analog output 2		
	Communication	RS485+	RS485 communication interface	Positive end of 485 differential signal (reference grounding: GND)	Standard RS485 communication interface. Please use twisted pair wire or shielded wire.
		RS485-		Negative end of 485 differential signal (reference grounding: GND)	
		CANH	Internal CAN communication interface	Whether connect terminal resistor is selected by the J6 jumper on the communication board	Please use twisted pair wire or shielded wire.
		CANL			
		CANGND			
		CANH+PC	External CAN communication interface	Whether connect terminal resistor is selected by the J3 jumper on the communication board	Please use twisted pair wire or shielded wire.
		CANL+PC			

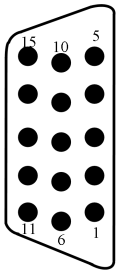
J11	Multi-functional input terminal	DI1	Multi-functional input terminal 1	It can be set as the digital input terminal with multiple functions.The factory default settings for DI1 and DI2 are FWD (forward running command terminal) and REV (reverse running command terminal) respectively. The running command terminals can be set with other input terminals and can realize the “three-wire control” function with the third input terminal. (common terminal: PLC)	Opto-isolated input, please refer to the introduction to the multifunctional input/output terminal wiring Input resistance: R=3.1kΩ; maximum input frequency: 200Hz Input voltage range: 20V~30V 
		DI2	Multi-functional input terminal 2		
		DI3	Multi-functional input terminal 3		
		DI4	Multi-functional input terminal 4		
		DI5	Multi-functional input terminal 5		
		DI6	Multi-functional input terminal 6		
		DI7	Multi-functional input terminal 7		
		DI8	Multi-functional input terminal 8		
	Multi-functional output terminal	DO1	Open collector output terminal 1 / DO pulse output terminal	It can be set as the digital output terminal with multiple functions and also can be reused as DO pulse output terminal, which is selected by the function code P09.17. (common terminal: COM)	Opto-isolated output Maximum operating voltage: 30V Maximum output current: 50mA
		DO2	Open collector output terminal 2 / DO pulse output terminal	It can be set as the digital output terminal with multiple functions. (common terminal: COM)	
	Power supply	+24	+24V power supply	To provide +24V power for external load	Maximum output current: 200mA

	Common terminal	PLC	Multi-functional input common terminal	Common terminal of multi-functional input terminal (Short circuited with +24V upon delivery)	Common terminal of D1~D8, PLC is internally isolated with +24
		COM	+24V power common terminal	1 common terminal, used together with other terminals	COM is internally isolated with GND
	Relay output terminal 1	TA TB TC	Relay output	It can be set as the relay output terminal with multiple functions. (common terminal: COM).	TA-TB: normally closed; TA-TC: normally open Contact capacity: AC250V/2A（COSΦ=1） AC250V/1A（COSΦ=0.4） DC30V/1A For operating method, please refer to the description of P09. The over-voltage class for the input voltage of the relay output terminal is class II.
	Relay output terminal 2	BRA BRC	Relay output	It can be set as the relay output terminal with multiple functions. (common terminal: COM)	BRA-BRC: Normally open Contact capacity: AC250V/2A（COSΦ=1） AC250V/1A（COSΦ=0.4） DC30V/1A For operating method, please refer to the description of P09. The over-voltage class for the input voltage of the relay output terminal is class II.

Note

It is suggested to use the wire with cross section area over 1mm^2 as the connecting wire of the control circuit terminals.

3.2.3 Encoder terminal

Terminal number	Type	Pin number	Pin definition	Function	Terminal distribution
J7	Resolver terminal	3	Z/EXC+	Resolver excitation negative	
		4	Z/EXC-	Resolver excitation positive	
		5	PTC-	Thermistor negative	
		9	B/SIN+	Resolver feedback SIN positive	
		10	B/SIN-	Resolver Feedback SIN negative	
		13	A/COS+	Resolver feedback COS positive	
		14	A/COS-	Resolver feedback COS negative	
		12	PTC+	Thermistor positive	

Chapter 4 Quick Operation Guide for Drive

4.1 Drive operation panel

4.1.1 Introduction to drive operation panel

Through the operation panel, the function code setting and modification, working status monitoring and operation control of the servo drive can be realized. The appearance of the operation panel and the names of the operation keys are shown in the following figure:

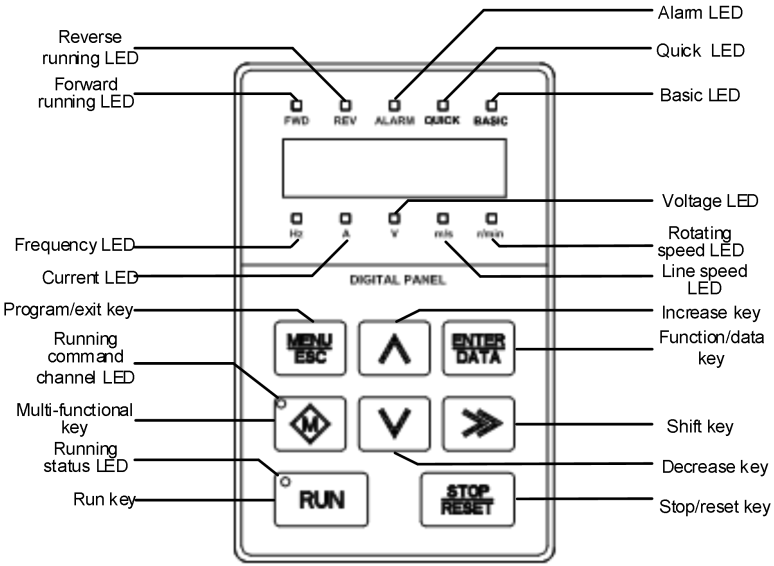


Fig. 4-1 Schematic diagram of operation panel

4.1.2 LED description

Table 4-1 LED description

LED symbol		Name	Meaning	Color
Unit LED	Hz	Frequency LED	On: Current parameter displayed represents the running frequency Flash: Current parameter displayed represents the frequency set	Green
	A	Current LED	On: Current parameter displayed represents the current	Green

	V	Voltage LED	On: Current parameter displayed represents the voltage	Green
	m/s	Line speed LED	On: Current parameter displayed represents the line speed	Green
	r/min	Rotating speed LED	On: Current parameter displayed represents the rotating speed	Green
Status LED	FWD	Forward running LED	On: In the stop status, it means the drive has forward running command In the running status, it means the drive is running forward Flash: The drive is switching from FWD to REV	Green
	REV	Reverse running LED	On: In the stop status, it means the drive has reverse running command In the running status, it means the drive is running reversely Flash: The drive is switching from REV to FWD	Green
	ALARM	Alarm LED	On: The drive enters the alarm status	Red
	QUICK	Menu mode LED	QUCIK LED BASIC LED Menu mode On Off Quick menu Off On Basic menu	Green
	BASIC		Off Off Verification menu	Green

The running status LED is above the RUN key and the running command channel LED is above the Multi-functional key (M key). Their indication meanings are as shown in Table 4-2.

Table 4-2 Status LED description

LED	Display status	The indicated status of the drive
Running status LED (RUN)	Off	Stop status
	On	Running status
Running command channel LED (M)	On	Operation panel control status
	Off	Terminal control status
	Flash	Serial port control status

4.1.3 Introduction to operation panel keys

Table 4-3 Operation panel function table

Key	Name	Function
MENU/ESC	Program/exit key	To enter or exit the programming state
ENTER/DATA	Function/data key	To enter the lower level menu or confirm data
∧	Increase key	To increase the data or function code

Key	Name	Function
∨	Decrease key	To decrease the data or function code
≫	Shift key	To select the bit for change in the data in editing state, or switch the display of status parameters in other state
M	Multi-functional key	Please refer to Table 4-4 for the useage of the Multi-functional key
RUN	Run key	When pressing this key in the operation panel mode, the drive will start to run
STOP/RESET	Stop/reset key	Stop or fault reset

Table 4-4 Useage of the Multi-functional key

Multi-functional key (M key)	Function	Function meaning
0	No function	The M key is disabled.
2	FWD/REV running direction	The M key is used as the direction switching key FWD/REV. In the operation panel running command channel, it can be used to switch the output frequency direction on line.
3	Command channel switching 1	The M key is used as the running command channel switching key, which is enabled only in the stop status. The running command channel switching order is as follows: Operation channel running command channel (LED of M key on) → terminal running command channel (LED of M key off) →serial port running command channel (LED of M key flash) → operation channel running command channel (LED of M key on)
4	Command channel switching 2	Using the M key as the running command channel switching key, which is enabled in both stop and running statuses. The switching order is as above.
5	Keyboard locking function	The M key is used as the multi-functional keyboard locking key. Now, press the M key and press the ∧ key three times at the same time to lock the keyboard. The locking mode of the keyboard depends on the thousands place of the function code. To unlock the keyboard, set the thousands place as 5, press the M key and press the∨ key three times at the same time, then the keyboard will be unlocked. Set the thousands place as 0, there is no keyboard locking function.
6	Emergency stop	Using the M key as the emergency stop key. When it is used in this way, once it is pressed, the drive will stop according to the setting time of P08.23 in any running mode.
7	Coast to stop	The M key is used to coast to stop. When it is used in this way, once it is pressed, the drive will coast to stop in any running mode.

4.1.4 Indentification of LED display symbols

The correspondence relation between the LED display symbols and the character/figure is as shown below:

Meaning	0	1	2	3	4	5	6	7	8	9
LED Display										
Meaning	A	b	C	c	d	E	F	G	H	h
LED Display										
Meaning	I	J	L	N	n	O	o	P	q	r
LED Display										
Meaning	S	T	t	U	V	y	-	.		
LED Display										

Fig. 4-2 Indentification of LED display symbols

4.2 Function code viewing and modification method

4.2.1 Restore to leave-factory values

In order to prevent the deviation of servo parameters caused by human and external factors, the factory settings of the servo drive can be restored. For example, set P00.05=2, the parameters will restore to the leave-factory values. The leave-factory value setting will make the drive parameters restore to the leave-factory values.

1. In the stop parameter display status, press MENU/ESC key to enter the first level menu P00.00;
2. Press ∧ key to change P00.00 to P00.05;
3. Press the ENTER/DATA key to enter the second level menu;
4. Press the ∧ key to change 0 to 2;
5. Press the ENTER/DATA key to confirm the change and return the first level menu. The change is successfully completed.

The above operation steps are shown in Fig. 4-3.

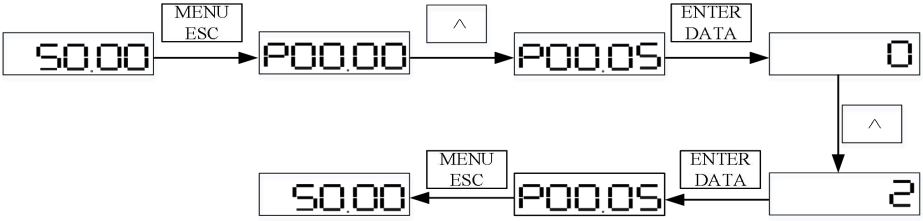


Fig. 4-3 Operation example of restoring leave-factory values

4.2.2 Setting the set frequency

For example, set P02.05=25Hz, change the setting of function code P02.05 from 50Hz to 25.00Hz.

1. In the stop parameter display status, press MENU/ESC key to enter the first level menu P00.00;
2. Press the ≫ key to select the second highest bit;
3. Press ∧ key to change P00.00 to P02.00;
4. Press the ≫ key to select the unit place;
5. Press ∧ key to change P02.00 to P02.05;
6. Press the ENTER/DATA key to enter the second level menu;
7. Press the ∨ key to change 50.00 to 25.00;
8. Press the ENTER/DATA key to confirm the change and return the first level menu. The change is successfully completed.

The above operation steps are shown in Fig. 4-4.

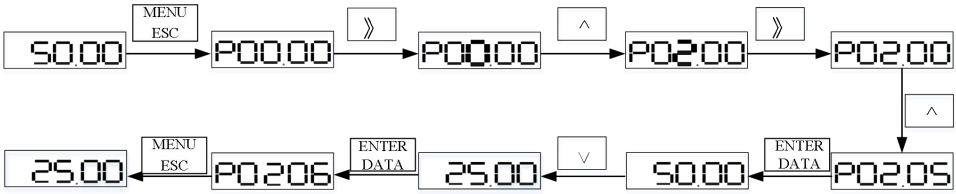


Fig. 4-4 Operation example for setting the set frequency

4.2.3 Switching status display parameters

The drive parameters displayed on the operation panel when the drive is stopped can be set through function code P16.02, such as: set frequency, bus voltage, motor speed and line speed, etc. These status parameters can be viewed by pressing the ≫ key on the operation panel when they have been set. The example for the status parameter display in the drive stop status when P16.02 is FFFF is as shown in Fig.4-5.

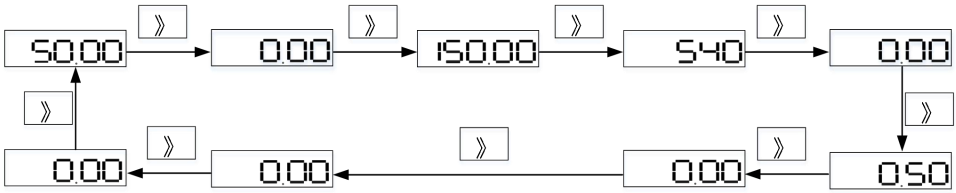


Fig. 4-5 Operation example for switching status parameter display

4.3 Quick start

4.3.1 Inspection before power-up

Conduct wiring connection according to the technical requirements specified in chapter 3 Wring of Servo Drive.

4.3.2 Initial power-up operation

When the drive passes the wiring and power supply inspection, turn on the circuit breaker of the AC power supply at the drive input side to apply power to the drive. The operation panel of the drive will first display “8.8.8.8.8”, and then the contactor will normally engage. When the characters displayed in the digital tube change into the set frequency, it indicates that the drive initialization is finished. If the LED above the M key on the operation panel is ON, it indicates that it is in the operation panel control status.

4.3.3 No-load commissioning

1. Check the drive wiring, power on if correct.

2. Set PG closed loop vector for control mode, P02.00 = 0011.

3. Set PG parameters correctly , PG feedback sources P04.00, set parameters P04.00=12.

4. Set P03 motor parameters correctly, and do motor tuning P03.24.

5. When the motor tuning , motor is rotated to a certain position, and then low speed rotation, if the current is relatively small, P01.41 (resolver signal amplitude) exceeds 20000, and running smoothly, indicating that the tuning is successful. If the motor keeps running or an abnormal tuning alarm occurs, it means that the parameter settings are incorrect.

6. If there is a problem with the encoder, firstly make sure the number of encoder pole pairs, set the number of encoder pole pairs correctly in P04.17, ensuring the ratio of the motor poles and the number of encoder pole pairs is integer. Then check P01.41 (resolver signal amplitude), if the amplitude is lower than 7000, check the encoder wiring or encoder fault.

7. Set the frequency range from 0 to the rated frequency, observe whether the motor is running smoothly , whether there is vibration, especially in the vicinity of zero frequency . If there are vibration close to zero frequency, set the encoder low speed filter coefficient P04.10 and speed loop PI parameter P05 group.

🕮 Note

For details on parameter tuning, please go to Section 6.5.

Parameter tuning can also be called parameter self-learning or parameter self-tuning.

Chapter 5 Parameter List

Explanation to the terms in the function code parameter table

Table field	Explanation
Function code number	Representing the number of the function code, for example, P00.00
Function code name	LED function code name
LCD function code name	LCD function code name
Set range	The minimum and maximum values of the function code allowed to set
Minimum unit	The minimum unit range allowed by the function code
Leave-factory value	The value of the function code after restoring the leave-factory settings
Menu mode	"Q": Indicates simple function code mode; "B": Indicates complete function code mode.
Property	○: Means the function code can be changed during running; ×: Means the function code can be changed in the stop state; *: Means the function code can be read only, can not be changed
Unit	V: Voltage; A: Current; ℃: temperature; Ω: resistance; mH: inductance; rpm: rotate speed; %: percentage; bps: baud rate; Hz, kHz: frequency; ms. s, min, h. kh: time; kW: power; CC: flow; bar: pressure; ⁄: No unit

5.1 Basic menu function code parameter table

Function code	Name	LCD display	Setting range	Minimum unit	Default value	Menu mode		Change
						Q	B	
Group P00: System management								
P00.00	Menu mode selection	Menu mode selection	0: Quick menu mode. Only the parameters related to the quick running of the drive will be displayed 1: Full menu mode All the function parameters are displayed 2: Changing the memory menu mode Only the parameters that are different from the leave-factory values are displayed	1	1	√	√	○
P00.01	User password	User password	0: No password Other: Password protection	1	0	×	√	○
P00.02	LCD	Language	0: Chinese	1	0	×	√	○

	display language selection	selection	1: English					
P00.03	Parameter protection setting	Parameter protection setting	0: All the data can be changed; 1: Only the main set frequency (digital setting P02.05) and this function code can be changed 2: Only this function code can be changed	1	0	√	√	○
P00.04	Selection of key functions	Selection of key functions	Unit place: Pressure expert mode 0: P25.08~P25.18 function codes are not displayed 1: The above parameters are displayed Tens place: Function selection of the STOP/RESET key 0: The STOP key is valid only in the panel control mode 1: The STOP key is valid in all control modes Note: The RESET key is valid in any control mode Hundreds place: Function selection of M key 0: No function 1: Reserved 2: FWD/REV 3: Command channel switching 1 (valid only in stop status) 4: Command channel switching 2 (valid both in stop & running status) 5: Panel locking function 6: Emergency stop function 7: Coast to stop function Thousands place: Panel locking function 0: Lock all the keys 1: Lock all the keys except the STOP key 2: Lock all the keys except the >> key 3: Lock all the keys except the RUN & STOP key	1	0100H	×	√	×
P00.05	Parameter initialization	Parameter initialization	0: Parameter changing status 1: Clear fault memory information 2: Restore to leave-factory value 3: Restore the quick start function group only	1	0	×	√	×
P00.06	Parameter	Parameter	0: Disabled	1	0	×	√	×

	copy	copy	1: Uploading parameter 2: Downloading parameters 3: Downloading parameters (except the motor parameters) Note: The drive parameters will not be uploaded/downloaded					
Group P01: Status display parameters								
P01.00	Main reference frequency channel	Main reference frequency channel	0: Disabled 1: Digital reference 1: Keyboard ∧∨ reference 2: Digital reference 2: Terminal UP/DN reference 3: Serial port communication reference 4: AI analog reference 5~6: Reserved 7: Process closed loop PID 8: Reserved 9: Bus reference	1	1	×	√	*
P01.01	Main reference set frequency	Main reference set frequency	-3000.00~3000.00Hz	0.01Hz	0.00	×	√	*
P01.02	Auxiliary reference set frequency	Auxiliary reference set frequency	-3000.00~3000.00Hz	0.01Hz	0.00	×	√	*
P01.03	Set frequency	Set frequency	-3000.00~3000.00Hz	0.01Hz	0.00	×	√	*
P01.04	Frequency command (after acceleration/ deceleration)	Frequency command	-3000.00~3000.00Hz	0.01Hz	0.00	×	√	*
P01.05	Output frequency	Output frequency	-3000.00~3000.00Hz	0.01Hz	0.00	×	√	*
P01.06	Output voltage	Output voltage	0~480V	1V	0	×	√	*
P01.07	Output current	Output current	0.0~3Ie	0.1A	0.0	×	√	*
P01.08	Torque current	Torque current	-300.0~+300.0%	0.1%	0.0%	×	√	*
P01.09	Flux current	Flux current	0~+100.0%	0.1%	0.0%	×	√	*
P01.10	Output torque	Output torque	-300.0~+300.0%	0.1%	0.0%	×	√	*

P01.11	Motor power	Motor power	0.0~200.0% (relative to the rated power of the motor)	0.1%	0.0%	×	√	*
P01.12	Estimated frequency of motor	Estimated frequency of motor	-650.00~650.00Hz	0.01	0.00	×	×	*
P01.13	Measured frequency of motor	Measured frequency of motor	-650.00~650.00Hz	0.01	0.00	×	×	*
P01.14	High level of output (kWh)	Output (kWh)	0~65535*10000kWh	10^4kWh	0	×	√	*
P01.15	Low level of output (kWh)	Output (kWh)	0~9999kWh	1kWh	0	×	√	*
P01.16	Bus voltage	Bus voltage	0~800V	1V	0	×	√	*
P01.17	Operation state of the drive	Operation state of the drive	0~FFFFH Bit 0: RUN/STOP Bit 1: REV/FWD Bit 2: Running at zero speed Bit 3: Accelerating Bit 4: Decelerating Bit 5: Running at constant speed Bit 6: Pre-exciting Bit 7: Tuning Bit 8: Over-current limiting Bit 9: DC over-voltage limiting Bit 10: Torque limiting Bit 11: Speed limiting Bit 12: Drive in fault Bit 13: Speed control Bit 14: Torque control Bit 15: Reserved	1	0	×	√	*
P01.18	State of digital input terminal	DI terminal state	0~FFH, 0: off; 1: on	1	00	×	√	*
P01.19	State of digital output terminal	DO terminal state	0~FH, 0: open; 1: close	1	4	×	√	*
P01.20	AI1 input voltage	AI1 input voltage	-10.00~10.00V	0.01V	0.00	×	√	*
P01.21	AI2 input voltage	AI2 input voltage	-10.00~10.00V	0.01V	0.00	×	√	*
P01.22	AI3 input voltage	AI3 input voltage	-10.00~10.00V	0.01V	0.00	×	√	*
P01.23~ P01.40	Reserved	Reserved	-	-	-	-	-	-

P01.41	Resolver signal amplitude	Resolver signal amplitude	0~30000	1	23000	×	√	*
P01.42	Pressure reference	Pressure reference	0.0~P25.03(The maximum system pressure)	0.1	0.0	×	×	*
P01.43	Pressure Feedback	Pressure Feedback	0.0~P25.01(Pressure sensor range)	0.1	0.0	×	×	*
P01.44	Flow reference	Flow reference	0.00~P02.15	0.01Hz	0.0	×	×	*
Group P02: Basic parameters								
P02.00	Motor and control mode selection	Motor and control mode selection	Unit place: Motor control mode selection 0: Reserved 1: Vector control with PG 2: V/F control 3: IF control Tens place: Motor type selection 0: Reserved 1: Synchronous motor	1	11H	√	√	×
P02.01	Reserved	Reserved	-	-	-	-	-	-
P02.02	Running command channel selection	Command channel selection	0: Keyboard control 1: Terminal control 2: Communication control 3: CAN bus control	1	0	√	√	○
P02.03	Running direction setting	Running direction setting	0: Forward running; 1: Reverse running	1	0	√	√	○
P02.04	Main reference frequency source selection	Main reference source selection	0: Digital reference 1: Keyboard ∧∨ reference 1: Digital reference 2: Terminal UP/DN reference 2: Serial port communication reference 3: AI analog reference 4~5: Reserved 6: Process closed loop PID 7: Reserved 8: Bus reference	1	0	√	√	○
P02.05	Digital setting of main reference frequency	Main reference frequency setting	P02.17~P02.16	0.01Hz	2.00	√	√	○
P02.06~ P02.12	Reserved	Reserved	-	-	-	-	-	-
P02.13	Acceleration time	Acceleration time	0.0~3600.0	(Unit adopts that of	0.1	√	√	○

				P11.01) 0.1				
P02.14	Deceleratio n time	Deceleratio n time	0.0~3600.0	(Unit adopts that of P11.01) 0.1	0.1	√	√	○
P02.15	Maximum output frequency	Maximum output frequency	MAX{50.00, upper limit frequency P02.16}~ 3000.00Hz Note: The maximum output frequency is determined by P25.05	0.01Hz	50.00	√	√	×
P02.16	Upper limit frequency	Upper limit frequency	P02.17~P02.15	0.01Hz	50.00	√	√	○
P02.17	Lower limit frequency	Lower limit frequency	0.00~P02.16	0.01Hz	0.00	√	√	○
Group P03: Motor parameters								
P03.00	Motor rated power	Rated power	0.4~999.9kW	0.1	Depend ing on model	√	√	×
P03.01	Motor rated voltage	Rated voltage	0~rated voltage of drive (P98.04)	1	Depend ing on model	√	√	×
P03.02	Motor rated current	Rated current	0.1~999.9A	0.1A	Depend ing on model	√	√	×
P03.03	Motor rated frequency	Rated frequency	1.00~3000.0Hz	0.01Hz	Depend ing on model	√	√	×
P03.04	Motor rated rotating speed	Rated rotating speed	0~60000rpm	1rpm	Depend ing on model	√	√	×
P03.05	Motor power factor	Power factor	0.001~1.000 It shall be used when calculating the motor parameters with the nameplates	0.001	Depend ing on model	√	√	×
P03.06	Motor stator resistance	Stator resistance	0.000~65.000	0.001	Depend ing on model	√	√	×
P03.07	Motor direct axis inductance	Direct axis inductance	0.0~2000.0	0.1	Depend ing on model	√	√	×
P03.08	Motor back-EMF constant	Back-EMF constant	0.000~65.000	0.001	Depend ing on model	√	√	×
P03.09	Motor q-axis inductance	Q-axis inductance	0.0~2000.0	0.1	Depend ing on model	√	√	×
P03.10	Motor no-load current	No-load current	0.1~999.9A	0.1A	Depend ing on model	√	√	×
P03.11	Motor rated torque	Rated torque	0.1~1000.0Nm	0.1	Depend ing on model	√	√	×
P03.12	Motor maximum torque	Maximum torque	0.1~1000.0Nm	0.1	Depend ing on model	√	√	×

P03.13	Motor maximum current	Maximum current	0.1~999.9A	0.1	Depending on model	√	√	×
P03.14~ P03.23	Reserved	Reserved	-	-	-	-	-	-
P03.24	Parameter tuning	Parameter tuning	0: Disabled 1: Enabled (motor in static status) 2: Reserved (motor in rotate status)	1	0	×	√	×
P03.25	Motor identification current	Motor identification current	0~30% of motor rated current	0	10	√	√	×
P03.26	Initial angle for installing encoder	Initial angle	0~360.0	0.1	0	√	√	×
P03.27	Initial angle of encoder Z pulse	Angle of Z pulse	0~360.0	0.1	0	√	√	×
P03.28	Motor type selection	Motor type selection	0: SPM 1: IPM	1	0	√	√	×
Group P04: Encoder parameters								
P04.00~ P04.03	Reserved	Reserved	-	-	-	-	-	-
P04.04	Encoder type	Encoder type	0: Resolver 1~3: Reserved	1	0	×	√	*
P04.05	Encoder pulses per revolution	Encoder pulses per revolution	1~10000	1	1024	×	√	○
P04.06	Encoder rotation direction	Encoder rotation direction	0: A before B 1: B before A	1	0	×	√	×
P04.07~ P04.09	Reserved	Reserved	-	-	-	-	-	-
P04.10	Encoder signal filter coefficients	Encoder signal filter coefficients	Unit place:Encoder high-speed filter: 0~9 Tens place: Encoder low-speed filter: 0~9	1	0011	×	√	○
P04.11~ P04.14	Reserved	Reserved	-	-	-	-	-	-
P04.15	Encoder wire-break detection time	Encoder wire-break detection time	0.0: Disabled 0.1~10.0s	0.1	0.0	×	√	×
P04.16	Encoder wire-break protection action	Encoder wire-break action	0: Coast to stop (Er.PG1) 1: Switch to SVC running (reserved)	1	0	×	√	○
Group P05: Speed control parameters								
P05.00	Speed loop low-speed proportional gain	Speed loop low-speed proportional gain	0.1~200.0	0.1	12.0	√	√	○
P05.01	Speed loop low-speed integral	Speed loop low-speed integral	0.000~10.000S	0.001s	0.05s	√	√	○

	time	time						
P05.02	Speed loop low-speed output filter	ASR1 output filter	0~8 (corresponds to 0~2^8/10ms)	1	0	×	√	○
P05.03	Speed loop low-speed switching frequency	ASR switching frequency 1	0.0%~50.0%	0.1	10.0%	×	√	○
P05.04	Speed loop high-speed proportional gain	Speed loop high-speed proportional gain	0.1~200.0	0.1	10.0	√	√	○
P05.05	Speed loop high-speed integral time	Speed loop high-speed integral time	0.000~10.000S	0.001s	0.100s	√	√	○
P05.06	Speed loop high-speed output filter	ASR2 output filter	0~8 (corresponds to 0~2^8/10ms)	1	0	×	√	○
P05.07	Speed loop high-speed switching frequency	ASR switching frequency 2	0.0%~100.0%	0.1	20.0%	×	√	○
P05.08	Speed loop special speed segment proportional gain	Speed loop special speed segment proportional gain	0.1~200.0	0.1	10.0	×	√	○
P05.09	Speed loop special speed segment integral time	Speed loop special speed segment integral time	0.000~10.000s	0.001s	0.100s	×	√	○
P05.10	Speed loop special speed segment switching frequency	ASR switching frequency 3	0.0%~100.0%	0.1	70.0%	×	√	○
P05.11	Differential gain enabling	Differential gain enabling	0：Disable 1：Enable	1	0	×	√	×
P05.12	Speed loop differential gain	ASR differential gain	0.00~10.00	0.01	0.00	×	√	○
P05.13	Electric torque limit channel	Torque limit channel 1	0: Electric torque limit value 1: AI reference 2: Reserved 3: Closed loop output	1	0	×	√	×
P05.14	Braking torque limit channel	Torque limit channel 2	0: Braking torque limit value 1: AI reference 2: Reserved 3: Closed loop output	1	0	×	√	×
P05.15	Electric torque limit value	Torque limit value 1	0.0%~+300.0%	0.1%	250.0%	×	√	○

P05.16	Braking torque limit value	Torque limit 2	0.0%~+300.0%	0.1%	250.0%	×	√	○
P05.17	Zero-servo function selection	Zero servo function	0: Disabled 1: Always enabled 2: Enabled under conditions (terminal enabled)	1	0	×	√	×
P05.18	Zero servo gain	Zero servo gain	0~6.000	0.001	1.000	×	√	○
P05.19	Zero servo initial frequency	Zero servo initial frequency	0.00~10.00Hz	0.01	0.30	×	√	○
P05.20	Action selection upon detection of large speed deviation	Action selection upon detection of DEV	0: Decelerate to stop 1: Coast to stop, display Er.dEv 2: Continue to run	1	2	×	√	×
P05.21	Detection value of large speed deviation	Detection value of DEV	0%~50.0%	0.1%	16.0%	×	√	×
P05.22	Detection time of large speed deviation	DEV detection time	0.0~10.0s	0.1s	1.0	×	√	×
Group P06: Reserved								
Group P07: Reserved								
Group P08: Reserved								
Group P09: Digital input/output parameters								
P09.00~ P09.07	Function selection of input terminals X1~X8	X1 terminal function X2 terminal function X3 terminal function X4 terminal function X5 terminal function X6 terminal function X7 terminal function X8 terminal function	0: No function 1: Drive enable 2~19: Reserved 20: The slave runs at zero speed 21: Parallel flow/bypass flow switch input 22: External reset (RESET) input 23: Coast to stop input (FRS) 24: Acceleration/deceleration disable command 25: Stop DC braking input command 26: Simple PLC pause command 27: Lubrication pressure control 28~36: Reserved 37: Pressure switch to speed mode 38~42: Reserved 43: Drive running disabled 44~55: Reserved 56: Slave as master enable	1	1 37 22 21 20 42 57 12	√	√	×

			57: Pressure PID switch 58: It is valid for the slave to follow the second master					
P09.08	FWD/REV running mode setting	Running control mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire running control 1 – self-keeping function (add any one terminal among D1~D8) 3: Three-wire running control 2 – self-keeping function (add any one terminal among D1~D8)	1	0	×	√	×
P09.09	Terminal UP/DN acceleration/deceleration rate	Terminal UP/DN acceleration/deceleration rate	0.01~99.99Hz/s	0.01	1.00	×	√	○
P09.10	Terminal filtering time	Terminal filtering time	0~500ms	1	10	×	√	○
P09.11~ P09.14	Reserved	Reserved	-	-	-	-	-	-
P09.15	Input terminal enabled status setting	Input terminal enabled status	Binary setting: 0: Normal logical, enabled upon connection 1: Inverted logical, enabled upon disconnection Unit place of LED: BIT0~BIT3: X1~X4 Tens place of LED: BIT0~BIT3: X5~X8	1	00	×	√	○
P09.16	Virtual input terminal setting	Virtual input terminal setting	Binary setting: 0: Disabled 1: Enabled Unit place of LED: BIT0~BIT3: X1~X4 Tens place of LED: BIT0~BIT3: X5~X8	1	00	×	√	○
P09.17	Reserved	Reserved	-	-	-	-	-	-
P09.18	Open collector output terminal Y1	Y1 function selection	0: Drive in running state signal (RUN) 1~9: Reserved 10: Drive running at zero-speed 11~14: Reserved 15: Drive ready for running (RDY) 16: Drive fault 17: Heating alarm 18: Pressure control status output 19~43: Reserved	1	0	√	√	×
P09.19	Open collector output terminal Y2	Y2 function selection		1	1	√	√	×
P09.20	Relay R1 output function	R1 function selection		1	15	√	√	×

	selection							
P09.21	Relay R2 output function selection	R2 function selection		1	18	√	√	×
P09.22	Output terminal enabled status setting	Output terminal enabled status	Binary setting: 0: Enabled upon connection 1: Enabled upon disconnection Unit place of LED: BIT0~BIT3: Y1,Y2,R1,R2	1	0	×	√	○
P09.23	Relay R1 output delay	R1 output delay	0.1~10.0s	0.1s	0.1	×	√	○
P09.24	Frequency arrival detection width	FAR detection width	0.00~3000.00Hz	0.01Hz	2.50Hz	×	√	○
P09.25	FDT 1 level upper limit	FDT 1 level upper limit	P09.24~ P02.16	0.01Hz	50.00Hz	×	√	○
P09.26	FDT 1 level lower limit	FDT 1 level lower limit	0.00~ P09.23	0.01Hz	49.00Hz	×	√	○
P09.27	FDT 2 level upper limit	FDT 2 level upper limit	P09.26~ P09.24	0.01Hz	25.00Hz	×	√	○
P09.28	FDT 2 level lower limit	FDT 2 level lower limit	0.00~ P02.16	0.01Hz	24.00Hz	×	√	○
P09.29~ P09.32	Reserved	Reserved	-	-	-	-	-	-
P09.33	Flux detection value	Flux detection value	10.0%~100.0%	0.1%	100.0%	×	√	○
P09.34	Zero-speed threshold	Zero-speed threshold	0.0%~100.0% of maximum frequency	1.0%	1.0%	×	√	○
Group P10: Analog input/output terminal parameters								
P10.00	Analog input properties	Analog input properties	Unit place: AI1 0: Voltage input 1: Current input Tens place: AI2 0: Voltage input 1: Current input AI3 is the differential voltage input	1	00H	×	√	×
P10.01	Analog function selection	AI function selection	Unit place of LED: AI1 function selection 0: No function 1: Main reference frequency setting 2: Reserved 3: Torque offset 4: Speed limit value 1	1	010H	×	√	×

			5: Speed limit value 2 6: Torque limit value 1 7: Torque limit value 2 8: Torque command (reference) 9: Main reference frequency setting (unipolar) A: Reserved B: Motor temperature detection C: Output voltage offset (under V/F) D: Output voltage (under V/F) E: Reserved (command rate numerator) Tens place of LED: AI2 function selection is the same as above Hundreds place of LED: AI3 function selection is the same as above					
P10.02	AI1 filtering	AI1 filtering	0.000~10.000s	0.001s	0.002s	×	√	○
P10.03	AI2 filtering	AI2 filtering	0.000~10.000s	0.001s	0.002s	×	√	○
P10.04	AI3 filtering	AI3 filtering	0.000~10.000s	0.001s	0.002s	×	√	○
P10.05	Analog curve selection	Analog curve selection	Unit place of LED: AI1 curve selection 0: Pressure feedback curve 1: Flow reference curve 2: Pressure reference curve Tens place of LED: AI2 curve selection (the same as above) Hundreds place of LED: AI3 curve selection (the same as above) Thousands place of LED: Curve multi inflection point setting Note: The thousands place of LED is 0, P10.12~P10.29, P10.34~P10.65 function codes are not displayed; the thousands place of LED is 3, the above function codes are displayed	1	0210H	√	√	○
P10.06	Maximum pressure feedback	Maximum reference 1	P10.07~100.0%	0.1%	100.0%	√	√	○
P10.07	Actual value corresponds to maximum pressure feedback	Actual value corresponds to maximum reference 1	Frequency reference: 0.0~100.0%Fmax Torque: 0.0~300.0%Te Magnetic flux: 0.0~100.0%Φe	0.1%	100.0%	√	√	○
P10.08	Minimum pressure feedback	Minimum reference 1	0.0%~P10.05	0.1%	0.0%	√	√	○
P10.09	Actual	Actual	The same as P10.06	0.1%	0.0%	√	√	○

	value corresponds to minimum pressure feedback	value corresponds to minimum reference 1						
P10.10	Maximum flow reference	Maximum reference 1	P10.12~100.0%	0.1%	100.0%	√	√	○
P10.11	Actual value corresponds to the maximum flow reference	Actual value corresponds to maximum reference 1	The same as P10.07	0.1%	100.0%	√	√	○
P10.12	Inflection point 9 of the flow curve reference	Inflection point 9 of the flow reference	P10.14~ P10.10	0.1%	90.0%	√	√	○
P10.13	Actual value corresponds to the inflection point 9 of the flow curve reference	Actual value of inflection point 9	The same as P10.07	0.1%	90.0%	√	√	○
P10.14	Inflection point 8 of the flow curve reference	Inflection point 8 of the flow curve reference	P10.16~ P10.12	0.1%	80.0%	√	√	○
P10.15	Actual value corresponds to the inflection point 8 of the flow curve reference	Actual value corresponds to the inflection point 8	The same as P10.07	0.1%	80.0%	√	√	○
P10.16	Inflection point 7 of the flow curve reference	Inflection point 7 of the flow curve reference	P10.18~ P10.14	0.1%	70.0%	√	√	○
P10.17	Actual value correspond	Actual value correspond	The same as P10.07	0.1%	70.0%	√	√	○

	s to the inflection point 7 of the flow curve reference	s to the inflection point 7						
P10.18	Inflection point 6 of the flow curve reference	Inflection point 6 of the flow curve reference	P10.20~ P10.16	0.1%	60.0%	√	√	○
P10.19	Actual value corresponds to the inflection point 6 of the flow curve reference	Actual value corresponds to the inflection point 6	The same as P10.07	0.1%	60.0%	√	√	○
P10.20	Inflection point 5 of the flow curve reference	Inflection point 5 of the flow curve reference	P10.22~ P10.18	0.1%	50.0%	√	√	○
P10.21	Actual value corresponds to the inflection point 5 of the flow curve reference	Actual value corresponds to the inflection point 5	The same as P10.07	0.1%	50.0%	√	√	○
P10.22	Inflection point 4 of the flow curve reference	Inflection point 4 of the flow curve reference	P10.24~ P10.20	0.1%	40.0%	√	√	○
P10.23	Actual value corresponds to the inflection point 4 of the flow curve reference	Actual value corresponds to the inflection point 4	The same as P10.07	0.1%	40.0%	√	√	○
P10.24	Inflection point 3 of the flow curve	Inflection point 3 of the flow curve	P10.26~ P10.22	0.1%	30.0%	√	√	○

	reference	reference						
P10.25	Actual value corresponds to the inflection point 3 of the flow curve reference	Actual value corresponds to the inflection point 3	The same as P10.07	0.1%	30.0%	√	√	○
P10.26	Inflection point 2 of the flow curve reference	Inflection point 2 of the flow curve reference	P10.28~ P10.24	0.1%	20.0%	√	√	○
P10.27	Actual value corresponds to the inflection point 2 of the flow curve reference	Actual value corresponds to the inflection point 2	The same as P10.07	0.1%	20.0%	√	√	○
P10.28	Inflection point 1 of the flow curve reference	Inflection point 1 of the flow curve reference	P10.30~ P10.26	0.1%	10.0%	√	√	○
P10.29	Actual value corresponds to the inflection point 1 of the flow curve reference	Actual value corresponds to the inflection point 1	The same as P10.07	0.1%	10.0%	√	√	○
P10.30	Minimum reference of flow curve	Minimum reference 2	0.0%~P10.28	0.1%	0.0%	√	√	○
P10.31	Actual value corresponds to the minimum reference of flow curve	Actual value corresponds to minimum reference 2	The same as P10.07	0.1%	0.0%	√	√	○
P10.32	Maximum pressure	Maximum reference 1	P10.34~100.0%	0.1%	68.0%	√	√	○

	reference							
P10.33	Actual value corresponds to the maximum reference of pressure	Actual value corresponds to maximum reference 1	Frequency reference: 0.0~100.0% Pmax Torque: 0.0~300.0%Te Magnetic flux: 0.0~100.0%Φe	0.1%	68.0%	√	√	○
P10.34	Inflection point 16 of the pressure curve reference	Inflection point 16 of the curve 1 reference	P10.36~P10.32	0.1%	64.0%	×	√	○
P10.35	Actual value corresponds to the inflection point 16 of the pressure curve reference	Actual value corresponds to the inflection point 16	The same as P10.33	0.1%	64.0%	×	√	○
P10.36	Inflection point 15 of the pressure curve reference	Inflection point 15 of the curve 1 reference	P10.38~P10.34	0.1%	60.0%	×	√	○
P10.37	Actual value corresponds to the inflection point 15 of the pressure curve reference	Actual value corresponds to the inflection point 15	The same as P10.33	0.1%	60.0%	×	√	○
P10.38	Inflection point 14 of the pressure curve reference	Inflection point 14 of the curve 1 reference	P10.40~P10.36	0.1%	56.0%	×	√	○
P10.39	Actual value corresponds to the inflection point 14 of the	Actual value corresponds to the inflection point 14	The same as P10.33	0.1%	56.0%	×	√	○

	pressure curve reference							
P10.40	Inflection point 13 of the pressure curve reference	Inflection point 13 of the curve 1 reference	P10.42~P10.38	0.1%	52.0%	×	√	○
P10.41	Actual value corresponds to the inflection point 13 of the pressure curve reference	Actual value corresponds to the inflection point 13	The same as P10.33	0.1%	52.0%	×	√	○
P10.42	Inflection point 12 of the pressure curve reference	Inflection point 12 of the curve 1 reference	P10.44~P10.40	0.1%	48.0%	×	√	○
P10.43	Actual value corresponds to the inflection point 12 of the pressure curve reference	Actual value corresponds to the inflection point 12	The same as P10.33	0.1%	48.0%	×	√	○
P10.44	Inflection point 11 of the pressure curve reference	Inflection point 11 of the curve 1 reference	P10.46~P10.42	0.1%	44.0%	×	√	○
P10.45	Actual value corresponds to the inflection point 11 of the pressure curve reference	Actual value corresponds to the inflection point 11	The same as P10.33	0.1%	44.0%	×	√	○
P10.46	Inflection point 10 of	Inflection point 10 of	P10.48~P10.44	0.1%	40.0%	×	√	○

	the pressure curve reference	the curve 1 reference						
P10.47	Actual value corresponds to the inflection point 10 of the pressure curve reference	Actual value corresponds to the inflection point 10	The same as P10.33	0.1%	40.0%	×	√	○
P10.48	Inflection point 9 of the pressure curve reference	Inflection point 9 of the curve 1 reference	P10.50~P10.46	0.1%	36.0%	×	√	○
P10.49	Actual value corresponds to the inflection point 9 of the pressure curve reference	Actual value corresponds to the inflection point 9	The same as P10.33	0.1%	36.0%	×	√	○
P10.50	Inflection point 8 of the pressure curve reference	Inflection point 8 of the curve 1 reference	P10.52~P10.48	0.1%	32.0%	×	√	○
P10.51	Actual value corresponds to the inflection point 8 of the pressure curve reference	Actual value corresponds to the inflection point 8	The same as P10.33	0.1%	32.0%	×	√	○
P10.52	Inflection point 7 of the pressure curve reference	Inflection point 7 of the curve 1 reference	P10.54~P10.50	0.1%	28.0%	×	√	○
P10.53	Actual	Actual	The same as P10.33	0.1%	28.0%	×	√	○

	value corresponds to the inflection point 7 of the pressure curve reference	value corresponds to the inflection point 7						
P10.54	Inflection point 6 of the pressure curve reference	Inflection point 6 of the curve 1 reference	P10.56~P10.52	0.1%	24.0%	×	√	○
P10.55	Actual value corresponds to the inflection point 6 of the pressure curve reference	Actual value corresponds to the inflection point 6	The same as P10.33	0.1%	24.0%	×	√	○
P10.56	Inflection point 5 of the pressure curve reference	Inflection point 5 of the curve 1 reference	P10.58~P10.54	0.1%	20.0%	×	√	○
P10.57	Actual value corresponds to the inflection point 5 of the pressure curve reference	Actual value corresponds to the inflection point 5	The same as P10.33	0.1%	20.0%	×	√	○
P10.58	Inflection point 4 of the pressure curve reference	Inflection point 4 of the curve 1 reference	P10.60~P10.56	0.1%	16.0%	×	√	○
P10.59	Actual value corresponds to the inflection point 4 of	Actual value corresponds to the inflection point 4	The same as P10.33	0.1%	16.0%	×	√	○

	the pressure curve reference							
P10.60	Inflection point 3 of the pressure curve reference	Inflection point 3 of the curve 1 reference	P10.62~P10.58	0.1%	12.0%	×	√	○
P10.61	Actual value corresponds to the inflection point 3 of the pressure curve reference	Actual value corresponds to the inflection point 3	The same as P10.33	0.1%	12.0%	×	√	○
P10.62	Inflection point 2 of the pressure curve reference	Inflection point 2 of the curve 1 reference	P10.64~P10.60	0.1%	8.0%	×	√	○
P10.63	Actual value corresponds to the inflection point 2 of the pressure curve reference	Actual value corresponds to the inflection point 2	The same as P10.33	0.1%	8.0%	×	√	○
P10.64	Inflection point 1 of the pressure curve reference	Inflection point 1 of the curve 1 reference	P10.66~P10.62	0.1%	4.0%	×	√	○
P10.65	Actual value corresponds to the inflection point 1 of the pressure curve reference	Actual value corresponds to the inflection point 1	The same as P10.33	0.1%	4.0%	×	√	○
P10.66	Minimum	Minimum	0.0%~P10.64	0.1%	0.0%	√	√	○

	reference of pressure curve	reference 1						
P10.67	Actual value corresponds to the minimum reference of pressure curve	Actual value corresponds to minimum reference 1	The same as P10.33	0.1%	0.0%	√	√	○
P10.68~ P10.74	Reserved	Reserved	-	-	-	-	-	-
P10.75	AI zero offset automatic correction	AI zero offset automatic correction	0~1	1	0	×	√	○
Group P11: Reserved								
Group P12: Advanced function parameters								
P12.00~ P12.01	Reserved	Reserved	-	-	-	-	-	-
P12.02	Carrier wave frequency	Carrier wave frequency	0.7~15.0KHz (minimum vector: 3k)	0.1	8.0	√	√	○
P12.03	PWM mode optimization	PWM mode optimization	Unit place: Enable the over modulation 0: Disabled 1: Enabled Tens place: Automatic adjustment selection for carrier wave frequency 0: No automatic adjustment 1: Automatic adjustment Hundreds place: Modulation mode 0: Two-phase/ three-phase switching 1: Three-phase modulation Thousands place: Low frequency carrier limit 0: Disable 1: Enable	1	1001H	×	√	×
P12.04	Current loop gain selection	Current loop gain selection	0: Manual selection 1: Calculate automatically (after tuning)	1	0	×	√	×
P12.05	Current loop proportional gain	Current loop proportional gain	1~5000	1	1000	×	√	○
P12.06	Current loop integral	Current loop integral	0.5~100.0ms	0.1	4.0	×	√	○

	time	time						
P12.07	Anti-trip function enabling	Anti-trip function enabling	0~1	1	0	×	√	×
P12.08	Frequency reduction rate upon voltage compensation	Frequency reduction rate	0.00~99.99Hz/s	0.01	10.00	×	√	○
P12.09	Pre-magnetizing time	Pre-magnetizing time	0.0~10.0s	0.1	0	×	√	×
P12.10	Minimum flux reference value	Minimum flux reference value	10%~150%	1%	100%	×	√	○
P12.11	Flux-weakening adjustment coefficient 1	Flux-weakening adjustment coefficient 1	0~10000	1	0	×	√	○
P12.12	Flux-weakening adjustment coefficient 2	Flux-weakening adjustment coefficient 2	0~10000	1	600	×	√	○
P12.13	Flux-weakening control mode	Flux-weakening control mode	0~1	1	1	×	√	○
P12.14	Cooling fan control	Fan control	0: Operate automatically 1: Fan operates continually during power-up 2: The fan runs in a running command Note: It will keep running for 3 minutes after power-off	1	2	×	√	×
P12.15~ P12.17	Reserved	Reserved	-	-	-	-	-	-
P12.18	Motor temperature detection device selection	Motor temperature detection device selection	Unit place: Temperature detection device types 0: PTC 1: KTY84 Tens place: Number of temperature detection device cores 0: Single core 1: Three core	1	00	×	√	×
P12.19	Reserved	Reserved	-	-	-	-	-	-
Group P13: Reserved								

Group P14: Hydraulic servo control parameters								
P14.00	Pressure control mode	Pressure control mode	0: Non-pressure control mode 1: Reserved 2: Drive pressure control mode 2 AI1 analog channel provides pressure feedback command; AI2 analog channel provides flow reference command; AI3 analog channel provides pressure reference command. 3: CANopen pressure mode CANopen gives pressure and flow commands, AI1 analog channel provides pressure feedback commands, and the drive performs pressure control. Note: See pressure control for details	1	0	×	√	×
P14.01	Pressure command rise time	Pressure command rise time	0~6000ms	1ms	20	×	√	○
P14.02	Pressure control proportional gain Kp1	Proportional gain 1	0.000~15.000	0.001	3.000	×	√	○
P14.03	Pressure control integral gain Ki1	Integral gain 1	0.000~10.000	0.001	0.35	×	√	○
P14.04	Pressure control differential gain Kd1	Differential gain 1	0.000~10.000	0.001	0.000	×	√	○
P14.05	Pressure control proportional gain Kp2	Proportional gain 2	0.000~10.000	0.001	4.000	×	√	○
P14.06	Pressure control integral gain Ki2	Integral gain 2	0.000~10.000	0.001	0.6	×	√	○
P14.07	Pressure control differential gain Kd2	Differential gain 2	0.000~10.000	0.001	0.000	×	√	○
P14.08	Flow command rise time	Flow command rise time	0.0~600.0ms	0.1	40.0	×	√	○

P14.09	Flow command drop time	Flow command drop time	0.0~600.0ms	0.1	100.0	×	√	○
P14.10	Unloading pressure reverse speed limit	Unloading pressure reverse speed limit	-100.0%~100% Note: The maximum output frequency is 100%	0.1%	-10.0%	×	√	○
P14.11	Pressure sensor fault detection selection	Pressure sensor fault detection selection	Unit place: Pressure sensor fault detection selection 0: Continue to run, no alarm 1: Continue to run and display “AL.FbL” (feedback lost) or “AL.Fbo” (feedback exceeding limit) 2: Coast to stop and display “Er.FbL” (feedback lost) or “Er.Fbo” (feedback exceeding limit) Tens place: Unloading pressure reverse speed limit fault detection selection 0: Continue to run, no alarm 1: Continue to run and display AL.PIL 2: Coast to stop and display Er.PIL Note: As long as the pressure sensor feedback fault occurs, the appropriate "feedback loss" or "feedback exceeding limit" function output terminal will have output.	1	00	×	√	×
P14.12	Pressure sensor feedback lost detection value	PID feedback lost detection value	0.0~100.0%	0.1%	30.0%	×	√	○
P14.13	Pressure sensor feedback lost detection time	PID feedback lost detection time	0.0s~25.0s	0.1s	0.2s	×	√	○
P14.14	Pressure sensor feedback exceeding limit detection level	PID feedback exceeding limit detection level	0.0~100.0%	0.1%	80.0%	×	√	○
P14.15	Pressure sensor feedback exceeding limit detection	PID feedback exceeding limit detection time	0.0s~25.0s	0.1s	1.0s	×	√	○

	time							
P14.16	Pressure overshoot suppression function	Pressure overshoot suppression function enabled	0~1	1	1	×	√	○
P14.17	Pressure overshoot suppression detection level	Pressure overshoot suppression detection level	0.0~100.0	0.1	0.5	×	√	○
P14.18	Pressure overshoot suppression coefficient	Pressure overshoot suppression coefficient	0~100	1	5	×	√	○
P14.19~ P14.24	Reserved	Reserved	-	-	-	-	-	-
P14.25	Pressure control proportional gain Kp3	Proportional gain 3	0.000~60.000	0.001	2.000	×	√	○
P14.26	Pressure control integral gain Ki3	Integral gain 3	0.000~60.000	0.001	0.150	×	√	○
P14.27	Pressure control differential gain Kd3	Differential gain 3	0.000~30.000	0.001	0.000	×	√	○
P14.28	Pressure command drop time	Pressure command drop time	0~6000ms	1ms	100	×	√	○
P14.29	The second group of pressure overshoot suppression detection levels	The second group of pressure overshoot suppression detection levels	0.0~100.0	0.1	0.5	×	√	○
P14.30	The second group of pressure overshoot suppression coefficients	The second group of pressure overshoot suppression coefficients	0~100	1	5	×	√	○
P14.31~ P14.33	Reserved	Reserved	-	-	-	-	-	-

P14.34	Pressure sensor fault detection current lower limit	Pressure sensor fault detection current lower limit	20.0%~300.0%	0.1%	100.0%	×	√	○
P14.35	Pressure sensor fault detection current upper limit	Pressure sensor fault detection current upper limit	20.0%~100.0%	0.1%	50.0%	×	√	○
P14.36	Pressure control state output maximum speed	Pressure control state output maximum speed	0.0%~100.0%	0.1%	10.0%	×	√	○
P14.37	Pressure control state output minimum pressure setting	Pressure control state output minimum pressure setting	0.0%~100.0%	0.1%	60.0%	×	√	○
P14.38	Pressure control state output delay time	Pressure control state output delay time	0.001~10.000s	0.001s	0.100s	×	√	○
P14.39	Pressure mode switching speed mode torque upper limit	Pressure mode switching speed mode torque upper limit	50.0~250.0%	0.1%	150%	×	√	○
Group P15: External communication parameters								
P15.00	Reserved	Reserved	-	-	-	-	-	-
P15.01	External CAN baud rate	External CAN baud rate	0: 125k 1: 250k 2: 500k 3: 1000k	1	3	×	√	○
P15.02	External CAN driver station number	External CAN driver station number	1~127	1	5	×	√	○
P15.03	External CAN disconnecti on detection	External CAN disconnecti on detection	0.0~100.0s	0.1s	0.1s	×	√	○

	time	time						
P15.04	485 baud rate selection	485 baud rate selection	Unit place of LED: Baud rate selection 0:9600 1:19200 2:38400 3:57500 4:115200 Tens place of LED: Data format 0:N,8,1 1:E,8,1 2:O,8,1 3:N,8,2 4:E,8,2 5:O,8,2 Hundreds place of LED: Reserved	1	004	×	√	×
P15.05	485 local address	485 local address	0~127	1	5	×	√	×
P15.06	485 local response delay	485 local response delay	0.0~1000ms	1	5ms	×	√	×
Group P16: Keyboard display setting parameters								
P16.00	LED display parameter selection 1 when running	Running display 1	Binary setting: 0: No display; 1: Display Unit place of LED: BIT0: Output frequency (Hz) BIT1: Preset frequency (Hz flashing) BIT2: Output current (A) Tens place of LED: BIT0: Running rotating speed (r/min) BIT1: Preset rotating speed (r/min, flashing) BIT2: Running line speed (m/s) BIT3: Preset line speed (m/s, flashing) Hundreds place of LED: BIT0: Output power BIT1: Output toque (%) Note: The default display shall be output frequency when all the parameters are 0	1	017H	×	√	○
P16.01	LED display parameter selection 2 when running	Running display 2	Binary setting: 0: No display; 1: Display Unit place of LED: BIT0: Output voltage (V) BIT1: AI1 (V) BIT2: AI2 (V) BIT3: AI3 (V)	1	00	×	√	○

			Tens place of LED: BIT0: Analog closed loop feedback (%) BIT1: Analog closed loop reference (%, flashing) BIT2: Terminal status (without unit) BIT3: DC bus voltage					
P16.02	LED display parameter selection when stop	Stop display	Binary setting: 0: No display; 1: Display Unit place of LED: BIT0: Preset frequency (Hz) BIT1: Running speed (r/min) BIT2: Preset speed (r/min) BIT3: DC bus voltage Tens place of LED: BIT0: Running line speed (m/s) BIT1: Preset line speed (m/s) BIT2: Analog closed loop feedback (%) BIT3: Analog closed reference (%) Hundreds place of LED: BIT0: AI1 (V) BIT1: AI2 (V) BIT2: AI3 (V) BIT3: Terminal status (without unit) Note: The default display shall be set frequency when all the parameters are 0	1	009H	×	√	○
P16.03	Line speed coefficient	Line speed coefficient	0.1%~999.9% VF-PG: Line speed = Mechanical rotating speed × P16.03 Preset line speed = Preset rotating speed × P16.03 VF-NPG: Line speed = Operation frequency × P16.03 Preset line speed = Preset frequency × P16.03 Non-VF: Line speed = Measured/estimated rotating speed × P16.03 Preset line speed = Preset frequency × P16.03	0.1%	1.0%	×	√	○
P16.04	Rotating speed display	Rotating speed coefficient	0.1%~999.9% VF-PG: Running rotating speed = Mechanical	0.1%	100.0%	×	√	○

	coefficient		rotating speed × P16.04 Preset rotating speed = Preset rotating speed × P16.04 VF-NPG: Running rotating speed = Running frequency × motor rated rotating speed/motor rated frequency × P16.04 Preset rotating speed = Preset frequency × motor rated rotating speed/motor rated frequency × P16.04 Non-VF: Running rotating speed = Measured/ estimated rotating speed × P16.04 Preset rotating speed = Preset frequency × motor rated rotating speed/motor rated frequency × P16.04					
P16.05	Close loop analog display coefficient	Closed loop display coefficient	0.1%~999.9% Note: The close loop analog reference/feedback displays range is 0~9999.9	0.1%	100.0%	×	√	○
P16.06	Inverter module temperature	Inverter module temperature	0.0~150.0℃	0.1℃	0.0	×	√	*
P16.07	Rectifier module temperature	Rectifier module temperature	0.0~150.0℃	0.1℃	0.0	×	√	*
P16.08	Motor temperature measured	Motor temperature measured	0℃~200℃	1℃	0	×	√	*
P16.09	Accumulated power-on hours	Accumulated power-on hours	0 ~ maximum 65535 hours	1hour	0	×	√	*
P16.10	Accumulated running hours	Accumulated work hours	0 ~ maximum 65535 hours	1hour	0	×	√	*
P16.11	Accumulated running hours of fan	Accumulated running hours of fan	0 ~ maximum 65535 hours	1hour	0	×	√	*
Group P25: Hydraulic servo selection parameters								
P25.00	Hydraulic servo model	Hydraulic servo model	0~FFFF Jointly developed by the servo drive manufacturers and injection molding machine	1	0	×	√	○

			manufacturers, in order to set the parameters (using a parameter required for curing all the parameters set by the corresponding models). Note: When you select "0", representing that hydraulic servo model is not formulated, you need to set the parameters yourself.					
P25.01	Pressure sensor range	Pressure sensor range	0.0~255.0	0.1 kg/cm^2	250.0	×	√	○
P25.02	Output signal mode of the pressure sensor	Output signal mode of the pressure sensor	0:1~5V output 1:4~20mA output (reserved) 2:1~10V 3:0~10V Set according to pressure sensor specifications	1	0	×	√	○
P25.03	Maximum system pressure	Maximum system pressure	0.0~255.0 The maximum pressure required by the system,when the command voltage DC10V corresponding system pressure output, corresponding to the maximum system pressure	0.1 kg/cm^2	175.0	×	√	○
P25.04	Motor type	Motor type	0~65536 Jointly developed by the servo drive manufacturers and servo motor manufacturers, in order to set the parameters (using a parameter required for curing all the parameters set by P03). For specific curing parameters, see Appendix A.4. Note: When you select "0", representing that motor type is not formulated, you need to set the parameters yourself.	1	0	×	√	○
P25.05	Maximum speed	Maximum speed	0~60000rpm	1	2000	×	√	○
P25.06	Bottom pressure	Bottom pressure	Expressed by percentage of the pressure sensor range (P25.01)	0.1%	1.0%	×	√	○
P25.07	Bottom flow	Bottom flow	Expressed by percentage of the maximum speed (P25.05)	0.1%	0.5%	×	√	○
P25.08	AI1 zero offset	AI1 zero offset	-1000.0~1000.0	0.1	0.0	×	√	○
P25.09	AI1 bias	AI1 bias	-5000~5000	1	0	×	√	○
P25.10	AI2 zero offset	AI2 zero offset	-1000.0~1000.0	0.1	0.0	×	√	○
P25.11	AI2 bias	AI2 bias	-5000~5000	1	0	×	√	○
P25.12	AI3 zero offset	AI3 zero offset	-1000.0~1000.0	0.1	0.0	×	√	○
P25.13	AI3 bias	AI3 bias	-5000~5000	1	0	×	√	○
P25.14	AI1 dead zone	AI1dead zone	0.0~1000.0	0.1	0	×	√	○
P25.15	AI2 dead zone	AI2 dead zone	0.0~1000.0	0.1	0	×	√	○

P25.16	AI3 dead zone	AI3 dead zone	0.0~1000.0	0.1	0	×	√	○
P25.17	Overspeed fault threshold	Overspeed fault threshold	0~5000rpm	1	2000	×	√	○
P25.18	Constant speed judgment threshold	Constant speed judgment threshold	0~100rpm	1	10	×	√	○
Group P26: Vector control optimization parameters								
P26.00	Speed loop bandwidth control enable	Speed loop bandwidth control enable	0~2	1	1	×	√	○
P26.01	Expected low speed bandwidth	Expected speed bandwidth (low speed)	1.0~200.0Hz	0.1Hz	10.0Hz	×	√	○
P26.02	Expected high speed bandwidth	Expected speed bandwidth (high speed)	1.0~200.0Hz	0.1Hz	10.0Hz	×	√	○
P26.03	Speed loop rigidity class	Speed loop rigidity class	1~10	1	4	×	√	○
P26.04	System inertia	System inertia	1~100000kg.cm^2	1kg.cm^2	1	×	√	○
P26.05	Motor stand-alone inertia	Motor stand-alone inertia	1~100000kg.cm^2	1kg.cm^2	1	×	√	○
P26.06	Inertia identification maximum speed	Inertia identification maximum speed	20.~100%	1%	80%	×	√	○
P26.07	Inertia identification enabled	Inertia identification enabled	1~100000kg.cm^2	1kg.cm^2	1	×	√	○
P26.08	Speed filter bandwidth	Speed filter bandwidth	1~2000Hz	1Hz	500Hz	×	√	○
P26.09	Speed feedback filter bandwidth	Speed feedback filter bandwidth	100~2000Hz	1Hz	2000Hz	×	√	○
P26.10~ P26.12	Reserved	Reserved	-	-	-	-	-	-
Group P33: Multi-pump parallel control parameters								
P33.00	Internal CAN baud rate selection	Internal CAN baud rate selection	0:125K 1:250K 2:500K 3:1M	1	3	×	√	○
P33.01	Internal CAN communication address	Internal CAN communication address	1~127	1	1	×	√	○
P33.02	Internal	Internal	0.1~5.0	0.1	0	×	√	○

	CAN disconnection detection time	CAN disconnection detection time						
P33.03	Parallel flow type	Parallel flow type	0: Single pump 1: Single-master multi-slave composite allocation 2: Single-master and multiple-slave bypass/parallel flow 3: Multiple masters and multiple slaves parallel flow	1	0	×	√	○
P33.04	Single master selection	Single master selection	0: Invalid 1: Valid	1	0	×	√	○
P33.05	Unit number	Unit number	0~15	1	0	×	√	○
P33.06	Node master/ slave switch	Node master/ slave switch	0: Slave pump mode 1: Master pump mode	1	0	×	√	○
P33.07	Pump displacement	Pump displacement	0~65536	1	40	×	√	○
P33.08	Flow cut-in threshold	Traffic cut-in threshold	0~100%	1	60%	×	√	○
P33.09	Flow cut-in hysteresis	Flow cut-in hysteresis	0~100%	0	2%	×	√	○
Group P97: Protection and fault parameters								
P97.00	Fault protection and alarm property setting 1	Fault protection and alarm property setting 1	Unit place of LED: Action upon communication fault 0: Activate protection and coast to stop 1: Alarm and keep running 2: Alarm and stop in the stop mode (only in serial port control mode) 3: Alarm and stop in the stop mode (in all control modes) Tens place of LED: Action upon contactor abnormality 0: Activate protection and coast to stop 1: Alarm and keep running Hundreds place of LED: Action upon EEPROM abnormality 0: Activate protection and coast to stop 1: Alarm and keep running Thousands place of LED: Action upon 24V/±10V short circuit 0: Activate protection and coast to stop 1: Alarm and keep running	1	0000	×	√	×

P97.01	Fault protection and alarm property setting 2	Fault protection and alarm property setting 2	Unit place of LED: Action upon phase loss 0: Activate protection upon input and output phase loss 1: No protection upon input phase loss 2: No protection upon output phase loss 3: No protection upon input and output phase loss Tens place of LED: Action upon loss of external analog frequency/torque input 0: No action 1: Activate protection and coast to stop 2: Alarm and keep running Hundreds place of LED: Action upon motor overheat 0: Activate protection and decelerate to stop 1: Activate protection and coast to stop 2: Alarm and keep running Thousands place of LED: Action upon analog input (AI1, AI2, AI3) fault 0 : Activate protection and decelerate to stop 1 : Activate protection and coast to stop 2 : Alarm and keep running	1	0000	×	√	×
P97.02	Fault protection and alarm property setting 3	Fault protection and alarm property setting 3	Unit place of LED: Action upon temperature sampling disconnection 0 : Activate temperature protection upon inverter and rectifier module and stop in the stop mode 1 : Activate temperature protection upon inverter and rectifier module and coast to stop 2 : Temperature alarm upon inverter and rectifier module and keep running 3 : No action to rectifier, activate temperature protection upon inverter and stop in the stop mode Tens place of LED: Action upon under-voltage fault indication 0 : No action 1 : Action (under-voltage is regarded	1	0000	×	√	×

			as a kind of fault) Hundreds place of LED: Action upon auto-reset interval fault indication 0 : No action 1 : Action Thousands place of LED: Fault lockup function selection 0 : Prohibited 1 : Open (without fault output) 2 : Open (with fault output)					
P97.03	Overload protection setting for motor	Overload protection setting	Unit place of LED: Overload compensation mode 0: No action 1: Common motor (with low-speed compensation) 2: Variable-frequency motor (without low-speed compensation) Tens place of LED: Overload pre-alarm detection selection 0: Always detect 1: Detect only at constant speed Hundreds place of LED: Overload pre-alarm action selection 0: Alarm and keep running 1: Activate protection and coast to stop Thousands place of LED: Overload detection level selection 0: Relative to rated current of the motor (Er.oL1) 1: Relative to rated current of the drive (Er.oL2)	1	1100H	×	√	×
P97.04	Overload pre-alarm detection level	Overload detection level	20.0%~200.0%	0.1%	180.0%	×	√	○
P97.05	Overload pre-alarm detection time	Overload detection time	0.0~60.0s	0.1s	2.0s	×	√	○
P97.06	Motor over-temperature protection point	Motor over-temperature protection point	0~200℃	1	130.0	×	√	○
P97.07	Over-voltage stall selection	Over-voltage stall selection	0: Disabled (when the braking resistor is installed) 1: Enabled	1	1	×	√	×
P97.08	Over-volta	Over-volta	120.0%~150.0%Udce	0.1%	140.0%	×	√	×

	ge point at stall	ge point at stall						
P97.09	Auto current limiting action selection	Auto current limiting action	0: Disabled at constant speed 1: Enabled at constant speed Note: Always enabled for acceleration/deceleration	1	1	×	√	×
P97.10	Auto current limiting level	Current limiting level	20.0%~200.0%Ie	0.1%	150.0%	×	√	×
P97.11	Frequency reduction rate upon current limiting	Frequency reduction rate	0.00~99.99Hz/s	0.01Hz/s	10.00 Hz/s	×	√	○
P97.12	Grounding short circuit detection upon power-up	Grounding short circuit detection upon power-up	0: Disable 1: Enable (enabled for small power)	1	1	×	√	○
P97.13	Auto reset times	Auto reset times	0: No function 1~100: Auto reset times Note: Auto reset is not available for module protection, external device fault and AI over-current fault	1	0	×	√	×
P97.14	Auto reset interval	Reset interval	2.0~20.0s per time	0.1s	5.0s	×	√	×
P97.15	The first fault type	First fault	0: No abnormal record 1: Over-current during the drive acceleration (Er.oC1) 2: Over-current during the drive deceleration (Er.oC2) 3: Over-current when the drive is running with constant speed (Er.oC3) 4: Over-voltage during the drive acceleration (Er.oU1) 5: Over-voltage during the drive deceleration (Er.oU2) 6: Over-voltage when the drive is running with constant speed (Er.oU3) 7: Reserved 8: Input side phase loss (Er.IrF) 9: Output side phase loss (Er.odF) 10: Power module protection (Er.drv) 11: Radiator 1 overheating (Er.oH1) 12: Radiator 2 overheating (Er.oH2) 13: Drive overload (Er.oL1)	1	0	×	√	*

			14: Motor overload (Er.oL2) 15: External fault（Er.EFT） 16: EEPROM read-write error (Er.EEP) 17: Abnormal serial port communication (Er.SC1) 18: Abnormal contactor (Er.rLy1) 19: Abnormal current detection circuit (Er.CUr), Hall or amplifying circuit 20: System interference (Er.CPU) 21: PID feedback lost (Er.FbL) 22: External reference command lost (Er. EGL) 23: Keyboard parameter copy error (Er.CoP) 24: Poor tuning (Er.TUn) 25: Local PG fault (Er.PG1) 26: Reserved 27: Reserved 28: Parameter setting error (Er.PST) 29: Control board 24V power short circuit (Er.24v) 30: Reserved 31: Expansion card fault (Er.oPT) 32: Reserved 33: Grounding short circuit (Er.GdF) 34: Large DEV deviation fault (Er.dEv) 35: Reserved 36: Reserved 37: Reserved (Expansion PG fault (Er.PG2)) 38: PID feedback exceeding limit (Er.Fbo) 39: Motor over-temperature (Er.oHL) 40: Reserved 41: Abnormal AI input fault (Er.AIF abnormal analog input) 42: Inverter module temperature sampling disconnection protection (Er.THI) 43: Rectifier module temperature sampling disconnection protection (Er.THr) 44: Short circuit of ±10V analog output power (Er.10v) 45: Abnormal internal over-current reference (Er.rEF)					

			46~50: Reserved Note: 1. Er.drv fault can not be reset until 10s later; 2. For continuous over-current less than 3 times (including 3 times), it can not be reset until 6s later; if it is more than 3 times, it can not be reset until 200s later; 3. The keyboard displays AL.xxx in case of any fault (e.g. in case of the contactor fault, keyboard displays Er.xxx if there is protection action, and displays AL.xxx if continuing running with alarm)					
P97.16	The second fault type	The second fault	The same as P97.15	1	0	×	√	*
P97.17	Latest fault type	The third fault	The same as P97.15	1	0	×	√	*
P97.18	DC bus voltage at the latest fault	Fault voltage	0~999V	1V	0V	×	√	*
P97.19	Actual current at the latest fault	Fault current	0.0~999.9A	0.1A	0.0A	×	√	*
P97.20	Running frequency at the latest fault	Fault frequency	0.00Hz~3000.00Hz	0.01Hz	0.00Hz	×	√	*
P97.21	Drive running status at the latest fault	Drive status at fault	0~FFFFH	1	0000	×	√	*
Group P98: Drive parameters								
P98.00	Serial No.	Serial No.	0~FFFF	1	600	×	√	*
P98.01	Software version No.	Software version No.	0.00~99.99	1	1.00	×	√	*
P98.02	User-customized version No.	User-customized version No.	0~9999	1	0	×	√	*
P98.03	Rated capacity	Rated capacity	Output power (0~999.9KVA) (set by the model automatically)	0.1kVA	Manufacturer setting	×	√	*
P98.04	Rated voltage	Rated voltage	0~999V (set by the model automatically)	1V	Manufacturer setting	×	√	*
P98.05	Rated current	Rated current	0~999.9A (set by the model automatically)	0.1A	Manufacturer setting	×	√	*

P98.06	Drive series selection	Drive series selection	0: 220V 1: 380V 2: 400V 3: 415V 4: 440V 5: 460V 6: 480V	1	Manufacturer setting	×	√	*

5.2 Detailed description of pressure control function parameters

5.2.1 Hydraulic servo control parameters (Group P14)

P14.00	Pressure control mode	0~3 (0)

0: Non-pressure control mode

1: Reserved

2: Drive pressure control mode 2

AI1 analog channel provides pressure feedback command;

AI2 analog channel provides flow reference command;

AI3 analog channel provides pressure reference command.

3: CANopen pressure mode

CANopen gives pressure and flow commands, AI1 analog channel provides pressure feedback commands, and the drive performs pressure control.

P14.01	Pressure command rise time	0~6000ms (0)

Pressure reference command acceleration / deceleration is the soft start function to increase or decrease the target value by the set acceleration / deceleration time.

The set time refers to the required time of pressure reference from 0.0% command to 100.0% command or from 100.0% command to 0.0% command.

P14.02	Pressure control proportional gain Kp1	0.000~60.000(1.500)

The first group of PID proportional gain for pressure control. The larger Kp1 is, the quicker response becomes, but too large Kp1 may easily cause oscillation and the steady-sate error cannot be eliminated by using Kp1 control only. The smaller Kp1 is, the slower response becomes, too slow response may easily cause the lower efficiency and product instability.

P14.03	Pressure control integral gain Ki1	0.000~60.000(0.150)

The first group of PID integral gain for pressure control. The main functions of Ki1 lie in eliminating steady-state deviation and making the feedback value consistent with the target value. Too large Ki1 may easily cause overshoot and oscillation.

P14.04	Pressure control differential gain Kd1	0.000~30.000(0.000)

Kd is used for improving the response performance of the system, but too large configuration may easily cause oscillation.

P14.05	Pressure control proportional gain Kp2	0.000~60.000(1.500)

Corresponding to pressure control proportional gain Kp1(P14.02).

P14.06	Pressure control integral gain Ki2	0.000~60.000(0.300)

Corresponding to pressure control integral gain Ki1(P14.03).

P14.07	Pressure control differential gain Kd2	0.000~30.000(0.000)

Corresponding to pressure control differential gain Kd1(P14.04).

🕮 Note

1. In the hydraulic servo control, the first is to control the response of servo motor ,the second is to control the response of system pressure and flow, therefore, control and adjust the servo motor response firstly and then control and adjust the system response. For servo motor control and regulation, it is mainly the speed loop and current loop parameter adjustment.
2. The larger percentage gain (Kp), integral gain (Ki), differential gain (Kd) are, the quicker response becomes, but too fast response easily cause that the servo motor vibrates and injection molding machine movement is unsteady; Conversely, the smaller proportional gain (Kp), integral gain (Ki), differential gain (Kd) are, the slower response becomes,and too low response easily cause the pressure control unstable and overshoot.

P14.10	Unloading pressure reverse speed limit	-100.0%~100.0% (-10.0%)

The maximum reverse speed when unloading pressure, corresponding to the percentage setting of the maximum speed, is used for setting the maximum reverse speed of motor. The larger the set value is, the quicker unloading pressure becomes, but too fast unloading pressure easily cause the pump reverse noise.The smaller the set value is, the slower unloading pressure becomes.

P14.11	Pressure sensor fault detection selection	00~22H (00)

Unit place: Pressure sensor fault detection selection

0: Continue to run, no alarm

1: Continue to run and display “AL.FbL” (feedback lost) or “AL.Fbo” (feedback exceeding limit)

2: Coast to stop and display “Er.FbL” (feedback lost) or “Er.Fbo” (feedback exceeding limit)

Note: As long as the pressure sensor feedback fault occurs, the appropriate "feedback loss" or "feedback exceeding limit" multi-functional output terminal will have output.

Tens place: Unloading pressure reverse speed limit fault detection selection

0: Continue to run, no alarm

1: Continue to run and display AL.PIL

2: Coast to stop and display Er.PIL

P14.12	Pressure sensor feedback lost detection value	0.0~100.0(0.0%)
P14.13	Pressure sensor feedback lost detection time	0.0~25.0s (1.0s)

When the pressure sensor feedback signal is less than the detection value set by P14.12 and its time exceeds the time set by P14.13, then pressure sensor feedback is considered as “lost”.

P14.14	Pressure sensor feedback exceeding limit	0.0~100.0%(100.0%)

P14.15	Pressure sensor feedback exceeding limit detection time	0.0~25.0s (1.0s)

When the pressure sensor feedback signal is greater than the detection value set by P14.14 and its time exceeds the time set by P14.15, then pressure sensor feedback is considered as “exceeding limit”.

P14.16	Pressure overshoot suppression function	0~1 (0)

0: Disabled

1: Enabled

P14.17	Pressure overshoot suppression detection level	0.0~100.0 (0.5)

The larger the value is, the later the overshoot suppression starts, the worse the overshoot suppression effect is, and the larger the overshoot is. On the contrary, the earlier the overshoot suppression starts, the better the overshoot suppression effect is and the smaller the overshoot is.

P14.18	Pressure overshoot suppression coefficient	0~100(5)

The larger the value is, the later the overshoot suppression starts, the worse the overshoot suppression effect is, and the larger the overshoot is. On the contrary, the earlier the overshoot suppression starts, the better the overshoot suppression effect is and the smaller the overshoot is.

P14.19~P14.24	Reserved	-
P14.25	Pressure control proportional gain Kp3	0.000~60.000 (2.000)
P14.26	Pressure control integral gain Ki3	0.000~60.000 (0.150)
P14.27	Pressure control differential gain Kd3	0.000~30.000 (0.000)

When the function of terminal No.57 (pressure PID switching) is valid, the pressure loop PID is switched to P14.25~P14.27.

P14.28	Pressure command rise time 2	0~6000ms (0)

When the function of terminal 57 (pressure PID switching) is valid, the pressure reference acceleration and deceleration time is switched to P14.28.

P14.29	The second group of pressure overshoot suppression detection levels	0.0~100.0 (0.5)
P14.30	The second group of pressure overshoot suppression coefficients	0~100 (5)

When the function of terminal No.57 (pressure PID switching) is valid, the pressure overshoot suppression parameter is switched to P14.29 and P14.30.

P14.31~P14.33	Reserved	-
P14.34	Pressure sensor fault detection current lower limit	20.0%~300.0% (100.0%)
P14.35	Pressure sensor fault detection current upper limit	20.0%~100.0% (50.0%)
P14.36	Pressure control state output maximum speed	0.0%~100.0% (10.0%)

P14.37	Pressure control state output minimum pressure setting	0.0%~100.0% (60.0%)
P14.38	Pressure control state output delay time	0.001~10.000s(0.100s)

When the difference between the feedback pressure and the reference pressure is less than the setting of P14.37, and the actual speed of the motor is lower than the setting of P14.36, after the time delay of P14.38, the holding pressure control state is output.

P14.39	Pressure mode switching speed mode torque upper limit	50.0~250.0% (150%)

When the function of terminal No. 37 (pressure switching to speed mode) is valid, the upper limit of the drive torque is determined by P14.39.

5.2.2 Hydraulic servo selection parameters (Group P25)

P25.00	Hydraulic servo model	0~FFFFH (0000)

Jointly developed by the servo drive manufacturers and manufacturers of injection molding machines, in order to set the parameters (using a parameter required for curing all the parameters set by the corresponding models). When the servo pump model parameters is nonzero, the following parameters will not be changed:

P02.00	Motor and control mode selection	P03.00	Motor rated power
P03.01	Motor rated voltage	P03.02	Motor rated current
P03.03	Motor rated frequency	P03.04	Motor rated rotating speed
P03.08	Motor back-EMF constant	P05.00	Speed loop low-speed proportional gain
P05.01	Speed loop low-speed integral time	P05.04	Speed loop high-speed proportional gain
P05.05	Speed loop high-speed integral time	P05.15	Electric torque limit value
P05.16	Braking torque limit value	P14.00	Pressure control mode
P14.01	Pressure command rise time	P25.01	Pressure sensor range
P25.03	Maximum system pressure	P25.05	Maximum speed

Note: When you select "0", representing that hydraulic servo model is not formulated, you need to set the parameters yourself.

P25.01	Pressure sensor range	0.0~255.0 (250.0)

Set according to pressure sensor specifications.

P25.02	Pressure sensor output signal mode	0~3 (0)

0:1~5V output

1:4~20mA output (reserved)

2:1~10V

3:0~10V

Set according to pressure sensor specifications

P25.03	Maximum system pressure	0.0~255.0 (175.0)

The maximum pressure required by the system,the command voltage DC10V corresponding to system pressure output, corresponding to the maximum system pressure.

P25.04	Motor type	0~65536H (0000)

Jointly developed by the servo drive manufacturers and servo motor manufacturers, in order to set the parameters (using a parameter required for curing all the parameters set by P03).

When the motor type parameters is nonzero, the following parameters will not be changed:

P02.00	Motor and control mode selection	P03.00	Motor rated power
P03.01	Motor rated voltage	P03.02	Motor rated current
P03.03	Motor rated frequency	P03.04	Motor rated rotating speed
P03.08	Motor back-EMF constant		

Note: When you select "0", representing that motor type is not formulated, you need to set the parameters yourself.

Description

For the "Comparison Table of Motor Function Code and Motor Type" corresponding to P25.04, please go to Appendix 1 (A.3) for reference.

P25.05	Maximum speed	0~6000 (2000)

Corresponding to the system output flow set the maximum speed of the motor, the set value should be less than 140% of the motor rated speed (P03.04), the value must be less than the maximum speed of the motor.

P25.06	Bottom pressure	0.0~100.0 %(1.0)

The minimum system operating pressure ,expressed by percentage of the pressure sensor range (P25.01).

P25.07	Bottom flow	0.0~100.0 %(0.5)

The minimum system operating flow, expressed by percentage of the maximum speed (P25.05).

5.2.3 External communication parameters (Group P15)

P15.01	External CANopen baud rate selection	0~3 (0)

External CAN baud rate selection:

0: 125K

1: 250K

2: 500K

3: 1M

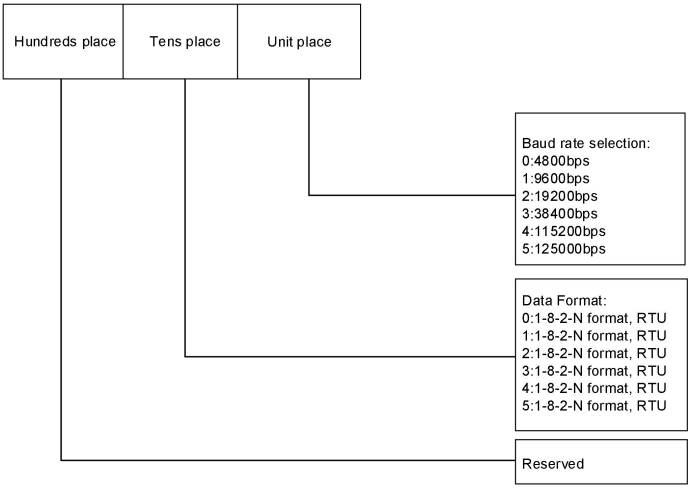
P15.02	External CANopen driver station number	0~127 (0)

Master and slave station must choose different address.

P15.03	External CANopen disconnection detection time	0~5.0 (0)

Set external CAN break detection time, if the drive does not receive data within the set time, it will report failure.

P15.04	485 communication configuration	0~0x155 (004)



P15.05	485 local address	0~247 (5)

Identify the current 485 address of the servo drive.

P15.06	485 local response delay	0.0~1000.0ms (0)

Master and slave station must choose different address.

5.2.4 Multi-pump parallel control parameters (Group P33)

P33.00	Internal CAN baud rate selection	0~3 (0)

The internal CAN bus needs to set the baud rate above 500K, and the internal CAN communication baud rate selection:

2: 500K

3: 1M

P33.01	Internal CAN driver station number	0~127 (0)

Master and slave station must choose different address.

P33.02	Internal CAN disconnection detection time	0~5.0 (0)

Set internal CAN break detection time, if the drive does not receive data within the set time, it will report failure.

P33.03	Parallel flow type	0~3 (0)

0: Single pump

1: Single-master multi-slave composite allocation

2: Single-master and multiple-slave bypass/parallel flow

3: Multiple masters and multiple slaves parallel flow

P33.04	Single master selection	0~1 (0)

When set to 1, the drive is the absolute master in the entire network, and there can only be one absolute master in the entire network.

P33.05	Unit number	0~15 (0)

The unit to which each control node belongs.

P33.06	Node master/slave switch	0~1 (0)

This function is suitable for master/slave switching of multi-master and multi-slave parallel flow nodes.

P33.07	Pump displacement	0~65535 (40)

The displacement of the oil pump per revolution.

P33.08	Flow cut-in threshold	0.0~100.0 % (60）

Multiple pumps are in a hydraulic system. When the system flow exceeds the current pump flow cut-in threshold, other pumps will participate in the work.

P33.09	Flow cut-in hysteresis	0.0~100.0 % (2)

Multiple pumps in a hydraulic system are used to prevent the flow from reaching a critical point causing the pumps to start and stop back and forth.

Chapter 6 Basic Steps of Pressure Control Debugging

6.1 Pressure debugging process

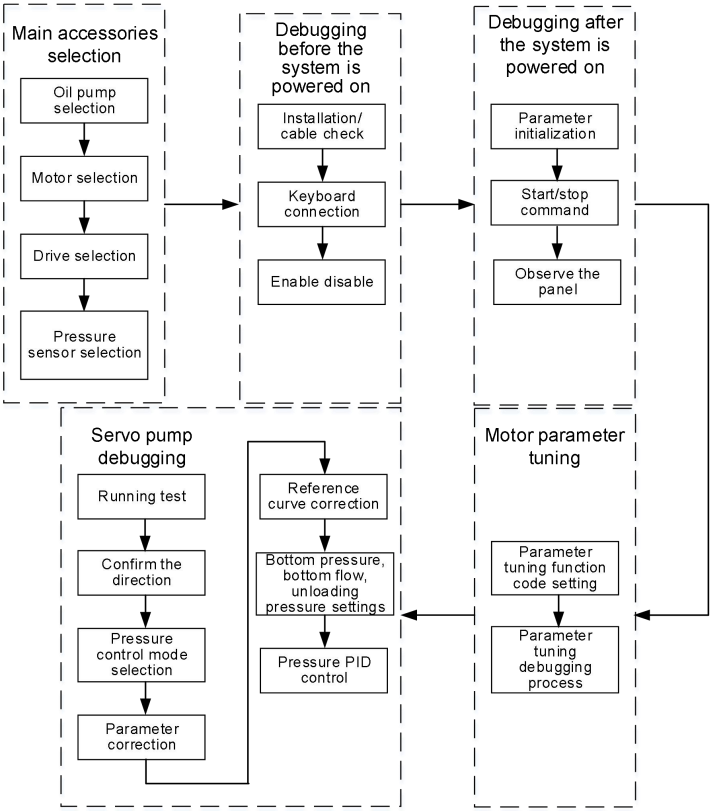


Fig.6-1 Pressure debugging flow chart

6.2 Selection method of main parts of hydraulic servo

6.2.1 Oil pump selection

The size of the oil pump is determined by the output flow Q (L/min) of the oil pump, the pressure P_1 (kgf/cm2) that the system is subjected to, and the maximum speed of the motor N_{max} (rpm). The size of the oil pump is jointly formulated by the manufacturer of the servo drive and the manufacturer of the injection molding machine to facilitate parameter setting (use one parameter to cure all the parameters required for the corresponding model).

Pump pressure selection:Pump rated pressure should be greater than or equal to system pressure P_1 (kgf/cm2).

Pump displacement selection:Pump displacement per revolution (ml/rev)=Q (L/min)×1000 (ml/L)/ N_{max} (rpm).

Pump type selection:Please follow the instructions below to select the pump type.

Table 6-1 Oil pump selection

Pump type	Price	Volumetric efficiency	Pulsation (stability)	Noise	Reliability	Pressure (unipolar)	Speed
Gear pump	Low	Low	Medium	Medium	High	Low	Medium
Plunger pump	Medium	High	Low	High	Low	Medium	Low
Screw pump	High	Medium	High	Low	Medium	High	High

Note

The oil pump selection introduced in this section is only for technical related personnel as a selection reference. If you need to set the function code P25.00, please contact the technical staff of our company. If the parameters are arbitrarily set, the equipment will be damaged, and the consequences will be at your own risk.

6.2.2 Motor selection

The size of the oil pump can be obtained through section 6.2.1, so as to obtain the displacement of the oil pump and the pressure that the system needs to bear, which are determined by the speed and torque of the motor.

(1) Motor rated speed selection:

Motor (PMSM) characteristic curve as shown in Fig. 6-2:

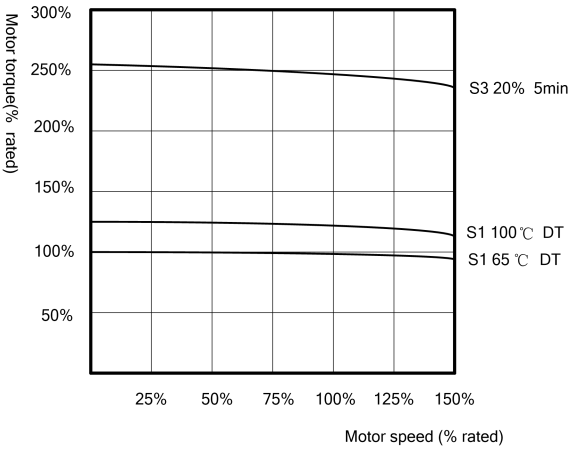


Fig.6-2 Motor characteristic curve

According to Fig.6-2, with the upgrading of the motor speed, motor torque will gradually decline. But when the speed exceeds 150% of rated speed, servo motor gradually saturated, motor torque will decline rapidly, so the

speed stage can not be used as servo motor speed period. Therefore, it is recommended to select 140% of the rated speed as the maximum speed of the motor (Nmax (rpm) = N (rpm) × 140%).

🕮 Note

For better control effect, please select the maximum speed of the motor as 130% of the rated speed.

(2) Motor rated torque selection:

The maximum output power of the injection molding machine:P2max (KW)=P1(kgf/cm2) × 0.9807 (kgf/cm2/bar) ×Q(L/min)/ 600

Motor maximum output power (convert according to 90% of the total energy conversion efficiency):

P3max (KW)＝P2max(KW)×90%

The maximum output torque of the motor:Tmax(Nm) = P3max(kW)×9550/ N(rpm)

According to the motor characteristic curve in Fig. 6-2, it can be observed that the overall working state of the servo motor is between (S1 100℃ DT) and (S3 20% 5MIN). Since the the injection molding machine needs continuous high torque output when holding pressure, the torque curve of the servo motor is in a high torque state, which can be observed from the curve in the figure. It is recommended to select a motor type with a maximum torque of 180% of the rated torque.

Motor rated torque: T(Nm)=Tmax(Nm)/180%

🕮 Note

If a double displacement plunger pump or a double gear pump is selected, the torque output of the motor can be reduced by reducing the displacement of the oil pump during the holding pressure process.

If the servo motor is in the working state (S3 20% 5MIN), the motor whose maximum torque is 230% of the rated torque can be selected.

6.2.3 Drive selection

Drive capacity selection:After the servo motor selection is completed, you can ask motor suppliers for corresponding motor torque constant value Kt (Nm / A).Therefore, the holding pressure current of the drive can be determined by the formula I(A)=Tmax(Nm)/Kt(Nm/A). According to the principle that this value is less than 150% of the servo drive rated output current, achieve the desired servo drive model and its surrounding parts models.

🕮 Note

The torque constant value Kt (Nm / A) is related to the servo motor technology, materials and motor rated speed N (rpm).

The selection of motors and drives introduced in this section is only for reference by technical personnel. After completing the motor selection, please refer to Appendix A (A.4) for the motor code set by the servo drive corresponding to the motor type.

🕮 Note

If you need to set the function code P25.04, please contact the technical staff of our company. If you set parameters arbitrarily and cause equipment damage, you will be responsible for the consequences.

6.2.4 Pressure sensor selection

After completing the selection of the above oil pump, motor and drive, the pressure and displacement required by the system can be determined. In order to make the system pressure loop form a closed-loop mode, it is necessary to determine the specifications of the pressure sensor according to the pressure and displacement required by the system, and set P25.01 and P25.02. Set P25.03 according to the maximum pressure required by the system. At the same time, set the maximum motor running speed corresponding to the maximum percentage of flow command, and set P25.05.

P25.01	Pressure sensor range	0.0~255.0
P25.02	Output signal mode of the pressure sensor	0~3
P25.03	Maximum system pressure	0.0~255.0
P25.05	Maximum speed	0~6000

6.3 Debugging before the system is powered on

6.3.1 Determine the installation

Before powering on, relevant personnel are required to observe the connection of each terminal in detail to ensure that all fixed screws are securely locked to prevent slippage during equipment movement. At the same time, it is necessary to observe whether there is a wire head at the connecting line or the pressure line is not flat. If this situation is found, it is necessary to deal with the wire ends in time to prevent the danger of electric shock. Please confirm the following items before turning on the power:

Item	Content
Power supply voltage confirmation	Confirm whether the power supply is AC380V~480V 50/60Hz
	Ensure that the power input terminal (R/S/T) is connected reliably
	Make sure the servo drive and motor are wired correctly
Confirmation of the connection between the output terminal of the servo drive and the motor terminal	Confirm whether the connection between the servo output terminal (U/V/W) and the motor terminal is firm
Confirmation of the connection of the control circuit terminals of the servo drive	Determine whether the connection between the control circuit terminals of the servo drive and other controller devices is reliable
Status confirmation of servo drive control short circuit	Confirm whether the control circuit terminals of the servo drive are all in the OFF state (non-operational state)
Load confirmation	Confirm whether the motor is in no-load state and not connected to the mechanical system

6.3.2 Keyboard connection

When the operation panel is connected, observe whether there is a problem with the LED display screen, simply debug the operation keyboard, and observe whether there is a problem with the keyboard.

6.3.3 Enable disable

In order to ensure the safety of the system during the debugging process, it is necessary to disable the system enable before switching on the three-phase AC power for debugging. When the keyboard is not connected, there are two ways to disable the enable:

Method 1: Disconnect the drive terminal input enable button

Method 2: If the computer of the injection molding machine has a system enable function, and the enable output function is connected to the drive enable terminal, the system enable output should be disabled at this time.

6.4 Debugging after the system is powered on

6.4.1 Parameter initialization

Restore the settings of the servo drive to the factory settings. After initialization, P00.05 will automatically return to zero.

P00.05	Parameter initialization		Default value	0
	Setting range	0	Parameter changing status	
		1	Clear fault memory information	
		2	Restore to leave-factory value	
		3	Restore the quick start function group only	

0: Parameter changing status

If the parameter value of this function code is set as 0, all the parameters can be changed.

1: Clear fault memory information

If the parameter value of this function code is set as 1, the content of the fault record (P97.15~P97.21) will be cleared.

2: Restore to leave-factory value

If the parameter value of this function code is set as 2, the function codes of the Group P97.15 will be restored to the leave-factory values based on the drive type, except for the user password (P00.01), the drive status display parameters (Group P01) and the motor parameters (Group P03) and P12.04.

3: Restore the quick start function group only

If the parameter value of this function code is set as 3, only the parameters related to the quick running of the drive will be restored.

🕮 Note

New models can perform parameter initialization settings, and old models can skip this step. If the old model needs to be initialized, it needs to be carried out while retaining the original parameters, which can effectively reduce the risk of equipment damage and personal injury.

6.4.2 Start and stop commands

P02.02	Parameter initialization		Default value	0
	Running command channel selection	0	Keyboard control	
		1	Terminal control	
		2	Communication control	
		3	Bus control	

0: Operation panel running command channel

To start and stop through the RUN, STOP and M keys on the operation panel.

1: Terminal running command channel

To start and stop through the external control terminals FWD, REV.

2: Serial port running command channel

To start and stop through the serial port.

3: Start and stop in bus mode

The oil pump is controlled via CANopen bus.

6.4.3 Observe panel display

After the power is turned on, the operator display in normal state is as follows:

State	Display	Description
Normal	2.00	The factory default display is the current frequency of the motor 2Hz
Failure	Er.oXX	Servo drive failure shutdown status, display failure type

6.5 Motor parameter tuning

Considering that motor types not shown in the drive function code (P25.04) will be replaced on site.In this way, customers can use the motor tuning function of the drive to complete the tuning of the motor. There are two ways to tune the motor: static and dynamic (reserved).

6.5.1 Dynamic and static tuning comparison

Static mode: The motor parameter values, namely resistance, inductance and flux linkage, are calculated according to the motor nameplate parameters and the motor voltage equation. Therefore, the accuracy of motor parameters depends on the accuracy of the nameplate parameters.

Dynamic mode (reserved): When the motor needs to rotate to a certain speed, it can complete the identification of resistance, inductance, flux linkage and back EMF. However, this method is not suitable for large loads, otherwise the test accuracy of motor parameters will be easily affected. Therefore, when the motor is tuned, it is necessary to keep the motor running at no-load or light-load.

6.5.2 Motor parameter tuning function code setting

P03.00	Motor rated power	0.4~999.9KW
P03.01	Motor rated voltage	0~ rated voltage of drive (P98.04)
P03.02	Motor rated current	0.1~999.9A
P03.03	Motor rated frequency	1.00~3000.0Hz
P03.04	Motor rated rotating speed	0~6000rpm
P03.24	Parameter tuning	0: Disabled 1: Enabled (motor in static status) 2: Reserved (motor in rotate status)

6.5.3 Motor parameter tuning and debugging flowchart

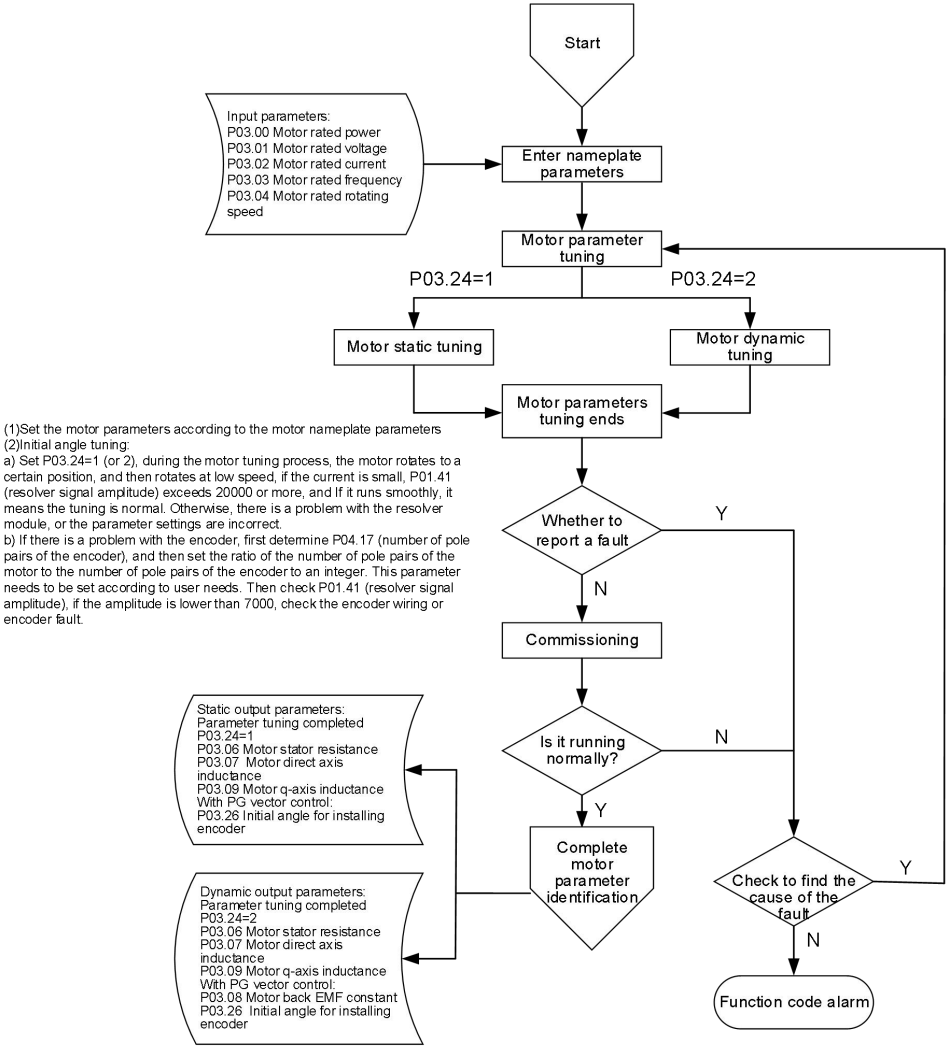


Fig.6-3 Motor parameter tuning flowchart

6.6 Hydraulic servo debugging

6.6.1 Operational testing

After motor tuning is complete, the drive is powered down, then powered on, running motor, start process should be smooth, keyboard display frequency should be small fluctuations around the set value when stable,

the current displayed by the drive should be less than 10% of the rated current of the motor when no-load, this shows that both the resolver and the motor are operating normally.

Run at each speed segment, observe the motor operation, appropriate adjust speed loop PI parameters and current loop PI parameters of the drive such that the motor are running smoothly in the high and low speed. Oscillate or purr when motor is running, appropriately weaken speed loop (P05.00, P05.01, P05.04, P05.05) and current loop (P12.05, P12.06) , (P05. 00, P05.04, P12.05 appropriately reduced, P05.01, P05.05, P12.06 appropriately increased).

🕮 Note

Before the pressure debugging, the motor needs to be tested, please refer to section 4.3.

6.6.2 Confirm the direction

The drive is set to low speed operation at 2HZ (P02.05 = 2.00), observe the direction of the oil, if the FWD indicator is on, the building pressure direction is correct, if the REV indicator is on, the building pressure direction is incorrect. Swap any two phase wiring of the motor UVW, and repeat the motor parameter tuning steps in Section 6.5, and set P03.24 to static tuning or dynamic tuning. Adjust to the motor forward (FWD keyboard lights), motor running direction is the direction of building pressure.

6.6.3 Pressure control mode selection

P14.00	Parameter initialization		Default value	0
	Pressure control mode	0	Non-pressure control mode	
		1	Reserved	
		2	Drive pressure control mode 2	
		3	Bus control	

0: Non-pressure control mode

1: Reserved

2: Drive pressure control mode 2

AI1 analog channel provides pressure feedback command; AI2 analog channel provides flow reference command; AI3 analog channel provides pressure reference command.

3: CANopen pressure mode

CANopen gives pressure and flow commands, AI1 analog channel provides pressure feedback commands, and the drive performs pressure control.

6.6.4 Parameter correction

6.6.4.1 Pressure reference curve correction:

According to the computer set 170kg/cm²~10kg/cm² in turn, observe drive parameter P01.22, based on 10 V, set the corresponding percentage to the function code P10.32(170kg/cm²), P10.34(160kg/cm²), P10.36(150kg/cm²),P10.38(140kg/cm²), P10.40(130kg/cm²),P10.42(120kg/cm²),P10.44(110kg/cm²), P10.46(100kg/cm²), P10.48(90kg/cm²), P10.50(80kg/cm²), P10.52(70kg/cm²), P10.54(60kg/cm²), P10.56(50kg/cm²), P10.58(40kg/cm²), P10.60(30kg/cm²), P10.62(20kg/cm²), P10.64(10kg/cm²). When

computer set pressure reference to 140 kg/cm ², drive keyboard P01.22 value is 7.13V, then the P10.38 value is set to 71.3%.

6.6.4.2 Flow reference curve correction:

The same as pressure reference curve correction, set 99% ~ 10% of the flow on the computer in turn, observe drive parameter P01.21, based on 10V, set the corresponding percentage to the function code P10.10(99% flow), P10.12(90% flow), P10.14(80% flow), P10.16(70% flow), P10.18(60% flow), P10.20(50% flow),P10.22(40% flow), P10.24(30% flow), P10.26(20% flow), P10.28(10% flow).

6.6.4.3 AI zero offset automatic correction

Set AI zero offset automatic correction parameter P10.75 to "1", the drive will do AI zero offset auto correction operation once, zero offset value detected by 3 analog channels is written to P10.08, P10.30, P10 .66 parameter.

P10.75	AI zero offset automatic correction	0~1
P10.08	Minimum pressure feedback	0.0%~P10.05
P10.30	Minimum reference of flow curve	0.0%~P10.28
P10.66	Minimum reference of pressure curve	0.0%~P10.64

6.6.5 Bottom pressure, bottom flow, unloading pressure settings

6.6.5.1 Bottom pressure, bottom flow settings

Because of the presence of leakage in the pump, when the flow and pressure command is not given by the system, the hydraulic oil in the oil circuit will be back to the fuel tank, causing that air enter the oil circuit, resulting in noise and unstable of system operation, so it should be provided a certain bottom pressure and bottom flow. In the standby mode you can adjust P25.06(bottom pressure), P25.07 (bottom flow), amend P01.42 (pressure command), P01.44 (flow command) according to P01.42 (pressure command), P01.44 (flow command) display value, achieve the desired value.

P25.06	Bottom pressure	0.0%~100%
P25.07	Bottom flow	0.0%~P25.05

6.6.5.2 Unloading pressure settings

The maximum reverse speed when the pressure is unloaded, corresponding to the percentage setting of the maximum speed, used to set the maximum direction running speed of the motor.

P14.10	Unloading pressure reverse speed limit	-100%~100%

The larger the unloading pressure value is set, the faster the unloading pressure will be, but if it is too large, the reverse noise of the oil pump will be caused; the smaller the setting value, the slower the unloading pressure will be, and the longer the unloading pressure response time will be.

6.6.6 Pressure PID Control

The larger proportional gain (Kp), integral gain (Ki), differential gain (Kd) are, the quicker response becomes, but too fast response easily cause that the servo motor vibrates and injection molding machine movement is unsteady; conversely , the smaller proportional gain (Kp), integral gain (Ki), differential gain (Kd) are, the slower response becomes,and too low response easily cause the pressure control unstable and overshoot.

P14.02	Pressure control proportional gain Kp1	0.000~60.000
P14.03	Pressure control integral gain Ki1	0.000~60.000
P14.04	Pressure control differential gain Kd1	0.000~30.000

In control process of injection molding machine, due to the response requirements of the different action is inconsistent, it generally use different PID parameter settings, but in order to debug conveniently, only "Injection packing action" and "other actions" are distinguished and switched.

Chapter 7 Parallel Control Scheme of Multiple Oil Pumps

Due to the limitation of the displacement of the oil pump and the power of the motor, the single oil pump system has been unable to meet the flow requirements of large tonnage pressure control in most cases. In order to better solve the problems of insufficient flow, low production efficiency and long process cycle of user products, the entire hydraulic system can complete two or more networking by connecting multiple single oil pump systems in parallel, so as to achieve bypass /parallel flow control, thereby obtaining a pressure control system with large flow. Under field conditions, parallel pumps can be divided into three schemes: single-master and multi-slave compound distribution, single-master and multi-slave bypass /parallel flow, and multi-master and multi-slave schemes.

7.1 Single-master multi-slave compound distribution

The single-master multi-slave composite control structure diagram is shown in Fig. 7-1. See Fig. 7-2 for the wiring method in compound distribution mode. When set to compound distribution, the main drive is responsible for receiving the pressure command, flow command, operation enable signal and pressure sensor signal at the oil outlet of the system sent by the system computer, and controls the pressure and system flow. The main drive in the network can be connected to analog interfaces AI1, AI2 and AI3 or external CAN interfaces CANH-PC, CANL-PC and CANGnd through function code P14.00. When P14.00 is 2, the analog interface is connected to the pressure sensor and the flow and pressure reference terminals of the system computer respectively to receive pressure feedback, flow and pressure command signals; when P14.00 is 3, the external CAN interface is connected to the computer system to receive the flow and pressure command signals of the system computer. The slave drives are connected to each other through the internal CAN interfaces CANH, CANL and CANGnd to realize the interaction of internal signals. The following formula can be used to calculate the flow each drive has to bear, which is called the maximum private flow. The maximum private flow can be calculated by the following formula:

Single pump maximum flow (L/min) = maximum speed (P25.05) × oil pump displacement per revolution (P33.07)/1000 (L/ml)

Maximum private flow (L/min) = single pump maximum flow (L/min) × flow cut-in threshold ratio (%)

System maximum flow (L/min) = single pump 1 maximum flow (L/min) + single pump 2 maximum flow (L/min) + ... + single pump N maximum flow (L/min)

System reference total flow (L/min) = system maximum flow (L/min) × system reference flow percentage (%)

When the total flow reference of the system computer is less than the maximum private flow of the main drive, the main drive will carry all system flow requirements; when it is greater than the maximum private flow of the main drive, the main drive will provide its own maximum private flow, and then the remaining flow demand is distributed to the slave drive 1; when the remaining flow demand is less than the maximum private flow of the slave drive 1, the slave drive 1 will carry the remaining flow demand; when the remaining flow demand is greater than the maximum private flow of the slave drive 1, the slave drive 1 provides its own maximum private flow, and provides the remaining flow demand to other slave drives; and so on, until the remaining flow can be completely digested by the remaining slave drives ; but if the maximum private flow of the last slave

drive is less than the remaining flow, that is, the sum of the maximum private flow of all drives cannot digest the system flow demand, then all drives will distribute the system flow demand proportionally.

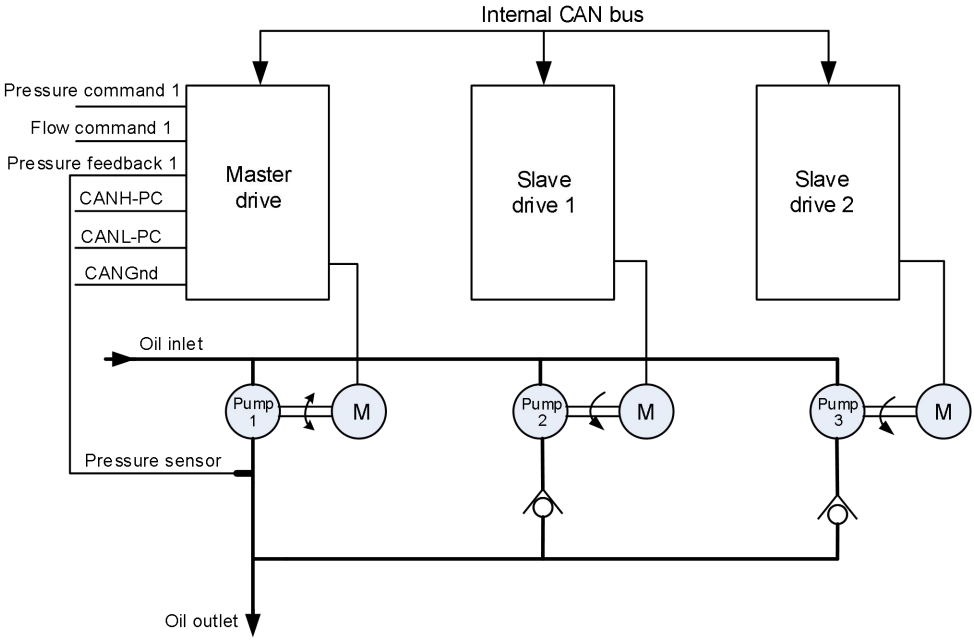


Fig. 7-1 Single-master multi-slave composite distribution structure diagram

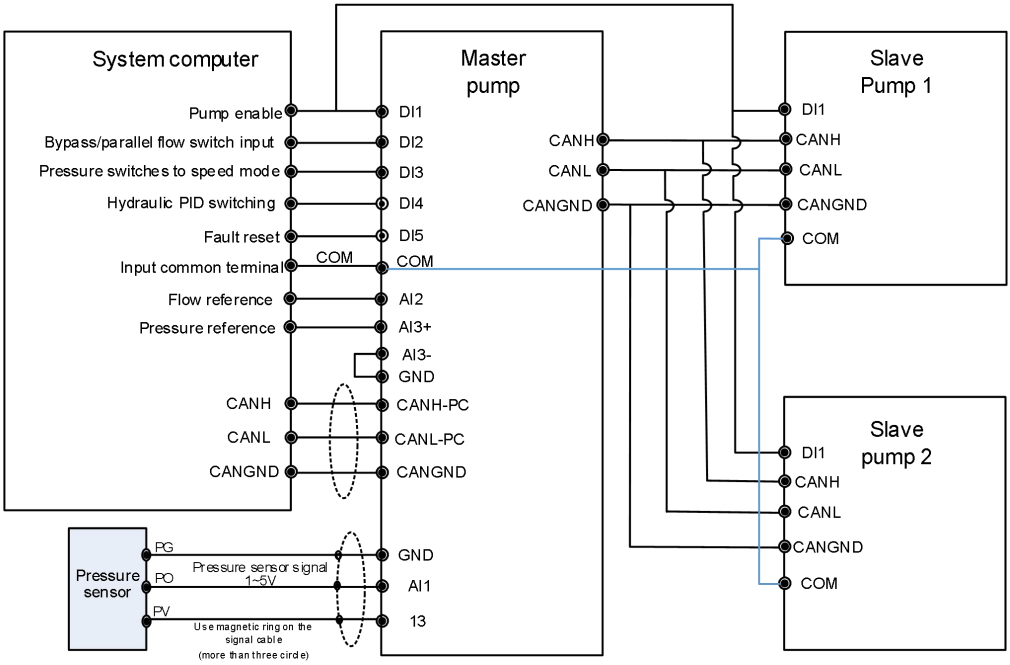


Fig. 7-2 Single-master multi-slave composite control terminal wiring diagram

Compound distribution example:

The composite distribution structure diagram is shown in Fig. 7-1. The entire composite distribution hydraulic network consists of 3 hydraulic systems, which are respectively the master drive 1, the slave drive 2, and the slave drive 3. The master drive 1 will calculate the flow that can be digested by itself, and distribute the excess flow to the slave drive 2 in the system. If the slave drive 2 still cannot digest the flow allocated by the system, it will allocate the excess flow to the slave drive 3. If the drive 3 still cannot digest the flow, the system will command the three drives to distribute the system flow demand proportionally.

The settings are shown in Table 7-1. If the computer system sets the percentage of the system reference flow to 20%, the function code setting in the table and the above formula can calculate that the reference flow of the system is 48L, and the maximum private flow of the three drives is 32L. Therefore, the master drive 1 will not be able to digest the 48L flow allocated by the system, and the master drive 1 will allocate the excess 16L flow to the slave drive 2 for digestion. Since the maximum private flow of the slave drive 2 is 48L, it can digest the excess 16L flow, thus slave drive 3 will not need to distribute flow.

Table 7-1 Example of compound distribution function code setting

Drive type / Function code	Master drive 1	Slave drive 2	Slave drive 3
P14.00 (Pressure control mode)	2 (AI) or 3 (CAN communication)	1	1
P25.05 (Maximum speed)	2000	2000	2000
P33.00 (Internal CAN baud rate selection)	3	3	3

P33.01 (Internal CAN communication address)	0	1	2
P33.02 (Internal CAN disconnection detection time)	0.5	0.5	0.5
P33.03 (Parallel flow type)	1	1	1
P33.04 (Single master selection)	1	0	0
P33.05 (Unit number)	0	0	0
P33.06 (Node master/ slave switch)	0	0	0
P33.07 (Pump displacement)	40	40	40
P33.08 (Flow cut-in threshold)	40%	40%	40%
P33.09 (Flow cut-in hysteresis)	2%	2%	2%

7.2 Single master multi-slave pump bypass /parallel flow

There are two control modes for single-master multi-slave pump bypass/parallel flow control, namely bypass flow and parallel flow control mode. The control structure diagram is shown in Fig. 7-3. The wiring method is shown in Fig. 7-4. The control network realizes the switching of the bypass flow or parallel flow control mode by adding a DI2 terminal (No. 21 function) with a bypass /parallel switching input function on each slave drive. When the DI2 terminal is valid, it is in the bypass flow control mode, and each drive is used as an independent single-circuit hydraulic system to complete the flow and pressure control. When the DI2 terminal is invalid, it is in the parallel flow control mode. The control is that the master drive receives the pressure and flow commands given by the computer system, and uses the internal CAN connection of each drive to follow the flow received by the master drive.

The master drive in the network can be connected to analog interfaces AI1, AI2 and AI3 or external CAN interfaces CANH-PC, CANL-PC and CANGnd through function code P14.00. When P14.00 is 2, the analog interface is connected to the pressure sensor and the flow and pressure reference terminals of the system computer respectively to receive pressure feedback, flow and pressure command signals; when P14.00 is 3, the external CAN interface is connected to the computer system to receive the flow and pressure command signals of the system computer. The slave drive are connected to each other through the internal CAN interfaces CANH, CANL and CANGnd to realize the interaction of internal signals.

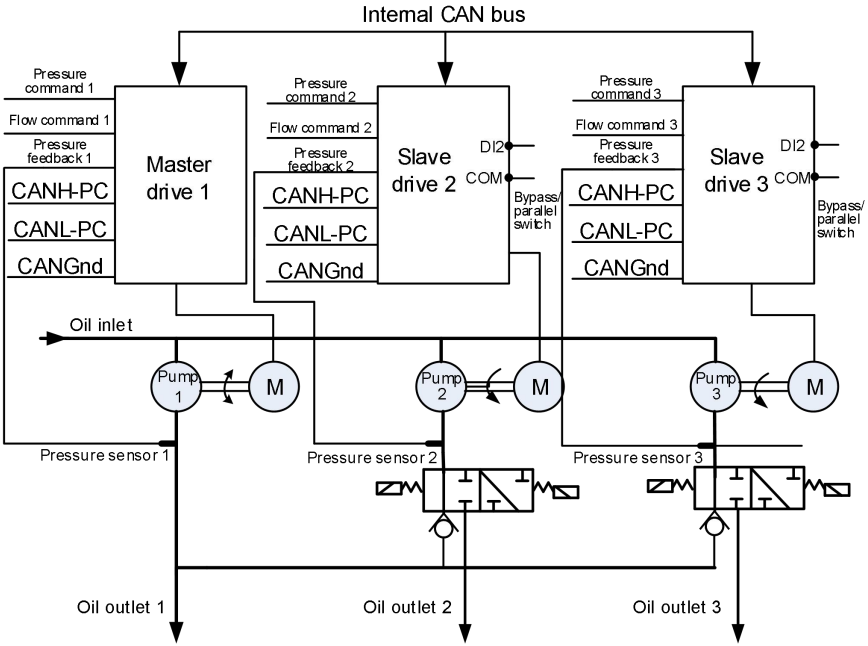


Fig. 7-3 Single-master multi-slave pump bypass/parallel flow structure diagram

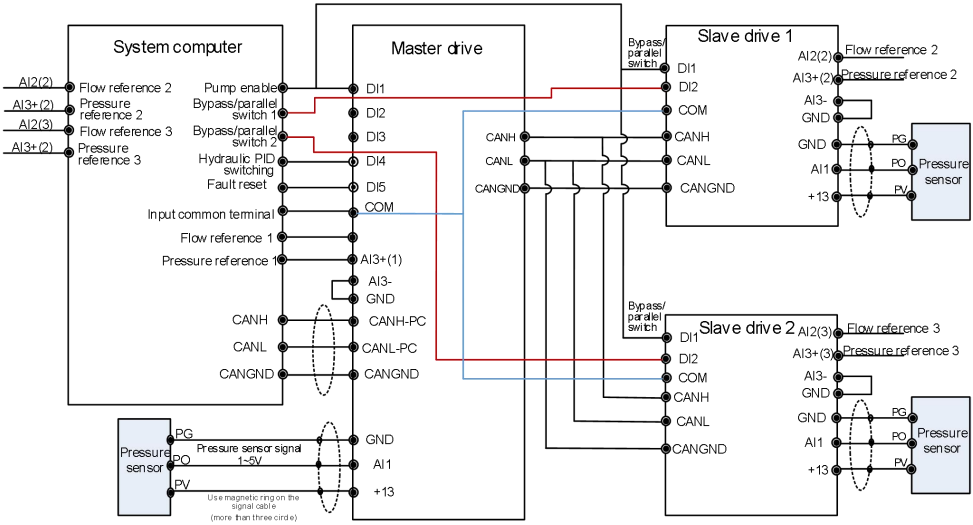


Fig. 7-4 Single-master multi-slave pump bypass/parallel control terminal wiring diagram

Example of single-master multi-slave bypass/parallel flow :

Fig. 7-3 shows the structure diagram of the single-master multi-slave bypass/parallel flow. The entire single-master multi-slave bypass/parallel flow hydraulic network consists of 3 hydraulic systems, which are respectively the master drive 1, the slave drive 2, and the slave drive 3. The settings are shown in Table 7-2. When the DI2 terminal is invalid, it is the parallel flow control mode. After the computer system sets the flow, the slave drive will follow the flow received by the master drive. When the DI2 terminal is valid, it is the bypass flow control mode, and each drive is used as a single independent hydraulic circuit to complete the flow and pressure control.

Table 7-2 Example of function code setting for single-master multi-slave bypass/parallel flow

Drive type / Function code	Master drive 1	Slave drive 2	Slave drive 3
P14.00 (Pressure control mode)	2 (AI) or 3 (CAN communication)	1	1
P25.05 (Maximum speed)	2000	2000	2000
P33.00 (Internal CAN baud rate selection)	3	3	3
P33.01 (Internal CAN communication address)	0	1	2
P33.02 (Internal CAN disconnection detection time)	0.5	0.5	0.5
P33.03 (Parallel flow type)	2	2	2
P33.04 (Single master selection)	1	0	0
P33.05 (Unit number)	Invalid	Invalid	Invalid
P33.06 (Node master/ slave switch)	Invalid	Invalid	Invalid
P33.07 (Pump displacement)	Invalid	Invalid	Invalid
P33.08 (Flow cut-in threshold)	Invalid	Invalid	Invalid
P33.09 (Flow cut-in hysteresis)	Invalid	Invalid	Invalid

🕮 Note

When DI2 is invalid, the system is in parallel flow state, and the pressure command, flow command and pressure feedback signal received from the drive are invalid.

7.3 Multi-master multi-slave pump bypass /parallel flow

The multi-master and multi-slave pump parallel flow structure diagram is shown in Fig. 7-5. The wiring method is shown in Fig. 7-6. The system consists of a master unit and two slave units. A unit can consist of one or more drives, each of which is defined as a node. There must be one control node in each unit, but there can be multiple or none of the follower nodes. The control node in each unit is responsible for receiving the

pressure command, flow command, operation enable signal sent by the system computer and pressure sensor signal at the oil outlet of the system, and controls the pressure and the total flow of the system.

The control unit in the unit can be selected to access analog interfaces AI1, AI2 and AI3 or external CAN interfaces CANH-PC, CANL-PC and CANGnd through function code P14.00. When P14.00 is 2, the analog interface is connected to the pressure sensor and the flow and pressure reference terminals of the system computer respectively to receive pressure feedback, flow and pressure command signals; when P14.00 is 3, the external CAN interface is connected to the computer system to receive the flow and pressure command signals of the system computer. Each node in each unit is connected to each other through the internal CAN interfaces CANH, CANL and CANGnd to realize the interaction of internal signals.

Example of multi-master multi-slave parallel flow:

The multi-master multi-slave parallel flow structure diagram is shown in Fig. 7-5. The entire multi-master multi-slave parallel flow hydraulic network consists of 5 hydraulic systems, which are the master drive 1, the slave drive 2, the slave/master drive 3, the slave drive 4 and the slave/master drive 5.

The control system realizes the switching of the slave as the master and the slave pump to follow the second master within the unit by adding DI3 terminal (function No. 56) with a slave/master switching input function and DI4 terminal (function No. 58) with a effective input function of another slave following the second master to the slave control node in each slave unit. When DI3 is invalid, the master drive 1 is defined as the control unit, and the other drives are defined as follower units, then the follower units run at the same speed as the master drive. When DI3 and DI4 are valid, master drive 1, slave/master drive 3 and slave/master drive 5 are defined as control nodes, and slave drive 2 and slave drive 4 are defined as follower nodes. The master drive 1 and the slave drive 2 are the master unit 1, and the slave drive 2 follows the master drive 1 to operate. The slave/master drive 3 and the slave drive 4 are the slave unit 2, and the slave drive 4 follows the slave/master drive 3 to operate. The slave/master drive 5 is the slave unit 3, since there is only one drive in this unit, it only operates under a single pressure closed loop.

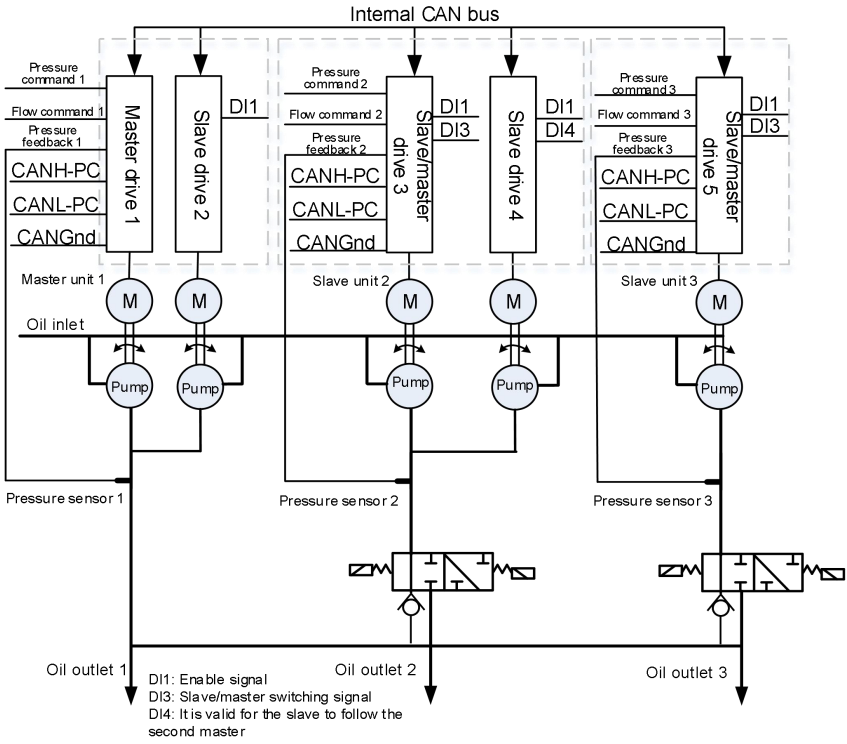


Fig. 7-5 Multi-master multi-slave pump bypass/parallel flow structure diagram

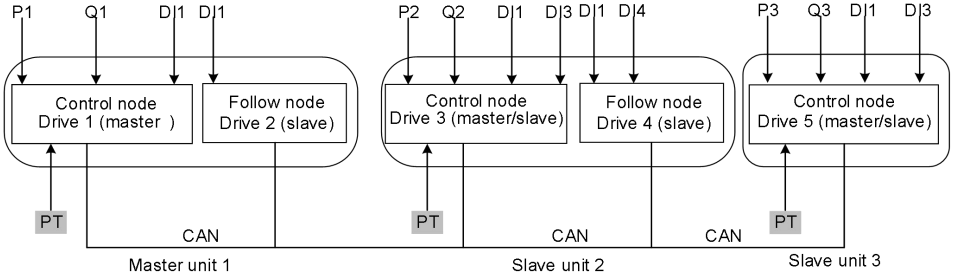


Fig. 7-6 Multi-master multi-slave pump parallel flow terminal wiring diagram

Table 7-3 Multi-master multi-slave parallel flow function code setting example

Drive type / Function code	Master drive 1	Slave drive 2	Master/slave drive 3	Slave drive 4	Master/slave drive 5
P14.00 (Pressure control mode)	2 (AI) or 3 (CAN communication)	1	1	1	1

P25.05 (Maximum speed)	2000	2000	2000	2000	2000
P33.00 (Internal CAN baud rate selection)	3	3	3	3	3
P33.01 (Internal CAN communication address)	0	1	2	3	4
P33.02 (Internal CAN disconnection detection time)	0.5	0.5	0.5	0.5	0.5
P33.03 (Parallel flow type)	3	3	3	3	3
P33.04 (Single master selection)	1	0	0	0	0
P33.05 (Unit number)	0	0	1	1	2
P33.06 (Node master/ slave switch)	0	0	1	0	1
P33.07 (Pump displacement)	Invalid	Invalid	Invalid	Invalid	Invalid
P33.08 (Flow cut-in threshold)	Invalid	Invalid	Invalid	Invalid	Invalid
P33.09 (Flow cut-in hysteresis)	Invalid	Invalid	Invalid	Invalid	Invalid

There are two sets of CAN terminals at the J9 terminal of the drive control board, which are the internal CAN terminals CANH and CANL, the external CAN terminals CANH-PC and CANL-PC. The internal CAN terminal is used for the internal signal transmission of multi-pump parallel control, the CANH and CANL signal terminals on all drive control boards are connected together, the ground terminal CANGND is connected together through the shielding layer, and the internal CAN termination resistance of bus drive 1 and drive N need to be connected (connected via J6 jumper). The external CAN terminal is used to connect the injection molding machine computer or other operation controllers. The drive CANH-PC, CANL-PC and CANGND are connected to the CANH, CANL and CANGND of the injection molding machine computer. At the same time, the external CAN terminal resistance of the drive needs to be connected (connected by J3 jumper). Fig. 7-7 is a schematic diagram of CAN bus wiring.

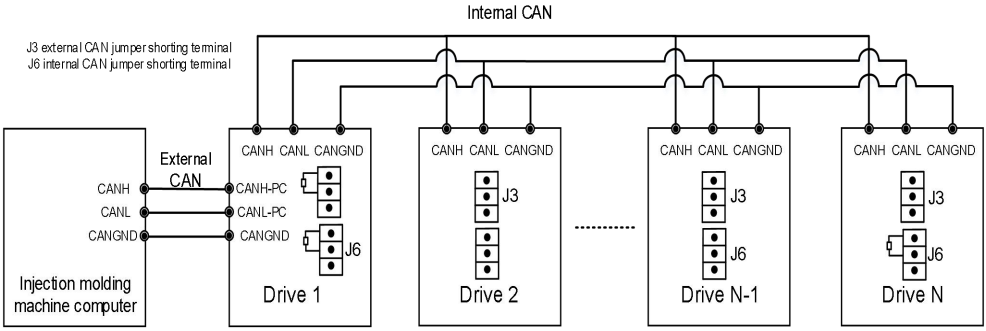


Fig. 7-7 CAN bus wiring diagram

🕮 Note

When connecting the CAN bus, please use a twisted pair shielded cable for connection, which can effectively reduce the interference of external signals.

Chapter 8 Troubleshooting

8.1 Displaying exception and solutions

All possible fault types for MV600J6 are summarized as shown in table 8-1. Before consulting the service department, the user can perform self-check according to the hints of the table and record the fault symptoms in detail. To seek for service support, please contact the sales person.

Table 8-1 Fault record table

Fault code	Fault type	Possible fault cause	Solutions
Er.oC1	Acceleration over-current of the drive	The acceleration time is too short.	Lengthen the acceleration time
		The motor parameters are incorrect.	Perform the parameter tuning of the motor
		When instantaneous stop happens, restart the rotating motor	Set the start mode P08.00 as the speed tracking restart function
		PG fault occurs when it is running	Check the PG and its wiring
		The drive power is too low.	Adopt the drive with high power class
		V/F curve is improper.	Adjust the V/F curve setting and the manual torque increase
Er.oC2	Deceleration over-current of the drive	The deceleration time is too short.	Lengthen the deceleration time
		There is potential energy load or the load inertial torque is large.	Use additionally appropriate dynamic braking components
		Encoder fault occurs when PG is running	Check the encoder and its wiring
		The drive power is low.	Adopt the drive with high power class
Er.oC3	Constant speed over-current of the drive	The acceleration/deceleration time is too short.	Lengthen the acceleration/deceleration time appropriately
		Sudden load change or abnormal load	Check the load
		Low grid voltage	Check the input power supply
		Encoder fault occurs when PG is running	Check the encoder and its wiring
		The drive power is low	Adopt the drive with high power class
Er.oU1	Acceleration over-voltage of	Abnormal input voltage	Check the input power supply
		Acceleration time is too short.	Lengthen the acceleration time appropriately

Fault code	Fault type	Possible fault cause	Solutions
	the drive	When instantaneous stop happens, restart the rotating motor	Set the start mode P08.00 as the speed tracking restart function
Er.oU2	Deceleration over-voltage of the drive	The deceleration time is too short (compared with regeneration energy).	Lengthen the deceleration time
		There is potential energy load or the load inertial torque is large.	Select appropriate dynamic braking components
Er.oU3	Constant speed over-voltage of the drive	When the vector control functions, the ASR parameter setting is improper.	See the ASR parameter setting of Group P05
		The acceleration/deceleration time is too short.	Lengthen the acceleration/deceleration time appropriately
		Abnormal input voltage	Check the input power supply
		The input voltage fluctuates abnormally	Install the input reactor
		Large load inertia	Adopt dynamic braking components
Er.IrF	Input side phase loss	There is phase loss in input R.S.T.	Check the installation wiring Check the input voltage
Er.odF	Output side phase loss	There is phase loss in output U.V.W.	Check the output wiring Check the motor and the cables
Er.drv	Power module protection	There is interphase short circuit or grounding short circuit in output three phases.	Rewiring and check if the motor insulation is good.
		Instantaneous over-current of the drive	See the over-current solutions
		The duct is blocked or the fan is damaged.	Unblock the duct or replace the fan
		The ambient temperature is too high.	Lower the ambient temperature
		The wirings or the plug-in units of the control board loosens.	Check them and rewiring
		Abnormal current waveform caused by output phase loss and so on	Check the wiring
		The auxiliary power supply is damaged; the drive voltage is insufficient.	Seek for service support
		Inverter module bridging conduction	Seek for service support
		Abnormal control board	Seek for service support
		Braking pipe damaged	Seek for service support

Fault code	Fault type	Possible fault cause	Solutions
Er.oH1	Inverter module heatsink over-temperature	The ambient temperature is too high.	Lower the ambient temperature
		The duct is blocked.	Clean the duct
		The fan is damaged.	Replace the fan
		The inverter module is abnormal.	Seek for service support
Er.oH2	Rectifier heatsink over-temperature	The ambient temperature is too high.	Lower the ambient temperature
		The duct is blocked.	Clean the duct
		The fan is damaged.	Replace the fan
Er.oL1	Drive overload	The motor parameters are incorrect.	Perform the parameter tuning of the motor
		The load is too large.	Adopt the drive with higher power
		The DC braking amount is too large.	Reduce the DC braking current and lengthen the braking time
		When instantaneous stop happens, restart the rotating motor	Set the start mode P08.00 as the speed tracking restart function
		The acceleration time is too short.	Lengthen the acceleration time
		The grid voltage is too low.	Check the grid voltage
		V/F curve is improper.	Adjust V/F curve and torque increase
Er.oL2	Motor overload	The motor overload protection factor setting is incorrect.	Set the overload protection factor of motor correctly.
		The motor is blocked or the sudden change of load is too large.	Check the load
		The universal motor runs at low speed for a long time, with heavy load.	If long-term low-speed running is required, special motor should be used.
		The grid voltage is too low.	Check the grid voltage
		V/F curve is improper.	Set V/F curve and torque increase correctly
Er.EFT	Emergency stop or external device fault	Stop suddenly by pressing the STOP key	See the function definition of the STOP key in P00.04
		External fault emergency-stop terminal is enabled.	After the external fault is revoked, release the external fault terminal
Er.EEP	EEPROM read/write fault	The read/write error of the control parameters occurs.	Reset by pressing the STOP/RESET key, seek for service support
Er.SC1	Abnormal remote	The baud rate is set improperly.	Set the baud rate properly.

Fault code	Fault type	Possible fault cause	Solutions
	serial port communication	Serial port communication error	Reset by pressing the STOP/RESET key, seek for service support
		The fault alarm parameters are set improperly.	Modify the P15.03 and P97.00 settings
		The host device does not work.	Check if the host device is working and if the wiring is correct.
Er.rLy	Abnormal contactor	The grid voltage is too low.	Check the grid voltage
		The contactor is damaged.	Replace the contactor of the main circuit, seek for service support
		The power-up buffer resistance is damaged.	Replace the buffer resistance, seek for service support
		The control circuit is damaged.	Seek for service support
		Input phase loss	Check the input R.S.T. wiring
Er.CUr	Current detection circuit abnormal	The wirings or the plug-in units of the control board loosens.	Check them and rewiring
		The auxiliary power supply is damaged.	Seek for service support
		The Hall device is damaged.	Seek for service support
		The amplifying circuit is abnormal.	Seek for service support
		The AI analog input voltage is too high.	Reduce the AI analog input voltage to less than 12V
Er.CPU	System interference	Severely interfered	Reset by pressing STOP/RESET key or install a power filter to the input side of the power supply
		DSP read/write error of the main control panel	Reset by pressing the STOP/RESET key, seek for service support
Er.FbL	Closed loop feedback loss	The parameters for feedback loss are set improperly.	Modify the P14.26 setting
		Feedback wire-break	Rewiring
		The reference of closed loop feedback value is too low.	See the P14.01 setting and increase the feedback reference
Er. EGL	External reference command lost	During the frequency main reference or the torque command selects analog current reference, the analog reference signal is disconnected or too low (less than 2mA).	Check the wiring or adjust the input type of the reference signal

Fault code	Fault type	Possible fault cause	Solutions
Er.CoP	Operation panel parameter copying error	The operation panel parameters are incomplete or the operation panel version is inconsistent with main control panel version.	Refresh the operation panel data and version, use P00.06=1 for uploading the parameters first and then use P00.06=2 or 3 for downloading.
		The operation panel EEPROM is damaged.	Seek for service support
Er.TUn	Poor Tuning	The nameplate parameters of the motor are incorrect.	Set the parameters properly according to the motor nameplate
		When reverse running is prohibited, reverse rotating tuning is performed.	Cancel the reverse running prohibition
		Tuning overtime	Check motor wiring
			Check the P02.16 (upper limit frequency) and see whether the P02.17 set value is lower than rated frequency.
Er.PG1	PG fault	Resolver amplitude below 7000	Check the P01.41 resolver amplitude, if it is lower than 7000, you need to check whether the resolver wiring or its circuit is normal
Er.PST	Parameter setting error	Wrong speed feedback encoder selection setting	The same speed feedback encoder shall not be used for two motors simultaneously.
		Wrong analog AI function selection setting	The same function shall not be selected for different analogs simultaneously.
		Process closed loop invocation setting error	During vector control, the torque limit (P05.13，P05.14) and frequency reference (P02.04 or PLC section frequency reference) can not be given by the process closed loop simultaneously.
Er.24v	Control board 24V power short circuit	Short circuit of P24 and terminal COM	Confirm whether the wiring of P24 and COM is correct
		The interface board circuit is damaged.	Replace the interface board, seek for service support
Er.oPT	Expansion card fault	The expansion card is poorly inserted.	Reinsert the expansion card
		The expansion card is damaged.	Seek for service support
Er.GdF	Grounding short circuit fault	One of the phases (The most likely one is phase U) is grounding short circuited.	Check the grounding short circuit of the output three phase and troubleshoot it.
Er.dEv	Too large speed	ASR parameters are improper.	Modify the setting of the group P05 function code

Fault code	Fault type	Possible fault cause	Solutions
	deviation (DEV) fault	DEV deviation detection value setting is too low.	Modify the DEV detection value setting
		Heavy load fluctuation	Eliminate the load vibration
Er.Fbo	PID feedback exceeding limit	PID feedback value out of limited range	Check whether the feedback value input voltage is normal, if normal, seek for service support
Er.oHL	Motor over-temperature	The ambient temperature is too high.	Lower the ambient temperature
		The motor duct is blocked.	Clean the motor duct
		The motor fan is damaged.	Replace the motor fan
		The motor operates at low frequency and large load for a long time.	Add a large fan for the motor to dissipate heat
Er.AIF	Abnormal AI analog input	Abnormal control circuit	Seek for service support
		The input analog is out of the range and the absolute value is greater than 11V	Check the analog input
Er.THI	Inverter module temperature sampling disconnection	Abnormal temperature sampling circuit	Seek for service support
		The inverter module temperature sampling wire is poorly connected.	Check the inverter module temperature sampling wire connection
Er.THr	Rectifier module temperature sampling disconnection	Abnormal temperature sampling circuit	Seek for service support
		The temperature sampling wire is poorly connected.	Check the temperature sampling wire connection
Er.10v	Control board ±10V power short circuit	±10V grounding	Confirm whether the ±10V wiring is correct
		The interface board circuit is damaged.	Replace the interface board, seek for service support
Er.rEF	Abnormal internal over-current reference	The control board circuit is damaged.	Seek for service support
Er.PIL	Wrong PID limit value setting	The PID lower limit set value exceeds PID upper limit set value	Adjust the PID upper / lower limit set value

All the possible alarm types for MV600J6 are summarized as shown in table 8-2. For details, please refer to the group P97 function code setting. If the fault disappears automatically during the running process, the drive will also automatically reset to the status before the alarm (except AL.SC1, for details, please refer to the group P97 function code description).

Table 8-2 Alarm code table

Alarm code	Alarm type	Possible alarm causes	Solutions
AL.oL1	Drive overload	The motor parameters are incorrect.	Perform the parameter tuning of the motor
		The load is too large.	Adopt the drive with higher power
		The DC braking amount is too large.	Reduce the DC braking current and lengthen the braking time
		When instantaneous stop happens, restart the rotating motor	Set the start mode P08.00 as the speed tracking restart function
		The acceleration time is too short.	Lengthen the acceleration time
		The grid voltage is too low.	Check the grid voltage
		V/F curve is improper.	Adjust V/F curve and torque increase
AL.oL2	Motor overload	The motor overload protection factor setting is incorrect.	Set the overload protection factor of motor correctly.
		The motor is blocked or the sudden change of load is too large.	Check the load
		The universal motor runs at low speed for a long time, with heavy load.	If long-term low-speed running is required, special motor should be used.
		The grid voltage is too low.	Check the grid voltage
		V/F curve is improper.	Set V/F curve and torque increase correctly
AL.EEP	EEPROM read/write fault	The read/write error of the control parameters occurs.	Reset by pressing the STOP/RESET key, seek for service support
AL.SC1	Abnormal serial port communication	The baud rate is set improperly.	Set the baud rate properly.
		Serial port communication error	Reset by pressing the STOP/RESET key, seek for service support
		The fault alarm parameters are set improperly.	Modify the P15.03 and P97.00 settings
		The host device does not work.	Check if the host device is working and if the wiring is correct.
AL.rLy1	Abnormal contactor	The grid voltage is too low.	Check the grid voltage
		The contactor is damaged.	Replace the contactor of the main circuit, seek for service support
		The power-up buffer resistance is damaged.	Replace the buffer resistance, seek for service support

Alarm code	Alarm type	Possible alarm causes	Solutions
		The control circuit is damaged.	Seek for service support
		Input phase loss	Check the input R.S.T. wiring
AL.FbL	Closed loop feedback loss	The parameters for feedback loss are set improperly.	Modify the P14.26 setting
		Feedback wire-break	Rewiring
		The reference of closed loop feedback value is too low.	See the P14.01 setting and increase the feedback reference
AL.EGL	External reference command lost	During the frequency main reference or the torque command selects analog current reference, the analog reference signal is disconnected or too low (less than 2mA).	Check the wiring or adjust the input type of the reference signal
AL.24v	Control board 24V power short circuit	Short circuit of P24 and terminal COM	Confirm whether the wiring of P24 and COM is correct
		The interface board circuit is damaged.	Replace the interface board, seek for service support
AL.Fbo	Closed loop feedback loss	The parameters for feedback loss are set improperly.	Modify the P14.26 setting
AL.PIL	Wrong PID limit value setting	The PID lower limit set value exceeds PID upper limit set value	Adjust the PID upper / lower limit set value

WARNING

Please carefully choose the fault alarm function; otherwise, the accident range extension, the human injury and the property damage may be caused.

8.2 Common faults and solutions

Table 8-3 Operation exception and solutions

Symptoms	Conditions	Possible causes	Solutions
The operation panel has no response.	An individual key or each key has no response.	The locking function of the operation panel takes effect.	In stop or running status, press the ENTER/DATA key and retain pressure on it, then press the V key successively for three times, after that, you can unlock it.

Symptoms	Conditions	Possible causes	Solutions
			Completely power off the drive and then power it up
		The wires of the operation panel have poor contact.	Check the wires and perform the hot plug again
		The keys of the operation panel are damaged.	Replace the operation panel or seek for service support
The function code can not be modified.	Can not be modified in running status	The function code can not be modified in running status.	Modify it in the stop status
	A portion of function code can not be modified.	The function code P00.03 is set as 1 or 2.	Set the P00.03 as 0
		The function code is actual detection value.	Actual parameters can not be changed by users.
	There is no response when MENU/ESC key is pressed.	The locking function of the operation panel takes effect or others.	See the solutions to “the operation panel has no response”
	Can not enter the editing state after pressing the MENU/ESC key; the function code status display is 0000.	User password is set.	Input the user password correctly
			Seek for service support
The drive stops unexpectedly during operation.	In the case that there is no stop command, the drive stops automatically and the run LED is off.	Fault alarm occurs.	Find out the fault causes and reset the fault
		A single cycle of the simple PLC is completed.	Check the PLC parameter setting
		There is power supply interruption.	Check the power supply
		Running command channel switches	Check the relevant function code setting of the operation and running command channel
		Too large DEV	Modify the DEV detection value setting
		The positive/negative logic of the control terminals changes.	Check if the P09.15 setting corresponds with the requirements
	In the case that there is no stop command, the motor stops automatically and the drive run indicator light	Fault resets automatically.	Check the fault auto reset setting and find out the fault causes
		Simple PLC pause	Check PLC pause functional terminal
		External interrupt	Check the external interrupt setting and find out the fault source

Symptoms	Conditions	Possible causes	Solutions
	is on (running at zero frequency).	The set frequency is 0.	Check the set frequency
		The startup frequency is higher than the set frequency.	Check the startup frequency
		There is something wrong with the skip frequency setting.	Check the skip frequency setting
		The closed loop output is negative when the reverse running is prohibited.	Check the P14.22 and the P08.18 setting
		Enable the “disabling forward run” terminal during forward run process	Check the terminal function setting
		Enable the “disabling reverse running” terminal during reverse running process	Check the terminal function setting
		The frequency adjustment setting is 0.	Check the P02.11 and the P02.12 setting
		Transient low-voltage compensation is applied when power-fault restart and the power supply voltage is too low.	Check the power-fault restart function setting and the input voltage
The drive does not work.	The drive does not work after the run key is pressed and the running LED is off.	The terminal with the coast-to-stop function is enabled.	Check the coast-to-stop terminal
		The “disabling run” terminal of the drive is enabled.	Check the “disabling run” terminal of the drive
		The terminal with the external stop function is enabled.	Check the terminal with the external stop function
		Under the three-wire control mode, the terminal with the three-wire operation control function is not closed.	Set and close the three-wire operation control terminal
		Fault alarm occurs.	Troubleshoot
		The virtual terminal function of the host device is set improperly.	Cancel the virtual terminal function of the host device or set the function properly through the host device, or modify the P09.15 setting
		The forward/reverse logic of the input terminal is set improperly.	Check the P09.14 setting

Symptoms	Conditions	Possible causes	Solutions
When the drive is started, the report -LU- runs immediately.	The thyristor or the contactor disconnects and the drive load is large.	Since the thyristor or the contactor is not closed, when the drive runs with large load, the DC bus voltage of the main circuit will drop; the drive will display -LU- first and will not display Er.JCF fault.	Run the drive after the thyristor or the contactor is closed completely

8.3 Fault source analysis

As shown in Fig. 8-1 below, the hydraulic servo system mainly consists of a permanent magnet synchronous motor, a motor rotor position/speed sensor (resolver), an oil pump coaxially connected between the servo drive and the servo motor, and a pressure sensor that detects the hydraulic pressure of the system.

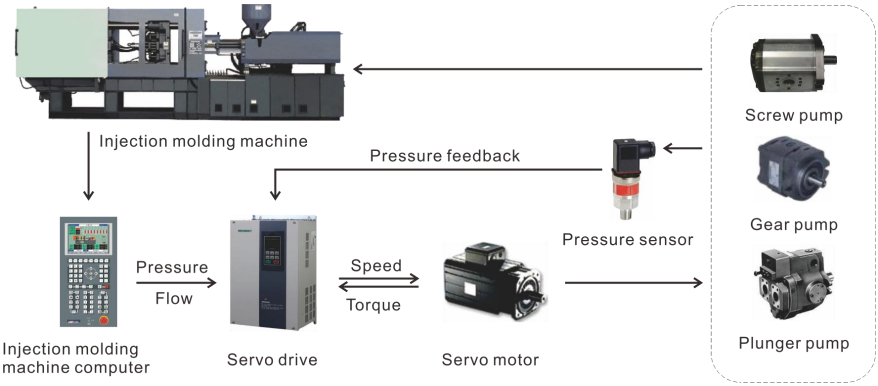


Fig. 8-1 Injection molding machine hydraulic servo system composition

In most cases, all components (including connecting wires) appearing in the above block diagram can be considered as the source of fault. Familiarity with the distribution of faults facilitates a systematic and comprehensive analysis of faults, so that the source of the fault can be found quickly and accurately. The following figure shows the distribution of system faults:

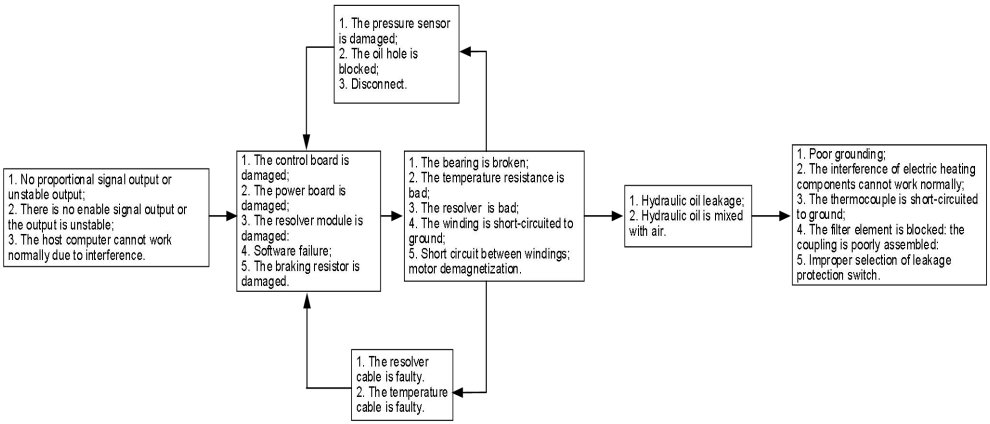
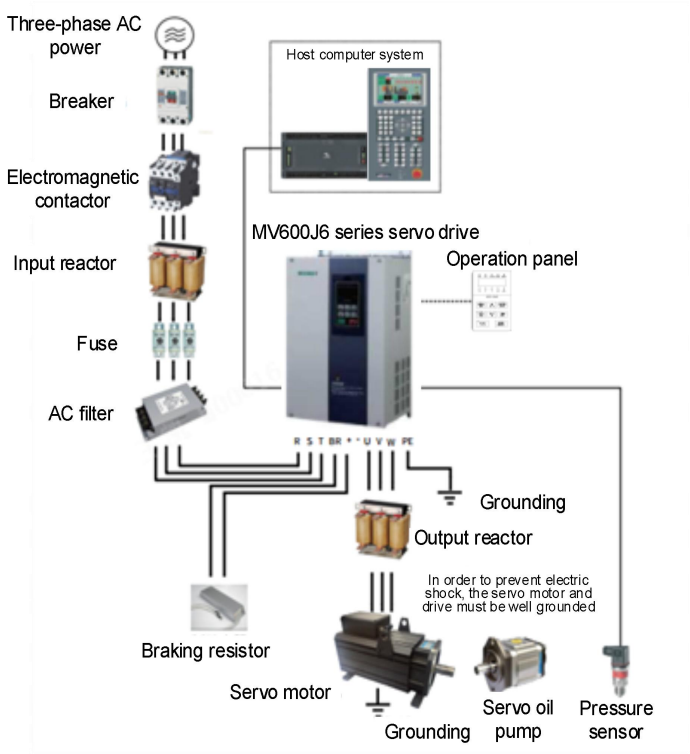


Fig. 8-2 Fault analysis of hydraulic servo system

Appendix A Optional Components

A.1 Peripheral components



Attached Fig. A-1 Peripheral electrical components diagram

Attached Table A-1 Instructions for the use of MV600J6 peripheral components

Accessory name	Installation position	Description
Breaker	Between power supply and drive input side	Short-circuit breaker: Cut off the power supply when the downstream equipment is overcurrent to prevent accidents.
		Leakage protection circuit breaker: The drive may generate high-frequency leakage current when working. In order to prevent electric shock accidents and induced electric fires, please choose and install a suitable leakage protection circuit breaker according to the site conditions.
(Electromagnetic) Contactor	Between air and drive input side	During the power-on and power-off operation of the drive, frequent power-on and power-off operations (interval time not less than 1 hour) or direct start-up operations should be avoided through the contactor.
Input reactor	Drive input side	Improve the power factor of the input side; Effectively eliminate high-order harmonics on the input side, prevent other equipment damage due to voltage waveform distortion; eliminate input current imbalance caused by power supply phase imbalance.

Fuse	Between power supply and drive input side	Prevent accidents due to short circuits, and protect subsequent semiconductor devices.
AC filter	Drive input side	Reduce the external conduction and radiation interference of the drive; reduce the conduction interference from the power supply end to the drive, and improve the anti-interference ability of the drive.
Braking resistor	All models	The motor consumes regenerative energy through the braking resistor during deceleration.
Output reactor (du/dt filter)	Between the drive output side and the current, mounted close to the drive	The output side of the drive generally contains more high-order harmonics. When the distance between the motor and the drive is long, there is a large distributed capacitance in the line. One of the harmonics may resonate in the loop, which has two effects: a) Destroy the insulation performance of the motor, which will damage the motor for a long time. b) Large leakage current is generated, causing frequent protection of the drive. Generally, the distance between the drive and the motor is more than 100m, it is recommended to install the output
Output magnetic ring	Mounted close to the drive on the output side of the drive	The output magnetic ring of the AC reactor is mainly used to reduce the harmonic current.
Host computer system	Part of the control signal is connected to the drive	The host computer system mainly controls the action of the whole machine, sends various instructions to the drive, and exchanges information with the drive.
Servo motor	Drive output side	Please select the suitable motor according to the recommendation.
Servo oil pump	Connect to servo motor	Provide flow and pressure to hydraulic systems.
Pressure sensor	Installed on the oil circuit of the oil port, the feedback signal is connected to the drive	Provide hydraulic circuit pressure feedback analog signal.

A.2 AC input reactor selection

The AC input reactor is mainly used to reduce the harmonics in the input current. As an optional accessory, an external reactor can be installed when the application environment has high harmonic requirements. The recommended manufacturers and models of input reactors are shown in the table below:

Attached Table A-2 Recommended model of AC input reactor

Drive model	Reactor model	Rated power (KW)	Rated inductance (mH)
MV600J6-4T5.5	MACL-5.5KW-R	5.5	0.93
MV600J6-4T7.5	MACL-7.5KW-R	7.5	0.7
MV600J6-4T11	MACL-11KW-R	11	0.46
MV600J6-4T15	MACL-15KW-R	15	0.35
MV600J6-4T18.5	MACL-18.5KW-R	18.5	0.28
MV600J6-4T22	MACL-22KW-R	22	0.233
MV600J6-4T30	MACL-30KW-R	30	0.184
MV600J6-4T37	MACL-37KW-R	37	0.155
MV600J6-4T45	MACL-45KW-R	45	0.116
MV600J6-4T55	MACL-55KW-R	55	0.0935
MV600J6-4T75	MACL-75KW-R	75	0.074
MV600J6-4T90	MACL-90KW-R	90	0.066
MV600J6-4T110	MACL-110KW-R	110	0.056
MV600J6-4T132	MACL-132KW-R	132	0.0483
MV600J6-4T160	MACL-160KW-R	160	0.0424

A.3 Braking resistor configuration

Attached Table A-3 Braking resistor configuration

Power kW	Braking unit	Recommended braking resistor power kW	Recommended braking resistor resistance Ω	Minimum braking resistor resistance Ω
5.5	Built-in	1	45	35
7.5		1	45	35
11		1.5	32	25
15		1.5	32	25
18.5		2.5	25	20
22		2.5	20	16
30		3	20	16
37		4	16	12
45		5	16	12
55		6	9	7
75		8	9	7
90		10	7	5
110	MDBU-4-132	12	6	5
132	MDBU-4-132	14	6	5
160	MDBU-4-200	15	4	3

🕮 Description

The main functions of the built-in braking unit:

1. Braking action voltage and braking rate can be adjusted by function code; 2. Braking resistor short circuit protection; 3. Radiator overheating protection; 4. Abnormal alarm indication of braking IGBT module;

🕮 Note

The connecting wire between the braking resistor and drive should be within 5 meters, If it is longer than 5m, twisted pair wire shall be adopted. The maximum wire length is 10m.

A.4 Servo motor selection

The motor codes in Attached Table A-4 are jointly formulated by the servo drive manufacturer and the servo motor manufacturer, so that the motor parameters of group P03 can be solidified only by entering the motor code into the function code of P25.04. When the P25.04 motor type function code is not zero, the following function codes cannot be changed:

Function code	Name
P02.00	Motor and control mode selection
P03.00	Motor rated power
P03.01	Motor rated voltage
P03.02	Motor rated current
P03.03	Motor rated frequency
P03.04	Motor rated rotating speed
P03.08	Motor back-EMF constant

🕮 Note

When P25.04 motor type function code selects "0", it means that the motor type has not been specified, and it is necessary to complete the tuning of the motor parameters of group P03 through P03.24 motor tuning.

Attached Table A-4 Servo motor selection table

Motor model (Megmeet)	Motor code
XST2-20F-045-15RH42	20455
XST2-20F-043-17RH42	20437
XST2-20F-042-20RH42	20420
XST2-20F-068-15RH42	20685
XST2-20F-064-17RH42	20647
XST2-20F-065-20RH42	20650
XST2-20F-079-15RH42	20795
XST2-20F-074-17RH42	20747
XST2-20F-075-20RH42	20750
XST2-20F-090-15RH42	20905
XST2-20F-086-17RH42	20867
XST2-20F-085-20RH42	20850
XST2-20F-114-15RH42	21145
XST2-20F-108-17RH42	21087
XST2-20F-107-20RH42	21070
XST2-20F-135-15RH42	21355
XST2-20F-134-17RH42	21347
XST2-20F-129-20RH42	21290
XST2-20F-150-15RH42	21505
XST2-20F-149-17RH42	21497
XST2-20F-147-20RH42	21470
XST2-20F-167-158H42	21675
XST2-20F-162-17RH42	21627
XST2-20F-163-20RH42	21630
XST2-26F-188-15RH48	21885
XST2-26F-184-17RH48	21847
XST2-26F-184-20RH48	21840
XST2-26F-217-15RH48	22175
XST2-26F-213-17RH48	22137
XST2-26F-214-20RH48	22140
XST2-26F-244-15RH48	22445
XST2-26F-239-17RH48	22397
XST2-26F-240-20RH48	22400
XST2-26F-270-15RH48	22705
XST2-26F-262-17RH48	22627
XST2-26F-265-20RH48	22650
XST2-26F-288-15RH48	22885
XST2-26F-285-17RH48	22857
XST2-26F-283-20RH48	22830
XST2-26F-315-15RH48	23155
XST2-26F-310-17RH48	23107

XST2-26F-295-20RH48	22950
XST2-26F-335-15RH48	23355
XST2-26F-330-17RH48	23307
XST2-26F-321-20RH48	23210
XST2-26F-355-15RH48	23555
XST2-26F-350-17RH48	23507
XST2-26F-347-20RH48	23470
XST2-26F-375-158H48	23755
XST2-26F-369-17RH48	23697
XST2-26F-364-20RH48	23640
XST2-26F-394-15RH48 XST2-26F-394-15RH60	23945
XST2-26F-387-17RH48 XST2-26F-387-17RH60	23877
XST2-26F-380-20RH48 XST2-26F-380-20RH60	23800
XST2-26F-450-20RH48 XST2-26F-450-20RH60	24500

Motor model (Physis motor)	Motor series	Motor code
U310F（SMPM）	1004F	31045
		31042
	1007F	31075
		31072
	1010F	31005
		31002
	1013F	31035
		31032
U313F（SMPM）	1310F	31315
		31312
	1320F	31325
		31322
	1330F	31335
		31332
	1340F	31345
		31342
E010__F（IPM）	E01004F	10045
		10042
	E01005F	10055
		10052
	E01007F	10075
		10072
	E01008F	10085
		10082
	E01010F	10105
		10102
	E01012F	10125

		10122
	E01013F	10135
		10132
E012__F（IPM）	E01215F	12155
		12152
	E01220F	12205
		12202
	E01225F	12255
		12252
	E01230F	12305
		12302
	E01235F	12355
		12352

🕮 Description

If you need the physical parameters of the motor, you can refer to our motor selection manual for the motor model and motor series in Attached Table A-4.

🕮 Note

Some peripheral electrical components in Attached Fig. A-1 need to be selected according to the actual site environment. The above are the AC input reactors, braking resistor configurations and servo motor types recommended by our company. If the user needs other corresponding components, please refer to the accessories selection introduced in section 6.2. If you still have questions, please call us.

Appendix B　The Use of Megdrive Studio in MV600J6

B.1 Software Megdrive Studio installation and startup

B.1.1 Hardware requirements

Need to configure a PC or laptop and Micro-USB, Micro-USB is connected to the J10 terminal in the servo drive.

Attached Fig.B-1　Micro-USB

B.1.2 Install Megdrive Studio software

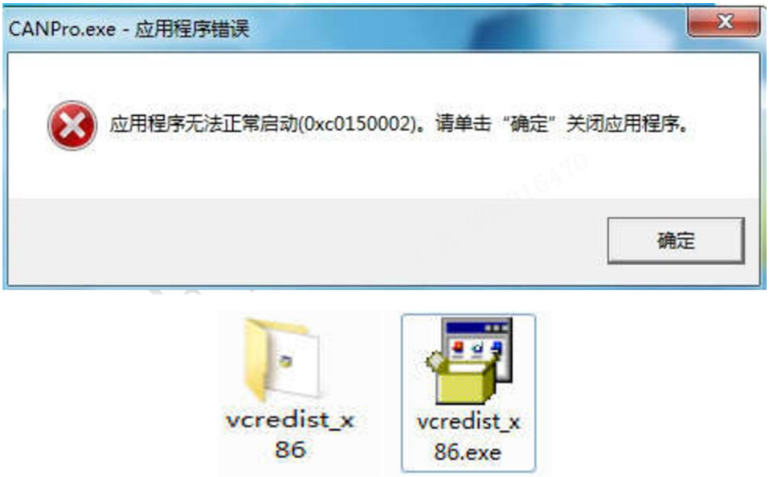
Open the MDS.smart host computer installer folder, as shown below:

Attached Fig.B-2　Install software execution files

The installation steps are as follows:

1.Double-click setup.exe to install. After installing this program, the computer may prompt you to download and install Microsoft's Microsoft.NET Framework X (if the computer does not have the framework program installed), you need to allow the download and installation before it can be installed correctly.

2. After the installation is complete, a shortcut to the installer will be generated on the desktop. Since some dynamic link libraries in the software depend on the VC2008 runtime library, if this library is not installed in the computer, double-click to open it, and a prompt "The application cannot start normally 0x0150002" will pop up, install and download the x86 version of the VC2008 library, and install the VC2008 library file. After that, double-click the shortcut to open it.



Attached Fig.B-3 Installation software operating environment

3. If the installation above steps are completed, the software will be able to be used normally.

B.1.3 Install driver software

Connect the USB-CAN adapter, find the driver corresponding to the PC or laptop from the driver folder and install it.

Attached Fig.B-4 Install the usb-driver file

B.2 Servo parameter setting and software interface setting

After completing the setting of the servo drive, open the software Megdrive Studio, and you will enter the interface of Attached Fig.B-5. First connect the USB cable to the USB terminal of J6, and then press to set the drive model as: "Drive_J6", and then correctly select the USB serial port number connected to J6, and the communication address and baud rate are connected by default.

Attached Fig.B-5 Communication parameter setting

B.3 Function description of MV600J6 in Megdrive Studio

B.3.1 Megdrive Studio interface introduction

Megdrive Studio interface consists of menu bar, toolbar and status bar. Various functions in the menu bar and toolbar can be selected, such as: connection settings, oscilloscope, parameter management, and instructions for use.

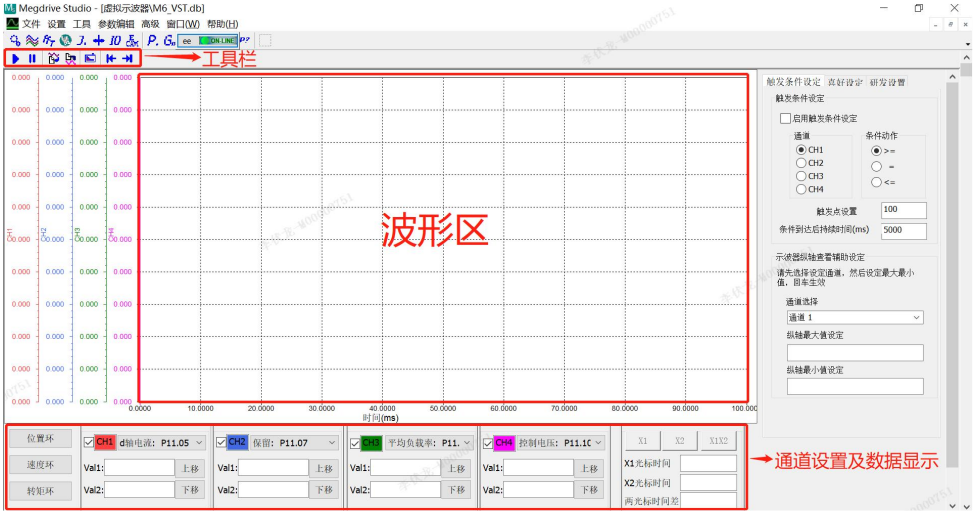
Attached Fig.B-6 Megdrive Studio interface introduction

Description

For more in-depth understanding, please click on the help in the software to view.

B.3.2 Oscilloscope function introduction

The oscilloscope toolbar is composed of oscilloscope running, oscilloscope pause, saving oscilloscope data, opening oscilloscope data, setting oscilloscope channel, saving waveform picture, moving waveform right and left. Waveform area: Displays the real-time waveform of the selected parameter.



Attached Fig.B-7 Oscilloscope function introduction 1

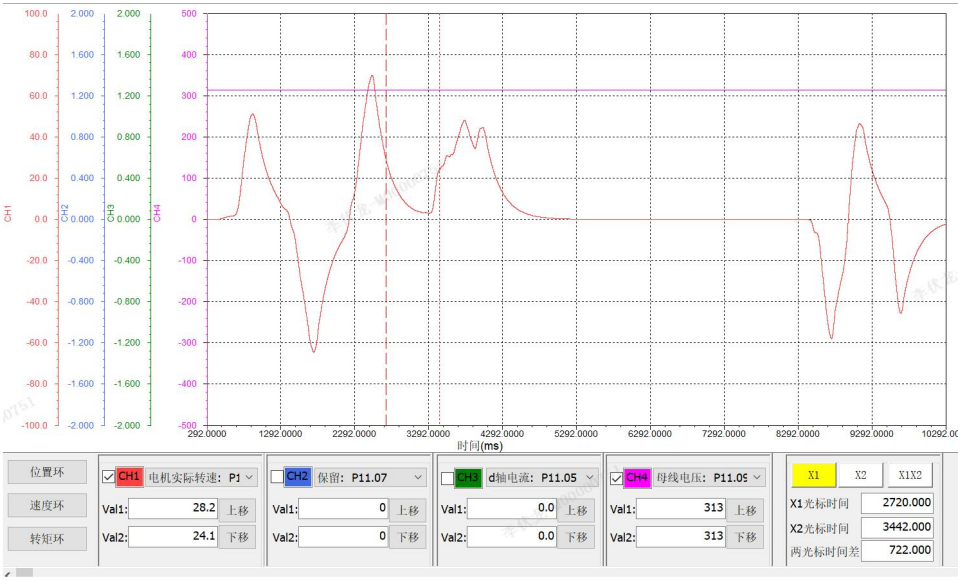
Channel setting and data display (display channel 1, channel 4 waveform):

Attached Fig.B-8 Oscilloscope function introduction 2

Check the channel to display the waveform, uncheck it to not display; each channel can move the waveform up or down independently;

Cursor: Cursor X1 or X2 can be selected individually, or cursor X1 and X2 can be selected at the same time

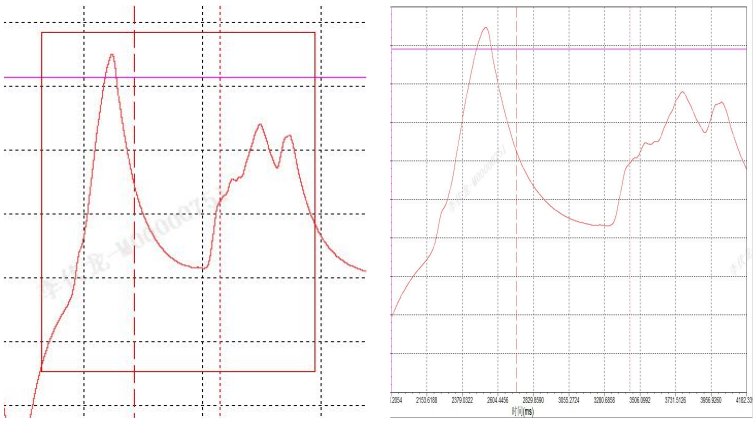
After the cursor is selected, press "CTRL" + the left mouse button to move the cursor quickly, and the currently selected cursor can be fine-tuned by pressing the left and right arrows (←, →). The cursors display the current timeline time and the current value at each channel's cursor position.



Attached Fig.B-9 Oscilloscope function introduction 3

Waveform zoom: Press and hold the left button, draw a zoom-in rectangle from the upper left to the lower right, and release to complete the zoom in the rectangular area.

Waveform zoom out: Double-click any area to zoom out.



(a) Original graphics (b) Zoom in the graphics

Attached Fig.B-10 Oscilloscope function introduction 4

B.3.3 Parameter editing function introduction

The parameter editing toolbar consists of opening the CSV parameter file, saving the file to CSV, downloading the servo parameters and reading from the servo parameters. Professionals who are familiar with MV600J6 are recommended to use this function, which is convenient for multi-platform debugging. When a model is debugged, connect the servo drive to the software, upload the data to the software through the servo drive, and generate a CSV file for saving. Then, connect to other models in the same way, and import the CSV file you just saved to other platforms. After such repeated operations, the rapid debugging of multiple platforms can be quickly completed.

Function: parameter reading and writing, parameter saving and importing

Open the parameter editor interface:

①Click "Parameter Edit" in the menu bar, and then select the "Parameter Editor" option.

②Click the toolbar icon "P. Parameter Editor" to open it. The parameter editor interface is as follows:

Attached Fig.B-11 Parameter editing function introduction

Directory tree: Display the parameter groups supported by the current servo;

Operating tools: tools for reading and writing parameters;

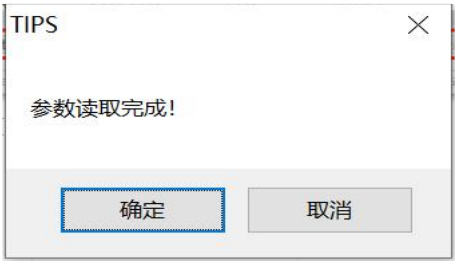
Upload and download parameters:

①Select the parameter group of the directory tree, and select the operation tool as required (take reading the parameters of this group as an example):

②After clicking the selected tool, there will be a progress bar prompt, as shown below (if the number of selected parameters is small, it may not appear):

0	P06.07	1000	0-65535	1000	运行更改
1	P06.08	1000	0-65535	1000	运行更改
2	P06.09				运行更改
3	P06.10				运行更改
4	P06.11	6000.0	0.0-6000.0	6000.0	运行更改
5	P06.12	0	0-3	0	停机更改

③After the parameter reading is completed, the following prompt will appear:



④Click any group of parameters in the directory tree to refresh the interface (the current value of the parameter is different from the default value, the parameter row will be displayed in gray).

序号	功能码地址	参数	范围	默认值	更改属性	说明
143	P06.00	0	0-5	0	停机更改	主给定源选择
144	P06.01	200.0	-6000.0-6000.0	0.0	运行更改	主给定速度设定
145	P06.02	0	0-4	0	停机更改	辅助速度源选择
146	P06.03	0.0	-6000.0-6000.0	0.0	运行更改	辅助给定速度设定
147	P06.04	0	0-4	0	停机更改	主辅给定运算
148	P06.05	100.0	0.0-6000.0	100.0	运行更改	点动速度
149	P06.06	100.0	0.0-6000.0	100.0	只读	点动运行
150	P06.07	800	0-65535	1000	运行更改	速度指令加速时间1
151	P06.08	900	0-65535	1000	运行更改	速度指令减速时间1
152	P06.09	6000.0	0.0-6000.0	6000.0	运行更改	最大转速阈值
153	P06.10	6000.0	0.0-6000.0	6000.0	运行更改	正向转速阈值
154	P06.11	6000.0	0.0-6000.0	6000.0	运行更改	反向转速阈值
155	P06.12	0	0-3	0	停机更改	电动转矩限制通道
156	P06.13	0	0-3	0	停机更改	制动转矩限制通道

Parameter modification:

①Open the directory tree, select the parameter group, and then double-click the parameter to be modified, the parameter modification interface will pop up (drop-down box or value modification):

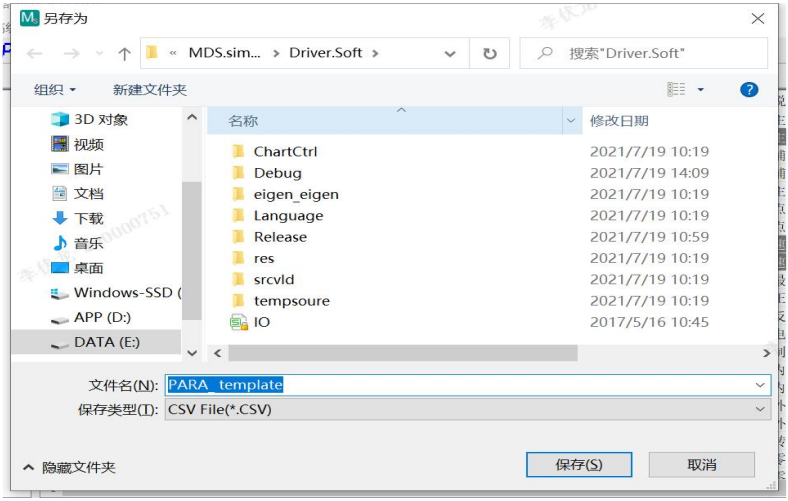
② Modify the parameters as needed, and click Download.

Parameters save (save to csv file):

①Click the Save button

②In the pop-up save interface, select the file save path and name the file name

③Click Save to complete the parameter saving

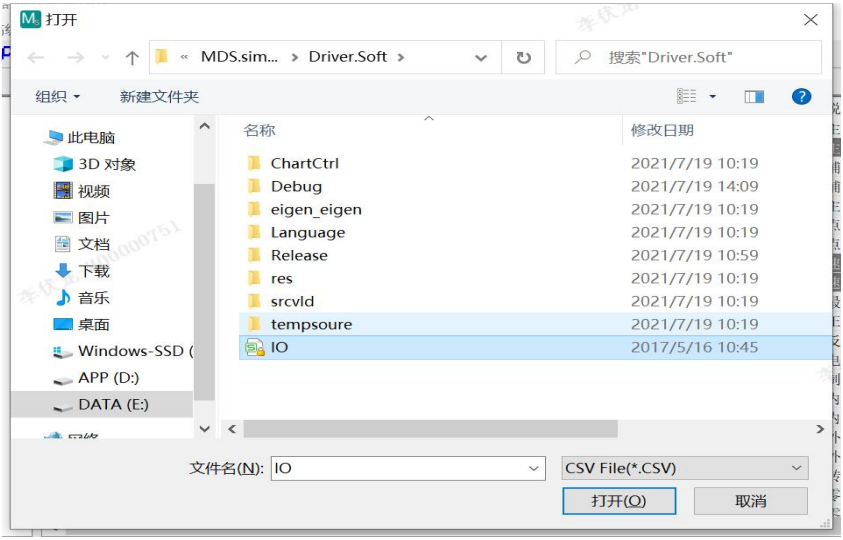


Parameters open (open csv file):

①Click the Open button

②Find the required file in the pop-up open interface and click to open

③Click the directory tree to refresh the interface and wait for the subsequent operations



Note

When downloading data, make sure that the debugged data is correct and safe. If there is any wrong operation, the consequences will be at your own risk.

Appendix C Warranty and Service

Shenzhen Megmeet Drive Technology Co., Ltd. manufactures motor drive products strictly according to the ISO9001:2008 standard. In case of any abnormal product, please contact your product provider or the headquarter of Shenzhen Megmeet Drive Technology Co., Ltd.. Our company will provide full technical support service for our customers.

1. Warranty period

The product is warranted for 18 months from the date of purchase, however, the warranty date shall not exceed 24 months after the manufacture date recorded in the nameplate.

2. Warranty scope

During the warranty period, any product abnormalities incurred due to our company can be freely repaired or replaced by our company. In case of any following situations, a certain maintenance fees for the product will also be charged even if it is in the warranty period.

1). The damages are caused by fire, flood, strong lightning strike, etc.

2). The artificial damages are caused by unauthorized modifications.

3). The product is damaged due to fall or in transit after purchasing.

4). The damages are caused by using beyond the standard specification requirements.

5). The damages are caused by operation and use failing to follow the instruction manual.

3. After-sales service

1). If there are specific requirements for drive installation and trial operation, or the working status of the drive is unsatisfactory (such as unsatisfactory performance and function), please contact your product agent or Shenzhen Megmeet Drive Technology Co., Ltd..

2). In case of any abnormality, please timely contact your product provider or Shenzhen Megmeet Drive Technology Co., Ltd. for help.

3). During the warranty period, our company will repair any product abnormality incurred due to product manufacturing or design free of charge.

4). If the product is out of the warranty period, our company will make paid repair according to user’s requirement.

5). The service charge is calculated by actual costs. If there is an agreement, the agreement shall prevail.

Shenzhen Megmeet Drive Technology Co., Ltd.

Address: 5th Floor, Block B, Unisplendor Information Harbor, Langshan Rd., Science & Technology Park, Nanshan District, Shenzhen, 518057, China

Tel: +86-755-86600500

Fax: +86-755-86600562

Website: www.megmeet-drivetech.com

Shenzhen Megmeet Drive Technology Co., Ltd.

Drive Warranty Bill

Customer company:	
Detailed address:	
Postal Code:	Contact:
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact :	Tel:
Maintenance personnel:	Tel:
Maintenance date:	
Comment on service: ☐Good ☐Fair ☐So so ☐ Poor Other comment: User's signature: Date:	
Return visit record in Customer Service Center: □Telephone return visit □Letter return visit Others: Signature of the technical support engineer: Date:	

Note: This bill becomes invalid if the user can not be visited.

Shenzhen Megmeet Drive Technology Co., Ltd.

Drive Warranty Bill

Customer company:	
Detailed address:	
Postal Code:	Contact :
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact :	Tel:
Maintenance personnel:	Tel:
Maintenance date:	
Comment on service: ☐Good ☐Fair ☐So so ☐ Poor Other comment: User's signature: Date:	
Return visit record in Customer Service Center: □Telephone return visit □Letter return visit Others: Signature of the technical support engineer: Date:	

Note: This bill becomes invalid if the user can not be visited.