前言 Preface

ESDD 系列伺服驱动器是为驱动永磁同步伺服电机（PMSM）而开发的一款伺服驱动器。ESDD 系列伺服驱动器容量范围涵盖广（额定电流 10Ａ ～ ３００Ａ ），是目前市场上性价比较高的中大功率伺服驱动器。ESDD series servo driver is developed for driving the permanent-magnet servo motor (PMSM). The capacity range of ESDD series servo driver is extensive in coverage (rated current 10A ~ 300 A). It is a medium and high power servo driver with higher cost-performance ratio on the existing market.

本手册为 ESDD 系列伺服驱动器的操作指导手册。This manual is an operation guidance of ESDD series servo driver.

本手册提供给使用者选型、安装、参数设置、现场调试、故障诊断及日常保养与维护的相关注意事项及指导。为正确使用本系列伺服驱动器，请事先认真阅读本手册，并请妥善保存以备后用。设备配套客户请将此手册随设备发给最终用户。This manual provides users with some notices concerned and guidance on lectotype, installation, parameter setting, field debugging, fault diagnosis and daily maintenance. In order to correctly use this series servo driver, please carefully read this manual and keep it properly for use in the future. For the equipment matching customer, please issue this manual to the end user along with equipment.

伺服驱动器安装调试流程：Installation and debugging process of the servo driver:

选型->到货验收->接线及部件安装->调试 Lectotype - > inspection of incoming merchandise - > wiring and component installation - > debugging

开箱验货：Unpacking and checking the goods:

在开箱时，请认真确认：When unpacking, please carefully confirm:

1 ）本机铭牌的型号及伺服驱动器额定值是否与您的订货一致。箱内含您订购的机器、产品合格证、用户操作手册及保修单。Whether servo driver's model and rated value on the nameplate of this machine coincides with those on goods ordered by you and whether the machine, product qualification certificate, user manual and warranty bill are contained inside the case.

2 ）产品在运输过程中是否有破损现象；若发现有某种遗漏或损坏，请速与本公司或您的供货商联系解决。Whether there is any product damage in transport process. In the event of any omission or damage, please immediately contact this company or your supplier to solve it.

初次使用：Initial use:

对于初次使用本产品的用户，应先认真阅读本手册。若对一些功能及性能方面有所疑惑，请咨询我公

司的技术支持人员，以获得帮助，对正确使用本产品有利。The user who uses this product for the first time should firstly carefully read this manual. For any question on some function and performance aspects, please consult technical support personnel of our company to obtain help, which is favourable to correctly using this product.

由于本公司致力于伺服驱动器的不断改善，因此所提供的资料如有变更，恕不另行通知。Because this company is devoted to constant improvement of the servo driver, the information provided will be subject to changes without further notice.

目录 Table of Contents

第一章 安全信息及注意事项

Chapter I Safety Information and Precautions

1.1 安全定义 Safety Definition

在本手册中，安全注意事项有以下两类：In this manual, safety notice includes two classes below:

⚠危险　　错误操作可能会引起危险，导致人身伤害，并可能损坏设备。

⚠注意　　不注意该提示，可能出现不希望的结果或状态。

危险　　错误操作可能会引起危险，导致人身伤害，并可能损坏设备。
Danger: The faulty operation would possibly cause danger, result in personal injury and possibly damage equipments.
注意　　不注意该提示，可能出现不希望的结果或状态。
Attention:　　Disregarding this prompt would possibly generate an undesired result or status.

1.2 安全事项 Safety Matters

1、　安装前：Before installation:

⚠危险　危险 Danger
● 损伤的伺服驱动器及缺件的伺服驱动器请不要使用，否则有受伤的危险。Please do not use any servo driver damaged and short of parts, otherwise it will cause a wounded danger.   ● 请使用 B 级以上绝缘电机，否则有触电危险。Please use a motor with insulation above Class B, otherwise it will cause an electric shock danger.

2、安装时：During installation:

⚠危险　危险 Danger
● 禁止将产品暴露在有水气，腐蚀性、可燃性气体的场合使用，否则会导致触电或火灾。It is prohibited to use the product at any place with steam, corrosive and flammable gases, otherwise it will result in an electric shock or a fire.

- 禁止将产品用于阳光直射，灰尘、盐分及金属粉末较多的场所，禁止将产品用于有水、油及药品滴落的场所。It is prohibited to use the product at any place with more direct sunshine, dust, salinity, metal powder. It is prohibited to use the product at any place with water, oil and drug drippage.

<div align="center">⚠️ 注意 Attention</div>

- 两个以上伺服驱动器置于同一柜中时，请注意安装位置，保证散热效果。When more than two servo drivers are put in the same cabinet, please note the installation site to ensure heat elimination effect.
- 不能让导线头或螺钉掉入伺服驱动器中，否则会能引起伺服驱动器损坏。Never make any lead end or screw fall into the servo driver; otherwise it will damage the servo driver.

3 、配线时：During wiring:

<div align="center">◇ 危险 Danger</div>

- 应由专业电气工程人员施工，否则有触电危险！Construction shall be performed by professional electrical engineering personnel; otherwise it will cause an electric shock danger!
- 伺服驱动器和电源之间必须有断路器隔开，否则可能发生火警！The servo driver and power supply must be separated by a circuit breaker, otherwise it will possibly cause outbreak of fire!
- 接线前请确认电源处于关断状态，否则有触电的危险！Before wiring, please confirm that power supply has been switched off; otherwise it will cause an electric shock danger!
- 接地端子必须可靠接地，接地不良可能会造成触电或火灾。The earthing terminal must be earthed reliably. The bad earth will possibly cause an electric shock or a fire.

<div align="center">⚠️ 注意 Attention</div>

- 制动电阻必须按指定方式连接，否则会损坏驱动器。The braking resistor must be connected according to specific mode; otherwise it will damage the driver.
- 不能将输入电源线连到输出端 U、V、W，否则会引起伺服驱动器损坏！Never connect the input powerline to output end U, V and W, otherwise it will damage the servo driver!
- 确保所配线路符合 EMC 要求及所在区域的安全标准，所用导线线径请参考手册所建议，否则可能发生事故！Make sure that wiring conforms to EMC requirement and safety standards in local area. For lead wire diameter, please refer to suggestions in the manual, otherwise it will possibly have an accident happen!

4、上电前：Before power on:

<table>
<tr><td align="center">◇危险 Danger</td></tr>
<tr><td>

● 请确认电源电压等级是否和伺服驱动器额定电压一致；输入、输出的接线位置是否正确，并注意检查外围电路中是否有短路现象，所连线路是否紧固，否则可能引起伺服驱动器损坏。Please confirm whether mains voltage grade coincides with rated voltage of the servo driver; whether input and output wiring positions are correct, and pay attention to checking whether there is any short circuit in peripheral circuit; whether connected circuit is fastened, otherwise it will possibly damage the servo driver.
</td></tr>
</table>

<table>
<tr><td align="center">⚠注意 Attention</td></tr>
<tr><td>

● 检查所有外围配件是否按本手册所提供电路正确接线。否则可能引起事故。Check whether all of peripheral accessories are correctly connected according to the circuit provided in this manual, otherwise it will possibly cause an accident.

● 伺服驱动器必须盖好盖板后才能上电，否则可能引起触电。The servo driver can be powered on only after covered with a cover plate, otherwise it will possibly cause an electric shock.
</td></tr>
</table>

5、上电后 After power-on

<table>
<tr><td align="center">◇危险 Danger</td></tr>
<tr><td>

● 上电后禁止打开盖板，否则有触电的危险。It is prohibited to open the cover plate after power-on, otherwise it will cause an electric shock danger.

● 不要用湿手触摸伺服驱动器及周边电路，否则有触电危险。Never touch the servo driver and peripheral circuit by wet hand; otherwise it will cause an electric shock danger.

● 禁止触摸伺服驱动器端子（U、V、W 接线端子，电机接线端子及控制端子），否则有触电危险。It is prohibited to touch servo driver's terminals (U, V, W connecting terminal, motor connecting terminal and control terminal), otherwise it will cause an electric shock danger.
</td></tr>
</table>

<table>
<tr><td align="center">⚠注意 Attention</td></tr>
<tr><td>

● 请勿随意更改伺服驱动器厂家参数，否则可能造成设备损害。Please do not change parameters of the servo driver manufacturer at will; otherwise it will possibly damage the equipment.
</td></tr>
</table>

6、运行中：In running:

◇危险 Danger
● 运行时，禁止触摸驱动器和任何旋转中的电机零件，否则可能会造成人员受伤。In running, it is prohibited to touch the driver and any rotating motor part; otherwise it will possibly cause personnel injury.
● 请勿触摸散热风扇及放电电阻以试探温度，否则可能引起灼伤！ Please do not touch the radiator fan and discharge resistor to probe temperature; otherwise it will possibly cause burn!
● 非专业技术人员请勿在运行中检测信号，否则可能引起人身伤害或设备损坏！ Non-professional technical personnel shall not detect any signal in running; otherwise it will possibly cause personal injury or equipment damage!
● 在瞬时停电后重新上电时，应远离机器，以防意外。Be sure to far from the machine to prevent any accident when powering on over again after instant power-cut.

⚠注意 Attention
● 伺服驱动器运行中，避免有东西掉入设备中。否则会引起设备损坏！In running of the servo driver, prevent any thing from falling into the equipment; otherwise it will cause equipment damage!
● 不要采用接触器通断的方法来控制伺服驱动器的启停。否则会引起设备损坏！Never adopt the break-make method of contactor to control start/stop of the servo driver; otherwise it will cause equipment damage!

7、维修、保养时：During maintenance:

⚠注意 Attention
● 除指定的专业人员外，请勿对伺服驱动器实施维修及保养，有触电和损坏设备的危险。Except specified professionals, please do not implement maintenance for the servo driver, otherwise it will cause dangers of electric shock and equipment damage.
● 请勿自行进行改造，否则会造成人身伤害或设备损坏！Please do not renovate it at discretion; otherwise it will cause personal injury or equipment damage!
● 请勿带电对设备进行维修及保养。否则有触电危险。Please do not perform maintenance for the equipment with electrification, otherwise it will cause an electric shock danger
● 确认在伺服驱动器 POWER 灯熄灭后才能对伺服驱动器实施保养及维修。否则电容上残余电荷会对人造成伤害。The servo driver can be maintained only after you confirm that POWER lamp is off, otherwise residual charge on capacitance will injure people.

第二章 产品信息

Chapter II Product Information

2.1 铭牌说明 Nameplate information
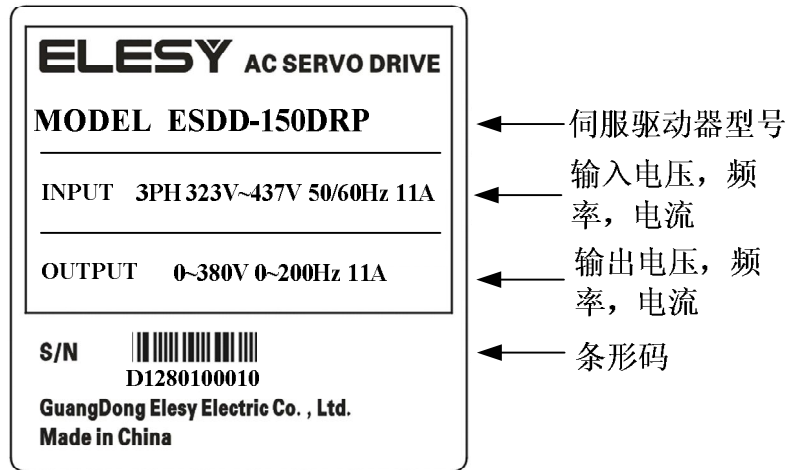
伺服驱动器型号 Servo driver model

输入电压，频率，电流 Input voltage, frequency, current

输出电压，频率，电流 Output voltage, frequency, current

条形码 Bar code

图 2.1 伺服驱动器铭牌说明 Fig. 2.1 Description of the servo driver nameplate

2.2 命名规则 Naming Rule

ESDD － 150 D R P

特殊型号标记(通用型没有该位)

编码器型号： E：增量式编码器
P：省线式编码器
S：绝对值编码器
R：旋转变压器

电压等级： A：220V
D：380V

输出功率： 110＝11KW；
150＝15KW；
300＝30KW；

ESDD伺服驱动器
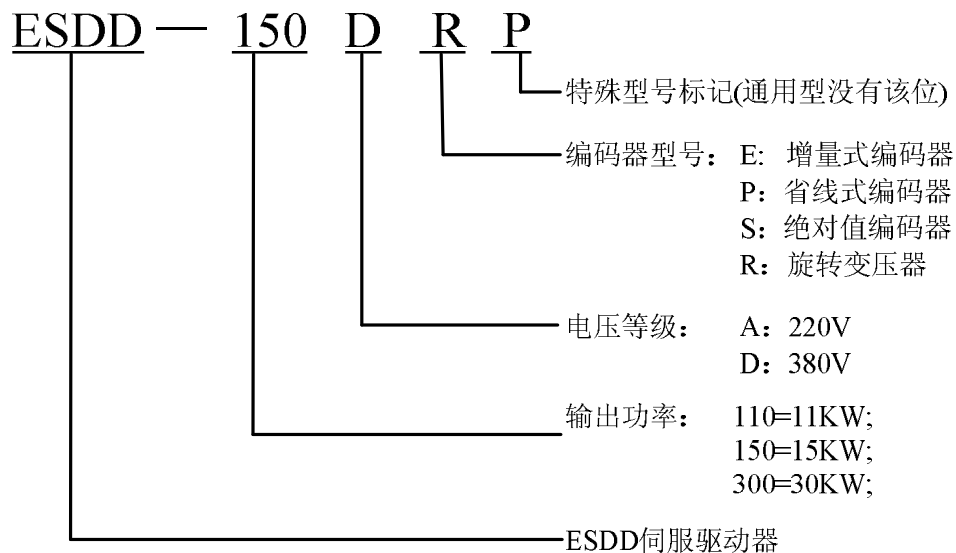
特殊型号标记（通用型没有该位）Specific model　mark (universal type is free of this bit)

编码器型号：E：增量式编码器 Encoder type: E: incremental type encoder

　　　　　　P：省线式编码器　　　　　　　P:Wire-saving type encoder

　　　　　　S：绝对值编码器　　　　　　　S:Absolute value encoder

　　　　　　R：旋转变压器　　　　　　　　R:Rotary transformer

电压等级：input voltage and phase:　　A：220V

　　　　　　D：380V

输出功率：rate output power:　　　110=11KW

　　　　　　150=15KW

　　　　　　300=30KW

ESDD 伺服驱动器 ESDD servo driver

图 2.2 伺服驱动器命名规则 Fig. 2.2 Naming Rule For the Servo Driver

2.3 技术规范 Technical Specification

项目 Item		规格 Specs
电源输入 Power Input		三相 AC380V（-15% ～ 20%）Three phase AC380V (- 15% ～ 20%)
基本功能 Basic functions	速度频率响应Speed frequency response	≥300Hz
	速度波动率Speed fluctuation rate	＜0.03(负载0 ～ 100%）（Load 0 ～ 100%　)
	调速范围 Speed adjustable range	1:5000
	输入脉冲频率Input pulse frequency	差分输入：≤500Kpps　　集电极开路输入：≤200Kpps　　Differential input:≤500Kpps　　Open collector input:≤200Kpps
	转矩控制精度 Torque control accuracy	±2%
	控制方式 Control mode	①位置控制；②速度控制；③力矩控制；④位置、速度混合控制；⑤速度、力矩混合控制；⑥力矩、位置混合控制；⑦压力闭环控制；⑧位置闭环控制。 ① position control; ② speed control; ③ Torque control; ④ mixed control for position and speed; ⑤ mixed control for speed and Torque; ⑥ mixed control for Torque and position; ⑦ closed-loop control for pressure; ⑧ closed-loop control for position.
	转矩限制功能 Torque limitation function	可设定转矩限制范围 ：-300% ～ +300% 。Torque limitation range which can be set: - 300%～+300%.
	共直流母线功能 Common DC bus function	可实现多台伺服驱动器共用直流母线的功能。It can realize the function for multiple servo drivers to share DC bus.
个性化	QUICK 键 QUICK key	用户自由定义快捷菜单。User can freely define shortcut menu.
	可编程数字输入输出	用户可自定义输入输出 IO 功能。User can self-define input/output I/O

功能 Individuation function	Programmable digital input-output	function.
	运行命令通道 Run command channel	操作面板给定、控制端子给定、串行通迅口给定、CAN 通讯口给定。可通过多种方式切换。The given operation panel, control terminal, serial communication port and CAN communication port can be switched through multi-ways.
端子配置 Terminal configuration	输入端子 Input terminal	数字输入端子。Digital input terminal.
		模拟量输入端子，可以选择是电压输入(±10V)或电流输入(0～20mA)。The analog input terminal can select voltage input (±10V) or current input (0～20mA) .
		脉冲输入端子：①脉冲+方向；②CCW 脉冲/CW 脉冲；③两相正交脉冲。Pulse input terminal: ① pulse + direction; ② CCW pulse / CW pulse; ③ two-phase orthogonal pulse.
	输出端子 Output terminal	数字输出端子。Digital output terminal.
		模拟输出端子，可选 0～20mA 或 0～10V 。Analog output terminal can select 0～20mA or 0～10V.
		继电器输出端子。Relay output terminal.
		位置反馈脉冲输出端子。Position feedback pulse output terminal.
	通信端子 Communication terminal	CAN通讯端子；RS485/RS232 通讯端子。CAN communication terminal; RS485 / RS232 communication terminal.
监视功能 Monitoring function	监视功能 Monitoring function	转速、当前位置、指令脉冲积累、位置偏差、电机转矩、电机电流、转子位置、指令脉冲频率、控制方式、输入输出 IO 信号等。Rotation speed, current position, command pulse accumulation, position deviation, motor torque, motor current, rotor position, command pulse frequency, control mode, input/output IO signal, etc.
保护功能 Protection function	保护功能 Protection function	上电电机短路检测、输入输出缺相保护、过流保护、过压保护、欠压保护、过热保护、过载保护等。Power-on motor short circuit detection, input/output open-phase protection, over-current protection, overvoltage protection, undervoltage protection, overheating protection, overload protection, etc.
选配件 Optional Components	选配件 Optional Components	制动组件、操作面板等。Brake component, operation panel, etc.
环境 Environment	使用场所 Use place	室内，不受阳光直晒，无尘埃、腐蚀性气体、可燃性气体、油雾、水蒸汽、滴水或盐份等。 Indoor, free from direct sunshine, dust, corrosive gas, flammable gas, oil mist, water vapour, drip or salinity, etc.
	海拔高度 Height above sea level	＜1000m
	环境温度 Ambient temperature	－10℃ ～ ＋40℃（环境温度在 40℃～50℃, 请降额使用 When ambient temperature is in 40℃～50℃, please derate it in use ）
	湿度 Humidity	小于 95%RH，无水珠凝结 Less than 95%RH, free of water globule condensation
	振动 Vibration	小于 5.9m/s2（0.6g）Less than 5.9m / s2（0.6g)
	存储温度 Storage temperature	－40℃ ～ ＋70℃

2.4 产品安装尺寸 Product installation size
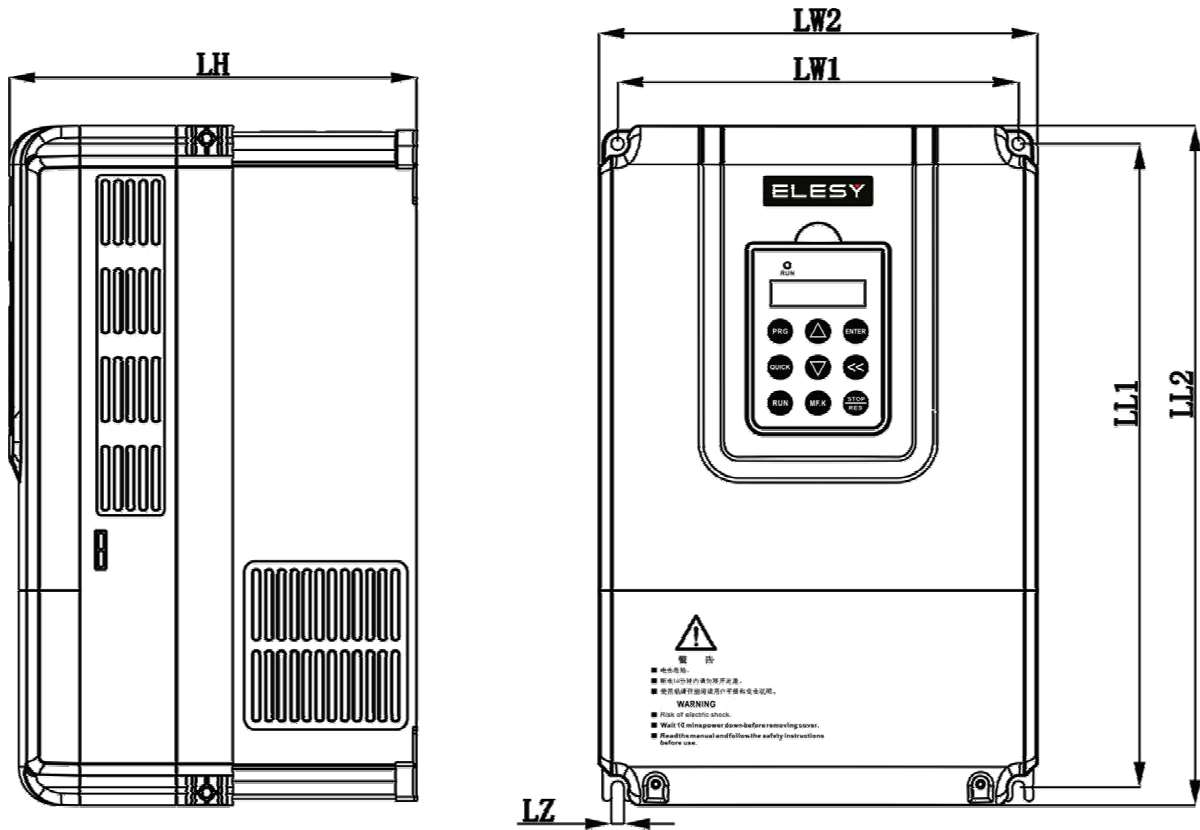
图 2.3 ESDD-110/150 系列驱动器安装尺寸图

Fig. 2.3 Installation Size Diagram for ESDD - 110 / 150 Series Driver
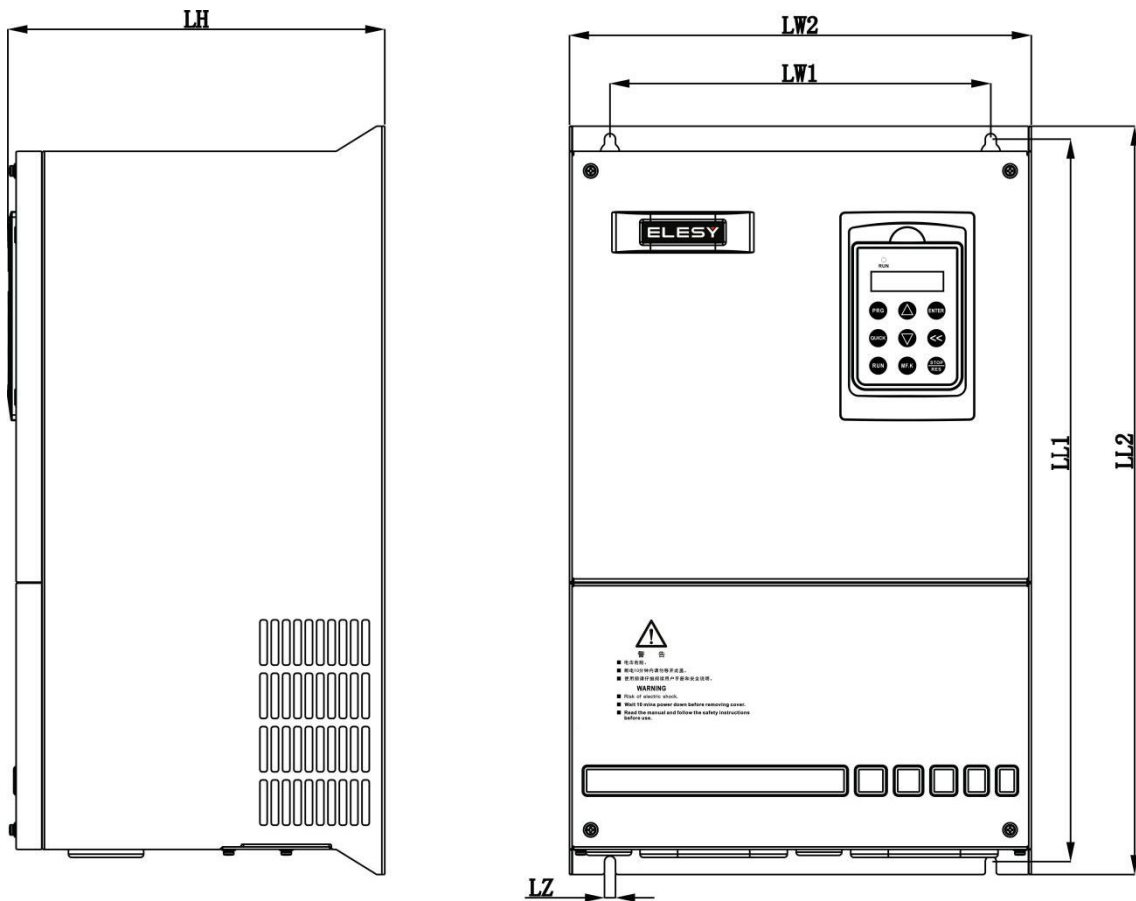
图 2.4 ESDD-185/220/300 系列驱动器安装尺寸图

Fig. 2.4 Installation Size Diagram for ESDD-185/220/300 Series Driver

表 2.1 ESDD 系列驱动器安装尺寸

Table 2.1 Installation Size for ESDD Series Driver

Driver type / Size	Unit	ESDD-110/150	ESDD-185/220/300
LH	mm	193	233
LW1	mm	190	235
LW2	mm	208	285
LL1	mm	305	447
LL2	mm	322	463
LZ	mm	6	6.8

2.5 选配件 Optional Components

若需以下选配件，请在订货时说明。If you need the following optional components, please specify them　when ordering goods.

名称 Name	功能 Function
外引操作面板 External operation panel	外引 LED 显示和操作键盘 External LED display and operating keyboard
外置制动单元 External brake unit	缩短电机的减速时间，与制动电阻配套使用。It can shorten motor's deceleration time，matched with the braking resistor for use.
能量回馈单元 Energy feedback unit	将伺服驱动器中电能回馈给交流电网的节能产品。Feed back electrical energy in the servo driver to　the energy-saving product in AC network.
延长电缆 Extension cable	标准 8 芯网线，可以和操作面板连接。Standard 8 core network line, can be connected with operation panel.
整流单元 Rectifying unit	伺服驱动器共母线时使用，具有节能功能。Used when the servo drivers share bus, provided with energy-saving function.
制动电阻 Brake resistor	消耗再生能量，缩短电机的减速时间。It consumes renewable energy,and can shorten motor's deceleration time.

2.6　伺服驱动器的日常保养与维护 Daily maintenance for the servo driver

2.6.1 日常保养 Daily maintenance

由于环境的温度、湿度、粉尘及振动的影响，会导致伺服驱动器内部器件老化，导致伺服驱动器潜在

的故障发生或降低伺服驱动器的使用寿命。因此，有必要对伺服驱动器实施日常和定期的保养及维护。Affected by ambient temperature, humidity, dust and vibration, the components inside the servo driver will be aged and potential fault will occur in the servo driver or reduce its service life, so it is necessary to implement daily and regular maintenance for the servo driver.

（1）日常检查项目： Daily inspection items:

电机运行中声音是否发生异常变化；Whether motor sound in running generates any anomalous change;

电机运行中是否产生了振动；Whether motor generates any vibration in running;

伺服驱动器安装环境是否发生变化；Whether installation environment of the servo drive generates any change;

伺服驱动器散热风扇是否正常工作；Whether radiator fan of the servo driver is in normal operations;

伺服驱动器是否过热。Whether the servo driver overheats.

（2）日常清洁：Routine cleaning:

应始终保持伺服驱动器处于清洁状态；Be sure to always keep the servo driver clean;

有效清除伺服驱动器上表面积尘，防止积尘进入伺服驱动器内部。特别是金属粉尘；Effectively clear away dust deposition on the servo driver surface to prevent dust deposition, especially metallic dust, from entering into the servo driver.

有效清除伺服驱动器散热风扇的油污。Effectively clear away oily soil on radiator fan of the servo driver.

（3）伺服驱动器的存贮：Storage of the servo driver:

用户购买伺服驱动器后，暂时存贮和长期存贮必须注意以下几点：After purchasing the servo driver, user must pay attention to several points below for temporary or long-term storage:

1.存储时尽量按原包装装入本公司的包装箱内。 When storing it, put it into the package box of this company as far as possible according to original package.

2.长时间存放会导致电解电容的劣化，必须保证在2 年之内通一次电，通电时间至少5小时，输入电压必须用调压器缓缓升高至额定值。Storage for a long time will result in deterioration of electrolytic capacitor. It must be powered on once within 2 years, with power-on duration at least 5 hours. The input voltage must be increased to the rated value slowly with a voltage regulator.

2.6.2 定期检查 Regular inspection

请定期对运行中难以检查的地方检查。定期检查项目：检查风道，并定期清洁；检查螺丝是否有松动；检查伺服驱动器是否受到腐蚀；检查接线端子是否有拉弧痕迹；主回路绝缘测试。Please periodically inspect any place difficult to be inspected in running. The regular inspection items: Check air duct and regularly clean it; check whether screws are loose; check whether the servo driver is corroded; check whether there is any arc

discharge trace on connecting terminal; test insulation in major loop.

注意：用兆欧表（请用直流 500V 兆欧表）测量绝缘电阻时，要将主回路线与伺服驱动器脱开。不要用绝缘电阻表测试控制回路绝缘。不必进行高压测试（出厂时已完成）。

Note: When using a megger (please use DC 500V megger) to measure the insulation resistance, be sure to disconnect major loop wire from the servo driver. Never use an insulation resistance meter to test insulation of control loop. The high-voltage test need not be performed (Already completed when leaving factory).

2.6.3 伺服驱动器易损件更换 Replacement for wearing parts of the servo driver

伺服驱动器易损件主要有冷却风扇（一般使用寿命 2～3 年）和滤波用电解电容器（一般使用寿命 4～5 年），其寿命与使用的环境及保养状况密切相关。The wearing parts of the servo driver mainly include cooling fan (general service life is 2 ~ 3 years) and electrolytic capacitor for filtering (general service life is 4 ~ 5 years). The service life is closely related to the use environment and maintenance status.

用户可以根据运行时间确定更换年限。User can determine the replacement term according to running time.

（1）冷却风扇：Cooling fan:

可能损坏原因：轴承磨损、叶片老化。Possible damage cause: bearing wear, blade aging.

判别标准：风扇叶片等是否有裂缝，开机时声音是否有异常振动声。Distinguishing standard: Check whether there is any crack on fan blade and whether there is any abnormal vibration sound during starting up.

（2）滤波电解电容：Electrolytic capacitor for filtering:

可能损坏原因：输入电源品质差、环境温度较高，频繁的负载跳变、电解质老化。Possible damage cause: poor quality of input power supply; higher ambient temperature; frequent load jump and electrolyte aging.

判别标准：有无液体漏出、安全阀是否已凸出，静电电容的测定，绝缘电阻的测定。Distinguishing standard: Check whether there is any liquid leak and whether safety valve protrudes. Measurement of electrostatic capacitance and insulation resistance.

2.7 伺服驱动器的保修说明 Warranty description for the servo driver

免费保修仅指伺服驱动器本身，在正常使用情况下，发生故障或损坏，我公司负责 18 个月保修（从制造出厂之日起，以机身上条形码为准），18 个月以上，将收取合理的维修费用；The free warranty only means that the servo driver itself goes out of order or is damaged under normal use conditions. Our company will be responsible for warranty of 18 months (from the production date, subject to bar code on machine body). Where it exceeds 18 months, rational maintenance cost will be collected.

在 18 个月内，如发生以下情况，应收取一定的维修费用（有关服务费用按照厂家统一标准计算，如有契约，以契约优先的原则处理）：If the following situations occur within 18 months, certain maintenance cost

shall be collected (related service charge is calculated according to uniform standard of manufacturer. If there is a contract, the contract shall prevail):

（1）用户不按使用手册中的规定，带来的机器损害；The machine is damaged because user fails to comply with provisions in user manual;

（2）由于火灾、水灾、电压异常等造成的损害；Damages caused by fire, flood, voltage abnormality, etc.;

（3）将伺服驱动器用于非正常功能时造成的损害。Damages caused when the servo driver is used for non-normal functions.

第三章 机械与电气安装

Chapter III Mechanical and Electrical Installation

3.1 机械安装 Mechanical installation

3.1.1 驱动器安装环境 Installation environment of the driver

1） 周围环境温度对伺服驱动器寿命有很大影响，不允许伺服驱动器的运行环境温度超过允许温度范围（-10℃～50℃）；The ambient temperature has a great influence on service life of the servo driver. It is not allowed for the operating ambient temperature of the servo driver to exceed the allowable temperature range（ - 10℃~ 50℃);

2） 将伺服驱动器装于阻燃物体的表面，周围要有足够空间散热，伺服驱动器工作时易产生大量热量。并用螺丝垂直安装在安装支座上；Install the servo driver on an antiflaming object surface, around which there are to be sufficient spaces for heat elimination because the servo driver is easy to generate a great deal of heat during running. Use screws to vertical install it on the erection support.

3） 请安装在不易振动的地方，振动应不大于 0.6G。特别注意远离冲床等设备；Please install it at a place difficult of vibration, with vibration no bigger than 0.6G. Pay special attention to keeping away from a punch press and other equipments;

4） 避免装于阳光直射、潮湿、有水珠的地方；Avoid installing it at any place with direct sunshine, moist and water globule;

5） 避免装于空气中有腐蚀性、易燃性、易爆性气体的场所；Avoid installing it at any place with corrosive, inflammable, explosive gases;

6） 避免装在有油污、多灰尘、多金属粉尘的场所。Avoid installing it at any place with oily soil, much dust and

metallic dust.

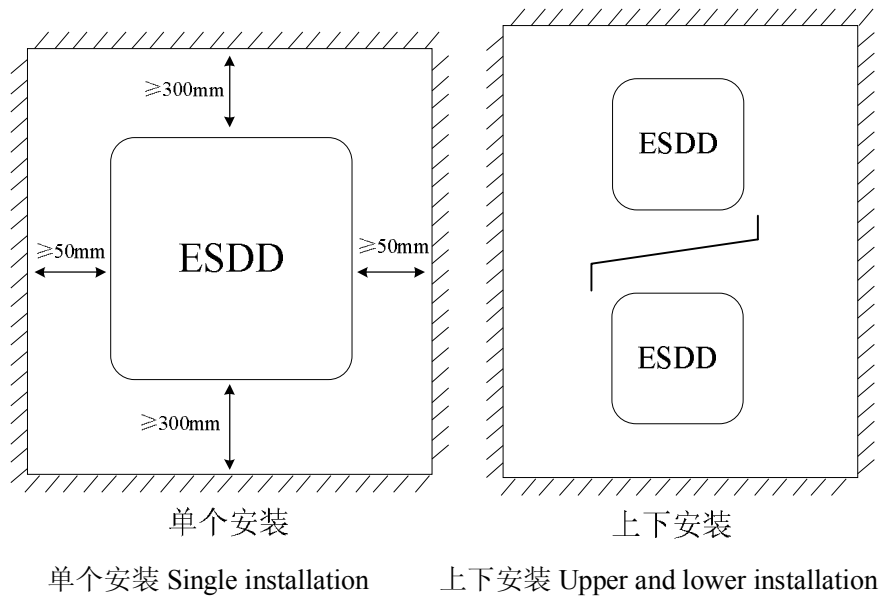单个安装 Single installation   上下安装 Upper and lower installation

图 3.1 安装间隔 Fig. 3.1 Installation Spacing

当伺服驱动器上下安装时请安装图示的隔热导流板。When the servo drivers are installed at upper and lower mode, please install the heat insulation guide plate as shown in the diagram.

### 3.1.2 机械安装散热 Heat elimination of mechanical installation

请注意以下几点：   Please note several points below:

1 ）请垂直安装伺服驱动器，便于热量向上散发。但不能倒置。若柜内有较多伺服驱动器时，最好是并排安装。在需要上下安装的场合，请参考图 3.1 的示意，安装隔热导流板。Please vertically install the servo driver to facilitate upward emission of heat quantity, but never upside down. If there are quite many servo drivers inside cabinet, they had better be installed side by side. For any place which needs upper and lower installation, please refer to Fig. 3.1 to install the heat insulation guide plate.

2 ）安装空间遵照图 3 .1 所示，保证伺服驱动器的散热空间。但布置时请考虑柜内其它器件的散热情况。The installation space shall comply with those shown in Fig. 3.1 to ensure the heat elimination space of the servo driver, but please consider heat elimination of other parts inside cabinet during arrangement.

3 ）安装支架一定是阻燃材质。The installing support must be made of antiflaming material.

4 ）对于有金属粉尘应用场合，建议采用散热器柜外安装方式。此时全密封的柜内空间要尽可能大。For any place with metallic dust, it is suggested to install the radiator outside cabinet. At this time the space inside omniseal cabinet shall be as large as possible.

3.2 电气安装 Electrical installation

## 3.2.1 伺服驱动器接线 Wiring of the servo driver

1、油泵伺服驱动器接线示意图。Wiring schematic diagram for the servo driver of oil pump
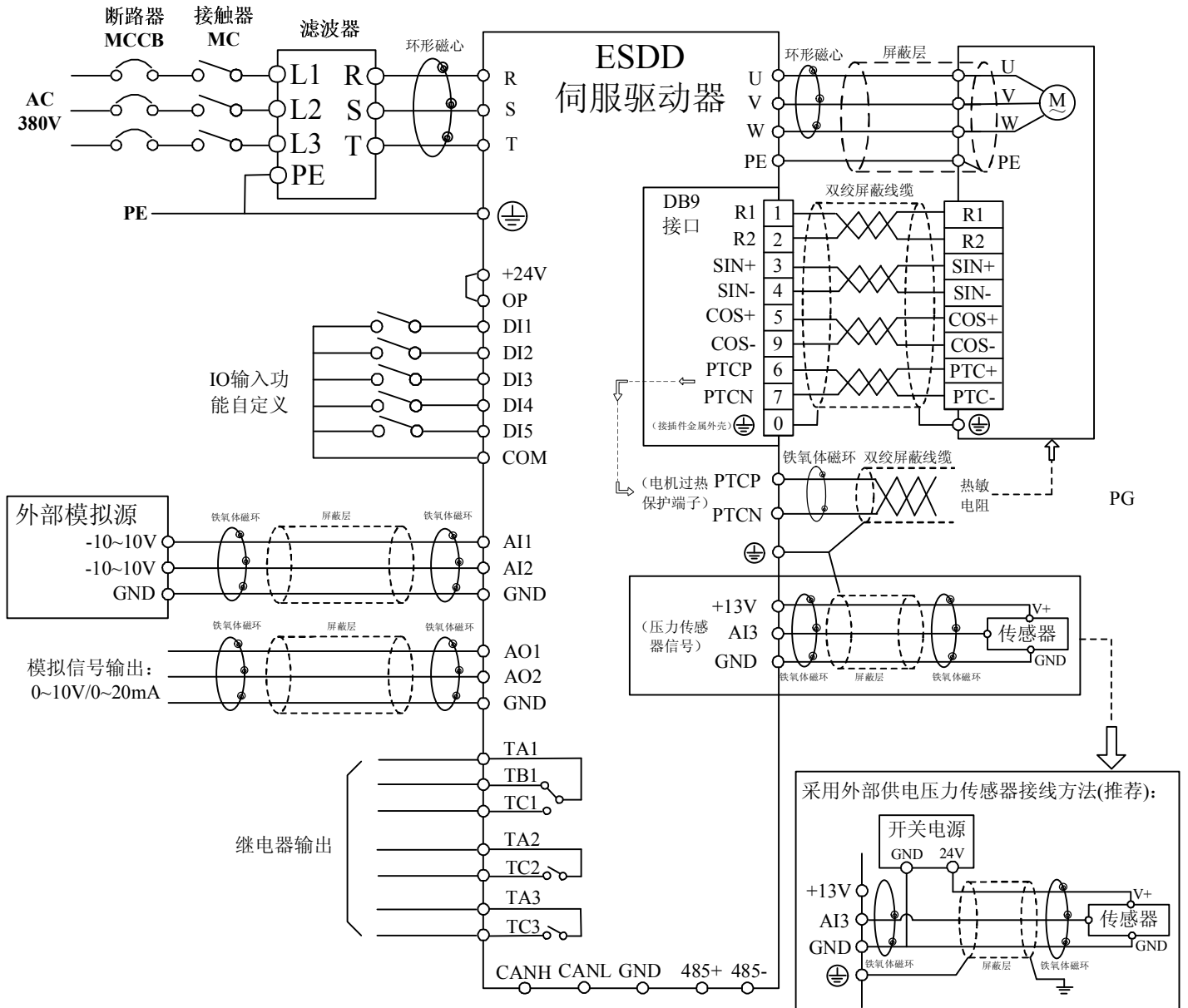
伺服驱动器 Servo driver, 断路器 circuit breaker, 接触器 contactor, 滤波器 filter, 环形磁心 toroidal magnetic core, 屏蔽层 shielded layer, 双绞屏蔽线缆 shielded twisted pair cable, 接口 interface, IO 输入功能定义 IO input function definition, 外部模拟源 external analog source, 铁氧体磁环 ferrite bead, 模拟信号输出 analog signal output, 继电器输出 relay output，（接插件金属外壳）(connector metal shell)，（电机过热保护端子）(motor overheating protection terminal), 热敏电阻 thermomistor， （压力传感器信号）(pressure sensor signal), 传感器 sensor, 采用外部供电压力传感器接线方法（推荐）： adopt the pressure sensor connection mode of external electric supply (recommended):， 开关电源 switching power supply

图 3.2 油泵伺服驱动器接线示意图 Fig. 3.2 Wiring Schematic diagram for The Servo Driver of Oil Pump

2、通用型 ESDD 伺服驱动器接线示意图。Wiring schematic diagram for universal type ESDD servo driver
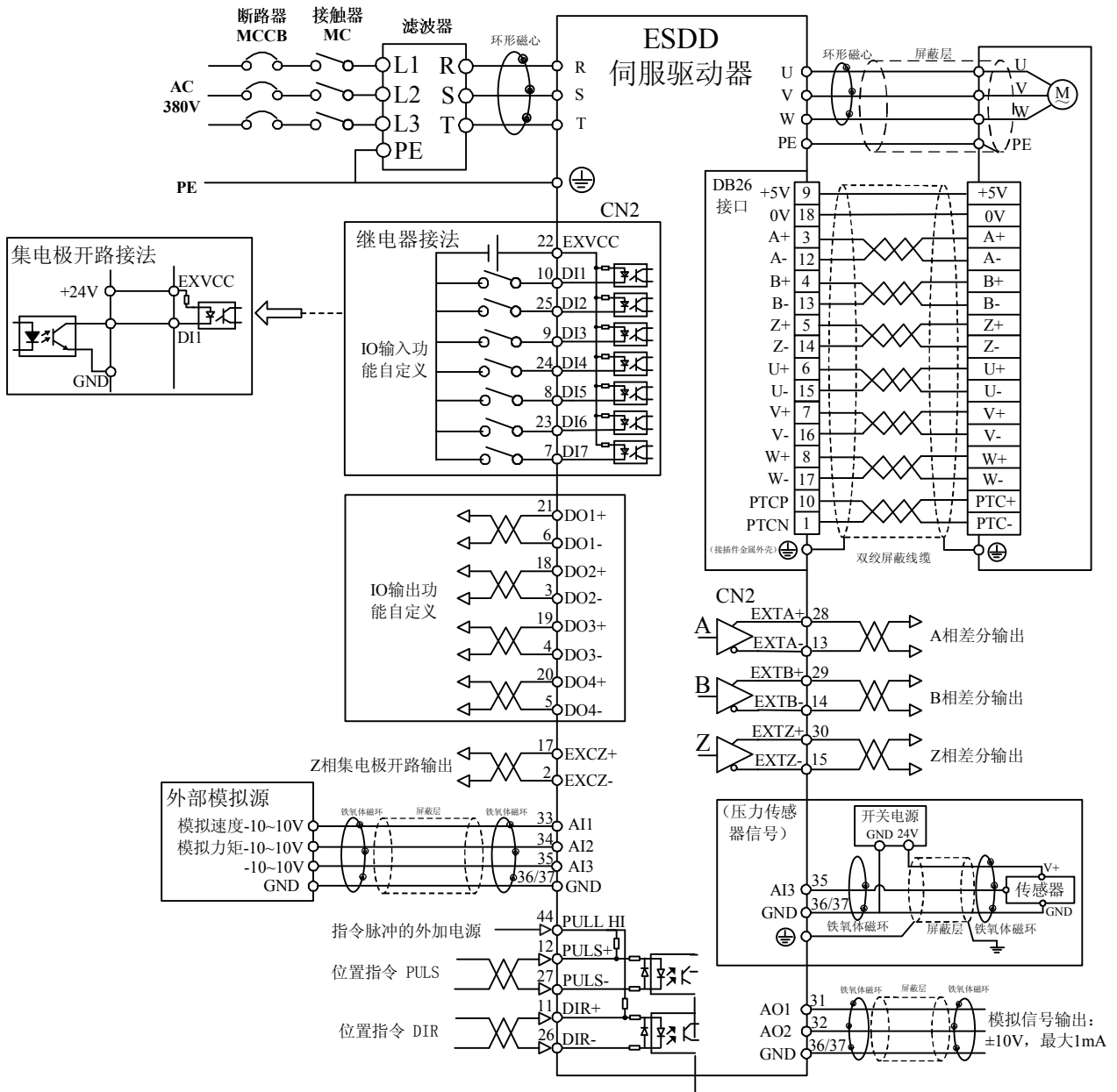
伺服驱动器 Servo driver, 断路器 Circuit Breaker, 接触器 contactor, 滤波器 filter, 环形磁心 toroidal magnetic core, 屏蔽层 shielded layer,

集电极开路接法 open collector connection, 继电器接法 relay connection, IO 输入功能自定义 IO input function self-defining, IO 输出功能自定义 IO output function self-defining,

接口 interface ， （接插件金属外壳）(connector metal shell), 双绞屏蔽线缆 shielded twisted pair cable, A 相差分输出 A-phase differential output, B 相差分输出 B-phase differential output, Z 相差分输出 Z-phase differential output,

Z 相集电极开路输出 Z-phase open collector output, 外部模拟源 external analog source, 模拟速度 analog speed, 模拟力矩 analog torque, 铁氧体磁环 ferrite bead, 屏蔽层 shielded layer,

指令脉冲的外加电源 additional power supplies of instruction pulse, 位置指令 position instruction, （压力传感器信号）(pressure sensor signal), 开关电源 switching power supply, 传感器 sensor, 模拟信号输出：±10V analog signal output: ±10V, 最大 1mA maximum 1mA

图 3.3 通用伺服驱动器接线示意图 Fig. 3.3 Wiring Schematic diagram for Universal Servo Driver

<table>
<tr><td colspan="2" align="center">⬦危险 _{Danger}</td></tr>
</table>

⬦危险 Danger
● 确认电源开关处 OFF 状态才可进行配线操作，否则可能发生电击事故！Wiring can be operated only after you confirm that power switch is off, otherwise it will possibly cause an electric shock accident!
● 配线人员须是专业受训人员，否则可能对设备及人身造成伤害！The wiring personnel must be professional trainees, otherwise it will possibly cause equipment and personal injury!
● 必须可靠接地，否则有触电发生或有火警危险！It must be reliably grounded; otherwise it will cause an electric shock or a fire alarm danger!
● 确认输入电源与伺服驱动器的额定值一致，否则损坏伺服驱动器！Confirm that input power supply coincides with rated value of the servo driver; otherwise it will damage the servo driver!
● 确认电机和伺服驱动器相适配，否则可能会损坏电机或引起伺服驱动器保护！Confirm that motor is adaptive to the servo driver; otherwise it will possibly damage motor or cause protection of the servo driver!
● 不可将电源接于 U、V、W 端子，否则损坏伺服驱动器！Never connect power supply to terminal U, V and W; otherwise it will damage the servo driver!
● 不可将制动电阻直接接于直流母线 P+、(-)上，否则引起火警！Never directly connect the braking resistor to DC bus P+, (-), otherwise it will cause a fire alarm!

3.2.2 主回路端子定义及接线说明 Description for definition and connection of major loop terminal

端子符号 Terminal symbol	名称 Name	说明 Description
R, S, T	三相电源输入端子 Input terminal of three-phase supply	三相交流电源连接点。Connection point of three-phase AC supply
（+），（-）	直流母线正负端子 Plus-minus terminals of DC bus	共直流母线输入点。Input point of sharing DC bus.
（+），PB	制动电阻连接端子 Connecting terminal of the braking resistor	制动电阻连接点。Connection point of the braking resistor.
P，（+）	外置电抗器连接端子	外置电抗器连接点（30KW以上配置）。Connection point

	Connecting terminal of external electric reactor	of external electric reactor (configured for those above 30KW).
U,V,W	伺服驱动器输出端子 Output terminal of the servo driver	连接电机 Connected to the motor
⏚	接地端子 Earthing terminal	接地端子 Earthing terminal

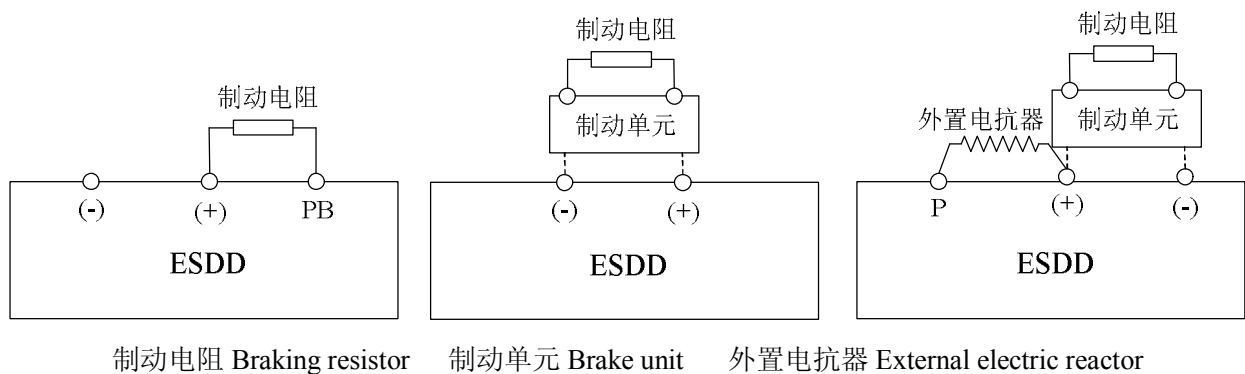制动回路接线说明：Connection description for brake circuit:

制动电阻 Braking resistor　　制动单元 Brake unit　　外置电抗器 External electric reactor

图 3.4 制动回路接线示意图 Fig. 3.4 Schematic diagram for Wiring of Brake Circuit

接线注意事项：Notes on wiring:

1、输入电源 R、S、T：伺服驱动器输入三相交流电源, 无相序要求。Input power supply R, S and T: There is no phase sequence requirement for the input three-phase AC supply of the servo driver.

➢ 2、直流母线（＋）、（－）端子：驱动器断电后直流母线（＋）、（－）端子尚有残余电压, 须确认小于 36V 后方可接触, 否则有触电的危险；选用外置制动组件时, 注意（＋）、（－）极性不能接反, 否则导致伺服驱动器损坏甚至火灾；制动单元的配线长度不应超过 10m, 应使用双绞线或紧密双线并行配线；不可将制动电阻直接接在直流母线上, 可能会引起伺服驱动器损坏甚至火灾。Terminals of DC bus (+) , (-): After the driver is powered down, the terminals of DC bus (+),(-) maybe retain the residualvoltage. Please do not touch it until you confirm the residual voltage is less than 36V, otherwise it may cause an electric shock. When selecting an external brake component, pay attention to not connecting the polarity of (+) , (-) inversely, otherwise it will damage the servo driver, even cause a fire. The wiring length of the brake unit shall not exceed 10m. The twisted pair or tight double wires shall be used for parallel wiring. Please don't connect the braking resistor to the DC bus, otherwise it may damage the servo driver, even cause a fire!

3、制动电阻连接端子(+)、PB：已经内置制动单元的机型，其制动电阻连接端子才有效；制动电阻选型参考推荐值且配线距离应小于5m，否则可能导致伺服驱动器损坏。Braking resistor's connecting terminal (+), PB: The braking resistor's connecting terminal can be effective only for the machine type with the brake unit already built-in. The braking resistor type shall be selected by referring to the recommended value and the wiring length shall be less than 5m, otherwise it may damage the servo driver.

4、外置电抗器连接端子 P、（+）：电抗器外置的伺服驱动器，装配时把 P 、（+）端子之间的连接片去掉，电抗器接在两个端子之间。External electric reactor's connecting terminal P, (+): When assembling the external servo driver of electric reactor, remove the connection strap between terminal P and (+), and connect electric reactor between two terminals.

5、伺服驱动器输出 U、V、W：伺服驱动器输出不可连接电容器或浪涌吸收器，否则会引起伺服驱动器经常保护甚至损坏；电机电缆过长时，由于分布电容的影响，易产生电气谐振，从而引起电机绝缘破坏或产生较大漏电流使伺服驱动器过流保护，电机电缆长度大于 100m 时，须加装交流输出电抗器。Servo driver's output U, V and W: Please don't connect servo driver's output to any capacitor or surge absorber; otherwise it would cause frequent protection of the servo driver, even damage the servo driver. When motor's cable is too long, it is easy to generate electric syntony owing to influence of the distributed capacitance, thereby destroying motor's insulation or generating biggish leakage current to cause overcurrent protection of the servo driver. When motor's cable length is greater than 100m, be sure to install AC output reactor additionally.

6、接地端子 PE：端子必须可靠接地，接地线阻值必须少于 0.1Ω。否则会导致设备工作异常甚至损坏；不可将接地端子和电源零线 N 端子共用。Earthing terminal PE: The terminal must be grounded reliably. The ground lead's resistance value must be less than 0.1Ω, otherwise it would result in running anomaly, even damage of the equipment. The earthing terminal mustn't be shared with terminal N of power supply's null line.

3.2.3 控制端子说明 Description for control terminal

1、油泵伺服驱动器控制端子 Control terminal for oil pump servo driver

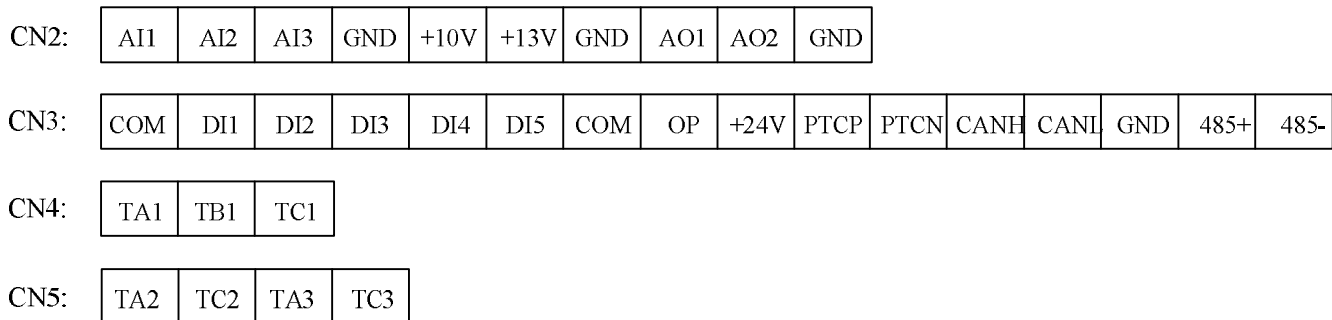图中为油泵伺服驱动器控制回路端子图。The following is the control loop terminal diagram of oil pump servo driver

CN2:	AI1	AI2	AI3	GND	+10V	+13V	GND	AO1	AO2	GND						

CN3:	COM	DI1	DI2	DI3	DI4	DI5	COM	OP	+24V	PTCP	PTCN	CANH	CANL	GND	485+	485-

CN4:	TA1	TB1	TC1

CN5:	TA2	TC2	TA3	TC3

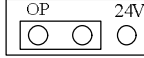图 3.5 控制回路端子布置图 Fig. 3.5 Terminal Arrangement Diagram of Control Loop
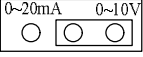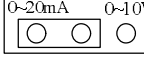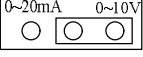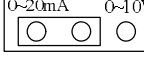
表 3.1 油泵伺服驱动器控制端子功能说明
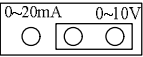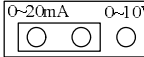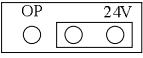
Table 3.1 Functional Description for Control Terminal of Oil Pump Servo Driver

分类 Category	符号 Symbol	名称 Name	说明 Description
电源 Power supply	+10V-GND	+10V 电源	对外提供 10V±10%电源，最大输出电流：10mA，一般用作外接电位器工作电源，电位器阻值范围：1kΩ～5kΩ 。Provide 10V±10% power supply externally. Maximum output current: 10mA, generally used as working power supply of external connected potentiometer. Potentiometer's resistance value scope: 1kΩ～5kΩ.
	+13V-GND	压力传感器电源 Power supply of pressure sensor	对外提供 13V±10%电源，最大输出电流：10mA，一般用作压力传感器电源。Provide 13V±10% power supply externally. Maximum output current: 10mA, general used as power supply of pressure sensor.
	+24V-COM	+24V 电源 +24V power supply	对外提供+24 电源，一般用作数字输入输出端子工作电源。输出电压 24V±10%，空载虚电压不超过 30V，最大输出电流 200mA,内部与 GND 隔离。Provide +24V power supply externally, general used as working power supply of digital input-output terminals. Output voltage 24V±10%. The idle empty does not exceed 30V, maximum output current 200mA. Inside is isolated from GND.
	OP	外部电源输入端子 Input terminal of external power supply	内部与COM、24V 隔离，出厂通过跳线与+24V 短接，当利用外部信号驱动 DI1～DI5 时，OP 需与外部电源连接，且与+24V 电源端子断开（由控制板上的 J8 跳线选择决定）。Inside is isolated from COM and 24V, short-circuited with +24V through jumper when leaving factory. When external signal is utilized to drive DI1～DI5, OP needs to be connected with external power supply and disconnected with +24V power terminal (selected and decided by jumper J8 on control panel).
模拟 输入 Analog input	AI1-GND	模拟量输入通道 1 Analog input channel 1	输入范围：±10V, 12 位分辨率，校正精度 0.5％；输入阻抗：100kΩ。Input range:±10V, 12 bit resolution ratio, accuracy in calibration 0.5 %; Input impedance: 100kΩ.

	AI2-GND	模拟量输入通道 2Analog input channel 2	输入范围：±10V, 12 位分辨率, 校正精度 0.5%； 输入阻抗：100kΩ。 Input range: ±10V, 12 bit resolution ratio, accuracy in calibration 0.5 %; Input impedance: 100kΩ.
	AI3-GND	模拟量输入通道 3Analog input channel 3	输入范围：±10V/0～20mA , 12 位分辨率, 校正精度 0.5%, 由控制板上的 J1 跳线选择决定±10V 或 0～20mA 输入；输入阻抗：电压输入时 100kΩ，电流输入时 500Ω。Input range: ±10V /0 ~20mA, 12 bit resolution ratio, accuracy in calibration 0.5 %. Whether input is ±10V or 0 ~ 20mA is selected and decided by jumper J1 on control panel; Input impedance: 100kΩ during voltage input, 500Ω during current input.
模拟 输出 Analog output	AO1-GND	模拟输出通道 1Analog output channel 1	由控制板上的 J7 跳线选择决定电压或电流输出。Whether output is voltage or current is selected and decided by jumper J7 on control panel. 输出范围：0～10V/0～20mA,12 位分辨率, 校正精度 1％，最大负载电阻值≤500Ω。Output range: 0 ~ 10V / 0~20mA, 12 bit resolution ratio, accuracy in calibration 1 %, Maximum load resistance value≤500Ω.
	AO2-GND	模拟输出通道 2Analog output channel 2	由控制板上的 J6 跳线选择决定电压或电流输出。Whether output is voltage or current is selected and decided by jumper J6 on control panel. 输出范围：0～10V/0～20mA,12 位分辨率, 校正精度 1％，最大负载电阻值≤500Ω。Output range: 0 ~10V / 0 ~20mA,12 bit resolution ratio, accuracy in calibration 1 %, Maximum load resistance value≤500Ω.
数字 输入 Digital input	DI1-COM	数字输入 1Digital input 1	1、光电隔离可编程数字输入 IO, 由参数 P2-01～P2-05 定义功能。The function for programmable digital input IO of optoelectronic isolation is defined by parameter P2 - 01 ～ P2 - 05. 2、输入阻抗：3.3kΩ ；Input impedance: 3.3kkΩ 3、输入电压范围：12V～24V 。Input voltage range: 12V ~ 24V.
	DI2-COM	数字输入 2Digital input 2	
	DI3-COM	数字输入 3Digital input 3	
	DI4-COM	数字输入 4Digital input 4	
	DI5-COM	数字输入 5Digital input 5	
	PTCP-PTCN	电机过热保护输入 Motor overheating protection input	电机温度过热保护 PTC 传感器。支持：PTC130 、PTC150 等 。PTC sensor of motor temperature overheating protection supports: PTC130, PTC150, etc.
通信 端子 Communication terminal	CANH	CAN 通讯端子 CAN communication terminal	保留端子，默认不带该功能。最高通讯速度 1Mbps。Default is free of the function of the reserved terminal. Maximal communication speed 1Mbps.
	CANL		
	GND		
	485+	485 通讯端子 Communication terminal 485	最高通讯速度 115.2Kbps。Maximal communication speed 115.2Kbps.
	485-		
继电	TA1-TB1	常闭端子，对应	触点驱动能力：Drive capability of the contact:

		DO1 功能定义 Normal close terminal, corresponding DO1 functional definition	
器输出 Relay output	TA1- TC1	常开端子，对应 DO1 功能定义 Normal open terminal, corresponding DO1 functional definition	AC 250V, 3A, COSφ=0.4 。 DC 30V, 1A。
	TA2- TC2	常开端子，对应 DO2 功能定义 Normal open terminal, corresponding to DO2 functional definition	
	TA3- TC3	常开端子，对应 DO3 功能定义 Normal open terminal, corresponding to DO3 functional definition	

表 3.2 油泵伺服驱动器跳线功能说明 Table 3.2 Functional Description for jumper wire of Oil Pump's Servo Driver

跳线序号 Jumper No.	跳线位置 Jumper position	功能说明 Functional description	跳线位置 Jumper position	功能说明 Functional description
J1	0~20mA 0~10V ○ [○ ○]	AI3 以电压形式输入（DC -10V～+10V）AI3 is input in voltage form（DC - 10V～+10V)	0~20mA 0~10V [○ ○] ○	AI3 以电流形式输入（0～20mA）AI3 is input in current form（0～20mA)
J8	OP 24V ○ [○ ○]	内部电源驱动 DI1~DI5 输入端子 Internal power supply drives DI1～DI5 input terminals	OP 24V [○ ○] ○	外部电源驱动 DI1~DI5 输入端子 External power supply drives DI1～DI5 input terminals
J7	0~20mA 0~10V ○ [○ ○]	AO1 以电压形式输出（DC 0～10V）AO1 is output in voltage form（DC 0～10V)	0~20mA 0~10V [○ ○] ○	AO1 以电流形式输出（0～20mA）AO1 is output in current form（0～20mA)
J6	0~20mA 0~10V ○ [○ ○]	AO2 以电压形式输出（DC 0～10V）AO2 is output in voltage form（DC 0～10V)	0~20mA 0~10V [○ ○] ○	AO2 以电流形式输出（0～20mA）AO2 is output in current form（0～20mA)

2、通用型伺服驱动器控制端子 Control terminal of universal servo driver
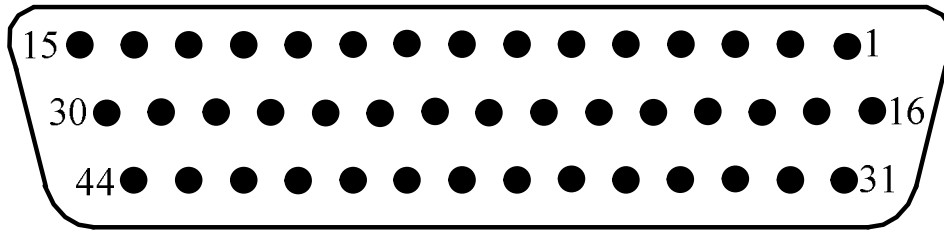

图 3.6 CN2 控制端子布置图 Fig. 3.6　Arrangement diagram for CN2 control terminals
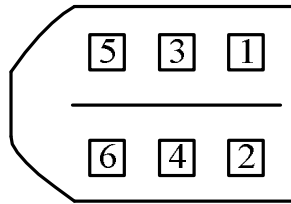

图 3.7 CN3 通信端子布置图 Fig. 3.7 Arrangement Diagram for CN3 Communication Terminals

表 3.3　通用伺服驱动器控制端子功能说明 Table 3.3 Functional Description for Control Terminals of Universal Servo Driver

分类 Category	端子号 Terminal number	符号 Symbol	说明 Description
数字输入 Digital input	CN2-22	EXVCC	I/O 输入端子的电源, +12V~+24VI / O input terminal's power supply, +12V ~ +24V
	CN2-10	DI1	光电隔离可编程数字输入 IO, 由参数 P2-01~P2-07 定义功能 The function for programmable digital input IO of optoelectronic isolation is defined by parameter P2 - 01 ~ P2 - 07.
	CN2-25	DI2	
	CN2-9	DI3	
	CN2-24	DI4	
	CN2-8	DI5	
	CN2-23	DI6	
	CN2-7	DI7	
位置指令输入 Position instruction input	CN2-12	PULS+	外部指令脉冲输入端子：External instruction pulses input terminal: 1）脉冲+符号方式；Pulse + symbol mode; 2）CCW/CW脉冲方式；CCW / CW pulse mode; 3）两相正交脉冲方式。Two-phase orthogonal pulse mode.
	CN2-27	PULS-	
	CN2-11	DIR+	
	CN2-26	DIR-	
	CN2-44	PULL HI	指令脉冲的外加电源。当位置脉冲使用集电极开路方式输入时，将本端子连接至一外加电源，提供 DC24V 电源。Additional power supply of instruction pulse. when position pulse is input in open collector mode, this terminal is connected to an additional power supply to provide DC24V.
电源 Power supply	CN2-43	+24V	驱动器所提供的+24V 电源, 可承受 100mA 电流+24V power supply provided by driver can withstand 100mA current
	CN2-42	COM	
模拟量输	CN2-31	AO1	模拟信号输出, -10V～+10VAnalog signal output, - 10V ~ +10V

| 入输出 Analog input/ output	CN2-32	AO2	
	CN2-33	AI1	模拟速度指令输入-10V～+10VAnalogy speed instruction input - 10V～+10v
	CN2-34	AI2	模拟力矩指令输入-10V～+10VAnalogy Torque instruction input - 10V～+10v
	CN2-35	AI3	模拟量输入端子，电压输入范围-10V～+10VAnalog input terminal, voltage input scope - 10V～+10V
	CN2-36	GND	模拟信号输入输出地 Analog signal input/output ground
	CN2-37	GND	
数字输出 Digital output	CN2-21	DO1+	光电隔离可编程数字输出 IO，由参数 P2-12~P2-15 定义功能 The function of optoelectronic isolation programmable digital output IO is defined by parameter P2 - 12～P2 - 15
	CN2-6	DO1-	
	CN2-18	DO2+	
	CN2-3	DO2-	
	CN2-19	DO3+	
	CN2-4	DO3-	
	CN2-20	DO4+	
	CN2-5	DO4-	
	CN2-17	EXCZ+	Z 相集电极开路输出 Z-phase open collector output
	CN2-2	EXCZ-	
位置反馈输出 Position feedback output	CN2-28	EXTA+	位置反馈脉冲 A 相差分输出 A-phase differential output of position feedback pulse
	CN2-13	EXTA-	
	CN2-29	EXTB+	位置反馈脉冲 B 相差分输出 B-phase differential output of position feedback pulse
	CN2-14	EXTB-	
	CN2-30	EXTZ+	位置反馈脉冲 Z 相差分输出 Z-phase differential output of position feedback pulse
	CN2-15	EXTZ-	
通信端子 Communication terminal	CN3-1	CANH	CAN 通讯端子，保留端子，默认不带该功能。最高通讯速度 1Mbps。CAN communication terminal, reserved terminal, default is free of the function. Maximal communication speed 1Mbps.
	CN3-2	CANL	
	CN3-3	485-	485 通讯端子，最高通讯速度 115.2Kbps。485 communication terminal, maximal communication speed 115.2Kbps.
	CN3-4	485+	
	CN3-5	GND	5V 电源输出端子。5V power output terminal.
	CN3-6	+5V	

3、接线原理 Wiring principle

1）模拟输入 Analog input

因微弱的模拟电压信号特别容易受到外部干扰，所以一般需要用双绞屏蔽电缆，而且配线距离尽量短，不要超过 20m，如图 3.8。在某些模拟信号受到严重干扰的场合，需另外加装滤波电容器和铁氧体磁芯，如图 3.9。 Because feeble analog voltage signal is especially susceptible to external interference, it generally needs to use the shielded twisted pair cable. The wiring distance shall be as short as possible and shall not exceed 20m, as shown in Fig. 3.8. At some places where analog signal is seriously disturbed, it needs to additionally install the filter capacitor and ferrite core, as shown in Fig. 3.9.
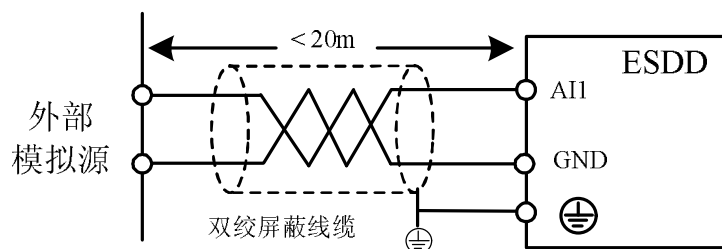
外部模拟源　External analog source
双绞屏蔽线缆　Shielded twisted pair cable

图 3.8　模拟量输入端子接线示意图 Fig. 3.8 Schematic diagram for Analog Input Terminal Wiring
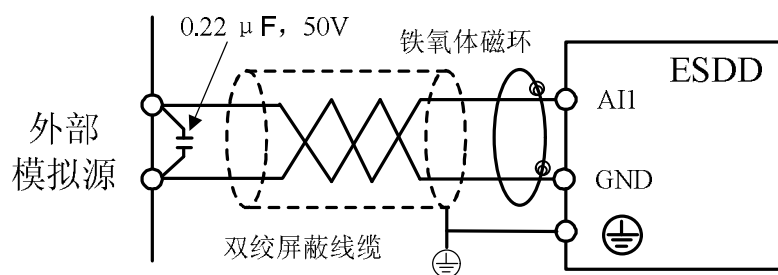
外部模拟源　External analog source
双绞屏蔽线缆 Shielded twisted pair cable
铁氧体磁环 Ferrite bead

图 3.9　模拟量输入端子抗干扰接线图 Fig. 3.9 Anti-jamming Wiring Diagram of Analog Input Terminal

2）数字输入 Digital input

一般需要用屏蔽电缆，而且配线距离尽量短，不要超过 20m。当选用有源方式驱动时，需对电源的串扰采取必要的滤波措施。建议选用触点控制方式。It generally needs to use the shielded cable. The wiring distance shall be as short as possible and shall not exceed 20m.　When active mode is used for driving, it needs to take necessary filtering measures for crosstalk of power supply. It is suggested to select the contact control mode.

输入电源由用户提供，DC12～24V，电源带载能力大于100mA。接线时请注意电源极性，电源极性接反，伺服驱动器不能工作。DC12～24V input power supply shall be provided by user.　The load-bearing ability of power supply shall be greater than 100mA. When wiring, please note power supply polarity. If power supply polarity is connected inversely, the servo driver will be unable to work.
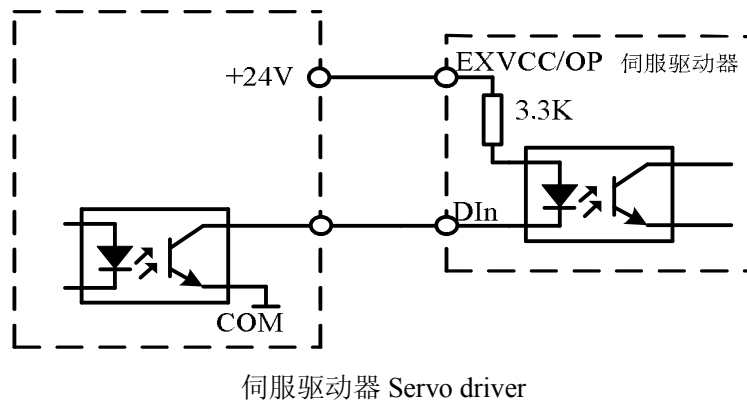
(a) 继电器电路接线方式：Relay circuit wiring mode:
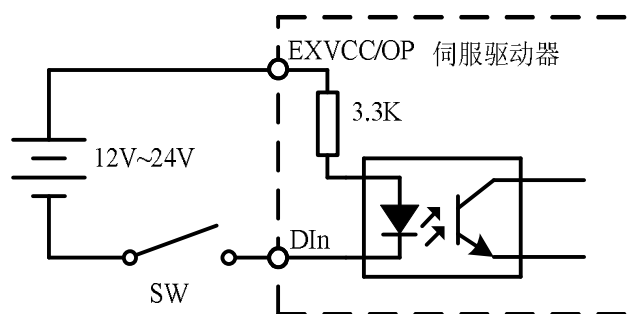
伺服驱动器 Servo driver
3.10　继电器电路接线示意图 3.10 Wiring Schematic diagram for Relay Circuit

(b) 集电极开路接线方式

伺服驱动器 Servo driver

3.11 集电极开路接线示意图 3.11 Wiring Schematic diagram for Open Collector

3）数字输出 Digital output

　　驱动器的开关量输出均为双端集电极开路输出。为保证信号传输的可靠性，所有输出信号均是光耦导通时有效。外部电源由用户提供，最大电压+24V，如果电源极性接反，会使伺服驱动器损坏，输出为集电极开路形式，最大电流 150 mA，如果负载是继电器等电感性负载，必须在负载两端反并联续流二极管，续流二极管接反会造成驱动器损坏。Both the on-off outputs of driver are in double end open collector mode. In order to ensure reliability of signal transmission, all of output signals are valid when optocoupler is in breakover. The external power supply is provided by user, with peak voltage of +24V. If power supply polarity is connected inversely, it will damage the servo driver. The output is in open collector mode, with maximum current of 150 mA. If load is a relay and other inductive types, the freewheeling diodes must be antiparalleled at both ends of load. If freewheeling diode is connected inversely, it will cause driver damage.
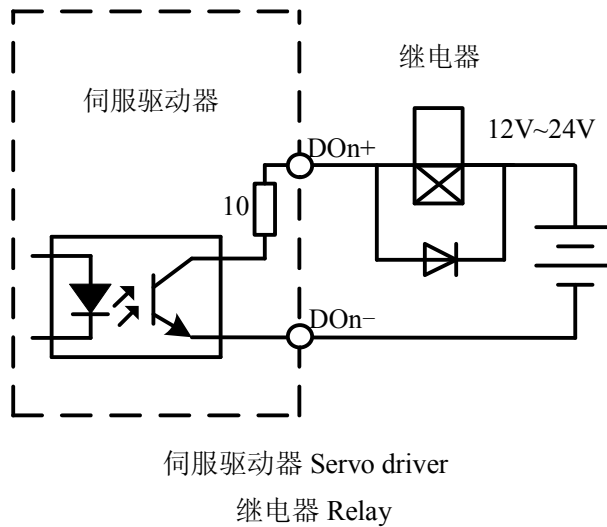
(a) 外接光耦输出 Externally connected optocoupler output

伺服驱动器 Servo driver
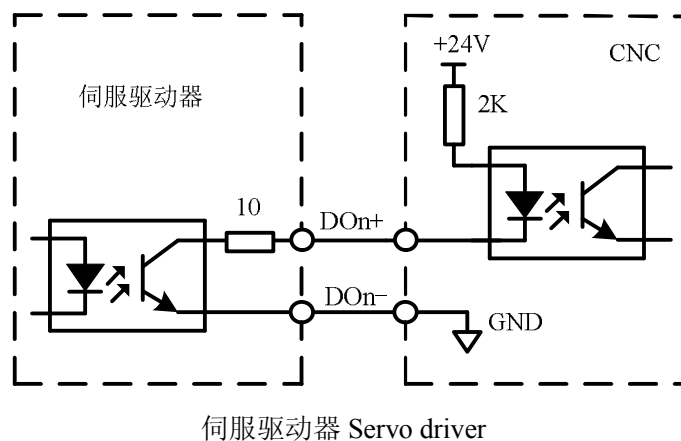
3.12 外接光耦输出示意图 3.12 Schematic diagram for externally connected optocoupler output

(b) 外接继电器输出 Externally connected relay output

(c)

伺服驱动器 Servo driver

继电器 Relay

3.13 外接继电器输出示意图 3.13 Schematic diagram for externally connected relay output

4）位置脉冲指令输入 Position pulse instruction input

位置脉冲指令输入可以采用差分输入接法，也可以采用集电极开路的单端输入接法，为提高抗干扰能力，建议采用差分接法，单端方式会使指令脉冲频率接收范围降低。因驱动器内部提供电源，可不必外接电源。The position pulse instruction input can adopt the differential input connection, or single-ended input connection of open collector. In order to improve antijamming ability, it is suggested to adopt differential connection. The single end mode will reduce the receiving range of instruction pulse frequency. Because driver inside is provided with power supply, external power source need not be adopted.

(a) 位置脉冲指令差分输入：推荐这种接法，抗干扰能力更好，且可以接收最高 500KHz 频率的脉冲指令。Differential input of position pulse instruction: It is recommended to adopt this connection with even better antijamming ability. It can receive pulse instruction with maximal 500KHz frequency.

上位机装置 Upper computer device   伺服驱动器 servo driver
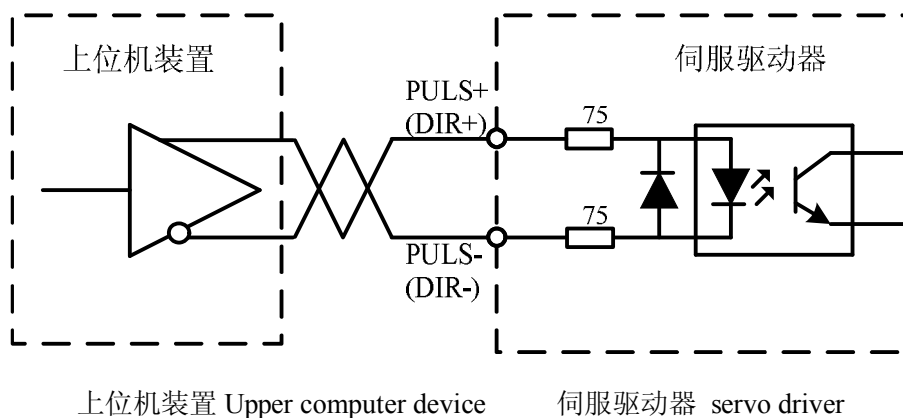
3.14 位置脉冲指令差分输入示意图 3.14 Schematic diagram for differential input of position pulse instruction

(b) 位置脉冲指令集电极开路输入，使用内部电源：最大脉冲频率 200KHz。The open collector input of position pulse instruction uses internal power supply: maximal pulse frequency 200KHz.
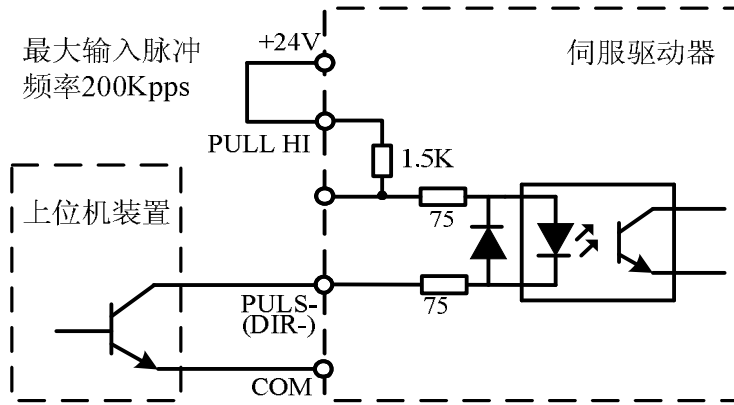
最大输入脉冲频率200Kpps Maximal input pulse frequency 200Kpps

上位机装置 Upper computer device　　　伺服驱动器　servo driver

3.15 集电极开路输入（使用内部电源）示意图 3.15 Schematic diagram for open collector input (use internal power supply)

(d) 位置脉冲指令集电极开路输入，外部供电：Open collector input of position pulse instruction, external electric supply:

使用外部调节电阻，电阻 R 根据 VCC 来调整，使驱动电流满足 6～10mA。最大输入脉冲频率 200Kpps。Use external regulation resistance. The resistance R is adjusted according to VCC to ensure drive current meets 6 ～ 10mA. Maximal input pulse frequency 200Kpps.

VCC	R的阻值 resistance value of R
24V	1KΩ
12V	680Ω
5V	100Ω

上位机装置 Upper computer device　　　伺服驱动器 servo driver

使用内部调节电阻，内部电阻 1.5KΩ。最大脉冲输入频率 200Kpps。Use internal regulation resistance. The internal resistance is 1.5K¦. Maximal pulse input frequency 200Kpps.

上位机装置 Upper computer device　　　伺服驱动器　servo driver

图 3.16 集电极开路输入（使用外部电源）示意图 Fig. 3.16 Schematic diagram for open collector input (use

external power supply)

脉冲指令有三种形式可以选择, 由 P0-14 参数设定; 可以通过参数 P0-16 设置输入 PULS 信号和 DIR 信号的相位, 用来调整计数沿。参数 P0-15 用于变更计数方向。Three forms of pulse instructions can be selected and set by P0 - 14 parameters. The phase positions of PULS signal and DIR signal can be input by setting parameter P0 - 16 to adjust count edge. The parameter P0 - 15 are used to change count direction.

表 3.4 脉冲指令形式（注：箭头表示计数沿，且 P0-15=0, P0-16=0 时）Table 3.4 Pulse Instruction Type (Note: The arrowhead expresses count edge, when P0 - 15 = 0, P0 - 16 = 0)

脉冲形式 Pulse form	正转 Positive rotation	反转 Reversal
P0-14=0, 脉冲+方向 Pulse + direction		
P0-14=1, CCW /CW 脉冲 Pulse		
P0-14=2, 两相正交脉冲 Two-phase orthogonal pulse		

3.2.4 反馈端子信号定义 Signal definition of feedback terminal

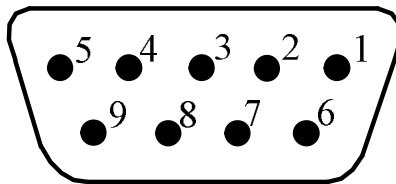**1、DB9 端子定义（油泵伺服驱动器配置）DB9 terminal definition (configured for oil pump's servo driver)**

图 3.17 反馈端子布置图（DB9）Fig. 3.17 Feedback Terminal Arrangement Diagram (DB9)

表 3.5 DB9 端子信号功能说明 Table 3.5 Functional Description for Db9 Terminal Signal

端子号 Terminal number	名称 Name	说明 Description
1	R1	激励信号 Excitation signal
2	R2	
3	SIN+	SIN 反馈信号 SIN feedback signal
4	SIN-	
5	COS+	COS 反馈信号 COS feedback signal

9	COS-	
6	PTCP	电机过热保护输入 Motor overheating protection
7	PTCN	input

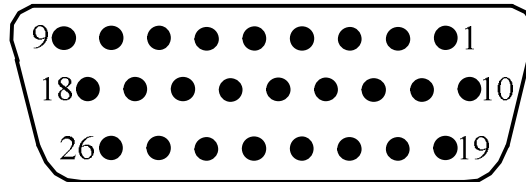2、DB26 端子定义（通用型伺服驱动器配置）DB26 terminal definition（configured for universal type servo driver)

图 3.18 反馈端子布置图（DB26）Fig. 3.18 Feedback Terminal Arrangement Diagram（DB26)

表 3.6 DB26 端子信号功能说明 Table 3.6 Functional Description for DB26 Terminal Signal

端子号 Terminal number	名称 Name	说明 Description
1	PTCN	电机过热保护输入 Motor overheating protection input
10	PTCP	
2	SD+	绝对值编码器信号输入 Absolute value encoder signal input
11	SD-	
3	A+	增量式编码器 A 相差分输入 A-phase differential input of the increment type encoder
12	A-	
4	B+	增量式编码器 B 相差分输入 B-phase differential input of the increment type encoder
13	B-	
5	Z+	增量式编码器 Z 相差分输入 Z-phase differential input of the increment type encoder
14	Z-	
6	U+	增量式编码器 U 相差分输入 U-phase differential input of the increment type encoder
15	U-	
7	V+	增量式编码器 V 相差分输入 V-phase differential input of the increment type encoder
16	V-	
8	W+	增量式编码器 W 相差分输入 W-phase differential input of the increment type encoder
17	W-	
18	GND	5V 电源信号输出 5V power supply signal output
9	+5V	

第四章 面板操作 Chapter IV Panel Operations

4.1 面板操作与显示界面介绍 Introduction to panel operations and display interfaces

使用操作面板，可对伺服驱动器进行功能参数修改、伺服驱动器工作状态监控和伺服驱动器运行控制（起动、停止）等操作，其外形及功能区如图 4-1 所示：Using the operation panel can modify functional parameters of the servo driver, monitor its working status and control its running (start/ stop), etc. The appearance and functions are shown in Fig. 4 - 1:
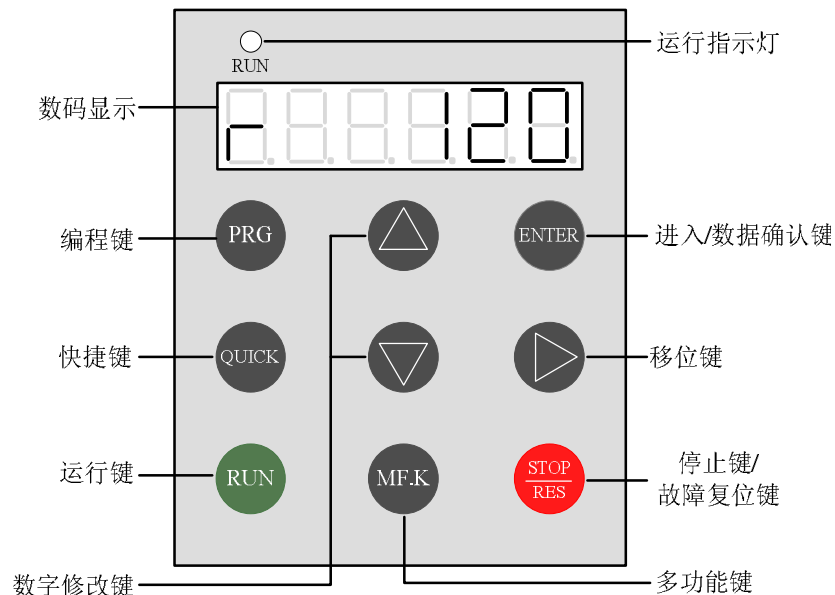
运行指示灯 Running indicator, 数码显示 digital display, 编程键 programming key, 快捷键 shortcut key, 运行键 running key, 数字修改键 digital modifying key, 进入/数据确认键 enter / data validation key,
移位键 shift key, 停止键/故障复位键 stop key / fault reset key, 多功能键 multifunction key

图 4.1 操作面板示意图 Fig. 4.1 Schematic diagram for Operation Panel

1）功能指示灯说明：Description for function indicator lamps:

RUN：灯灭时表示伺服驱动器处于停机状态，灯亮时表示伺服驱动器处于运转状态。When the indicator lamp is off, the servo driver remains at stopped status. When the indicator lamp is on, it indicates that the servo driver remains at running status.

2）数码显示区：Digital code display area:

6 位 LED 显示，可显示参数值、电机运行状态，各种监视数据以及报警代码等。6 bit LED can display parameter values, motor running status, all kinds of monitoring data as well as error code, etc.

4）键盘按钮说明：Description of the Keypad:

按键 Button	名称 Name	功能 Function
PRG	编程键 Programming key	一级菜单进入或退出，逐级退出菜单，快捷参数删除。Enter or quit the firstlevel menu, quit menu level by level, delete shortcut parameters.
ENTER	确认键 Confirm key	逐级进入菜单画面、设定参数值确认。Enter menu level by level, set and confirm parameter value
△	递增键 Ascending key	参数号或参数值的递增。Ascending of parameter number or parameter value.
▽	递减键 Descending key	参数号或参数值的递减。Descending of parameter number or parameter value.
▷	移位键 Shift key	在显示参数号界面下，可循环选择显示参数；在修改参数时，可以选择参数的修改位。Under the screen of displaying parameter number, you can cyclically select display parameters; When modifying parameters, you can select the modified bit of parameter.
RUN	运行键 Running key	在键盘操作方式下，用于运行操作，使能伺服驱动器。Under keyboard operation mode, it is used for running operation and enabling the servo driver.
STOP/RES	停止/复位键 Stop / reset key	运行状态时，按此键可用于停止运行操作；故障报警状态时，可用来复位操作，该键的特性受参数制约。During running status, holding down this key can be used to stop running operation. During malfunction alarm status, this key can be used to reset operation. The features of this key are restricted by parameters.
QUICK	快捷键 Shortcut key	进入或退出快捷菜单的一级菜单。详见 QUICK 操作说明。Enter or quit the firstlevel menu of shortcut menu. For details, see QUICK operation instruction.
MF.K	多功能键 Multifunction key	多功能切换键。Multifunction toggle key.

4.2 菜单结构说明 Description for menu structure

ESDD 伺服驱动器的操作面板采用三级菜单结构进行参数设置等操作。The three-level menu structure is adopted for operation panel of ESDD servo driver to perform parameter setting and other operations.

三级菜单分别为：功能参数组（一级菜单）→参数号（二级菜单）→参数设定值（三级菜单）。操作流程如图所示。The three-level menus are respectively: functional parameter group (the first level menu)→parameter number (the second level menu)→parameter setting value (the third level menu). The operational process is shown in the diagram.
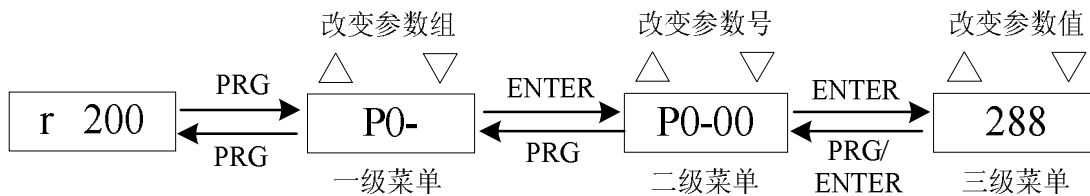
改变参数组 Change parameter group, 改变参数号 change parameter number, 改变参数值 change parameter value, 一级菜单 the first level menu, 二级菜单 the second level menu, 三级菜单 the third level menu

图 4.2 菜单操作流程图 Fig. 4.2 Operational Flowchart of Menu

说明：在三级菜单操作时，可按 PRG 键或 ENTER 键返回二级菜单。Description: When operating in the third level menu, you can hold down PRG key or ENTER key to return to the second level menu.

两者的区别是：按 ENTER 键确认修改参数值操作，修改参数值为新的设置值后返回二级菜单；而按 PRG 键取消修改参数值操作，直接返回二级菜单，。The difference is: Holding down ENTER key will confirm operation of modifying parameter value. After parameter value is modified into new setting value, it will return to the second level menu. Holding down PRG key will cancel operation of modifying parameter value and directly return to the second level menu.

4.2.1 修改参数值操作 Operation of modifying parameter value

例：将 P2-01 的参数值由 1 改为 21。（灰色字体表示数码管闪烁。）Example: Change parameter values of P2 - 01 from 1 to 21. (grey typeface expresses digitron flicker.)
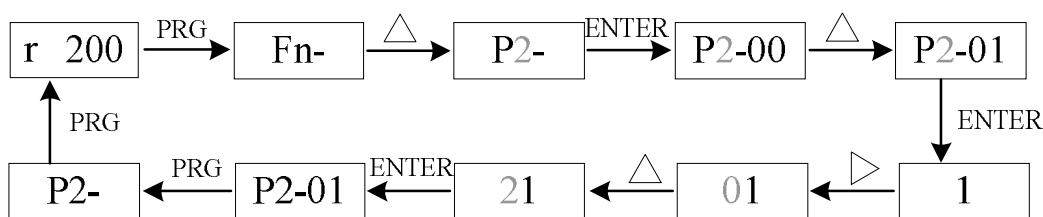

Fig. 4.3 Schematic Diagram for Modification Operation of Parameter Values

在第三级菜单下，使用"▷"键可进行移位，移到某个数码管，数码管闪烁，用"△、▽"键可修改该位的值。修改参数值时，若修改的值大于参数允许设置的最大值，则参数值自动设置为最大值，反之，如果小于最小值，则自动设置为最小值。Under the third level menu, using "▷ " key can shift to a certain digitron and have it flicker. Using "△、▽ " keys can modify the value at this bit. When modifying the parameter value, if the modified value is greater than maximum value allowed by the parameter, then the parameter value will be automatically set as maximum value. Contrarily if it is less than minimal value, then it will be automatically set as

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minimal value.

4.2.2 快捷菜单操作方式 Operation mode for shortcut menu

通过"QUICK"键可以迅速查看快捷菜单中的参数。快捷菜单的设立主要是方便用户对常用的功能参数进行快捷查看和修改。 快捷菜单中参数的显示形式为"uP3-01"，它表示的是功能参数 P3-01, 在快捷菜单中修改参数与在普通编程状态下修改相应的参数效果是一样的。Using "QUICK" key can quickly view parameters in shortcut menu. The shortcut menu is mainly to be convenient for user to quickly view and modify common functional parameters. The display format for parameters in shortcut menu is "uP3 - 01". What it represents is functional parameter P3 - 01. Modifying parameters in shortcut menu is the same as modifying corresponding ones under ordinary programming status. 快捷菜单最多可放入 16 个功能参数, 若 16 个参数已存满, 再想增加时则显示"FULL"；若进入菜单时显示"NULL", 表示快捷菜单为空。At most 16 functional parameters can be put into shortcut menu. If it is full with 16 parameters, it will display "FULL" when it is increased again. If it displays "NULL" when you enter into menu, it means that shortcut menu is blank.

1）增加快捷参数项 Adding shortcut parameters
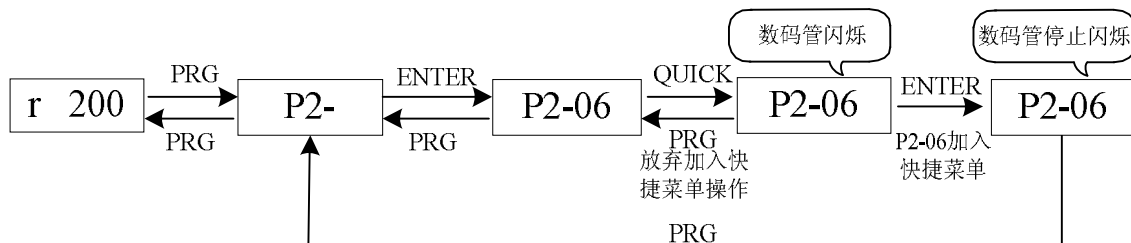
数码管闪烁 Digitron flicker, 数码管停止闪烁 digitron stops flicker, 放弃加入快捷菜单操作 abandon operation of joining shortcut menu, P2-06 加入快捷菜单 P2 - 06 join shortcut menu

图 4.4 增加快捷参数项操作示意图 Fig. 4.4 Operation Chart for Adding Shortcut Parameters

说明：在二级菜单下按"QUICK"键, 显示内容闪烁, 提示是否将该参数存入快捷菜单中, 按"ENTER"键确认, 显示内容停止闪烁, 操作完成, 若数码管显示 FULL 则表示快捷菜单已满, 不能再增加; 按"PRG"键取消, 显示内容停止闪烁, 操作取消。（注：只有 Pn-及 An-菜单下的参数可以加入到快捷菜单中。）Description: Under the second level menu, holding down "QUICK" key will have the display content flicker to prompt whether this parameter is stored in shortcut menu. Holding down "ENTER" key will have the display content stop flicker, which means that operation is completed. If digitron displays FULL, it means that shortcut menu is already full and cannot be increased. When you hold down "PRG" key to cancel, the display content will

stop flicker, which means that operation is canceled. (Note: Only parameters under Pn - and An - menus can be added into shortcut menu.)

2）快捷参数的修改操作 Modification operation for shortcut parameters
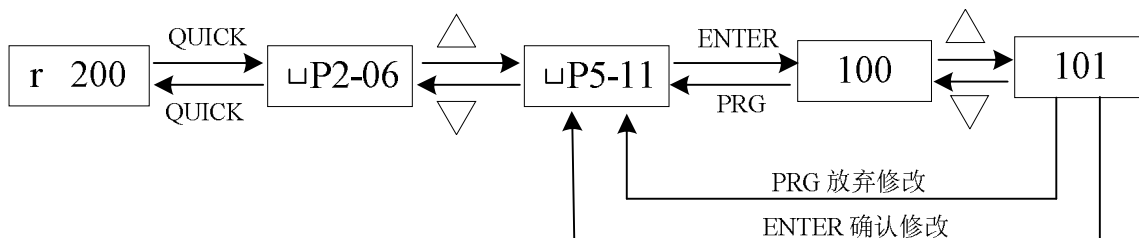
PRG 放弃修改 PRG abandons modification,　　　　ENTER 确认修改 ENTER confirms modification

图 4.5 快捷菜单参数值修改操作示意图 Fig. 4.5 Operation Chart for Modifying Parameter Values in Shortcut Menu

　　说明：在显示界面下，按"QUICK"键进入快捷菜单，用"△、▽"键可选择不同的快捷参数，然后按"ENTER"键进入下级菜单，此时快捷参数修改方法和普通菜单的三级菜单参数修改方法相同。若要退回上层显示，按"PRG"键，且所修改的参数值不改变。然后按"QUICK"键退出快捷菜单。Description: Under the display interface, holding down "QUICK" key will enter into shortcut menu. Using "△、▽" key can select different shortcut parameters and then holding down "ENTER" key will enter into the　next level menu.　At this time the modification method for shortcut parameters is the same as that of the third level menu parameters of ordinary menu.　If you want to return to display at upper level, hold down "PRG" key and modified parameter value is not changed, and then hold down "QUICK" key to quit shortcut menu.

3）删除快捷参数项 Deleting shortcut parameters
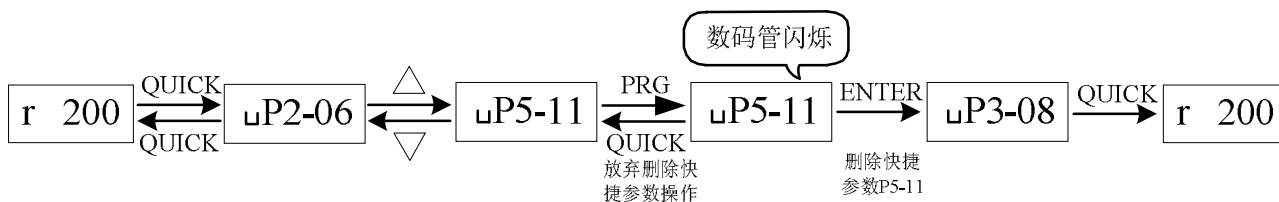
数码管闪烁 P5-11Digitron flicker,　　　　放弃删除快捷键参数操作 abandon operation of　deleting shortcut key parameter,　　删除快捷参数 delete shortcut parameter P5 - 11

图 4.6 删除快捷菜单项操作示意图 Fig. 4.6 Operation Chart for Deleting Shortcut Menu Items

　　说明：在快捷菜单下按"PRG"键，显示闪烁，提示是否删除该项参数，按"ENTER"键确认删除，显示停止闪烁，删除操作完成，若按"QUICK"键，显示停止闪烁，删除操作取消。若删除的是最后一个快捷参

数，删除后显示"NULL"，表示快捷菜单已空。Description: Under shortcut menu, holding down "PRG" key will have display flicker to prompt whether to delete this parameter. Holding down "ENTER" will confirm deletion and have display stop flicker, which means that deletion operation is completed. If you hold down "QUICK" key, display will stop flicker and deletion operation will be canceled. If the last shortcut parameter is deleted, it will display "NULL" after deletion, which means that shortcut menu is already blank.

4.2.3 状态参数查看操作 Operation of viewing state parameters

图 4.7 状态参数查看操作流程图 Fig. 4.7 Operational Flowchart for Viewing State Parameters

说明：在监视菜单"dP-"下有 32 项监视项目，包括速度、电流、转矩、频率、IO 状态、报警等信息，用户可以随时查看这些参数项。伺服驱动器通电后，若有报警，则显示报警参数，若无报警，显示的参数为伺服驱动器"P0-03"所设置的参数项。Description: There are 32 monitoring items under monitoring menu "dP -", including speed, current, torque, frequency, IO status, alarm and other information. User can view these parameters at any torque. If there is an alarm after the servo driver is powered on, it will display alarm parameter. If there is no alarm, the displayed parameter will be that set by the setting value of "P0-03".

以下是对状态参数部分项目的说明：The following is the description for partial items of state parameters:

1、 电机编码器反馈的当前位置由 dP-PoS.（高 5 位）+ dP-PoS（低 5 位）两部分组成。The current position fedback by motor encoder consists of 2 parts: dP - PoS. (high 5 bits) + dP - PoS (low 5 bits). 例如 dP-PoS.

   的显示数值为 P. 12 ，dP-PoS 的显示为 P4580b ，则当前位置脉冲计算方法如下：For example, the displayed value of dP - PoS. is P. 12 , the displayed value of dP - PoS is P4580b ,

   then the calculation method for pulse at current position is as follows:

   P. 12 × 100000 + P4580b = 1245806 个脉冲 1245806 pulses

   位置指令、位置偏差同理。The position instruction and position deviation are in the same way.

2、 位置指令脉冲 dP-CPo 为输入脉冲经过电子齿轮比放大后的数值。The position instruction pulse dP - CPo is a value after input pulse is magnified by electronic gear ratio.

3、 当前控制模式 dP-Cnt 显示含义如下：0-位置控制模式；1-速度控制模式；2-力矩控制模式；3-压力闭环控制模式；4-位置闭环控制模式； 5-Sr 运行模式；6-JOG 运行模式；7-开环运行。The display meanings for current control mode dP - Cnt are as follows: 0 - position control mode; 1 - speed control mode; 2 - Torque control mode; 3 - pressure closed-loop control mode; 4 - position closed-loop control

mode; 5 - Sr operation mode; 6 - JOG running mode; 7 - opening loop operation.

4、 如果显示数字及符号达到 6 位（例如显示-12345），则不再显示提示字符。If the displayed digit and symbol reach 6 bits (for example display - 12345), then it will no longer display prompt character.

5、 位置指令脉冲频率 dP-Frq，是未经电子齿轮放大的脉冲频率，最小单位 0.1KHz，正向显示正数，反向显示负数。The position instruction pulse frequency dP - Frq is a pulse frequency not magnified by electronic gear, with minimal unit of 0.1KHz. The positive display is a positive number. The reverse display is a negative number.

6、 报警号显示 dP-Err，具体报警号的含义请参阅第九章。Alarm number display dP – Err: For meanings of specific alarm number, please refer to Chapter IX.

7、 输入端子状态显示，高位状态 dP-InH、低位状态 dP-InL 显示如下图，输入 IO 口功能可自定义。1 代表输入 IO 无效，0 有效。Input terminal status display: The high position status dP - InH and low position status dP - InL are shown in the diagram below. The function of inputting IO port can be self-defined. 1 means that input IO is invalid. 0 means that it is valid.
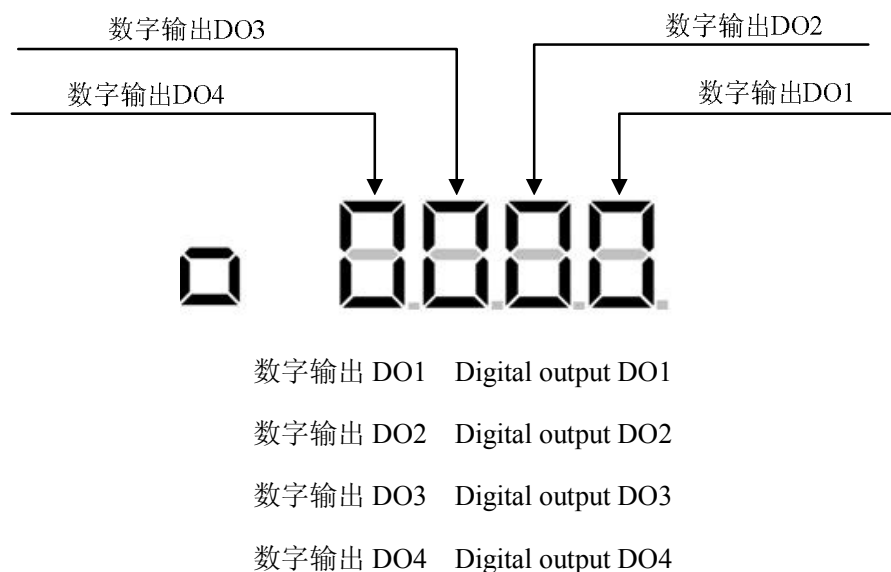
dP-InL 中各数码管定义：Definition for each digitron in dP - InL:
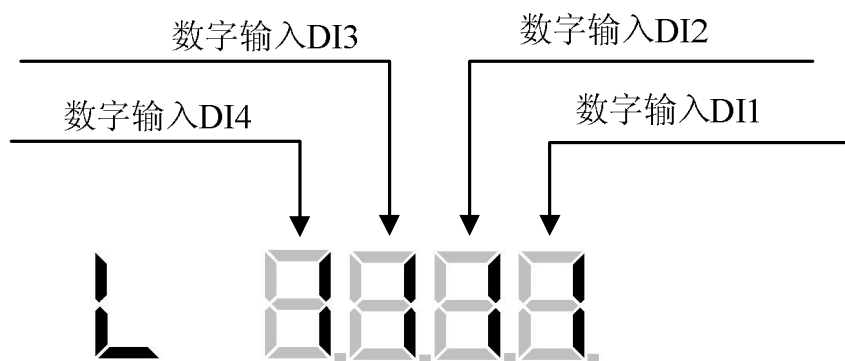
数字输入 DI1   Digital input DI1

数字输入 DI2   Digital input DI2

数字输入 DI3   Digital input DI3

数字输入 DI4   Digital input DI4

dP-InH 中各数码管定义：Definition for each digitron in dP - InH:

数字输入DI6

数字输入DI7　　　　　数字输入DI5

数字输入 DI5	Digital input DI5
数字输入 DI6	Digital input DI6
数字输入 DI7	Digital input DI7
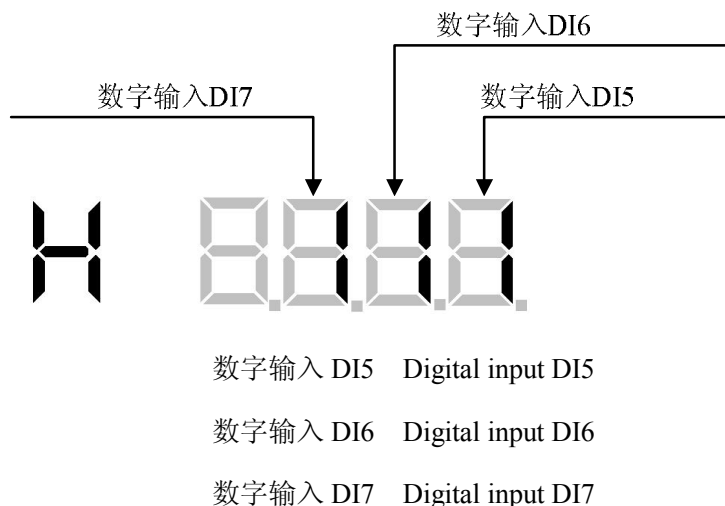
8、 输出端子状态 dP-oUt 显示如下图，输出 IO 口功能可自定义。1 代表输出 IO 无效，0 有效。The output terminal status dP - oUt is shown in the diagram below. The function of outputting IO port can be self-defined. 1 means that output IO is invalid. 0 means that it is valid.

dP-oUt 中各数码管定义：Definition for each digitron in dP - oUt:

数字输出DO3　　　　　　数字输出DO2

数字输出DO4　　　　　　数字输出DO1

数字输出 DO1	Digital output DO1
数字输出 DO2	Digital output DO2
数字输出 DO3	Digital output DO3
数字输出 DO4	Digital output DO4

9、 编码器 UVW 状态 dP-Cod 具体的表示方法为：每个端子对应显示数字的一位二进制位，该位为 0 时表示端子为 OFF 状态（数字信号 0），该位为 1 时表示端子为 ON 状态（数字信号 1）。具体的对应关系如下表所示：The detailed expression method for UVW status dP - Cod of encoder is: Each terminal is corresponding to a binary bit of the displayed digit.　When this bit is 0, it means that terminal is at OFF status (digital signal 0). When this bit is 1, it means that terminal is at ON status (digital signal 1).　The detailed corresponding relation is shown in the table below:

显示项目 Displayed item	二进制位 Binary bit	含义 Meanings

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	Cd8880	编码器 U 相 U-phase of encoder
dP-Cod 编码器 UVW 输入信号 UVW input signal of encoder	Cd8808	编码器 V 相 V-phase of encoder
	Cd8088	编码器 W 相 W-phase of encoder

第五章 功能参数表 Chapter V Functional Parameter Table

P0–00 为密码参数, 用户密码是"288", 密码错误, 只能访问 P0 段参数, 密码正确可以访问所有用户参数。Fn-、dP- 及快捷菜单中的参数不受密码保护。(这里出厂参数以 220 系列, 47.8Nm, 1500rpm 电机为例, 即 P0-01=10, 不同电机出厂参数不同, 用户使用时根据电机型号设置 P0-01 参数, 恢复出厂参数即可。)

P0¨C 00 is a password parameter. The user password is "288". If the password is incorrect, you can only access parameters in Segment P0. If the password is correct, you can access all the user parameters. The parameters in Fn -, dP - and shortcut menu are not protected by the password. (here 220 series, 47.8Nm, 1500rpm motor is exampled for factory parameters, namely P0 - 01 = 10. The factory parameters of different motors are different. When user uses them, set P0 - 01 parameter according to the motor type and restore factory parameter.)

功能表中符号说明如下：The symbol description in the function table is as follows:

"☆"：表示该参数的设定值在伺服驱动器处于停机、运行状态中, 均可更改, 并立即生效；Means that the setting value for this parameter can be changed in the case that the servo driver remains at both shutdown and running states and immediately takes effect;

"★"：表示该参数修改后需要保存参数, 重新上电有效。Means that this parameter needs to be saved after

modification and will be valid after power-on over again.

"●"：表示该参数的数值是实际检测记录值或为只读参数，不能更改；Means that this parameter value is an actually detected record value or a read-only parameter, and cannot be changed;

"＊"：表示该参数是"厂家参数"，仅限于制造厂家设置，禁止用户进行操作。Means that this parameter is a "manufacturer parameter" and is only limited to be set by manufacturer. It is prohibited for user to operate.

"▲"：表示该参数是特殊功能参数。Means that this parameter is specific functional one.

功能参数总表：General table for functional parameter:

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
Fn 组 特殊功能参数组 Group Fn, specific function parameter group						
Fn-SEt	0x1000	参数保存 Saved parameter	—	—	—	▲
Fn-dEF	0x1001	恢复出厂值 Restore factory value	—	—	—	▲
Fn-Sr	0x1002	速度试运行 Sr operation	—	—	—	▲
Fn-JoG	0x1003	JOG 寸动运行 JOG operation	—	—	—	▲
Fn-AI1	0x1004	模拟速度零偏补偿/ AI1 模拟输入零偏补偿 Analogy speed zero offset compensation / AI1 analog input zero offset compensation	—	—	—	▲
Fn-AI2	0x1005	模拟力矩零偏补偿/ AI2 模拟输入零偏补偿 Analogy torque zero offset compensation / AI2 analog input zero offset compensation	—	—	—	▲
Fn-AI3	0x1006	AI3 模拟输入零偏补偿 AI3 analog input zero offset	—	—	—	▲

Parameter item	Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
		compensation				
Fn-Err	0x1007	历史报警信息 Historical alarm information	—	—	—	●
Fn-CdY	0x1008	厂家参数 Manufacturer parameter	—	—	—	*
Fn-Jrd	0x1009	厂家参数 Manufacturer parameter	—	—	—	*
dP 组 监控参数组 Group dP, monitoring parameter group						
dP-SPd	0x2000	电机转速 Motor speed	—	rpm	—	●
dP-PoS	0x2001	电机位置低 5 位 Low 5 bits of motor position	—	pulse	—	●
dP-PoS.	0x2002	电机位置高 5 位 High 5 bits of motor position	—	105pulse	—	●
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
dP-CPo	0x2003	位置指令低 5 位 Low 5 bits of position instruction	—	pulse	—	●
dP-Cpo.	0x2004	位置指令高 5 位 High 5 bits of position instruction	—	105pulse	—	●
dP-EPo	0x2005	位置偏差低 5 位 Low 5 bits of position deviation	—	pulse	—	●
dP-Epo.	0x2006	位置偏差高 5 位 Position deviation high 5 bits	—	105pulse	—	●
dP-trq	0x2007	电机转矩 Motor torque	—	%	—	●
dP- I	0x2008	电机电流 Motor current	—	A	—	●
dP-InH	0x2009	输入端子高位状态 Input terminal high position status	—	—	—	●
dP-InL	0x200A	输入端子低位状态 Input terminal low position status	—	—	—	●
dP-oUt	0x200B	输出端子状态 Output	—	—	—	●

		terminal status				●
dP-Cnt	0x200C	控制方式 Control mode	—	—	—	●
dP-Frq	0x200D	位置脉冲频率 Position pulse frequency	—	KHz	—	●
dP-CS	0x200E	速度指令 Speed instruction	—	rpm	—	●
dP-Ct	0x200F	转矩指令 Torque instruction	—	%	—	●
dP-APo	0x2010	转子绝对位置 Absolute position of rotor	—	pulse	—	●
dP-Cod	0x2011	编码器 UVW 信号 UVW signal of encoder	—	—	—	●
dP-Id	0x2012	FPGA 软件版本 FPGA software version	—	—	—	●
dP-Err	0x2013	报警代码 Error code	—	—	—	●
dP-CCr	0x2014	保留 Reserved	—	—	—	●
dP-Cr	0x2015	保留 Reserved	—	—	—	●
dP-rES	0x2016	编码器校零脉冲 Zero calibration pulse of encoder	—	pulse	—	●
dP-ALE	0x2017	绝对值编码器报警 Absolute value encoder alarm	—	—	—	●
dP-Abr	0x2018	绝对值编码器圈数 Absolute value encoder number of turns	—	r	—	●
dP-tn	0x2019	驱动器温度 Driver temperature	—	°C	—	●
dP-UdC	0x201A	母线电压 DC-Bus voltage	—	V	—	●
dP-FPo	0x201B	外部位置反馈低 5 位 Low 5 bits of external position feedback	—	pulse	—	●
dP-FPo.	0x201C	外部位置反馈高 5 位 High 5 bits of external position	—	105pulse	—	●

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
		feedback				
dp-CPS	0x201D	压力给定 Pressure instruction	—	0.1kg/cm2	—	●
dp-FPS	0x201E	压力反馈 Pressure feedback	—	0.1kg/cm2	—	●
dp-CFL	0x201F	流量给定 Flowrate instruction	—	rpm	—	●
P0 组 基本功能组 Group P0, basic function group						
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P0-00	0x0000	密码 Password	0~9999	—	288	☆
P0-01	0x0001	电机型号 Motor type	0~39	—	10	★
P0-02	0x0002	软件版本 Software version	—	—	—	●
P0-03	0x0003	初始显示状态 Initial display item	0~31	—	0	★
P0-04	0x0004	控制方式选择 Control mode selection	0~10	—	0	☆
P0-05	0x0005	速度比例增益 Proportional gain of speed	5~1000	Hz	150	☆
P0-06	0x0006	速度积分时间常数 Integrating time constant of speed	1~1000	ms	40	☆
P0-07	0x0007	转矩指令滤波器 Torque instruction filter	0~500	%	50	☆
P0-08	0x0008	速度检测低通滤波器 Speed detection low-pass filter	1~500	%	50	☆
P0-09	0x0009	位置比例增益 Proportional gain of position	1~2000	1/s	13	☆
P0-10	0x000A	位置前馈增益 Feed-forward gain of position	0~100	%	0	☆
P0-11	0x000B	位置前馈低通滤波器截止 频率 Cut-off frequency for feed-forward low-pass filter of position	1~1200	Hz	300	☆
P0-12	0x000C	第一电子齿轮比分子 The first electronic gear ratio numerator	1~65535	pulse	1	☆
P0-13	0x000D	第一电子齿轮比分母 The first electronic gear ratio denominator	1~65535	pulse	1	☆

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P0-14	0x000E	位置指令脉冲输入方式 Input mode of position instruction pulse	0～2	—	0	★
P0-15	0x000F	位置指令脉冲方向 Direction of position instruction pulse	0～1	—	0	☆
P0-16	0x0010	位置指令脉冲信号逻辑 Signal logic of position instruction pulse	0~3	—	0	★
P0-17	0x0011	厂家参数 Manufacturer parameter	—	—	—	*
P0-18	0x0012	速度指令滤波时间常数 Filtering time constant of speed instruction	1~100	ms	100	☆
P0-19	0x0013	位置指令平滑滤波器 Smoothing filter of position instruction	0~20000	0.1ms	0	☆
P0-20	0x0014	驱动禁止输入无效 Driving inhibiting input invalidation	0~2	—	1	☆
P0-21	0x0015	保留 Reserved	—	—	—	—
P0-22	0x0016	保留 Reserved	—	—	—	—
P0-23	0x0017	最高速度限制 Maximum speed limitation	0~6000	rpm	2000	☆
P0-24	0x0018	转矩限制选择 Torque limitation selection	0~2	—	0	☆
P0-25	0x0019	内部 CCW 转矩限制 Internal CCW torque limitation	0~300	%	300	☆
P0-26	0x001A	内部 CW 转矩限制 Internal CW torque limitation	-300~0	%	-300	☆
P0-27	0x001B	外部 CCW 转矩限制 External CCW torque limitation	0~300	%	100	☆
P0-28	0x001C	外部 CW 转矩限制 External CW torque limitation	-300~0	%	-100	☆
P0-29	0x001D	速度试运行、JOG 运行转矩 限制 Speed test run, JOG running torque limitation	0~300	%	100	☆
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P0-30	0x001E	强制使能 Forcibly enabled	1~3	—	3	☆
P1 组 辅助功能 Group P1, auxiliary function						

P1-00	0x0100	分频电子齿轮比分子 Frequency division electronic gear ratio numerator	1~32767	pulse	1	☆
P1-01	0x0101	分频电子齿轮比分母 Frequency division electronic gear ratio denominator	1~32767	pulse	1	☆
P1-02	0x0102	位置反馈脉冲方向取反 Direction of position feedback pulse	0~1	—	0	☆
P1-03	0x0103	Z 脉冲扩宽 Z-pulse broadening	0~127	50us	0	★
P1-04	0x0104	保留 Reserved	—	—	—	—
P1-05	0x0105	保留 Reserved	—	—	—	—
P1-06	0x0106	厂家参数 Manufacturer parameter	—	—	—	*
P1-07	0x0107	故障清除次数限制 Limit for fault clearance times	0~20	—	5	★
P1-08	0x0108	欠压报警延时时间 Undervoltage alarm delay time	0~32767	ms	400	☆
P1-09	0x0109	使能延时时间 Delay time of servo-on	0~32767	10ms	0	☆
P1-10 ~ P1-13	0x010A ~ 0x010D	保留 Reserved	—	—	—	—
P1-14	0x010E	厂家参数 Manufacturer parameter	—	—	—	*
P1-15	0x010F	厂家参数 Manufacturer parameter	—	—	—	*
P1-16	0x0110	电磁制动零速度检测点 Zero speed detection point of electromagnetic braking	0~5000	rpm	15	☆
P1-17	0x0111	电机静止时电磁制动延迟时间 Electromagnetic braking delay time during motor stillness	0~30000	ms	0	☆
P1-18	0x0112	电机运转时电磁制动延迟时间 Electromagnetic braking delay time during motor running	0~30000	ms	500	☆
P1-19	0x0113	电机运转时电磁制动动作速度 Electromagnetic braking actuation speed during motor running	0~5000	rpm	100	☆

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P1-20	0x0114	零速度检测点 Zero speed detection point	0~5000	rpm	10	☆
P1-21	0x0115	零速度检测时间 Zero speed detection time	0~30000	ms	50	☆
P1-22	0x0116	保留 Reserved	—	—	—	—
P1-23	0x0117	保留 Reserved	—	—	—	—
P1-24	0x0118	定位完成范围 Positioning completion scope	0~32767	pulse	100	☆
P1-25	0x0119	位置超差检测范围 Detection range for overproof position	0~300.00	100pulse	4.00	☆
P1-26	0x011A	保留 Reserved	—	—	—	—
P1-27	0x011B	保留 Reserved	—	—	—	—
P1-28	0x011C	速度到达信号阈值 Speed reaches detection threshold	-5000~5000	rpm	500	☆
P1-29	0x011D	速度超差检测阈值 Detection threshold for overproof speed	0~6000	rpm	120	☆
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P1-30	0x011E	保留 Reserved	—	—	—	—
P1-31	0x011F	保留 Reserved	—	—	—	—
P1-32	0x0120	转矩到达信号阈值 Torque reaches detection threshold	0~3.00	×100%	1.00	☆
P1-33	0x0121	转矩到达滤波时间 Torque reaches filter time	-6000~6000	ms	100	☆
P1-34	0x0122	转矩过载报警水平 Torque overload alarm level	0~300	%	300	☆
P1-35	0x0123	转矩过载报警检测时间 Torque overload alarm detection time	0~3000	10ms	0	☆
P1-36	0x0124	保留 Reserved	—	—	—	—
P1-37	0x0125	保留 Reserved	—	—	—	—
P1-38	0x0126	开启风扇温度 Fan turnon temperature	30~120	℃	45	☆
P1-39	0x0127	保留 Reserved	—	—	—	—
P2 组 IO 输入输出 Group P2, IO input/output						
P2-00	0x0200	数字输入滤波时间 Digital input filter time	0~100	ms	0	☆

P2-01	0x0201	数字输入 DI1 功能定义 Digital input DI1 functional definition	0~29	—	1	☆
P2-02	0x0202	数字输入 DI2 功能定义 Digital input DI2 functional definition	0~29	—	2	☆
P2-03	0x0203	数字输入 DI3 功能定义 Digital input DI3 functional definition	0~29	—	3	☆
P2-04	0x0204	数字输入 DI4 功能定义 Digital input DI4 functional definition	0~29	—	4	☆
P2-05	0x0205	数字输入 DI5 功能定义 Digital input DI5 functional definition	0~29	—	5	☆
P2-06	0x0206	数字输入 DI6 功能定义 Digital input DI6 functional definition	0~29	—	6	☆
P2-07	0x0207	数字输入 DI7 功能定义 Digital input DI7 functional definition	0~29	—	7	☆
P2-08	0x0208	保留 Reserved	—	—	—	—
P2-09	0x0209	数字输入低四位取反 Negation of digital input low 4 bits	0~15	—	0000b	☆
P2-10	0x020A	数字输入高四位取反 Negation of digital input high 4 bits	0~15	—	0000b	☆
P2-11	0x020B	保留 Reserved	—	—	—	—
P2-12	0x020C	数字输出 DO1 功能定义 Digital output DO1 functional definition	0~11	—	1	☆
P2-13	0x020D	数字输出 DO2 功能定义 Digital output DO2 functional definition	0~11	—	2	☆
P2-14	0x020E	数字输出 DO3 功能定义 Digital output DO3 functional definition	0~11	—	3	☆
P2-15	0x020F	数字输出 DO4 功能定义 Digital output DO4 functional definition	0~11	—	4	☆
P2-16	0x0210	保留 Reserved	—	—	—	—
P2-17	0x0211	数字输出取反 Digital output negation	0~15	—	0000b	☆
P2-18	0x0212	模拟输出 AO1 功能定义 Analog output AO1	0~6	—	1	★

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
		functional definition				
P2-19	0x0213	模拟输出 AO1 输出比例 Analog output AO1 output proportion	-100~100	—	100	☆
P2-20	0x0214	模拟输出 AO2 功能定义 Analog output AO2 functional definition	0~6	—	1	★
P2-21	0x0215	模拟输出 AO2 输出比例 Analog output AO2 output proportion	-100~100	—	100	☆
P3 组 位置参数 Group P3, position parameter						
P3-00	0x0300	位置指令来源 Position instruction source	0~1	—	0	☆
P3-01	0x0301	第二电子齿轮比分子 The second electronic gear ratio numerator	1~32767	pulse	1	☆
P3-02	0x0302	第三电子齿轮比分子 The third electronic gear ratio numerator	1~32767	pulse	1	☆
P3-03	0x0303	第四电子齿轮比分子 The fourth electronic gear ratio numerator	1~32767	pulse	1	☆
P3-04	0x0304	保留 Reserved	—	—	—	—
P3-05	0x0305	保留 Reserved	—	—	—	—
P3-06	0x0306	原点触发启动模式 Origin point trigger start-up mode	0~2	—	0	☆
P3-07	0x0307	原点参考点设定 Origin point reference point setting	0~3	—	0	☆
P3-08	0x0308	到达原点移动方式设定 Setting of the motion mode of reaching origin point	0~2	—	0	☆
P3-09	0x0309	原点位置偏移转数 Origin point offset revolutions	-3000~3000	pulse	0	☆
P3-10	0x030A	原点位置偏移脉冲数 Origin point offset pulse number	-10000~10000	pulse	0	☆
P3-11	0x030B	原点回归第一速度 The first speed origin point returns to	-5000~5000	rpm	500	☆
P3-12	0x030C	原点回归第二速度 The second speed origin point	-5000~5000	rpm	50	☆

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
		returns to				
P3-13	0x030D	原点回归加速时间 The acceleration time of returning to origin point	0~10000	ms	0	☆
P3-14	0x030E	原点回归减速时间 The deceleration time of returning to origin point	0~10000	ms	0	☆
P3-15	0x030F	原点回归超时报警时间 Time-out alarm time of returning to origin point	0~30.0	s	30.0	☆
P3-16 ~ P3-19	0x0310 ~ 0x0313	保留 Reserved	—	—	—	—
P3-20	0x0314	内部位置指令模式 Internal position instruction mode	0~3	—	0	☆
P3-21	0x0315	内部位置运行方式 Internal position run mode	0~3	—	0	☆
P3-22	0x0316	内部位置暂停设定 Internal position pause setting	0~1	—	1	☆
P3-23	0x0317	运行段数选择 Selection of running number of segments	1~8	—	1	☆
P3-24	0x0318	保留 Reserved	—	—	—	—
P3-25	0x0319	内部位置 1 转数设定 Internal position 1 revolution setting	-32768~32767	pulse	10	☆
P3-26	0x031A	内部位置 1 脉冲设定 Internal position 1 pulse setting	-32768~32767	pulse	0	☆
P3-27	0x031B	内部位置 1 运行速度 Internal position 1 running speed	0~5000	rpm	100	☆
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P3-28	0x031C	内部位置 1 加减速时间 Internal position 1 acceleration and deceleration time	0~30000	ms	100	☆
P3-29	0x031D	内部位置 1 停顿时间 Internal position 1 pause time	0~30000	6ms	100	☆
P3-30	0x031E	内部位置 2 转数设定 Internal position 2 revolution setting	-32768~32767	pulse	50	☆
P3-31	0x031F	内部位置 2 脉冲设定	-32768~32767	pulse	0	☆

		Internal position 2 pulse setting				
P3-32	0x0320	内部位置 2 运行速度 Internal position 2 running speed	0~5000	rpm	100	☆
P3-33	0x0321	内部位置 2 加减速时间 Internal position 2 acceleration and deceleration time	0~30000	ms	100	☆
P3-34	0x0322	内部位置 2 停顿时间 Internal position 2 pause time	0~30000	6ms	100	☆
P3-35	0x0323	内部位置 3 转数设定 Internal position 3 revolution setting	-32768~32767	pulse	100	☆
P3-36	0x0324	内部位置 3 脉冲设定 Internal position 3 pulse setting	-32768~32767	pulse	0	☆
P3-37	0x0325	内部位置 3 运行速度 Internal position 3 running speed	0~5000	rpm	500	☆
P3-38	0x0326	内部位置 3 加减速时间 Internal position 3 acceleration and deceleration time	0~30000	ms	100	☆
P3-39	0x0327	内部位置 3 停顿时间 Internal position 3 pause time	0~30000	6ms	100	☆
P3-40	0x0328	内部位置 4 转数设定 Internal position 4 revolution setting	-32768~32767	pulse	55	☆
P3-41	0x0329	内部位置 4 脉冲设定 Internal position 4 pulse setting	-32768~32767	pulse	0	☆
P3-42	0x032A	内部位置 4 运行速度 Internal position 4 running speed	0~5000	rpm	1000	☆
P3-43	0x032B	内部位置 4 加减速时间 Internal position 4 acceleration and deceleration time	0~30000	ms	100	☆
P3-44	0x032C	内部位置 4 停顿时间 Internal position 4 pause time	0~30000	6ms	100	☆
P3-45	0x032D	内部位置 5 转数设定 Internal position 5 revolution setting	-32768~32767	pulse	60	☆

参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P3-46	0x032E	内部位置 5 脉冲设定 Internal position 5 pulse setting	-32768~32767	pulse	0	☆
P3-47	0x032F	内部位置 5 运行速度 Internal position 5 running speed	0~5000	rpm	1200	☆
P3-48	0x0330	内部位置 5 加减速时间 Internal position 5 acceleration and deceleration time	0~30000	ms	100	☆
P3-49	0x0331	内部位置 5 停顿时间 Internal position 5 pause time	0~30000	6ms	100	☆
P3-50	0x0332	内部位置 6 转数设定 Internal position 6 revolution setting	-32768~32767	pulse	0	☆
P3-51	0x0333	内部位置 6 脉冲设定 Internal position 6 pulse setting	-32768~32767	pulse	0	☆
P3-52	0x0334	内部位置 6 运行速度 Internal position 6 running speed	0~5000	rpm	0	☆
P3-53	0x0335	内部位置 6 加减速时间 Internal position 6 acceleration and deceleration time	0~30000	ms	100	☆
P3-54	0x0336	内部位置 6 停顿时间 Internal position 6 pause time	0~30000	6ms	100	☆
P3-55	0x0337	内部位置 7 转数设定 Internal position 7 revolution setting	-32768~32767	pulse	0	☆
P3-56	0x0338	内部位置 7 脉冲设定 Internal position 7 pulse setting	-32768~32767	pulse	0	☆
P3-57	0x0339	内部位置 7 运行速度 Internal position 7 running speed	0~5000	rpm	0	☆
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P3-58	0x033A	内部位置 7 加减速时间 Internal position 7 acceleration and deceleration time	0~30000	ms	100	☆
P3-59	0x033B	内部位置 7 停顿时间	0~30000	6ms	100	☆

		Internal position 7 pause time				
P3-60	0x033C	内部位置 8 转数设定 Internal position 8 revolution setting	-32768~32767	pulse	0	☆
P3-61	0x033D	内部位置 8 脉冲设定 Internal position 8 pulse setting	-32768~32767	pulse	0	☆
P3-62	0x033E	内部位置 8 运行速度 Internal position 8 running speed	0~5000	rpm	0	☆
P3-63	0x033F	内部位置 8 加减速时间 Internal position 8 acceleration and deceleration time	0~30000	ms	100	☆
P3-64	0x0340	内部位置 8 停顿时间 Internal position 8 pause time	0~30000	6ms	100	☆
P4 组 速度参数 Group P4, speed parameter						
P4-00	0x0400	速度指令来源 Speed instruction source	0~2	—	0	☆
P4-01	0x0401	模拟速度指令增益 Analogy speed instruction gain	0~1000	%	100	☆
P4-02	0x0402	模拟速度指令滤波系数 Analogy speed instruction filter coefficient	1~100	%	100	☆
P4-03	0x0403	模拟速度指令零飘补偿 Analogy speed instruction zero-offset compensation	-5.000~5.000	V	0.000	☆
P4-04	0x0404	模拟速度指令零位滞环阈值 Zero velocity hysteresis-loop threshold of analogy speed instruction	-5.000~5.000	V	0.050	☆
P4-05	0x0405	速度指令方向 Speed instruction direction	0~1	—	0	☆
P4-06	0x0406	速度加速时间 Speed acceleration time	0~30000	ms	100	☆
P4-07	0x0407	速度减速时间 Speed deceleration time	0~30000	ms	100	☆
P4-08 ~ P4-10	0x0408 ~ 0x040A	保留 Reserved	—	—	—	—
P4-11	0x040B	JOG 运行速度 JOG running speed	0~6000	rpm	100	☆
P4-12	0x040C	内部速度 1Internal speed 1	-5000~5000	rpm	10	☆
P4-13	0x040D	内部速度 2Internal speed 2	-5000~5000	rpm	50	☆

P4-14	0x040E	内部速度 3Internal speed 3	-5000~5000	rpm	100	☆
P4-15	0x040F	内部速度 4Internal speed 4	-5000~5000	rpm	500	☆
P4-16	0x0410	内部速度 5Internal speed 5	-5000~5000	rpm	0	☆
P4-17	0x0411	内部速度 6Internal speed 6	-5000~5000	rpm	0	☆
P4-18	0x0412	内部速度 7Internal speed 7	-5000~5000	rpm	0	☆
P4-19	0x0413	内部速度 8Internal speed 8	-5000~5000	rpm	0	☆
P5 组　力矩参数 Group P5, Torque parameter						
P5-00	0x0500	力矩指令来源 Torque instruction source	0~2	—	0	☆
P5-01	0x0501	模拟力矩指令增益 Analogy torque instruction gain	0~1000	%	100	☆
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
P5-02	0x0502	模拟力矩指令滤波系数 Analogy torque instruction filter coefficient	1~100	%	100	☆
P5-03	0x0503	模拟力矩零飘补偿值 Analogy torque　zero-offset compensation value	-5.000~5.000	V	0.000	☆
P5-04	0x0504	模拟力矩零位滞环阈值 Zero velocity hysteresis-loop threshold of analogy torque	-5.000~5.000	V	0.050	☆
P5-05	0x0505	力矩指令方向 Torque instruction direction	0~1	—	0	☆
P5-06	0x0506	力矩加速时间 Torque acceleration time	0~16000	ms	10	☆
P5-07	0x0507	力矩减速时间 Torque deceleration time	0~16000	ms	10	☆
P5-08	0x0508	保留 Reserved	—	—	—	—
P5-09	0x0509	保留 Reserved	—	—	—	—
P5-10	0x050A	力矩模式速度限制方式 Torque control mode speed limit mode	0~2	—	0	☆
P5-11	0x050B	力矩模式速度限制值 Torque control mode speed limit value	0~3000	rpm	2000	☆
P5-12	0x050C	保留 Reserved	—	—	—	—
P5-13	0x050D	力矩控制超速处理方式 Torque control overspeed	0~1	—	0	☆

		processing mode				
P5-14	0x050E	力矩控制超速允许时间 Torque control overspeed time allowed	0~10000	0.1ms	5000	☆
P5-15	0x050F	保留 Reserved	—	—	—	—
P5-16	0x0510	内部转矩 1 Internal torque 1	-300 ~300	%	100	☆
P5-17	0x0511	内部转矩 2 Internal torque 2	-300 ~300	%	100	☆
P5-18	0x0512	内部转矩 3 Internal torque 3	-300 ~300	%	100	☆
P5-19	0x0513	内部转矩 4 Internal torque 4	-300 ~300	%	100	☆
P6 组 通信参数 Group P6, communications parameters						
P6-00	0x0600	通讯站号设定 Setting for communication station number	0~32	—	1	★
P6-01	0x0601	通讯波特率设定 Settings for communication baud rate	0~6	bps	1	★
P6-02	0x0602	通讯字节数据结构 Communication byte data structure	0~8	—	6	★
P6-03	0x0603	保留 Reserved	—	—	—	—
P6-04	0x0604	通信协议 Communication protocol	0~1	—	0	★
P6-05	0x0605	通讯通道选择 Communication channel selection	0~1	—	0	☆
P6-06	0x0606	IO 输入选择 IO input selection	0~127	—	0	☆
P6-07	0x0607	通讯回复延时 Communication reply delay	0~32767	0.05ms	0	☆
P6-08	0x0608	保留 Reserved	—	—	—	—
P6-09	0x0609	软件输入 IO 信号值 Software input IO signal value	0~127	—	127	☆
P6-10	0x060A	保留 Reserved	—	—	—	—
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
A0 组 伺服油泵控制组 Group A0, servo oil pump control group						

A0-00	0x0900	油压控制方式 Oil pressure control mode	0~4	—	0	★
A0-01	0x0901	油压控制最高转速 Oil pressure control maximum speed	0~6000	rpm	2000	☆
A0-02	0x0902	系统油压 System oil pressure	0.1~300.0	kg/cm2	175.0	☆
A0-03	0x0903	最大油压 Maximal oil pressure	0.1~500.0	kg/cm2	250.0	☆
A0-04	0x0904	油压指令上升时间 Oil pressure instruction rise time	0~2000	ms	20	☆
A0-05	0x0905	卸压最大反向转速 Maximal back speed of pressure relief	0~6000	rpm	400	☆
A0-06	0x0906	底流 Underflow	0~500	rpm	10	☆
A0-07	0x0907	底压 Base pressure	0~600.0	kg/cm2	0.5	☆
A0-08	0x0908	压力控制切换最高转速 Maximum switching speed of pressure control	0~6000	rpm	200	☆
A0-09	0x0909	压力控制切换最低油压 Minimal switching oil pressure of pressure control	0.0~100.0	%	60.0	☆
A0-10	0x090A	压力控制切换延迟时间 Switching delay time of pressure control	0~9999	ms	50	☆
A0-11	0x090B	油压指令 S 滤波时间 Oil pressure instruction S-curre time	0~9999	ms	30	☆
A0-12	0x090C	油压控制 Kp1 Oil pressure control Kp1	0~800	—	210	☆
A0-13	0x090D	油压控制 Ki1 Oil pressure control Ki1	1~3000	—	100	☆
A0-14	0x090E	油压控制 Kd1 Oil pressure control Kd1	0~1000	—	0	☆
A0-15	0x090F	油压控制 Kp2 Oil pressure control Kp2	0~800	—	210	☆
A0-16	0x0910	油压控制 Ki2 Oil pressure control Ki2	1~3000	—	100	☆
A0-17	0x0911	油压控制 Kd2 Oil pressure control Kd2	0~1000	—	0	☆
A0-18	0x0912	油压控制 Kp3 Oil pressure control Kp3	0~800	—	210	☆
A0-19	0x0913	油压控制 Ki3Oil pressure control Ki3	1~3000	—	100	☆
A0-20	0x0914	油压控制 Kd3	0~1000	—	0	☆

Parameter item	Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
		Oil pressure control Kd3				
A0-21	0x0915	油压控制 Kp4 Oil pressure control Kp4	0~800	—	210	☆
A0-22	0x0916	油压控制 Ki4 Oil pressure control Ki4	1~3000	—	100	☆
A0-23	0x0917	油压控制 Kd4 Oil pressure control Kd4	0~1000	—	0	☆
A0-24	0x0918	厂家参数 Manufacturer parameter	—	—	—	*
A0-25	0x0919	厂家参数 Manufacturer parameter	—	—	—	*
A0-26	0x091A	厂家参数 Manufacturer parameter	—	—	—	*
A0-27	0x091B	压力超调抑制系数 Pressure overshoot damping coefficient	700~1000	—	1000	☆
A0-28	0x091C	厂家参数 Manufacturer parameter	—	—	—	*
参数项 Parameter item	通信地址 Communication address	名称 Name	参数范围 Range of the parameter	单位 Unit	出厂值 Factory value	属性 Attribute
A0-29	0x091D	厂家参数 Manufacturer parameter	—	—	—	*
A1 组 模拟输入参数 Group A1, analog input parameter						
A1-00	0x0A00	AI1 最小输入电压 AI1 minimal input voltage	-11.00~11.00	V	0.02	★
A1-01	0x0A01	AI1 最小输入对应设定 AI1 minimal input corresponding setting	-100.0~100.0	%	0.0	★
A1-02	0x0A02	AI1 最大输入电压 AI1 maximal input voltage	-11.00~11.00	V	10.00	★
A1-03	0x0A03	AI1 最大输入对应设定 AI1 maximal input corresponding setting	-100.0~100.0	%	100.0	★
A1-04	0x0A04	AI2 最小输入电压 AI2 minimal input voltage	-11.00~11.00	V	0.02	★
A1-05	0x0A05	AI2 最小输入对应设定 AI2 minimal input corresponding setting	-100.0~100.0	%	0.0	★
A1-06	0x0A06	AI2 最大输入电压 AI2 maximal input voltage	-11.00~11.00	V	10.00	★
A1-07	0x0A07	AI2 最大输入对应设定 AI2 maximal input corresponding setting	-100.0~100.0	%	100.0	★
A1-08	0x0A08	AI3 最小输入电压	-11.00~11.00	V	0.02	★

		AI3 minimal input voltage				
A1-09	0x0A09	AI3 最小输入对应设定 AI2 minimal input corresponding setting	-100.0~100.0	%	0.0	★
A1-10	0x0A0A	AI3 最大输入电压 AI3 maximal input voltage	-11.00~11.00	V	10.00	★
A1-11	0x0A0B	AI3 最大输入对应设定 AI2 maximal input corresponding setting	-100.0~100.0	%	100.0	★
A1-12	0x0A0C	AI1 滤波时间 AI1 filter time	1~1000	ms	10	☆
A1-13	0x0A0D	AI2 滤波时间 AI2 filter time	1~1000	ms	10	☆
A1-14	0x0A0E	AI3 滤波时间 AI3 filter time	1~1000	ms	1	☆
A1-15	0x0A0F	AI1 零偏补偿 AI1 zero offset compensation	-8192~8192	—	0	☆
A1-16	0x0A10	AI2 零偏补偿 AI2 zero offset compensation	-8192~8192	—	0	☆
A1-17	0x0A11	AI3 零偏补偿 AI3 zero offset compensation	-8192~8192	—	0	☆
A1-18	0x0A12	厂家参数 Manufacturer parameter	—	—	—	*
A1-19	0x0A13	厂家参数 Manufacturer parameter	—	—	—	*
A1-20	0x0A14	厂家参数 Manufacturer parameter	—	—	—	*
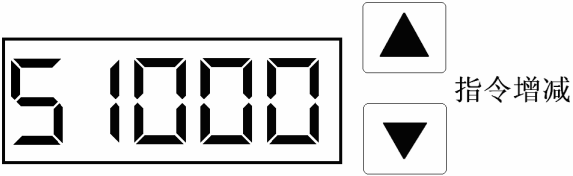
第六章 参数说明 Chapter VI   Parameter Description

6.1 设置参数详解 Detailed annotation for the set parameters

Fn   功能参数组 Functional parameter group

参数符号	名称 Name	说明 Description

Parameter symbol		
Fn-SEt	保存参数 Save parameter	将参数保存至非易失性内存中，实现参数的永久保存，当保存完成后，不受断电影响。再次上电后可以使用已修改的参数。操作方法：进入菜单"Fn-"选择"Fn- SEt"，按住"ENTER"键不放，直到显示"StArt"，松开按键，等到显示"donE"后，操作成功，若显示"Error"，则操作失败，再保存一次。 Save parameter in to NVRAM to realize permanent storage of parameter. After saved, it will not affected by power cut. After power on again, you can use the already modified parameter. Method of operation: Enter into menu "Fn -" to select "Fn - SEt", hold down "ENTER" key till "StArt" is displayed and then release the key. Wait until "donE" is displayed, which means that operation succeeds. If "Error" is displayed, then operation fails. Save it once again.
Fn-dEF	恢复出厂参数 Restore factory parameter	在适配新电机调试时，或出现参数混乱等情况，原因不详时可以通过恢复缺省值（即出厂值），将参数表中的参数恢复至出厂缺省值。During debugging of the adaptive new motor, the parameter disorder and other situations may appear, the reason of which is unclear. You can restore parameters in parameter table to factory default values by resetting values (namely factory value) 恢复出厂参数操作步骤：对照驱动器电机适配表（见附录），设置电机型号参数"P0-01"，然后进入菜单"Fn-"选择"Fn-dEF"，按住"ENTER"键不放，直到显示"StArt"，松开按键，等到显示"donE"后，再重新上电即可。Operation steps for resetting factory parameters: Set motor type parameter "P0 - 01" by contrasting the adaptive table of driver motor (see Annex), and then enter into menu " Fn - " to select "Fn - dEF", Hold down "ENTER" key till " StArt " is displayed and then release this key. After waiting until "donE" is displayed, power on over again.
Fn-Sr	速度试运行 Sr operation	进入菜单"Fn-"选择"Fn- Sr"，按"ENTER"键进入速度试运行模式，"RUN"键使能伺服驱动器。速度指令由按键提供，用"△、▽"键改变速度指令，电机按给定的速度运行。正数表示正转（CCW），负数表示反转（CW），最小给定速度是1rpm。 Enter into menu "Fn -" to select "Fn - Sr", hold down "ENTER" key to enter into speed test run mode, use "RUN" key to enable the servo driver. The speed instruction is provided by the keys. Using "△、▽" keys to change speed instruction will have the motor run according to the given speed. The positive number means positive rotation (CCW). The negative number means reversal (CW). The minimal given speed is 1rpm.

		  指令增减 Instruction increase and decrease
Fn-JoG	JOG 寸动运行 JOG operation	进入菜单"Fn-"选择 "Fn- JoG"，按"ENTER" 键进入 JOG 运行模式，"RUN"键使能伺服驱动器。按下"△"键并保持，电机按 JOG 速度正转（CCW）运行，松开按键，电机停转，保持零速；按下"▽"键并保持，电机按 JOG 速度反转（CW）运行，松开按键电机停转，保持零速。点动运行速度由参数"P4-11"设置。 Enter into menu "Fn -" to select "Fn - JoG", hold down "ENTER" key to enter into JOG running mode, use "RUN" key to enable the servo driver. Holding down "△" key without release will have the motor perform positive rotation running (CCW) according to JOG speed. Releasing this key will have the motor stall and keep zero speed. Holding down "▽" key without release will have the motor perform reversal running (CW) according to JOG speed. Releasing this key will have the motor stall and keep zero speed. The operation speed is set by parameter "P4 - 11".
Fn-AI1	模拟速度零偏补偿/模拟输入油压指令零偏补偿 Analogy speed zero offset compensation / analog input oil pressure instruction zero offset compensation	模拟速度方式零偏补偿。在模拟速度模式下，当用户给定的模拟量电压为零电压时，一般会存在共地电压差，这时使用零偏补偿功能可以将这一电压差消除。自动调零操作如下：进入"Fn-"菜单，选择"Fn-AI1"，按"ENTER" 键，等待显示"donE"，补偿完成，驱动器自动将补偿值写入到参数"P4-03"。 Analogy speed mode zero offset compensation: Under analogy speed mode, when analog quantity voltage given by user is zero voltage, common-ground voltage difference would exist generally. Here using the zero offset compensation function can eliminate this voltage difference. The automatic zero setting operation is as follows: Enter into "Fn -" menu to select "Fn - AI1", Hold down "ENTER" key to wait until "donE" is displayed. The compensation is completed. The driver automatically writes the compensation value into parameter "P4 - 03".
		压力闭环控制方式下（P0-04=6），用于自动设定模拟输入油压指令（AI1 通道）零偏补偿值，操作同上，补偿完成后补偿值自动写入参数"A1-15"。 Under pressure closed-loop control mode (P0 - 04 = 6), it is used to automatically set the analog input oil pressure instruction (AI1 channel) zero offset compensation value. The operation is as above. After compensation is completed, the compensation value will be automatically written into parameter "A1 - 15".
Parameter symbol	名称 Name	说明 Description

参数符号 Parameter symbol	名称 Name	说明 Description
Fn-AI2	模拟力矩零偏补偿 /模拟输入流量指令零偏补偿 Analogy torque zero offset compensation / analog input flowrate instruction zero offset compensation	模拟力矩方式零偏补偿。在模拟力矩模式下，当用户给定的模拟量电压为零电压时，一般会存在共地电压差，这时使用零偏补偿功能可以将这一电压差消除。自动调零操作如下：进入"Fn-"菜单，选择"Fn-AI2"，按"ENTER"键，等待显示"donE"，补偿完成，驱动器自动将补偿值写入到参数"P5-03" Zero offset compensation under analogy torque mode: Under analogy torque mode, when analog quantity voltage given by user is zero voltage, common-ground voltage difference would exist generally. Here using the zero offset compensation function can eliminate this voltage difference. The automatic zero setting operation is as follows: Enter into "Fn -" menu to select "Fn - AI2", Hold down "ENTER" key to wait until "donE" is displayed. The compensation is completed. The driver automatically writes the compensation value into parameter " P5 - 03".
		压力闭环控制方式下（P0-04=6），用于自动设定模拟输入流量指令（AI2 通道）零偏补偿值，操作同上，补偿完成后补偿值自动写入参数"A1-16"。 Under pressure closed-loop control mode (P0 - 04 = 6), it is used to automatically set the analog input flowrate instruction (AI2 channel) zero offset compensation value. The operation is as above. After compensation is completed, the compensation value will be automatically written into parameter "A1 - 16".
Fn-AI3	模拟输入油压反馈零偏补偿 Analog input oil pressure feedback zero offset compensation	压力闭环控制方式下（P0-04=6），用于自动设定模拟输入油压反馈（AI3 通道）零偏补偿值，操作同上，补偿完成后补偿值自动写入参数"A1-17"。 Under pressure closed-loop control mode (P0 - 04 = 6), it is used to automatically set the analog input oil pressure feedback (AI3 channel) zero offset compensation value. The operation is as above. After compensation is completed, the compensation value will be automatically written into parameter "A1 - 17".
Fn-Err	历史报警信息 Historical alarm information	该参数存储最近的 5 次报警信息，进入"Fn-"菜单，选择"Fn- Err"，按"ENTER"键显示最新的一次报警"0 – A.＿＿"，用"△、▽"键切换报警信息。 The recent 5 times of alarm information are stored in this parameter. Enter into "Fn -" menu to select "Fn - Err". Hold down "ENTER" key to display recent alarm "0–C A.＿＿" and use "△、▽" key to switch alarm information.

P0 基本功能组 Basic function group

参数符号 Parameter symbol	名称 Name	说明 Description
P0-00	密码 Password	用户密码为 288，可以查看及修改 P0~P6 段参数。The user password is 288. The user can view and modify parameters in P0 ~ P6 segments.

		密码错误只能访问 P0 段参数。The password error can only access parameters in P0 segment.
P0-01	电机型号 Motor type	按照《电机适配表》（附录）设置电机对应的型号代码，然后可以恢复与该电机相关参数的出厂值。 Set corresponding model code of motor according to "adaptive table of motor" (annex) and then you can restore factory values of relevant parameters of this motor
P0-02	软件版本 Software version	驱动器软件版本号，只读参数不能修改。Driver software version number is a read-only parameter which cannot be modified.
P0-03	初始显示状态 Initial display status	选择驱动器上电后数码管的显示状态：Digitron display status after power-on of selected driver:

选择驱动器上电后数码管的显示状态：Digitron display status after power-on of selected driver:

0: 电机转速 Motor speed	16: 转子绝对位置 Absolute position of rotor
1: 当前位置低 5 位 Low 5 bits of current position	17: 编码器 UVW 信号 UVW signal of encoder
2: 当前位置高 5 位 High 5 bits of current position	18: 机型代码 Machine type code
3: 位置指令低 5 位 Low 5 bits of position instruction	19: 报警代码 Error code
4: 位置指令高 5 位 High 5 bits of position instruction	20: 保留 Reserved
5: 位置偏差低 5 位 Low 5 bits of position deviation	21: 保留 Reserved
6: 位置偏差高 5 位 High 5 bits of position deviation	22: 编码器校零脉冲 Zero calibration pulse of encoder
7: 电机转矩 Motor torque	23: 绝对值编码器报警信息 Alarm information of absolute value encoder
8: 电机电流 Motor current	24: 多圈绝对值编码器圈数信息 Information on number of turns of multiple turn absolute value encoder
9: 输入端子状态高三位 High 3 bits of input terminal status	25: 驱动器温度 Driver temperature
10: 输入端子状态低四位 Low 4 bits of input terminal status	26: 母线电压 DC-Bus voltage

Parameter symbol	名称 Name	说明 Description		
P0-04		11: 输出端子状态 Output terminal status	27: 外部位置反馈低 5 位 Low 5 bits of external position feedback	
		12: 控制模式 Control mode	28: 外部位置反馈高 5 位 High 5 bits of external position feedback	
		13: 位置指令脉冲频率 Frequency of position instruction pulse	29: 压力给定 Pressure given	
		14: 速度指令 Speed instruction	30: 压力反馈 Pressure feedback	
		15: 转矩指令 Torque instruction	31: 流量给定 Flowrate given	

Parameter symbol	名称 Name	说明 Description	
P0-04	控制模式选择 Control mode	设置驱动器的控制模式：Setting control mode of driver:	
		0:位置控制模式 Position control mode	4:速度、力矩控制模式 Control mode of speed and torque
		1:速度控制模式 Speed control mode	5:位置、力矩控制模式 Control mode of position and torque
		2:力矩控制模式 Torque control mode	6:压力闭环控制模式 Pressure closed-loop control mode
		3:位置、速度控制模式 Control mode of position and speed	7:位置闭环控制模式 Position closed-loop control mode
P0-05	速度比例增益 Speed proportional gain	● 速度比例增益越大，伺服刚度越大，速度响应越快，但过大容易产生振动、发出噪声。The larger the speed proportional gain, the larger the servo rigidity, the quicker the speed response, but oversize proportional gain is easy to generate vibration and noise. ● 在系统不产生震荡的条件下，尽量增大此参数值。On the premise that system does not generate vibration, maximize this parameter value.	
P0-06	速度积分时间常数 Integrating time constant of speed	● 速度调节器积分时间常数，设置值越小，积分速度越快，刚度越大，过小容易产生振动、发出噪声。For the integrating time constant of speed controller, the smaller the set value, the quicker the integrating rate, the larger the rigidity. Too small set value is easy to generate vibration and noise.	

P0-07		● 在系统不出现震荡的情况下，尽量降低此参数值。In the case that system does not generate vibration, minimize this parameter value.
P0-07	转矩指令滤波器 Torque instruction filter	● 设定转矩指令滤波器特性，可以抑制转矩产生的共振（电机出现振动、发出尖锐的噪声）。Setting the torque instruction filter characteristic can restrain resonance generated by torque (motor generates vibration and sharp noise). ● 如果电机出现振动、发出尖锐的噪声，请降低本参数值。If motor generates vibration and sharp noise, please reduce this parameter value. ● 数值越小，截止频率越低，电机发出的噪音越低。如果负载惯量很大，可以适当降低参数设定值。但数值太小，会造成响应变慢，可能不稳定。The smaller the value, the lower the cut-off frequency, the lower the noise generated by motor. If load inertia is very large, you can appropriately reduce the parameter setting value, but too small value would make response slow and possibly cause instability. ● 数值越大，截止频率越高，响应加快。如果需要较高的机械刚性，可以适当提高参数设定值。The larger the value, the higher the cut-off frequency, the quicker the response. If you need higher mechanical rigidity, you can appropriately increase the parameter setting value.
P0-08	速度检测低通滤波器 Speed detection low-pass filter	● 设定速度检测低通滤波器特性。Set the speed detection low-pass filter feature ● 数值越小，截止频率越低，电机发出的噪音越低。如果负载惯量很大，可以适当降低参数值。但数值太小，造成响应变慢，可能会引起震荡。The smaller the value, the lower the cut-off frequency, the lower the noise generated by motor. If load inertia is very large, you can appropriately reduce the parameter value. But too small value would make response slow and possibly cause vibration. ● 数值越大，截止频率越高，速度反馈响应越快。如果需要较高的速度响应，可以适当提高参数设定值。The larger the value, the higher the cut-off frequency, the quicker the speed feedback response. If you need higher speed response, you can appropriately increase the parameter setting value.
P0-09	位置比例增益 Proportional gain of position	位置环调节器的比例增益，参数值越大，增益比例越高，刚度越大，位置跟踪误差越小，响应加快。但参数过大容易引起振动和超调。Proportional gain of position loop regulator: The larger the parameter value, the higher the gain proportion, the larger the rigidity, the smaller the position tracking error, the quicker the response. But oversize parameter is easy to cause vibration and overshooting.
P0-10	位置前馈增益 Feed-forward gain of position	● 位置环的前馈增益，参数值越大，系统位置跟踪误差越小，响应加快。设定为 100%时，表示任何频率的指令脉冲下，位置滞后量总是为 0。Feed-forward gain of position loop: The larger the parameter value, the smaller the system position tracking error, the quicker the response. When

Parameter symbol	名称 Name	说明 Description
		set as 100%, it means that position lagging amount is always 0 under instruction pulse of any frequency. ● 位置环的前馈增益比例过大，会使系统的位置环不稳定，容易产生震荡，位置环的前馈增益比例通常为 0。Oversize feed-forward gain proportion of position loop would make systemic position loop instable and be easy to generate vibration. The feed-forward gain proportion of position loop is usually 0.
P0-11	位置前馈低通滤波器截止频率 Cut-off frequency for feed-forward low-pass filter of position	位置环前馈量的低通滤波器截止频率，作用是增加复合位置控制的稳定性。The cut-off frequency for feed-forward low-pass filter of position loop plays a role in increasing stability of composite position control.
P0-12	第一电子齿轮比分子 The first electronic gear ratio numerator	以增量式编码器为例：The increment type encoder is exampled: ● 在位置控制模式下，对位置指令脉冲进行分频或倍频，方便与各种脉冲源相匹配，以达到用户需要的脉冲分辨率。Under position control mode, perform frequency division or frequency doubling for position instruction pulse to facilitate matching with all kinds of pulse sources so as to achieve pulse resolution ratio required by user. ● P×G=N×C×4 P：输入指令脉冲数 Input instruction pulse number
P0-13	第一电子齿轮比分母	G：电子齿轮比 Electronic gear ratio $G=\dfrac{P0\text{-}12}{P0\text{-}13}$ N：电机旋转圈数 Motor rotating number of turns C：光电编码器线数/转，本系统 C=2500 Optical electricity encoder's number of wires / turn, C = 2500 in this system ● 推荐范围为：The recommendation scope is: 1/50≤G≤50。
Parameter symbol	名称 Name	说明 Description
P0-14	位置指令脉冲输入方式 Input mode of position instruction pulse	设置位置指令脉冲的输入形式：Set the input form of position instruction pulse: 0：脉冲+符号 Pulse + symbol 1：CCW 脉冲/CW 脉冲 CCW pulse / CW pulse 2：两相正交脉冲 Two-phase orthogonal pulse
P0-15	位置指令脉冲方向 Direction of position instruction pulse	用于调整计数方向：Used for adjusting count direction: 0：正常。Normal. 1：方向反向。Inverse direction.
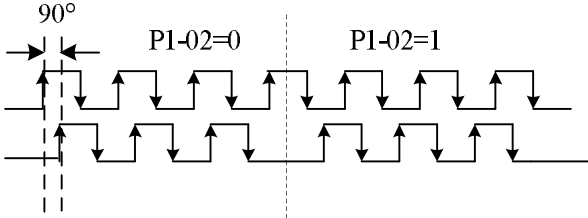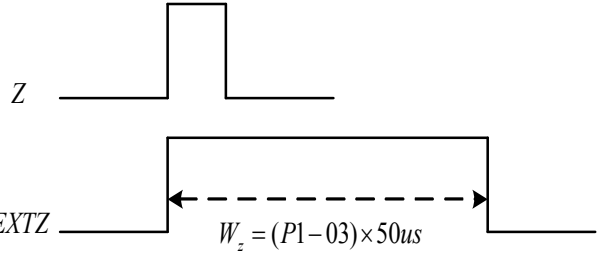
		设置脉冲输入信号 PULS、DIR 相位, 用来调整计数沿。Set the phase positions of pulse input PULS and DIR, used to adjust count edge.

| **P0-16** | 位置指令脉冲信号逻辑 Signal logic of position instruction pulse | |

P0-16	PULSE	DIR
0	同相 Inphase	同相 Inphase
1	反相 Antiphase	同相 Inphase
2	同相 Inphase	反相 Antiphase
3	反相 Antiphase	反相 Antiphase

P0-18	速度指令滤波时间常数 Filter time constant of speed instruction	• 设定速度指令滤波器特性。Set the speed instruction filter characteristic. • 如果电机出现振动、发出尖锐的噪声, 请降低本参数值。If motor generates vibration and sharp noise, please reduce this parameter value. • 数值越小, 截止频率越低, 电机发出的噪音越低。如果负载惯量很大, 可以适当降低参数设定值。但数值太小, 会造成响应变慢, 可能不稳定。The smaller the value, the lower the cut-off frequency, the lower the noise generated by motor. If load inertia is very large, you can appropriately reduce the parameter setting value. But too small value would make response slow and possibly cause instability. • 数值越大, 截止频率越高, 响应加快。如果需要较高的机械刚性, 可以适当提高参数设定值。The larger the value, the higher the cut-off frequency, the quicker the response. If you need higher mechanical rigidity, you can appropriately increase the parameter setting value.

P0-19	位置指令平滑滤波器 Smoothing filter of position instruction	• 对指令脉冲进行平滑滤波, 具有指数形式的加减速。Perform smoothing filtering for instruction pulse, with acceleration and deceleration in the exponential form. • 滤波器不会丢失输入脉冲, 但会出现指令延迟现象。The filter would not lose input pulse, but instruction delay phenomenon would appear. • 此滤波器用于: This filter is used for: 1、 控制器无加减速功能 Controller is not provided with acceleration and deceleration functions 2、 电子齿轮分倍频较大 Sub-frequency doubling of electronic gear is biggish （>10） 3、 指令频率较低 Instruction frequency is quite low 4、 电机运行时出现步进跳跃、不平衡现象 The stepping jump and unbalanced phenomena appears when motor runs • 当设置为 0 时, 滤波器不起作用。When set as 0, the filter will be inoperative.

脉冲滤波指令频率 Pulse filtering instruction frequency,

滤波后滤波指令频率 post-filtering's filtering instruction frequency,

时间 time

Parameter symbol	名称 Name	说明 Description
P0-20	驱动禁止输入无效 Driving inhibiting input invalidation	0：使用 CCW、CW 输入禁止。Use CCW and CW input inhibit. 1：忽略 CCW、CW 输入禁止。Neglect CCW and CW input inhibit.
Parameter symbol	名称 Name	说明 Description
P0-23	最高速度限制 Maximum speed limitation	● 设置伺服电机的最高限速。Set maximal speed limit of servomotor. ● 与旋转方向无关，如果设置值超过额定转速，则实际最高限速为额定转速。Unrelated to direction of rotation. If the set value exceeds rated speed, actual maximal speed limit is the rated one.
P0-24	转矩限制选择 Torque limitation selection	0：基本限制，由信号 TCCW、TCW 决定是否受外部转矩限制。此外在速度模式下还受到参数 P0-29 的限制。Basic limitation: The TCCW and TCW signals decide whether it is limited by external torque. In addition, under speed mode, it will also be limited by parameter P0 - 29. TCCW=ON：受 P0-27、P0-25 限制 TCCW = ON: limited by P0 - 27, P0 - 25 TCCW=OFF：受 P0-25 限制 TCCW = OFF: limited by P0 - 25 TCW=ON：受P0-28、P0-26 限制 TCW = ON: limited by P0 - 28, P0 - 26 TCW=OFF：受 P0-26 限制 TCW = OFF: limited by P0 - 26 1：基本限制+模拟转矩限制。除了受基本限制之外，还受模拟转矩限制。（此限制不分方向） Basic limitation + analogy torque limitation: Besides basic limitation, it will also be limited by analogy torque. (irrespective of direction in this limitation) 2：基本限制+内部转矩限制。除了受基本限制之外，还受内部转矩限制，内部转矩由 TRQ1、TRQ2 信号决定，参考 6.2 章节。Basic limitation + internal torque limitation: besides basic limitation, it will also be limited by internal torque. The internal torque is decided by TRQ1 and TRQ2 signals. For details, refer to Section 6.2. 注：有多个限制发生时，最终限制值是绝对值较小的数值。Note: When multiple

参数符号 Parameter symbol	名称 Name	说明 Description
		limitations occur, final limitation value is that with smaller absolute value. P0-25、P0-26 在任何时候都有效。P0 - 25 and P0 - 26 are valid anytime. 如果设置值超过了系统允许的最大转矩，则实际转矩会限制在最大转矩。If the set value exceeds maximum torque allowed by system, then actual torque will be limited at maximum torque.
P0-25	内部 CCW 转矩限制	设置伺服电机 CCW、CW 方向的内部转矩限制值，设置值是额定转矩的百分比，任何时候，这个限制都有效。Set internal torque limitation values of servomotor CCW and CW directions. The set value is the percentage of rated torque. This limitation is valid at any time.
P0-26	内部 CW 转矩限制 Internal CW torque limitation	
P0-27	外部 CCW 转矩限制 External CCW torque limitation	设置伺服电机 CCW、CW 方向的外部转矩限制值，设置值是额定转矩的百分比。Set external torque limitation values of servomotor CCW and CW directions. The set value is the percentage of rated torque.
P0-28	外部 CW 转矩限制 External CW torque limitation	
P0-29	速度试运行、JOG 运行转矩限制 Speed test run, JOG running torque limitation	● 设置在速度试运行、JOG 运行方式下的转矩限制值，与旋转方向无关，双向有效。Set the torque limitation value under speed test run and JOG run mode, unrelated to direction of rotation, valid on two-direction. ● 设置值是额定转矩的百分比，例如设定为额定转矩的 1 倍，则设置值为 100，内外部转矩限制仍有效。The set value is the percentage of rated torque. For example, if it is set as double of rated torque, then the set value will be 100. The internal and external torque limitations are still valid.
P0-30	强制使能 Forcibly enabled	P0-30=3：只有当 SV_EN 信号 ON 时，电机才被使能。The motor can be enabled only when SV_EN signal is ON. P0-30=2：软件强制使能。Forcibly enabled by software.

P1 辅助功能组 Auxiliary function group

参数符号 Parameter symbol	名称 Name	说明 Description

P1-00	分频电子齿轮比分子 Frequency division electronic gear ratio numerator	以增量式光电编码器为例：The increment type photoelectric encoder is exampled: 位置反馈脉冲输出分频比，当 P1-00>P1-01 时，按 1:1 分频输出。Frequency dividing ratio for position feedback pulse output: When P1 - 00>P1 - 01, it will be outputted according to 1:1 frequency division.
P1-01	分频电子齿轮比分母 Frequency division electronic gear ratio denominator	编码器反馈脉冲电子齿轮比 $= \dfrac{N}{M} = \dfrac{P1\text{-}00}{P1\text{-}01}$，以 2500 线码盘为例，$\dfrac{N}{M} = \dfrac{2000}{2500}$，即电机每转一转，驱动器输出 2000 个脉冲 Encoder's feedback pulse electronic gear ratio $= \dfrac{N}{M} = \dfrac{P1\text{-}00}{P1\text{-}01}$. If 2500 wire coded disk is exampled, $\dfrac{N}{M} = \dfrac{2000}{2500}$, namely each time motor rotates one turn, driver will output 2000 pulses.
P1-02	位置反馈脉冲方向取反 Negation of position feedback pulse direction	位置反馈脉冲方向：Position feedback pulse direction: 0：CN1 中位置反馈输出信号 EXTA、EXTB 的相位关系不变； The phase relation for position feedback output signal EXTA and EXTB in CN1 is unchanged; 1：CN1 中位置反馈输出信号 EXTA、EXTB 的相位关系取反。The phase relation for position feedback output signal EXTA and EXTB in CN1 is of negation. 如图所示：As shown in the diagram:
P1-03	Z 脉冲扩宽 Z-pulse broadening	设置零位脉冲的宽度，零位脉冲的宽度随电机的转速升高而减小，根据实际运行情况调整零位脉冲宽度，方便与各种上位机匹配。Set the zero position pulse width, which is decreased along with speed-rise of motor. Adjust the zero position pulse width according to actual operational aspect to facilitate matching with all kinds of upper computers. $W_z = (P1-03) \times 50us$

P1-07	故障清除次数限制 Limit for fault clearance times	设置报警清除的次数，通过 RSTSV 信号可以清除报警，当操作次数超过此参数设置值时，则报警不能清除。（注：只有部分报警可以清除）Set the alarm clearance times. The alarm can be cleared away through RSTSV signal. When operation times exceed this parameter setting value, then alarm will be unable to be cleared away. (Note: Only partial alarms can be cleared away)
P1-08	欠压报警延时时间 Undervoltage alarm delay time	从检测到欠压信号到报警输出的延时时间。Delay time from undervoltage signal detected to the alarm output.
P1-09	使能延时时间 Delay time of enabling	从外部使能信号输入到驱动器使能的延时时间。Delay time from external enabling signal input to driver enabled.
P1-16	电磁制动零速度检测点 Detection point of electromagnetic braking zero speed	该参数仅用于电磁制动器时序判断，当电机运行速度（与方向无关）低于此参数设定值时，认为电机速度为零，电机静止。（参考 BRK 信号输出）This parameter is only used for temporal order judgment of electromagnetic brake. When motor running speed (unrelated to direction) is lower than this parameter setting value, it will be considered as zero speed and quiescence of motor. (refer to BRK signal output)
P1-17	电机静止时电磁制动延迟时间 Electromagnetic braking delay time during motor quiescence	● 当系统从使能状态变化到不使能或发生报警时，定义电机静止期间（电机速度<P1-16）从电磁制动（DO 输出端子 BRK OFF）到电机电流切断的延时时间。When system changes from enabling status to disenabling status or generating alarm, define the delay time of quiescent period of motor (motor speed <P1 - 16) from electromagnetic braking (DO output terminal BRK OFF) to motor current cut-off. ● 此参数是使制动器可靠制动后再切断电流，避免电机的微小位移或工作跌落。参数不应小于机械制动的延迟时间。This parameter is to ensure that current will be cut off after the brake reliably brakes to avoid infinitesimal displacement or work fall of motor. This parameter shall not be less than delay time of mechanical braking. ● 相应的时序参考 BRK 信号输出。 For corresponding time sequence, refer to BRK signal output.
P1-18	电机运转时电磁制动延迟时间 Electromagnetic braking delay time during motor running	● 当系统从使能状态变化到不使能或发生报警时，定义电机运行期间（电机运行速度≥P1-16）从电机电流切断到电磁制动器制动（DO 输出端子 BRK OFF）的延迟时间。When system changes from enabling status to disenabling status or generating alarm, define the delay time from motor current cut-off to braking of electromagnetic brake (DO output terminal BRK OFF) during motor running. ● 此参数是使电机从高速旋转状态减速为低速后，再让制动器制动，避免损坏制动器。This parameter is to ensure that the brake will brake after high speed rotation is decelerated to low speed to avoid damaging the brake. ● 实际动作时间是 P1-18 或电机减速到 P1-19 数值所需时间，取两者中的最小值。The actual actuation time is the required lime when P1 - 18 or
P1-19	电机运转时电磁制动动作速度 Electromagnetic braking actuation speed during motor running	

参数符号 Parameter symbol	名称 Name	说明 Description
		motor is decelerated to P1 -19 value, whichever is smaller. ● 相应时序参考 BRK 信号输出。
P1-20	零速度检测点 Detection point at zero speed	● 当电机运行速度低于此参数设置速度，并保持一定时间（零速度检测时间由参数 P1-21 设置），驱动器输出零速信号 ZPS。When motor running speed is lower than this parameter setting and keeps for a certain time (The zero speed detection time is set by parameter P1 - 21), the driver will output zero-speed signal ZPS.
P1-21	零速度检测时间 Detection time at zero speed	
P1-24	定位完成范围 Positioning completion scope	位置控制模式下，当位置偏差计数器内的剩余脉冲数小于或等于本参数设定值时，驱动器认为定位已完成，定位完成信号 SV_F 输出 ON，否则 SV_F 输出 OFF。Under position control mode, when residual pulse number in the position deviation counter is less than or equal to this parameter setting value, the driver believes that positioning is already completed. The positioning completion signal SV_F will output ON, otherwise it will output OFF.

参数符号 Parameter symbol	名称 Name	说明 Description
P1-25	位置超差检测范围 Detection range for overproof position	● 位置超差报警检测范围，在位置控制模式下，当位置偏差计数器的计数值超过本参数时，伺服驱动器给出位置超差报警。Detection range for overproof position alarm: Under position control mode, when count value in the position deviation counter exceeds this parameter, the servo driver will give out an overproof position alarm. ● 设为 0 时，不报警。When set as 0, it will not give an alarm.
P1-28	速度到达信号阈值 Speed reaches signal threshold	● 设置到达速度，与旋转方向无关，比较器具有迟滞特性。Set the arrival speed, unrelated to the direction of rotation, with comparator characterized by hysteresis. ● 在速度控制模式下，如果电机的速度超过本设定值，则 SV_S 输出 ON，否则 SV_S 输出 OFF。Under speed control mode, if motor speed exceeds this setting value, then SV_S will output ON, otherwise it will output OFF.
P1-29	速度超差检测阈值 Detection threshold for overproof speed	● 速度超差报警检测范围，在速度控制模式下，当速度偏差计数器的计数值超过本参数时，伺服驱动器给出速度超差报警。Detection range for overproof speed alarm: Under speed control mode, when count value in the speed deviation counter exceeds this parameter, the servo driver will give out an overproof speed alarm. ● 设为 0 时，不报警。When set as 0, it will not give an alarm.
P1-32	转矩到达信号阈值 Torque reaches signal threshold	当电机运行实际转矩达到该设定值，并保持一定时间（转矩到达滤波时间），SV_T 输出 ON，否则 SV_T 输出 OFF。

参数符号 Parameter symbol	名称 Name	说明 Description
P1-33	转矩到达滤波时间 Torque reaches filter time	When actual torque of motor running reaches this setting value and keep for a certain time (time for torque to reach filtering), SV_T will output ON, otherwise it will output OFF.
P1-34	转矩过载报警水平 Torque overload alarm level	当转矩指令超过 P1-34 设置值，并保持 P1-35 设置的时间，则驱动器输出 Err9 报警（转矩指令超限）。
P1-35	转矩过载报警检测时间 Torque overload alarm detection time	When torque instruction exceeds the set value of P1 - 34 and keep the set time of P1 - 35, then the driver will output an Err9 alarm (torque instruction ultralimit).
P1-38	开启风扇温度 Fan turn-on temperature	设置风扇开启时的温度。Set the fan turn-on temperature.

P2 IO 功能组 IO function group
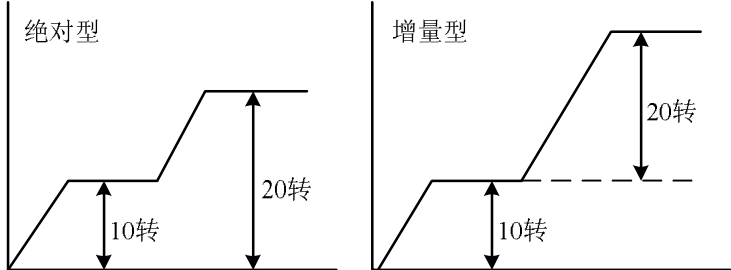
参数符号 Parameter symbol	名称 Name	说明 Description
P2-00	数字输入滤波时间 Digital input filter time	环境噪声较大时，提升设定值可增加控制可靠性。若数值太大时，将影响响应时间。When environment noise is biggish, enlarging the setting value can increase control reliability. If value is too large, it will affect response time.
P2-01 ~ P2-08	数字输入 DIn 功能定义 Digital input DIn functional definition	数字输入 IO 功能设置，参考 6.2 章节，设置为 0 时没有任何功能。For setting of digital input IO function, refer to Section 6.2. When set as 0, it will be free of any function.
P2-09	数字输入低四位取反 Negation for low 4 bits of digital input	二进制显示，位对应，相应的位为 1 时取反：Binary system display, bits are corresponding. When the corresponding bit is 1, negation will be performed: |	bit3	bit2	bit1	bit0
---	---	---	---	---
	DI4	DI3	DI2	DI1
DI1、DI2 取反 Negation for DI1 and DI2	0	0	1	1	
P2-10	数字输入高四位取反 Negation for high 4 bits of digital input	二进制显示，位对应，相应的位为 1 时取反： Binary system display, bits are corresponding. When the corresponding bit is 1, negation will be performed: |	bit3	bit2	bit1	bit0
---	---	---	---	---
	保留	DI7	DI6	DI5	

		Reserved			
	DI5 取反 Negation for DI5	0	0	0	1

参数符号 Parameter symbol	名称 Name	说明 Description
P2-12 ~ P2-15	数字输出 DOn 功能定义 Digital output DOn functional definition	数字输出 IO 功能设置，参考 6.3 章节，设置为 0 时没有任何功能。 For setting of digital output IO function, refer to Section 6.3. When set as 0, it will be free of any function.

参数符号 Parameter symbol	名称 Name	说明 Description
P2-17	数字输出取反 Negation for digital output	二进制显示，位对应，相应的位为 1 时取反： Binary system display, bits are corresponding. When the corresponding bit is 1, negation will be performed: （见下表）

	bit3	bit2	bit1	bit0
	DO4	DO3	DO2	DO1
DO2 取反 Negation for DO2	0	0	1	0

参数符号 Parameter symbol	名称 Name	说明 Description
P2-18	模拟 AO1 功能定义 Analog AO1 functional definition	0：电机速度(+/-10 V/额定转速) Motor speed (+ /-10 V / rated speed) 1：电机转矩(+/-10 V/额定转矩)Motor torque (+ /-10 V / rated torque) 2：速度指令(+/-10 V/额定转速) Speed instruction (+ /-10 V / rated speed)
P2-19	模拟 AO1 输出比例 Analog AO1 output proportion	3：转矩命令(+/-10 V/额定转矩) Torque command (+ /-10 V / rated torque) 范例：P2-18＝0 （AO1 为电机转速模拟输出）， Example: P2 - 18 = 0 (AO1 is the motor speed analog output), AO1 输出电压值为 V1 时的电机转速= (额定转速×V1/10)×P2-19/100。AO1 output voltage value is the motor speed during V1 = (rated speed * V1 / 10) * P2 - 19 / 100.
P2-20	模拟 AO2 功能定义 Analog AO2 functional definition	0：电机速度(+/-10 V/额定转速) Motor speed (+ /-10 V / rated speed) 1：电机转矩(+/-10 V/额定转矩)Motor torque (+ /-10 V / rated torque) 2：速度指令(+/-10 V/额定转速) Speed instruction (+ /-10 V / rated speed)
P2-21	模拟 AO2 输出比例 Analog AO2 output proportion	3：转矩命令(+/-10 V/额定转矩) Torque command (+ /-10 V / rated torque) 范例：P2-20＝0（AO2 为电机转速模拟输出），Example: P2 - 20 = 0 (AO2 is the motor speed analog output), AO2 输出电压值为 V1 时的电机转速= (额定转速×V1/10)×P2-21/100。AO2 output voltage value is the motor speed during V1 = (rated speed * V1 / 10) * P2 - 21 / 100.

P3 位置功能组 Position function group

参数符号 Parameter symbol	名称 Name	说明 Description
P3-00	位置指令来源 Position instruction source	0：外部端子输入脉冲作为位置指令。External terminal input pulse is taken as position instruction. 1：内部位置方式。Internal position mode.
P3-01	第二电子齿轮比分子 The second electronic gear ratio numerator	由 GEAR1、GEAR2 信号选择电子齿轮比，需要自定义输入 IO 口分别输入 GEAR1、GEAR2 信号。（参数说明参考"P0-12"、"P0-13"，设置方法参考 P2 IO 功能组参数及 6.2 章节） The electronic gear ratio is selected by GEAR1 and GEAR2 signals. It needs to self-define input IO port to respectively input GEAR1 and GEAR2 signals (for parameter description, refer to "P0 - 12", "P0 - 13". For the setting method, refer to parameters of P2 IO function group and Section 6.2)
P3-02	第三电子齿轮比分子 The third electronic gear ratio numerator	
P3-03	第四电子齿轮比分子 The fourth electronic gear ratio numerator	
P3-06	原点触发启动模式 Origin point trigger start-up mode	0：不启动。Not start. 1：驱动器通电第一次使能启动原点回归。The driver's power-on for the first time will enable start-up origin point to return. 2：由 IO 信号启动原点回归。IO signal will start origin point return.
P3-07	原点参考点设定 Origin point reference point setting	0：正转以 CCWI 作为原点参考点。Positive rotation takes CCWI as origin point reference point. 1：反转以 CWI 作为原点参考点。Reversal takes CWI as origin point reference point. 2：正转以 ORGP 作为原点参考点。Positive rotation takes ORGP as origin point reference point. 3：反转以 ORGP 作为原点参考点。Reversal takes ORGP as origin point reference point.
Parameter symbol	名称 Name	说明 Description
P3-08	到达原点移动方式设定 Setting of the motion mode of reaching origin point	0：检测到原点参考点后返回寻找 Z 脉冲。Return to search Z-pulse after origin point reference point is detected out. 1：检测到原点参考点后不返回，继续运行寻找 Z 脉冲。Do not return after origin point reference point is detected out and continue to run search of Z-pulse. 注意：若 CCWI、CWI 信号作为原点参考点，则检测到原点参考点信号后，不

		管该参数如何设置，都会返回寻找 Z 脉冲,返回寻找 Z 脉冲时，需要判断原点参考点信号是否无效，若该信号依然有效，则不检测 Z 脉冲。 Note: If CCWI and CWI signals are taken as origin point reference point, then it will return to search Z-pulse after origin point reference point signal is detected out, no matter how this parameter is set. When returning to search Z-pulse, you need to judge whether origin point reference point is invalid. If this signal is still valid, then Z0-pulse will not be detected.
P3-09	原点位置偏移转数 Origin point offset revolutions	找到 Z 脉冲后补偿的偏移脉冲数。Find up compensatory offset pulse number after Z-pulse.
P3-10	原点位置偏移脉冲数 Origin point offset pulse number	正转回原点时，如果偏移脉冲数为负，则正转补偿，若为正，则反转补偿； 反转回原点时，如果偏移脉冲数为负，则反转补偿，若为正，则正转补偿。When positive rotation returns to origin point, if offset pulse number is negative, then positive rotation will be compensated. If it is positive, then reversal will be compensated. When reversal returns to origin point, if offset pulse number is negative, then reversal will be compensated. If it is positive, then positive rotation will be compensated. 偏移脉冲数的计算与参数 P3-20 有关：Calculation for offset pulse number is related to parameter P3 - 20: P3-20=0 或 1 时，偏移脉冲数= P3-09×10000+ P3-10When P3 - 20 = 0 or 1, offset pulse number = P3 - 09 * 10000+ P3 - 10 P3-20=2 或 3 时，偏移脉冲数= P3-09×65536+ P3-10When P3 - 20 = 2 or 3, offset pulse number = P3 - 29 * 65536+ P3 - 10
P3-11	原点回归第一速度 The first speed for returning to origin point	寻找原点参考点时的运行速度。Search the running speed during origin point reference point.
P3-12	原点回归第二速度 The second speed of returning to origin point	找到原点参考点后寻找 Z 脉冲的运行速度。Find up the running speed of Z-pulse after origin point reference point
P3-13	原点回归加速时间 The acceleration time of returning to origin point	原点回归过程，0~1000rpm 的加减速时间，用于加速度的计算。Origin point return process, acceleration and deceleration time of 0 ~ 1000rpm, used for calculation of acceleration.
P3-14	原点回归减速时间 The deceleration time of returning to origin point	
P3-15	原点回归超时报警时间 Time-out alarm time of returning to origin point,	若在参数 P3-15 设置的时间内，原点回归操作未完成，则输出报警信号。If operation of returning to origin point fails to be completed within the set time in parameter P3 - 15, then it will output an alarm signal.
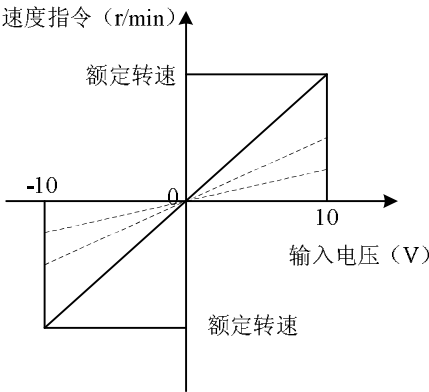
P3-20	内部位置指令模式 Internal position instruction mode	0：绝对十进制位置指令，定位位置＝转数*10000+脉冲数。Absolute decimal position instruction, the positioning position = revolutions * 10000+ pulse number. 1：增量十进制位置指令，位置增量＝转数*10000+脉冲数。Increment decimal position instruction, the position increment = revolutions * 10000+ pulse number. 2：绝对十六进制位置指令，定位位置＝转数*65536+脉冲数。Absolute hexadecimal position instruction, the positioning position = revolutions * 65536+ pulse number. 3：增量十六进制位置指令，位置增量＝转数*65536+脉冲数。Increment hexadecimal position instruction, the position increment = revolutions * 65536+ pulse number.
P3-21	内部位置运行方式 Internal position run mode	0：单次触发顺序运行模式。每触发一次（CNTR），所有设置位置（参数 P3-23 设置的位置段数）按顺序运行一遍后回到第一位置，等待下一次触发。Single trigger sequence running mode: Each time (CNTR) is triggered, all the set positions (position number of segments set in parameter P3 - 23) will run once in sequence and then return to the first position to wait for the next time trigger. 1：循环运行模式。若 CNTR 有效，则按照所设置的内部位置运行段数（P3-23）一直循环运行，直到 CNTR 无效则停止。Cycle run mode: If CNTR is valid, then it will cyclically run all along according to the set internal position running number of segments (P3 - 23). It will stop till CNTR is invalid. 2：单次触发运行模式。由 SP1、SP2、SP3 选择位置（参考 6.2 章节），CNTR 每触发一次，运行一次，此模式下不受参数 P3-23（运行段数选择）限制。（参考 6.2 章节，SP1、SP2、SP3 信号定义） Single trigger run mode: The position will be selected by SP1, SP2 and SP3 (refer to Section 6.2). Each time CNTR is triggered, it will run once. It will not be limited by parameter P3 - 23 (selection of running number of segments) under this mode. (refer to Section 6.2, signal definition for SP1, SP2 and SP3) 3：步进触发运行模式。SP3 信号触发一次，则运行到第一位置；SP2 信号触发一次，运行至前一段位置，若已经为第一段位置，则停在第一段位置处；SP1 信号触发一次，运行至后一段位置，若已经为最后一段位置（参数 P3-23 设置的位置段数），则停在最后一段位置处。 Stepping trigger run mode: Each time SP3 signal is triggered, it will run to the first position. Each time SP2 signal is triggered, it will run to the previous segment position. If it is already at the first segment position, then it will stop
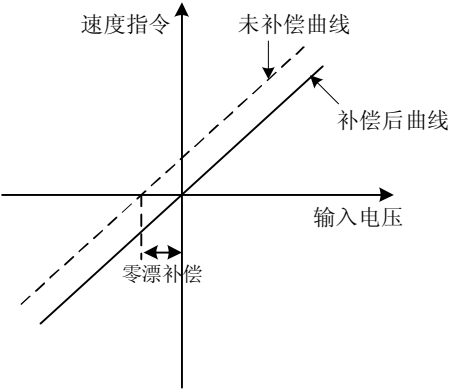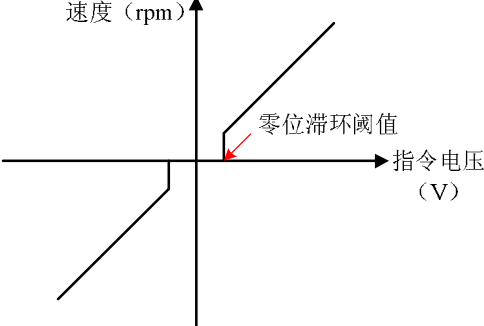
Parameter symbol	名称 Name	说明 Description
		at the first segment position. Each time SP1 signal is triggered, it will run to the next segment position. If it is already at the final segment position (position number of segments set in parameter P3 - 23), then it will stop at the final segment position.
P3-22	内部位置暂停设定 Internal position pause setting	0：内部位置暂停再次启动后，继续运行完剩余位置。After internal position pauses and starts again, continue to run the residual positions. 1：内部位置暂停再次启动后，回到第一位置。After internal position pauses and starts again, return to the first position. 注：此参数功能主要用在单次触发顺序运行模式和循环运行模式。Note: this parameter function is mainly used in single trigger sequence run mode and cycle run mode.
P3-23	运行段数选择 Selection of running number of segments	设置内部位置方式运行段数。（参考参数 P3-21 的说明）Set the internal position mode to run number of segments. (refer to description for parameter P3 - 21)
P3-25	内部位置 1 转数 Internal position 1 revolutions	第一段位置的脉冲指令，计算方法参考 P3-20 的定义。Pulse instruction at the first segment position. For calculation method, refer to definition for P3 - 20.
P3-26	内部位置 1 脉冲数 Internal position 1 pulse number	
P3-27	内部位置 1 速度 Internal position 1 speed	运行第一段位置时的速度。Speed during running the first segment position.
P3-28	内部位置 1 加减速时间 Internal position 1 acceleration and deceleration time	运行第一段位置时的加减速时间，用于加速度的计算。 Acceleration and deceleration time during running the first segment position, used for calculation of acceleration.
P3-29	内部位置 1 停顿时间 Internal position 1 pause time	运行完第一段位置的停顿时间。Pause time after running the first segment position.
P3-30 ~ P3-64	内部位置 2 ~ 内部位置 8 Internal position 2 ~ internal position 8	参考 P3-25～P3-29 参数的定义 Refer to definition for P3 - 25 ～ P3 - 29 parameters

P4　速度功能组 Speed function group

参数符号 Parameter symbol	名称 Name	说明 Description

| P4-00 | 速度指令来源
Speed instruction source | 0：外部模拟速度指令输入。External analogy speed instruction input.
1：内部速度。由 SC1 SC2 SC3 信号选择内部速度作为速度指令。
Internal speed: SC1, SC2 and SC3 signals will select internal speed as speed instruction. |

SC3	SC2	SC1	速度指令 Speed instruction
OFF	OFF	OFF	内部速度 1：P4-12 Internal speed 1: P4 - 12
OFF	OFF	ON	内部速度 2：P4-13 Internal speed 2: P4 - 13
OFF	ON	OFF	内部速度 3：P4-14 Internal speed 3: P4 - 14
OFF	ON	ON	内部速度 4：P4-15 Internal speed 4: P4 - 15
ON	OFF	OFF	内部速度 5：P4-16 Internal speed 5: P4 - 16
ON	OFF	ON	内部速度 6：P4-17 Internal speed 6: P4 - 17
ON	ON	OFF	内部速度 7：P4-18 Internal speed 7: P4 - 18
ON	ON	ON	内部速度 8：P4-19 Internal speed 8: P4 - 19

2：内部速度+模拟输入速度方式，由 SC1 SC2 SC3 信号决定速度指令来源,Internal speed + analog input speed mode: SC1, SC2 and SC3 signals will decide speed instruction source.

SC1 SC2 SC3 信号输入都为 0 时，选择外部模拟量输入作为速度指令。When SC1, SC2 and SC3 signal inputs are 0, select external analog input as speed instruction.

SC3	SC2	SC1	速度指令 Speed instruction
OFF	OFF	OFF	外部模拟速度指令输入 External analogy speed instruction input.
OFF	OFF	ON	内部速度 2：P4-13 Internal speed 2: P4 - 13
OFF	ON	OFF	内部速度 3：P4-14 Internal speed 3: P4 - 14
OFF	ON	ON	内部速度 4：P4-15 Internal speed 4: P4 - 15
ON	OFF	OFF	内部速度 5：P4-16

		ON	OFF	ON	内部速度 6：P4-17 Internal speed 6: P4 - 17	
		ON	ON	OFF	内部速度 7：P4-18 Internal speed 7: P4 - 18	
		ON	ON	ON	内部速度 8：P4-19 Internal speed 8: P4 - 19	

注：速度指令方向参考参数 P4-05 及 6.2 章节 SDIR1 SDIR2 CINV 信号的定义。
Note: For speed instruction direction, refer to parameter P4 - 05 and Section 6.2, definition for SDIR1, SDIR2 and CINV signals.

Parameter symbol	名称 Name	说明 Description
P4-01	模拟速度指令增益 Analogy speed instruction gain	● 设定模拟速度指令电压与实际速度指令之间的比例关系。Set the proportional relation between analogy speed instruction voltage and actual speed instruction. ● 模拟量输入范围-10V~10V，设置为 100%时，10V 电压输入对应额定转速。Analog input scope - 10V ~ 10V. When set as 100%, 10V voltage input will be corresponding to rated speed. 速度指令（r/min）Speed instruction (r / min), 额定转速 rated speed, 输入电压 input voltage
P4-02	模拟速度指令滤波系数 Analogy speed instruction filter coefficient	对模拟速度指令进行低通滤波，平滑指令，消除干扰影响。参数值越大，滤波作用越强。Perform lowpass filtering and smoothing instruction for analogy speed instruction to eliminate disturbing influence. The larger the parameter value, the stronger the filter action.
P4-03	模拟速度指令零偏补偿值 Analogy speed instruction zero offset compensation value	● 当速度指令输入为零时，通过改变此参数可以消除速度指令模拟量偏移。When speed instruction input is zero, you can eliminate the speed instruction analog quantity offset by changing this parameter. ● 可以通过 Fn-AI1 自动补偿，参考 Fn-AI1 的定义。It can be automatically compensated through Fn - AI1, refer to definition for Fn - AI1. ● 手动补偿： 使能伺服电机，电机在模拟速度方式下运行，查看"dP-CS"的值，根据"dP-CS"的值计算偏移电压，修改 P4-03 的参数值，然后保存参数即可。Manual compensation: enable servomotor and motor to run under analogy speed mode, view "dP - CS" value, calculate offset voltage according to "dP - CS" value, modify parameter values of P4 - 03, and then
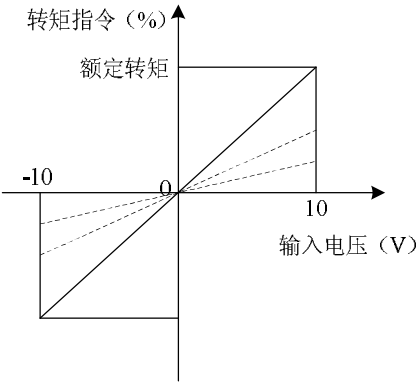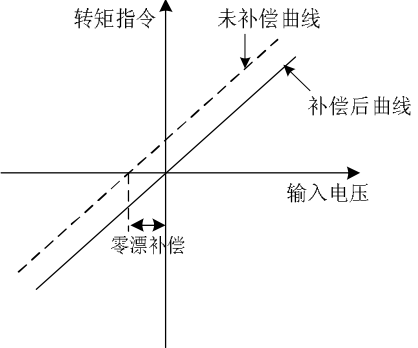
		save parameters. 速度指令 Speed instruction 未补偿曲线 uncompensated curve, 补偿后曲线 post-compensation curve, 零漂补偿 zero-offset compensation, 输入电压 input voltage
P4-04	模拟速度指令零位滞环阈值 Zero velocity hysteresis-loop threshold of analogy speed instruction	模拟速度方式下，设置模拟速度输入零位滞环的阈值，当模拟速度输入小于设置值时，速度指令为 0，电机锁定。Under analogy speed mode, set analogy speed input null hysteresis-loop threshold. When analogy speed input is less than the set value, speed instruction is 0 and the motor is locked. 如图所示：As shown in the diagram: 速度 Speed, 零位滞环阈值 Zero velocity hysteresis-loop threshold, 指令电压 instruction voltage
Parameter symbol	名称 Name	说明 Description
P4-05	速度指令方向 Speed instruction direction	0：速度方向由 CINV 控制； The speed direction is controlled by CINV; 1：速度方向由 SDIR2、SDIR1 组合来控制。（参考 6.2 章节）The speed direction is controlled by combination of SDIR2 and SDIR1. (refer to Section 6.2)
P4-06	速度方式加速时间 Acceleration time in speed mode	速度方式加减速时间，用于加速度的计算。The acceleration and deceleration time in speed mode is used for calculation of acceleration.
P4-07	速度方式减速时间 Deceleration time in	

参数符号 Parameter symbol	名称 Name	说明 Description
	speed mode	
P4-11	JOG 运行速度 JOG running speed	JOG 运行方式下速度设置。Speed setting under JOG run mode
P4-12	内部速度 1 Internal speed 1	
P4-13	内部速度 2 Internal speed 2	
P4-14	内部速度 3 Internal speed 3	在速度控制模式下（P0-04=1），且 P4-00=1，由 SC1、SC2、SC3 来选择内部运行速度，需要自定义输入 IO 口分别输入 SC1、SC2、SC3 信号（参考 IO 功能组参数及 6.2 章节）。 Under speed control mode (P0 - 04 = 1), P4 - 00 = 1, SC1, internal running speed is selected by SC1, SC2 and SC3. It needs to self-define input IO port to respectively input SC1, SC2 and SC3 signals (refer to IO function group parameter and Section 6.2).
P4-15	内部速度 4 Internal speed 4	
P4-16	内部速度 5 Internal speed 5	
P4-17	内部速度 6 Internal speed 6	
P4-18	内部速度 7 Internal speed 7	
P4-19	内部速度 8 Internal speed 8	

P5 力矩功能组 Torque function group

参数符号 Parameter symbol	名称 Name	说明 Description

参数符号 Parameter symbol	名称 Name	说明 Description
P5-00	力矩指令来源 Torque instruction source	0：外部模拟力矩指令输入。External analogy torque instruction input. 1：内部力矩。由 TRQ1 TRQ2 信号选择内部力矩作为力矩指令。Internal torque. The internal torque is selected as torque instruction by TRQ1 and TRQ2 signals. {TABLE1} 2：内部力矩+模拟力矩方式，由 TRQ1 TRQ2 信号决定力矩指令来源，TRQ1 TRQ2 信号输入都为 0 时，选择外部模拟量输入作为力矩指令。Internal torque + analogy torque mode: The torque instruction source is decided by TRQ1 and TRQ2 signals. When signal inputs of TRQ1 and TRQ2 are 0, select external analog input as torque instruction. {TABLE2} 注：力矩指令方向由参数 P5-05 决定。Note: The torque instruction direction is decided by parameter P5 - 05.

TABLE1:

TRQ2	TRQ1	转矩指令 Torque instruction
OFF	OFF	内部转矩 1：P5-16 Internal torque 1: P5 - 16
OFF	ON	内部转矩 2：P5-17 Internal torque 2: P5 - 17
ON	OFF	内部转矩 3：P5-18 Internal torque 3: P5 - 18
ON	ON	内部转矩 4：P5-19 Internal torque 4: P5 - 19

TABLE2:

TRQ2	TRQ1	转矩指令 Torque instruction
OFF	OFF	外部模拟力矩指令输入 External analogy torque instruction input.
OFF	ON	内部转矩 2：P5-17 Internal torque 2: P5 - 17
ON	OFF	内部转矩 3：P5-18 Internal torque 3: P5 - 18
ON	ON	内部转矩 4：P5-19 Internal torque 4: P5 - 19

参数符号 Parameter symbol	名称 Name	说明 Description
P5-01	模拟力矩指令增益 Analogy torque instruction gain	● 设定模拟转矩指令电压与实际转矩指令之间的比例关系。Set the proportional relation between analogy torque instruction voltage and actual torque instruction.

		● 模拟量输入范围-10V~10V，设置为 100%时，10V 电压输入对应额定转矩。Analog input scope - 10V ~ 10V. When set as 100%, 10V voltage input will be corresponding to rated torque. 转矩指令（%） 额定转矩 -10　　0　　10 输入电压（V） 转矩指令（%）Torque instruction (%),　　　　额定转矩 rated torque, 输入电压 input voltage
P5-02	模拟力矩指令滤波系数 Analogy torque instruction filter coefficient	对模拟转矩指令进行低通滤波，平滑指令，消除干扰影响。参数值越大，滤波作用越强。Perform lowpass filtering and smoothing instruction for analogy torque instruction to eliminate disturbing influence. The larger the parameter value, the stronger the filter action.
P5-03	模拟力矩指令零偏补偿值 Analogy torque instruction zero offset compensation value	● 当力矩指令输入为零时，通过改变此参数可消除转矩指令模拟量偏移。When torque instruction input is zero, the torque instruction analog quantity offset can be eliminated by changing this parameter. ● 可以通过"Fn-AI2"自动补偿。It can be automatically compensated through " Fn - AI2 ". ● 手动补偿：使能伺服电机，电机在模拟转矩方式下运行，查看"dP-Ct"的值，根据"dP-Ct"的值计算偏移电压电压，手动修改"P5-03"的参数值即可。Manual compensation: enable servomotor and motor to run under analogy torque mode, view "dP - Ct" value, calculate offset voltage according to " dP - Ct " value, manually modify parameter values of "P5 - 03 ". 转矩指令　　　未补偿曲线 补偿后曲线 输入电压 零漂补偿 转矩指令 Torque instruction,　　未补偿曲线 uncompensated curve, 补偿后曲线 post-compensation curve,　　零漂补偿 zero-offset compensation,

参数符号 Parameter symbol	名称 Name	说明 Description
		输入电压 input voltage
P5-04	模拟力矩指令零位 滞环阈值 Analogy torque instruction null hysteresis-loop threshold	模拟转矩方式下，设置模拟转矩指令输入零位滞环的阈值，当模拟转矩输入小于设置值时，转矩指令为零。Under analogy torque mode, set the analogy torque instruction input null hysteresis-loop threshold. When analogy torque input is less than the set value, torque instruction is 0.
P5-05	力矩指令方向 Torque instruction direction	0：正常方向。Normal direction. 1：方向反向。Inverse direction.
P5-06	力矩加速时间 Torque acceleration time	设置力矩方式下的加减速时间，用于加速度的计算。Set the acceleration and deceleration time under torque mode, used for calculation of acceleration.
P5-07	力矩减速时间 Torque deceleration time	
P5-10	力矩模式速度限制 方式 Torque control mode speed limit mode	0：基本限制，参数 P5-11 作为速度限制值。Basic limitation: parameter P5 - 11 is taken as speed limit value. 1：基本限制+模拟量限制，除了受基本限制之外，还受模拟速度指令限制。Basic limitation + analog quantity limitation, besides basic limitation, it is also limited by analogy speed instruction. 2：基本限制+内部速度限制，除基本限制外，还内部速度指令限制，内部速度指令由 SC1、SC2、SC3 信号决定。（参考 6.2 章节）Basic limitation + internal speed limit: Besides basic limitation, it will also be limited by internal speed instruction limit. The internal speed instruction is decided by SC1, SC2 and SC3 signals. (refer to Section 6.2)
P5-11	力矩控制速度限制 值 Torque control speed limit value	力矩方式下，电机运行速度限制在此参数以内。Under torque mode, the motor running speed is limited within this parameter.
参数符号 Parameter symbol	名称 Name	说明 Description
P5-13	力矩控制超速处理 方式 Torque control overspeed processing mode	0：将电机转速限制在转速限制值以下。The motor speed is limited below speed limit value. 1：超速时间大于允许时间后报警（Err7）。 Give an alarm after overspeed time is greater than time allowed (Err7).
P5-14	力矩控制超速允许 时间 Torque control overspeed time allowed	力矩控制模式下，设置允许电机转速超过速度限制值的时间。Under torque control mode, set the time of allowing the motor speed to exceed the speed limit value.
P5-16	内部转矩 1 Internal torque 1	力矩模式下，由 TRQ1、TRQ2 来选择内部转矩，需要自定义输入 IO 口分别输入 TRQ1、TRQ2 信号（参考 IO 功能组参数及 6.2 章节）。
P5-17	内部转矩 2 Internal torque 2	Under torque mode, internal torque is selected by TRQ1 and TRQ2. It needs to self-define input IO port to respectively input TRQ1 and TRQ2 signals (refer to
P5-18	内部转矩 3	

	Internal torque 3	IO function group parameter and Section 6.2).
P5-19	内部转矩 4 Internal torque 4	

P6 通信功能组 Communication function group

参数符号 Parameter symbol	名称 Name	说明 Description
P6-00	通讯站号设定 Setting of communication station number	设置本机地址，0 为广播地址，驱动器接收数据，但不回复。Set local address. 0 is the broadcast address. The driver receives data, but does not reply.
P6-01	通讯波特率设定 Settings for communication baud rate	MODBUS 通信波特率选择：Selection for MODBUS communication baud rate <table><tr><td>0：4800bps</td><td>1：9600bps</td><td>2：19200bps</td></tr><tr><td>3：38400bps</td><td>4：57600bps</td><td>5：115200bps</td></tr></table>
P6-02	通讯字节数据结构 Communication byte data structure	通信数据格式选择：Selection for communication data format: 0：7-N-2(ASCII), 7 位数据位，无校验位，两位停止位 7 data bits, no check bit, 2 stop bits 1：7-E-1(ASCII), 7 位数据位，偶校验，一位停止位 7 data bits, even parity check, 1 stop bit 2：7-O-1(ASCII), 7 位数据位，奇校验，一位停止位 7 data bits, odd parity, 1 stop bit 3：8-N-2(ASCII), 8 位数据位，无校验位，两位停止位 8 data bits, no check bit, 2 stop bits 4：8-E-1(ASCII), 8 位数据位，偶校验，一位停止位 8 data bits, even parity check, 1 stop bit 5：8-O-1(ASCII), 8 位数据位，奇校验，一位停止位 8 data bits, odd parity, 1 stop bit 6：8-N-2(RTU), 8 位数据位，无校验位，两位停止位 8 data bits, no check bit, 2 stop bits 7：8-E-1(RTU), 8 位数据位，偶校验，一位停止位 8 data bits, even parity check, 1 stop bit 8：8-O-1(RTU), 8 位数据位，奇校验，一位停止位 8 data bits, odd parity, 1 stop bit
P6-04	通信协议 Communication protocol	P6-04=0：标准 MODBUS 通信协议。 P6-04=0：Standard MODBUS communication protocol.
P6-05	通讯通道选择 Selection for communication	通信口选择：Selection for communication port: 0：RS232，只能实现点对点通信。RS232 can only realize point to point communication.

	P6-06	channel	1：RS485。

Parameter symbol	名称 Name	说明 Description

| P6-06 | IO 输入选择 IO input selection | 位控制， P6-06= bit6×64+bit5×32+bit4×16+bit3×8+bit2×4+bit1×2+bit0，bit0~ bit6 分别对应 DI1~ DI7:
Bit control, P6-06= bit6×64+bit5×32+bit4×16+bit3×8+bit2×4+bit1×2+bit0, bit0 ~ bit6 are respectively corresponding to DI1 ~ DI7:
0：IO 信号由外部端子输入。IO signal is input by external terminal.
1：IO 信号由软件输入 IO signal is input by software |

	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	DI7	DI6	DI5	DI4	DI3	DI2	DI1
P6-06 (DI1信号软件输入） （DI1 signal software input ）	0	0	0	0	0	0	1

Parameter symbol	名称 Name	说明 Description
P6-07	通讯回复延时 Communication reply delay	驱动器接收到上位机的信息时，延迟输出应答信息的时间。The time of delaying to output response message when driver receives upper computer information.

| P6-09 | 软件输入 IO 信号值 Software input IO signal value | 位控制，P6-09 = bit6×64+bit5×32+bit4×16+bit3×8+bit2×4+bit1×2+bit0，当IO输入选择软件输入时，该参数的相应位即为数字输入信号（参考P6-06）:
Bit control, P6-09 = bit6×64+bit5×32+bit4×16+bit3×8+bit2×4+bit1×2+bit0, When software input is selected for IO input, corresponding bit of this parameter is namely digital input signal (refer to P6 - 06): |

	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	DI7	DI6	DI5	DI4	DI3	DI2	DI1
P6-06 (DI1信号软件输入） （DI1 signal software input ）	0	0	0	0	0	0	1
P6-09 (DI1输入低电平） （DI1 input low level ） (x=0 or 1)	x	x	x	x	x	x	0

A0 伺服油泵控制组 Servo oil pump control group
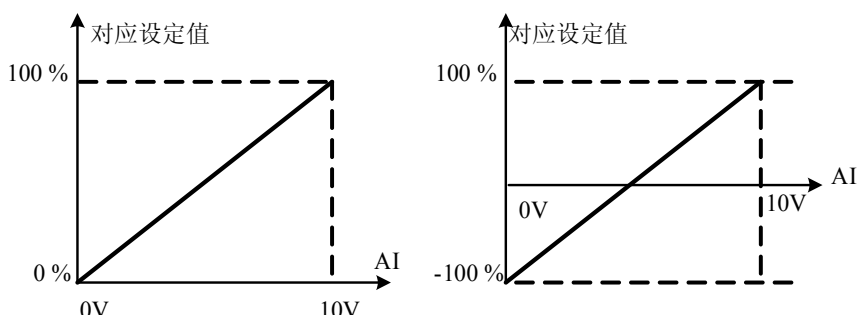
参数符号 Parameter symbol	名称 Name	说明 Description
A0-00	油压控制方式 Oil pressure control mode	0：驱动器油压控制模式 1。AI1 模拟通道提供油压指令, AI2 模拟通道提供流量指令, AI3 模拟通道提供油压反馈指令, 驱动器进行油压控制；Driver oil pressure control mode 1. AI1 analog channel provides oil pressure instruction; AI2 analog channel provides flowrate instruction; AI3 analog channel provides oil pressure feedback instruction; driver performs oil pressure control; 1：驱动器油压控制模式 2。CAN 给定流量、油压指令, AI3 模拟通道提供油压反馈指令, 驱动器进行油压控制。Driver oil pressure control mode 2. The flowrate and oil pressure instruction are given by CAN. AI3 analog channel provides oil pressure feedback instruction; driver performs oil pressure control.
A0-01	油压控制最高转速 Oil pressure control maximum speed	对应系统输出流量设定电机运行的最高转速, 建议该设定值小于额定转速的 140%。 Set maximum speed of motor running by corresponding to system output flowrate. It is suggested this setting value should be less than 140% of rated speed.
A0-02	系统油压 System oil pressure	设定系统的最大油压值。Set maximal oil pressure value of system.
A0-03	最大油压 Maximal oil pressure	设定压力传感器的压力量程。Set the pressure span of pressure sensor
A0-04	油压指令上升时间 Oil pressure instruction rise time	油压指令的滤波时间。Filter time of oil pressure instruction.
A0-05	卸压最大反向转速 Maximal back speed of pressure relief	设定卸压时的最大反向转速, 设定值越大, 卸压越快, 但太快会造成油泵反转噪声, 设定值越小, 卸压越慢。Set maximal back speed during pressure relief. The larger the set value, the quicker the pressure relief, but too fast pressure relief would cause reversal noise of oil pump. The smaller the set value, the slower the pressure relief.
A0-06	底流 Underflow	系统运行的最小流量对应的转速值。Rpm value corresponding to minimum flow of system running.
A0-07	底压 Base pressure	系统运行的最小压力。Minimal pressure of system running.
A0-08	压力控制切换最高转速 Switch to maximum speed under pressure control,	压力控制状态的最高转速。Maximum speed under pressure control status.

参数符号 Parameter symbol	名称 Name	说明 Description
A0-09	压力控制切换最低油压 Switch to minimal oil pressure under pressure control	进入压力控制状态的最低油压。Enter into minimal oil pressure under pressure control status. 当电机速度低于 A0-08 设定值，并且系统油压高于 A0-09 设定值时，进入压力控制状态，输出"双排量柱塞泵切换"信号。When motor speed is lower than A0 - 08 setting value and system oil pressure is higher than A0 - 09 setting value, it will enter into pressure control status and output "double-discharge plunger pump switch" signal.
A0-10	压力控制切换延迟时间 Delay time of switching to pressure control	设定系统切换到压力控制状态，输出"双排量柱塞泵切换"信号的延迟时间。Set the delay time for system to be switched into pressure control status and to output "double-discharge plunger pump switch" signal.
A0-11	油压指令 S 滤波时间 Oil pressure instruction S filter time	设定油压指令 S 滤波时间。Set the filter time of oil pressure instruction S.
参数符号 Parameter symbol	名称 Name	说明 Description
A0-12	油压控制 Kp1 Oil pressure control Kp1	油压控制第一组 PID 比例增益。设定值越大，响应越快，但响应太快容易引起超调，造成系统运行振荡，不稳定；设定值越小，响应越慢，响应太慢容易引起效率下降和制品不稳定。PID proportional gain in the first group of oil pressure control. The larger the set value, the quicker the response, but too fast response is easy to cause overshooting and cause system running oscillation and instability. The smaller the set value, the slower the response. Too slow response is easy to cause efficiency droop and product instability.
A0-13	油压控制 Ki1 Oil pressure control Ki1	油压控制第一组 PID 积分时间。设定值越小，响应越快，但响应太快容易引起超调，造成系统运行振荡，不稳定；设定值越大，响应越慢，响应太慢容易引起效率下降和制品不稳定。PID integration time in the first group of oil pressure control. The smaller the set value, the quicker the response, but too fast response is easy to cause overshooting and cause system running oscillation and instability. The larger the set value, the slower the response. Too slow response is easy to cause efficiency droop and product instability.
A0-14	油压控制 Kd1 Oil pressure control Kd1	油压控制第一组 PID 微分时间。设定值越大，响应越快，但响应太快容易引起超调，造成系统运行振荡，不稳定；设定值越小，响应越慢，响应太慢容易引起效率下降和制品不稳定。PID differential time in the first group of oil pressure control. The larger the set value, the quicker the response, but too fast response is easy to cause overshooting and cause system running oscillation and instability. The smaller the set value, the slower the response. Too slow response is easy to cause efficiency droop and product instability.
A0-15	油压控制 Kp2	油压控制第二组 PID（参考 A0-12、A0-13、A0-14）。

参数符号 Parameter symbol	名称 Name	说明 Description
	Oil pressure control Kp2	The second group PID of oil pressure control (refer to A0 - 12, A0 - 13, A0 - 14).
A0-16	油压控制 Ki2 Oil pressure control Ki2	
A0-17	油压控制 Kd2 Oil pressure control Kd2	
A0-18	油压控制 Kp3 Oil pressure control Kp3	油压控制第三组 PID（参考 A0-12、A0-13、A0-14）。 The third group PID of oil pressure control (refer to A0 - 12, A0 - 13, A0 - 14).
A0-19	油压控制 Ki3 Oil pressure control Ki3	
A0-20	油压控制 Kd3 Oil pressure control Kd3	
A0-21	油压控制 Kp4 Oil pressure control Kp4	油压控制第四组 PID（参考 A0-12、A0-13、A0-14）。 The fourth group PID of oil pressure control (refer to A0 - 12, A0 - 13, A0 - 14).
A0-22	油压控制 Ki4 Oil pressure control Ki4	
A0-23	油压控制 Kd4 Oil pressure control Kd4	
A0-27	压力超调抑制系数 Pressure overshoot damping coefficient	该参数值越小，抑制压力超调作用越明显，但太小可能引起系统振荡，设定为 1000 时不起作用。The smaller the parameter value, the more obvious the effect of restraining pressure overshooting, but too small value may cause system oscillation. When set as 1000, it will be inoperative.

A1 模拟输入参数组 Analog input parameter group

参数符号 Parameter symbol	名称 Name	说明 Description
A1-00	AI1 最小输入电压 AI1 minimal input voltage	该组参数定义了模拟输入电压与输入代表的设定值的关系,当模拟输入电压超过设定的范围时，超过最大值的部分按最大值计算，超过最小值的部分按最小值计算。 The parameter of this group defines the relationship between analog

Parameter symbol	名称 Name	说明 Description
A1-01	AI1 最小输入对应设定 AI1 minimal input corresponding setting	input voltage and setting value represented by input. When analog input voltage exceeds the set scope, the part exceeding maximum value will be calculated according to maximum value. The part exceeding minimal value will be calculated according to minimal value. 模拟输入为电流输入时，1mA 电流相当于 0.5V 电压。 When analog input is current input, 1mA current is equivalent to 0.5V voltage. 在不同的应用场合，模拟设定的 100%所对应的标称值有所不同，具体请参考各个应用部分的说明。以下图例说明了几种设定的情况： In different applications, the nominal values corresponding to 100% of analog setting are different. For details, please refer to description for each application. The following graphic examples describes several setting conditions:
A1-02	AI1 最大输入电压 AI1 maximal input voltage	
A1-03	AI1 最大输入对应设定 AI1 maximal input corresponding setting	 对应设定值 Corresponding setting value

Parameter symbol	名称 Name	说明 Description
A1-04	AI2 最小输入电压 AI2 minimal input voltage	参考 A1-00 ~ A1-03；Refer to A1 - 00 ~ A1 - 03;
A1-05	AI2 最小输入对应设定 AI2 minimal input corresponding setting	
A1-06	AI2 最大输入电压 AI2 maximal input voltage	
A1-07	AI2 最大输入对应设定 AI2 maximal input corresponding setting	
A1-08	AI3 最小输入电压 AI3 minimal input voltage	参考 A1-00 ~ A1-03；Refer to A1 - 00 ~ A1 - 03;
A1-09	AI3 最小输入对应设定 AI3 minimal input corresponding	

	setting	
A1-10	AI3 最大输入电压 AI3 maximal input voltage	
A1-11	AI3 最大输入对应设定 AI3 maximal input corresponding setting	
A1-12	AI1 滤波时间 AI1 filter time	对 AI1 模拟输入指令进行低通滤波, 平滑指令, 消除干扰影响。参数值越大, 滤波作用越强。Perform lowpass filtering and smoothing instruction for AI1 analog input instruction to eliminate disturbing influence. The larger the parameter value, the stronger the filter action.
A1-13	AI2 滤波时间 AI2 filter time	对 AI2 模拟输入指令进行低通滤波, 平滑指令, 消除干扰影响。参数值越大, 滤波作用越强。Perform lowpass filtering and smoothing instruction for AI2 analog input instruction to eliminate disturbing influence. The larger the parameter value, the stronger the filter action.
A1-14	AI3 滤波时间 AI3 filter time	对 AI3 模拟输入指令进行低通滤波, 平滑指令, 消除干扰影响。参数值越大, 滤波作用越强。Perform lowpass filtering and smoothing instruction for AI3 analog input instruction to eliminate disturbing influence. The larger the parameter value, the stronger the filter action.
A1-15	AI1 零偏补偿 AI1 zero offset compensation	设定模拟输入 AI1 通道零偏补偿值。Set the zero offset compensation value of analog input AI1 channel. 通过 Fn-AI1 自动补偿, 参考 Fn-AI1 的定义。It is automatically compensated through Fn - AI1, refer to definition for Fn - AI1.
A1-16	AI2 零偏补偿 AI2 zero offset compensation	设定模拟输入 AI2 通道零偏补偿值。Set the zero offset compensation value of analog input AI2 channel. 通过 Fn-AI2 自动补偿, 参考 Fn-AI2 的定义。It is automatically compensated through Fn - AI2, refer to definition for Fn - AI2.
A1-17	AI3 零偏补偿 AI3 zero offset compensation	设定模拟输入 AI3 通道零偏补偿值。Set the zero offset compensation value of analog input AI3 channel. 通过 Fn-AI3 自动补偿, 参考 Fn-AI3 的定义。It is automatically compensated through Fn - AI3, refer to definition for Fn - AI3.

6.2 数字输入功能 Digital input function

注：数字输入 DI 状态表示方法 Note: The expressive method for digital input DI status

OFF：表示开关状态为开路。**Means that switch status is in open-circuit.**

ON ：表示开关状态为导通。**Means that switch status is in turnon.**

设定值 Setting value	符号 Symbol	功能说明 Functional description
1	SV_ON	伺服使能：此信号接通时，伺服使能。 Servo enabled: When this signal is put through, the servo is enabled.
2	RSTSV	报警清除：有报警发生，如果该报警允许清除，则接通此信号后，驱动器报警信号清除。但需注意，只有部分报警允许清除(Err7、Err8、Err9、Err14、Err15、Err16、Err18)。 Alarm clearance: When there is an alarm occurring, if this alarm is allowed to be cleared away, driver alarm signal will be cleared away after this signal is put through. But it has to be noted that only partial alarms are allowed to be cleared away (Err7, Err8, Err9, Err14, Err15, Err16, Err18).
3	CCWI	CCW 驱动禁止, P0-20=0 驱动禁止输入有效，电机逆时针转动,当检测到 CCWI 信号为 ON 时驱动禁止，此时电机只能反向运行。 CCW driving is prohibited. When P0 - 20 = 0, the driving inhibiting input is valid, the motor anticlockwise rotates. When CCWI signal detected is ON, driving is prohibited. At this time the motor can only inversely run. P0-20=1,驱动禁止输入无效。 When P0 - 20 = 1, the driving inhibiting input is invalid.

设定值 Setting value	符号 Symbol	功能说明 Functional description
4	CWI	CW 驱动禁止, P0-20=0 驱动禁止输入有效，电机顺时针转动,当检测到 CWI 信号为 ON 时驱动禁止，此时电机只能反向运行。 CCW driving is prohibited. When P0 - 20 = 0, the driving inhibiting input is valid, the motor clockwise rotates. When CWI signal detected is ON, driving is prohibited. At this time the motor can only inversely run. P0-20=1，驱动禁止输入无效。 When P0 - 20 = 1, the driving inhibiting input is invalid.
5	PECLR	偏差计数器清零，位置控制时，使用此功能，清零驱动器位置偏差计数器。 Resetting the deviation counter: Using this function during position control can reset the driver position deviation counter.
6	PINH	脉冲指令禁止，位置控制时禁止指令脉冲输入计数的功能，使用此功能时，即使有指令脉冲输入也不计数，并且伺服锁定。Pulse instruction inhibition: during position control, inhibit the function of instruction pulse input count. When this function is used, even if there is any instruction pulse input, it will not be counted and servo will be locked.
7	ZCLAMP	零速箝位，在模拟速度控制方式下，如果要求模拟电压指令不为"0V"时，也要使电机停止，使伺服处于锁定状态，可使用'零速箝位'功能。Zero-speed clamp: Under analogy speed control mode, if you also want to make the motor stop to ensure servo remains at lock state when it is required that analog voltage instruction should not

be '0V',　　you can use 'zero-speed clamp' function.

此信号接通后，电机停止并锁定。After this signal is put through, the motor will stop and be locked.

电机速度 Motor speed,　　伺服锁定 servo locking,　　时间 time

8	TCCW	CCW 转矩限制, 正向运转转矩限制。 Torque limitations of CCW and positive direction running.
9	TCW	CW 转矩限制, 反向运转转矩限制。Torque limitation of CW and　reverse running.
10	CMODE	控制模式切换。Control mode switchover.

P0-04	CMODE 状态 CMODE status	
	ON	OFF
3	位置控制 Position control	速度控制 Speed control
4	速度控制 Speed control	力矩控制 Torque control
5	力矩控制 Torque control	位置控制 Position control

11	SP1	内部位置选择。Internal position selection.

SP3	SP2	SP1	位置指令 Position instruction
OFF	OFF	OFF	内部位置 1 Internal position 1
OFF	OFF	ON	内部位置 2 Internal position 2
OFF	ON	OFF	内部位置 3 Internal position 3
OFF	ON	ON	内部位置 4 Internal position 4
ON	OFF	OFF	内部位置 5 Internal position 5

(Row labels 12 SP2 and 13 SP3 appear in left columns)
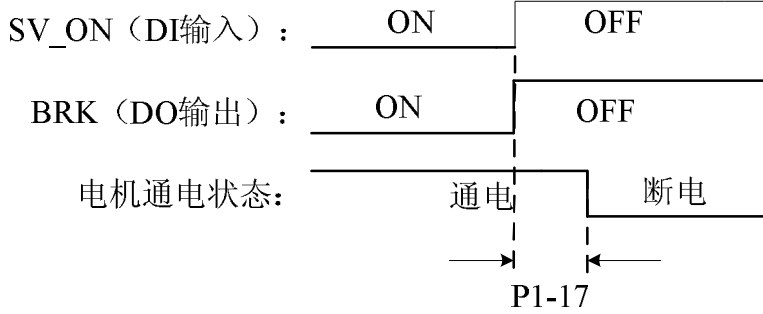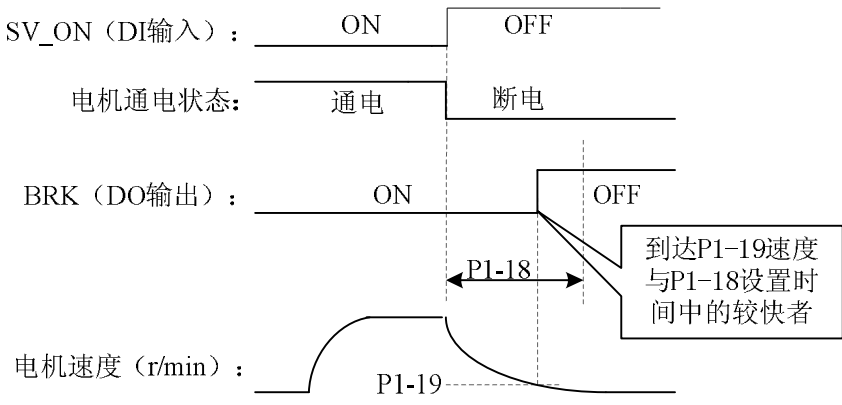
ON	OFF	ON	内部位置 6 Internal position 6
ON	ON	OFF	内部位置 7 Internal position 7
ON	ON	ON	内部位置 8 Internal position 8

设定值 Setting value	符号 Symbol	功能说明 Functional description		
14	SC1	内部速度选择（1~8）Internal speed selection (1 ~ 8)		
		SC3	SC2	SC1	速度指令 Speed instruction

SC3	SC2	SC1	速度指令 Speed instruction
OFF	OFF	OFF	内部速度 1：P4-12 Internal speed 1: P4 - 12
OFF	OFF	ON	内部速度 2：P4-13 Internal speed 2: P4 - 13
OFF	ON	OFF	内部速度 3：P4-14 Internal speed 3: P4 - 14
OFF	ON	ON	内部速度 4：P4-15 Internal speed 4: P4 - 15
ON	OFF	OFF	内部速度 5：P4-16 Internal speed 5: P4 - 16
ON	OFF	ON	内部速度 6：P4-17 Internal speed 6: P4 - 17
ON	ON	OFF	内部速度 7：P4-18 Internal speed 7: P4 - 18
ON	ON	ON	内部速度 8：P4-19 Internal speed 8: P4 - 19

（设定值 15 SC2, 16 SC3）

设定值 Setting value	符号 Symbol	功能说明 Functional description
17	TRQ1	内部转矩选择（1-4）Internal torque selection (1- 4)

TRQ2	TRQ1	转矩指令 Torque instruction
OFF	OFF	内部转矩 1：P5-16 Internal torque 1: P5 - 16
OFF	ON	内部转矩 2：P5-17 Internal torque 2: P5 - 17
ON	OFF	内部转矩 3：P5-18 Internal torque 3: P5 - 18
ON	ON	内部转矩 4：P5-19 Internal torque 4: P5 - 19

（设定值 18 TRQ2）

设定值 Setting value	符号 Symbol	功能说明 Functional description
19	GEAR1	电子齿轮比选择（1-4）Electronic gear ratio selection (1- 4)

20	GEAR2	GEAR2	GEAR1	齿轮比 Gear ratio	
		OFF	OFF	P0-12/ P0-13	
		OFF	ON	P3-01/ P0-13	
		ON	OFF	P3-02/ P0-13	
		ON	ON	P3-03/ P0-13	

21	SDIR1	速度运行方向选择：Speed running direction selection: P4-05=0 时，速度方向由 CINV 控制； When P4 - 05 = 0, speed direction is controlled by CINV; P4-05=1 时，速度方向由 SDIR2、SDIR1 组合来控制： When P4 - 05 = 1, speed direction is controlled by combination of SDIR2 and SDIR1:

22	SDIR2	SDIR2	SDIR1	电机控制 Motor control
		OFF	OFF	电机锁定 Motor locked
		OFF	ON	电机正转 Motor positive rotation
		ON	OFF	电机反转 Motor reversal
		ON	ON	电机锁定 Motor locked

23	CINV	速度指令取反。Speed instruction negation. P4-05=0 时，速度方向由 CINV 控制，OFF 时按设定方向转，ON 时按设定方向的反方向转。 When P4 - 05 = 0, speed direction is controlled by CINV. When it is OFF, the motor rotates according to the set direction. When it is ON, the motor rotates according to reversed direction of the set direction. P4-05=1 时，速度方向由 SDIR2、SDIR1 组合来控制。 When P4 - 05 = 1, speed direction is controlled by combination of SDIR2 and SDIR1.

24	EMGS	紧急停车。此信号接通时，伺服驱动器停机。 Emergency stop. When this signal is put through, the servo driver will stop.

25	SHOM	启动原点回归。Enable origin point return.

26	ORGP	原点回归参考点。Origin point returns to reference point.

设定值 Setting value	符号 Symbol	功能说明 Functional description		
27	CNTR	内部位置运行启动信号，参考 P3-21 参数定义。 Starting signal of internal position running, refer to definition for P3 - 21 parameter.		
28	P_PID1	油压控制 PID 参数选择：Oil pressure control PID parameter selection:		
29	P_PID2	P_PID2	P_PID1	PID 参数组别 PID parameter group
		OFF	OFF	第一组 The first group PID：A0-12、A0-13、A0-14
		OFF	ON	第二组 The second group PID：A0-15、

		A0-16、A0-17
ON	OFF	第三组 The third group PID：A0-18、A0-19、A0-20
ON	ON	第四组 The fourth group PID：A0-21、A0-22、A0-23

6.3 数字输出功能 Digital output function

设定值 Setting value	符号 Symbol	功能说明 Functional description
1	SV_RY	伺服准备好信号，当驱动器主电源通电后，无报警输出，在 1.5s 内输出此信号。 SRDY signal: If no alarm is outputted after main power supply of driver is switched on, it will output this signal within 1.5s.
2	ALM	报警输出信号，当驱动器"dP-Err"菜单下显示有报警时，输出 ON 信号。 Alarm output signal: When an alarm is displayed under driver "dP - Err" menu, it will output ON signal.
3	SV_F	定位完成信号，在位置方式下，位置偏差剩余脉冲小于或等于 P3-24 设定值，输出 ON 信号。Positioning completion signal: If residual pulse of position deviation is less than or equal to P3 - 24 setting value under position mode, it will output ON signal. 注意：'P3-24'参数的设定并不影响伺服系统最终的定位精度。当位置偏差脉冲数大于'P3-25'参数值时，驱动器则输出位置超差报警 Err8。 Note: Setting for 'P3 - 24' does not affect final setting accuracy of servo system. When position deviation pulse number is greater than 'P3 - 25' parameter value, the driver will output the position overproof alarm Err8. 位置偏差 Position deviation,　时间　time

4	BRK	电磁制动，机械抱闸。（参考 6.1 章节参数详解） Electromagnetic braking, mechanical contracting brake. (refer to Section 6.1, Detailed Annotation of Parameter) 1、电机处于静止状态时（电机运行速度< P1-16），动作时序图： When motor remains at quiescent state (motor running speed < P1 - 16), the action sequence chart is as follows: SV_ON（DI输入）：　ON　　OFF BRK（DO输出）：　ON　　OFF 电机通电状态：　　通电　　断电 P1-17 （DI 输入）(DI input)，　(DO 输出) (DO output)， 电机通电状态 motor power-up state,　通电 power-on,　　断电 power cut 2、电机处于运行状态（电机运行速度≥P1-16），动作时序图： When motor remains at running state (motor running speed≥ P1 - 16), the action sequence chart is as follows: SV_ON（DI输入）：　ON　　OFF 电机通电状态：　　通电　　断电 BRK（DO输出）：　ON　　OFF P1-18 到达P1-19速度与P1-18设置时间中的较快者 电机速度（r/min）：　P1-19 （DI 输入）(DI input)　电机通电状态：motor power-up state, 通电 power-on,　　断电　power cut （DO 输出）(DO output), 到达 P1-19 速度与 P1-18 设置时间中的较快者 whichever comes first in reaching P1 - 19 speed or the set time in P1 - 18, 电机速度 motor speed
5	SV_S	速度到达信号，在速度方式下，当电机的实际转速超过 P1-28 的设定值时，输出 ON 信号，否则输出 OFF 信号。 Speed arriving signal: under speed mode, when actual speed of motor exceeds P1 - 28 setting value, it will output ON signal, otherwise it will output OFF signal.

		速度 r/min P1-28 速度大于P1-28输出SV_S信号 SV_S　　OFF　　　　ON 速度 Speed, 速度大于 P1-28 输出 SV_S 信号 when speed is greater than P1 - 28, it will output SV_S signal
6	SV_T	力矩达到。在力矩方式下，当电机的实际转矩超过 P1-32 的设定值时，输出 ON 信号，否则输出 OFF 信号。（参考 SV_S 信号定义） Torque attainment: Under torque mode, when actual torque of motor exceeds P1 - 32 setting value, it will output ON signal, otherwise it will output OFF signal. (refer to definition for SV_S signal)
7	HOME	原点回归完成。Origin point return is completed.
8	ZPS	零速信号。当电机运行速度低于 P1-20 参数设置值时，驱动器输出 ON 信号，否则输出 OFF 信号。 Zero-speed signal: When motor running speed is lower than P1 - 20 parameter setting value, the driver will output ON signal, otherwise it will output OFF signal.
11	DSWH	双排量柱塞泵切换信号，当系统同时满足参数 A0-08、A0-09 的条件时，进入压力控制状态，驱动器输出 ON 信号，否则输出 OFF 信号。 Double-discharge plunger pump switchover signal: When system simultaneously meets conditions in parameter A0-08 and A0-09, it will enter into pressure control status and the driver will output ON signal, otherwise it will output OFF signal.

第七章 通信功能 Chapter Ⅶ Communication Function

7.1MODBUS 通信 MODBUS communication

7.1.1 MODBUS 通信概要 MODBUS communication summary

伺服驱动器提供了 RS485 通信接口，采用国际标准的 MODBUS 通信协议进行主从通信。The servo driver supports the serial communication of RS485, and adopts MODBUS communication protocol of international standard to perform master-slave communication. 用户通过 RS485 接口可以同时与 32 台伺服驱动器实现异步串行半双工通信。通信可实现如下功能：User can simultaneously realize asynchronous serial half-duplex communication with 32 servo drivers through RS485 interface. Communication can realize functions below:

➢ 读写伺服驱动器功能参数。Read and write functional parameters of the servo driver.

➢ 监视伺服驱动器工作状态。Monitor the operating state of the servo driver.

➢ 控制驱动器运行。Control running of driver.

7.1.2 MODBUS 通信协议 MODBUS communication protocol

一、数据帧格式 I. Data Frame Format

MODBUS 通信可提供两种模式：ASCII（American Standard Code for information interchange）模式、RTU（Remote Terminal Unit）模式。通过参数 P6-02 选择通信数据格式。

MODBUS communication can provide two modes: ASCII (American Standard Code for information interchange) mode and RTU (Remote Terminal Unit) mode. The communication data format can be selected through parameter P6 - 02.

RTU 模式帧格式：Frame format in RTU mode:

在 RTU 模式下，数据帧被 3.5 以上个字符时间分割，每一帧中的字节之间的时间间隔不大于 1.5 个字符时间，结构如下所示：In RTU mode, data frame is partitioned by more than 3.5 characters time. The time interval between bytes in each frame is not bigger than 1.5 character time, with structure shown below:

字节时间 Byte time
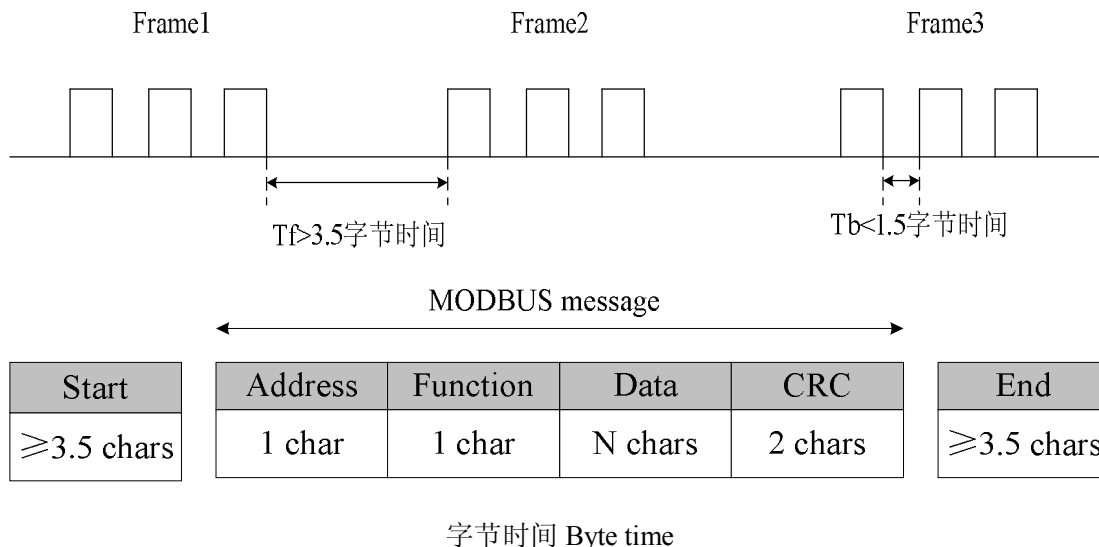
图 6.1　RTU 模式帧格式 Fig. 6.1 Frame Format in RTU mode

在帧完成之前，如果两字节之间的停顿时间在 1.5 字节和 3.5 字节传输时间之间，驱动器将该不完整消息帧丢弃，且无数据返回，直到下一个 3.5 字节的停顿时间出现（起始标志），才开始接收消息帧。

Before frame is completed, if pause time between two bytes is between transmission durations of 1.5 bytes and 3.5 bytes, the driver will discard this incomplete message frame and no data will be returned.　It will begin to receive the message frame until pause time of the next 3.5 bytes appears (beginning mark).

ASCII 模式帧格式：Frame format in ASCII mode:

在 ASCII 模式下，数据帧有固定的起始位和停止位，帧格式如下：In ASCII mode, there are fixed start bit and stop bit in data frame, with frame format as follows:

Start	Address	Function	Data	LRC	End
1 char :	2 chars	2 chars	2×N chars	2 chars	2 chars CR,LF

图 6.2　ASCII 模式帧格式 Fig. 6.2 Frame Format in ASCII mode

每个字节由两个 ASCII 字元组成，比如：0x12 用 ASCII 码表示则包含了'1'的 ASCII 码（0x31）及'2'的 ASCII 码（0x32）。

Each byte consists of two ASCII characters. For instance: 0x12 expressed by ASCII code contains ASCII code (0x31) of '1' and ASCII code (0x32) of '2'.

表 6.1　ASCII 码对照表 Table 6.1 Comparison Table of ASCII codes

字符 Character	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'
对应的 ASCII 码 Corresponding ASCII code	0x30	0x31	0x32	0x33	0x34	0x35	0x36	0x37
字符 Character	'8'	'9'	'A'	'B'	'C'	'D'	'E'	'F'

对应的 ASCII 码 Corresponding ASCII code	0x38	0x39	0x41	0x42	0x43	0x44	0x45	0x46
字符 Character	':'	'CR'	'LF'					
对应的 ASCII 码 Corresponding ASCII code	0x3A	0x0D	0x0A					

传输中的小数，则转换为整数后以 16 进制格式传输，如 0.10，进行传输的数据为 0x0A。

After decimal in transmission is converted into integer, it will be transmitted in hexadecimal format. For instance 0.10, data in transmission are 0x0A.

二、协议描述 II. Protocol Description

伺服驱动器支持 MODBUS 通信协议，能够对驱动器参数进行读写，读功能码 0x03，写功能码 0x06、0x10。
The servo driver supports MODBUS communication protocol and can read and write driver's parameters. The reading function code is 0x03. The writing function codes are0x06 and 0x10.

1 、读功能码(0x03)Reading function code (0x03)

	RTU 格式 RTU mode	ASCII 格式 ASCII format
START	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	起始位':', 0x3A。 Start bit ':', 0x3A.
ADDR	站地址（参数 P6-00），一个字节。 Slave address (parameter P6 - 00), 1 byte.	站地址, 2 个字节的 ASCII 字元。 Slave format, ASCII character of 2 bytes.
CMD	命令码, 0x03。 Function code, 0x03.	命令码, 0x30 0x33。 Function code, 0x30 0x33.
DATA1	读参数起始地址, 1 个字, 高 8 位字节在前, 低 8 位字节在后。Read parameter initial address, 1 word. The high 8-bit bytes are ahead, low 8-bit bytes are behind them.	读参数起始地址, 1 个字, 4 个字节 ASCII 字元。 Read parameter initial address, 1 word, ASCII character of 4 bytes.
DATA2	读字数(N≤16), 1 个字, 高 8 位字节在前, 低 8 位字节在后。Read number of words (N≤16), 1 word. The high 8-bit bytes are ahead, low 8-bit bytes are behind them.	读字数(N≤16), 1 个字, 4 个字节 ASCII 字元。 Read number of words (N≤16), 1 word, ASCII character of 4 bytes.
CRC/LRC	CRC16, 低字节在前, 高字节在后。CRC16, lower bytes are ahead, high bytes are behind them.	LRC, 2 个字节 ASCII 字元。 LRC, ASCII character of 2 bytes.
END	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	结束位'CR''LF', 0x0D 0x0A。 End bit 'CR' 'LF', 0x0D 0x0A.

响应帧格式：通信过程正确则返回如下格式帧，如果通信出错则返回错误信息（参考"4、通信错误处理"）。

Response massage: If communication process is correct, then it will return a frame in the following format. If

communication makes an error, then it will return an error message (refer to " 4, Communication Error Processing".

	RTU 格式 RTU mode	ASCII 格式 ASCII format
START	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	起始位':', 0x3A。 Start bit ':', 0x3A.
ADDR	站地址（参数 P6-00），一个字节。 Slave address (parameter P6 - 00), 1 byte.	站地址，2 个字节的 ASCII 字元。Slave format, ASCII character of 2 bytes.
CMD	命令码, 0x03。 Function code, 0x03.	命令码, 0x30 0x33。 Function code, 0x30 0x33.
DATA LENGTH	字节数，一个字节，等于读字数 N×2。 The number of bytes, 1 byte, equal to read number of words N * 2.	字节数，等于读字数 N×2, 2 个字节 ASCII 字元。 The number of bytes, equal to read number of words N * 2, ASCII character of 2 bytes.
DATA	返回的参数数据, N 个字。 Returned parameter data, N characters.	返回的参数数据, N 个字, N×4 个 ASCII 字元。 Returned parameter data, N characters, N * 4 ASCII characters.
CRC/LRC	CRC16, 低 8 位在前, 高 8 位在后。 CRC16, lower 8-bits are ahead, high 8-bits are behind them.	LRC, 2 个字节 ASCII 字元。 LRC, ASCII character of 2 bytes.
END	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	结束位'CR''LF', 0x0D 0x0A。 End bit ' CR' ' LF', 0x0D 0x0A.

2、写功能码（0x06）Writing function code (0x06)

	RTU 格式 RTU mode	ASCII 格式 ASCII format
START	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	起始位':', 0x3A。 Start bit ':', 0x3A.
ADDR	站地址（参数 P6-00），一个字节。 Slave address (parameter P6 - 00), 1 byte.	站地址, 2 个字节 ASCII 字元。 Slave format, ASCII character of 2 bytes.
CMD	命令码, 0x06。 Function code, 0x06.	命令码, 0x30 0x36。 Function code, 0x30 0x36.
DATA1	写参数起始地址, 1 个字, 高 8 位字节在前, 低 8 位字节在后。 Write parameter initial address, 1 word. The high 8-bit bytes are ahead, low 8-bit bytes are behind them.	写参数起始地址, 1 个字, 4 个字节 ASCII 字元。 Write parameter initial address, 1 word, ASCII character of 4 bytes.
DATA2	写入数据。Write in data.	写入数据。Write in data.
CRC/LRC	CRC16, 低 8 位在前, 高 8 位在后。 CRC16, lower 8-bits are ahead, high 8-bits are	LRC, 2 个字节 ASCII 字元。 LRC, ASCII character of 2 bytes.

	behind them.	
END	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	结束位'CR''LF', 0x0D 0x0A。 End bit ' CR' ' LF', 0x0D 0x0A.

响应帧格式：写入正确后，驱动器返回与发送相同的数据帧。如果通信出错，则返回错误信息。Response massage: After write-in is correct, the driver will return the data frame identical to sending. If communication makes an error, then it will return an error message.

3、写功能码（0x10）Writing function code (0x10)

	RTU 格式 RTU mode	ASCII 格式 ASCII format
START	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	起始位':', 0x3A。 Start bit ':', 0x3A.
ADDR	站地址（参数 P6-00），一个字节。Slave address (parameter P6 - 00), 1 byte.	站地址, 2 个字节 ASCII 字元。 Slave format, ASCII character of 2 bytes.
CMD	命令码, 0x10。 Function code, 0x10.	命令码, 0x31 0x30。 Function code, 0x31 0x30.
DATA1	写参数起始地址, 1 个字, 高 8 位字节在前, 低 8 位字节在后。 Write parameter initial address, 1 word. The high 8-bit bytes are ahead, low 8-bit bytes are behind them.	写参数起始地址, 1 个字, 4 个字节 ASCII 字元。 Write parameter initial address, 1 word, ASCII character of 4 bytes.
DATA2	写入数据字数, 一个字, 高字节在前, 低字节在后。 Write in data word number, 1 word. The high byte is ahead, lower byte is behind it.	写入数据字数, 一个字, 4 个字节 ASCII 字元。 Write in data word number, 1 word, ASCII character of 4 bytes.
DATA3	写入数据字节数, 一个字节。 Write in data byte number, 1 byte.	写入数据字节数, 一个字节, 2 个字节 ASCII 字元。 Write in data byte number,1 byte, ASCII character of 2 bytes.
DATAn	写入数据（≤16 个字）。 Write in data (≤16 words).	写入数据。Write in data.
CRC/LRC	CRC16, 低 8 位在前, 高 8 位在后。 CRC16, lower 8-bits are ahead, high 8-bits are behind them.	LRC, 2 个字节 ASCII 字元。 LRC, ASCII character of 2 bytes.
END	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	结束位'CR''LF', 0x0D 0x0A。 End bit 'CR' 'LF', 0x0D 0x0A.

响应帧格式：Response massage:

写入正确后, 驱动器返回：站地址+命令码（0x10）+写参数起始地址+写入数据字数(一个字)+CRC。

通信出错：返回错误信息。

After write-in is correct, the driver will return: station address + Function code (0x10) + write parameter initial

address + write in data word number (1 word) +CRC.

Communication error: return an error message.

4、通信错误处理 Communication error processing

通信错误响应帧格式：**Communication error response frame format:**

	RTU 格式 RTU mode	ASCII 格式 ASCII format
START	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	起始位':', 0x3A。 Start bit ':', 0x3A.
ADDR	站地址（参数 P6-00），一个字节。 Slave address (parameter P6 - 00), 1 byte.	站地址, 2 个字节 ASCII 字元。 Slave format, ASCII character of 2 bytes.
CMD	命令码, 0x83/0x86/0x90。 Function code, 0x83 / 0x86 / 0x90.	命令码。 Function code.
ERROR CODE	错误代码，一个字节。 Error code, 1 byte.	错误代码, 2 个字节 ASCII 字元。 Error code, ASCII character of 2 bytes.
CRC/LRC	CRC16, 低 8 位在前，高 8 位在后。 CRC16, lower 8-bits are ahead, high 8-bits are behind them.	LRC, 2 个字节 ASCII 字元。 LRC, ASCII character of 2 bytes.
END	≥3.5 个字符空闲时间。 ≥3.5 characters' idle time.	结束位'CR' 'LF', 0x0D 0x0A。 End bit 'CR' 'LF', 0x0D 0x0A.

错误代码说明：Description of the error code:

错误代码 Error code	说明 Description
0x01	CRC/LRC 校验错。CRC / LRC check error.
0x02	通信数据奇偶校验错误。Communication data parity error.
0x03	命令码错误，不是 0x03/0x06/0x10。 Function code error, not 0x03 / 0x06 / 0x10.
0x04	读、写数据超范围。Reading and Writing data exceed scope.
0x05	发送了非法数据地址。Send an illegal data address.
0x06	从机忙。Slave computer is busy.
0x07	帧长度错误。Frame length error.
0x08	只读参数，不可修改。 Read-only parameter, cannot be modified.

5、 特殊功能通信说明 Description for specific function communication

通信地址 Communication address	定义 Definition	写 Write	读 Read
0x1000	Fn-SEt 保存参数 Save parameter	1：开始保存参数。Begin to save parameter. 注：写其他数值返回错误信息。Note: Writing other values will return an error message.	1：操作进行中。Operation is ongoing. 2：操作成功。Operation succeeds. 3：操作失败。Operation fails.
0x1001	Fn-dEF 恢复出厂值 Restore factory value	1：开始恢复厂家参数。Begin to restore manufacturer parameters. 注：写其他数值返回错误信息。Note: Writing other values will return an error message.	1：操作进行中。Operation is ongoing. 2：操作成功。Operation succeeds. 3：操作失败。Operation fails.
0x1002	Fn-Sr Sr 运行 Fn-Sr Sr Operation	写该地址使驱动器进入 Sr 控制方式，且 Sr 速度由写入参数值决定。Writing this address will have the driver enter into Sr control mode, with Sr speed decided by writing parameter.	返回 Sr 速度。Return Sr speed.
0x1003	Fn-JoG JOG 运行 Fn-JoG JOG Operation	写该地址使驱动器进入 JOG 控制方式：Writing this address will have the driver enter into JOG control mode: 0：驱动器停转。The driver stalls. 1：驱动器反转。The driver reversal. 2：驱动器正转。The driver positive rotation.	0：JOG 停止。JOG stop. 1：JOG 反转。JOG reversal. 2：JOG 正转。JOG positive rotation.
0x1004	Fn-AI1 AI1 通道模拟输入零漂补偿 Fn - AI1 AI1 channel analog input zero-offset compensation	1：AI1 通道模拟输入零偏补偿开始。AI1 channel analog input zero offset compensation begins. 注：写其他数值返回错误信息。Note: Writing other values will return an error message.	1：操作进行中。Operation is ongoing. 2：操作成功。Operation succeeds. 3：操作失败。Operation fails.
0x1005	Fn-AI2 AI2 通道模拟输入零漂补偿 Fn - AI2 AI2 channel analog input zero-offset compensation	1：AI2 通道模拟输入零偏补偿开始 AI2 channel analog input zero offset compensation begins. 。 注：写其他数值返回错误信息。Note: Writing other values will return an error message.	1：操作进行中。Operation is ongoing. 2：操作成功。Operation succeeds. 3：操作失败。Operation fails.
0x1006	Fn-AI3 AI3 通道模拟输入零漂补偿 Fn - AI3 AI3 channel analog input zero-offset compensation	1：AI3 通道模拟输入零偏补偿开始。AI3 channel analog input zero offset compensation begins. 注：写其他数值返回错误信息。Note: Writing other values will return an error message.	1：操作进行中。Operation is ongoing. 2：操作成功。Operation succeeds. 3：操作失败。Operation fails.
0x1007	Fn-Err 历史报警	只读。Read-only.	返回历史报警信息，最多可以

		读 5 个字。
信息 n - Err historical alarm information		Return historical alarm information, at most can read 5 words

6、利用 ModBus 通信进行参数读写实例 Example for utilizing ModBus communication to read-write parameter

(1)读参数 Reading parameter

例：驱动器参数 P0-04=1, P0-05=150（通信地址参考第五章节），读这两个参数值的报文格式为：

Example: In the case of the driver parameter P0 - 04 = 1, P0 - 05 = 150 (for communication address, refer to Chapter V), the message format of reading these two parameter values is:

RTU：

发送报文： 0x01 0x03 0x00 0x04 0x00 0x02 0x85 0xCA

Sending message: 0x01 0x03 0x00 0x04 0x00 0x02 0x85 0xCA

正确应答： 0x01 0x03 0x04 0x00 0x01 0x00 0x96 0x2B 0x9D

Correct reply: 0x01 0x03 0x04 0x00 0x01 0x00 0x96 0x2B 0x9D

错误应答：0x01 0x83 0x01 0x80 0xF0(0x01：传输数据奇偶校验错)

Error reply: 0x01 0x83 0x01 0x80 0xF0 (0x01: transmitting data parity check error)

ASCII（起始位:0x3A　结束位:0x0D 0x0A）：

ASCII (start bit:0x3A, end bit :0x0D 0x0A):

发送报文： 0x3A 0x30 0x31 0x30 0x33 0x30 0x30 0x30 0x34 0x30 0x30 0x30 0x32 0x46 0x36
0x0D 0x0A

Sending message:

正确应答： 0x3A 0x30 0x31 0x30 0x33 0x30 0x34 0x30 0x30 0x30 0x31 0x30 0x30 0x39 0x36
0x36 0x31 0x0D 0x0A

Correct reply:

错误应答：0x3A 0x30 0x31 0x38 0x33 0x30 0x31 0x37 0x42 0x0D 0x0A ("0x30 0x31"->0x01:传输数据奇偶校验错)

Error reply: 0x3A 0x30 0x31 0x38 0x33 0x30 0x31 0x37 0x42 0x0D 0x0A (" 0x30 0x31 " - >0x01: transmitting data parity check error)

(2)写参数 Writing parameter

例：将驱动器参数 P2-00 的值改为 100, 写此参数值的报文格式为(通信地址参考第五章节)：Example:

When value of the driver parameter P2 - 00 is changed to 100, the message format of writing this parameter value is (for communication address, refer to chapter V):

0x06 命令码, RTU：

0x06 Function code, RTU:

发送报文： 0x01 0x06 0x02 0x00 0x00 0x64 0x89 0x99

Sending message: 0x01 0x06 0x02 0x00 0x00 0x64 0x89 0x99

正确应答： 0x01 0x06 0x02 0x00 0x00 0x64 0x89 0x99

Correct reply: 0x01 0x06 0x02 0x00 0x00 0x64 0x89 0x99

错误应答：0x01 0x86 0x02 0xC3 0xA1 (0x02：CRC 校验错)

Error reply: 0x01 0x86 0x02 0xC3 0xA1 (0x02: CRC check error)

ASCII(起始位:0x3A 结束位:0x0D 0x0A)：ASCII (start bit:0x3A, end bit:0x0D 0x0A):

发送报文： 0x3A 0x30 0x31 0x30 0x36 0x30 0x32 0x30 0x30 0x30 0x30 0x36 0x34 0x39 0x33
0x0D 0x0A

Sending message:

正确应答： 0x3A 0x30 0x31 0x30 0x36 0x30 0x32 0x30 0x30 0x30 0x30 0x36 0x34 0x39 0x33
0x0D 0x0A

Correct reply:

错误应答： 0x3A 0x30 0x31 0x38 0x36 0x30 0x32 0x37 0x37 0x0D 0x0A ("0x30 0x32"->0x02:
LRC 校验错)

Error reply: 0x3A 0x30 0x31 0x38 0x36 0x30 0x32 0x37 0x37 0x0D 0x0A ("0x30 0x32"->0x02: LRC check error)

0x10 命令码, RTU：

0x10 Function code, RTU:

发送报文： 0x01 0x10 0x02 0x00 0x00 0x01 0x02 0x00 0x64 0x84 0x7B

Sending message: 0x01 0x10 0x02 0x00 0x00 0x01 0x02 0x00 0x64 0x84 0x7B

正确应答： 0x01 0x10 0x02 0x00 0x00 0x01 0x00 0x71

Correct reply: 0x01 0x10 0x02 0x00 0x00 0x01 0x00 0x71

注：1、以上实例中，以"P6-00=1"为例，即站地址为 0x01。

Note: 1. "P6 - 00 = 1" is exampled in above examples, namely station address is 0x01.

三、校验 III. Check

1、CRC 校验 CRC check

RTU 模式采用 CRC(Cyclical Redundancy Check)校验法。当驱动器接收到一个新的消息帧时，先判断地址是否与本机地址相符，若不一致则不接收，当一组完整的消息帧接收到以后，才进行 CRC 校验,除每个字节的起始位、停止位、奇偶校验位外，其他所有二进制位全部要进行 CRC 校验。

CRC（Cyclical Redundancy Check) is adopted for RTU mode. When receiving a new message frame, the driver will firstly judge whether the address coincides with local one. If inconsistent, then it will not receive. Only after a group of intact message frames are received, will CRC check be performed. Except start bit, stop bit and parity bit of each byte, all of other binary bits shall be checked by CRC.

$$G(x) = x^{16} + x^{15} + x^2 + 1$$

以下是 C 语言生成 CRC 值的计算方法：

The following is the calculation method for CRC value generated by C language:

```
unsigned char* ParaDate;

unsigned char DataLen;

unsigned int CRCdat(unsigned char* ParaDate, unsigned char DataLen)

{

    int i;

    unsigned int CRC_reg=0xffff;

    while(DataLen--)

    {

        CRC_reg ^= *ParaDate++;

        for(i=0;i<8;i++)

        {

            if(CRC_reg & 0x01)   CRC_reg=( CRC_reg>>1)^0xa001;

            else   CRC_reg= CRC_reg>>1;

        }

    }

    return CRC_reg;

}
```

2、LRC 校验 LRC check

ASCII 模式采用 LRC(Longitudinal Redundancy Check)校验法。LRC 校验是将从 ADDR 至最后一个数据的内容进行无进位加(不包括起始字符和结束字符)，得到的结果保留低 8 位，超出部分予以去除（如：

0x78+0xA2=0x1A），然后再对结果计算二的补数(如例中 LRC 码为 0xE6)，即得到 LRC 校验值。

LRC (Longitudinal Redundancy Check) is adopted for ASCII mode. LRC check is to perform addition without carry for contents from ADDR to the last datum (excluding beginning character and termination character), to reserve low 8-bits for the obtained result, to wipe off the exceeding part (for instance: 0x78+0xA2 = 0x1A) and then to calculate two's complement for the result (as shown in example, LRC code is 0xE6) and to finally obtain LRC check value.

第八章 故障诊断 Chapter VIII Fault Diagnosis

报警代码	报警名称	主要原因	处理办法
Err 0	正常	正常	
Err 1	模块保护	驱动器使能报警，驱动器异常	与厂家联系
		参数设置异常	重新调整驱动器参数
		驱动器温度过高	请换容量大的电机和驱动器
		受干扰	接地不良
		启动停止时报警，负载惯量大或加减速时间短	减小负载惯量；增加上位机的加减速时间
Err 2	过电流	使能报警，驱动器输出短路	排除短路
		运行过程中，电机振荡	参数设置不当，重新设置参数
		负载电流过大	换大容量驱动器
		电机绝缘不好	更换电机
		启动停止时报警，负载惯量大或加减速时间短	减小负载惯量；增加上位机的加减速时间
Err 3	欠压	运行过程中报警，电网电压低	测量电网电压
		上电报警，电路板故障	与厂家联系
		主回路无输入电压源	重新确认供电电源
Err 4	过电压	制动器没工作	制动电阻接线断开；制动晶体管损坏；制动电阻损坏
		制动电阻容量不够	换大容量制动电阻
		上电报警，电源电压过高	检查电源电压
Err 5	模拟A通道无电流	接通电源报警，电路板模拟A通道故障	与厂家联系
Err 6	模拟B通道无电流	±12V电源故障，电路板模拟B通道故障	与厂家联系
Err 7	超速	接通电源报警,电路板故障,编码器故障	更换驱动器,更换电机
		编码器电缆不良	换编码器线
		输入指令脉冲频率过高	正确设定输入脉冲
		加/减速时间常数太小，使速度超调量过大	增大上位机的加/减速时间常数
		输入电子齿轮比太大	请正确设置电子齿轮比
		伺服系统不稳定，引起超调	重新设置有关增益；如果增益不能设置到合适值，则减小负载转动惯量比率

报警代码 Error code	报警名称 Alarm name	主要原因 Leading cause	处理办法 Method of disposition
Err 0	正常 Normal	正常 Normal	
Err 1	模块保护 Module protection	驱动器使能报警，驱动器异常 The driver enabling alarm, the driver abnormality	与厂家联系 Contact manufacturer
		参数设置异常 Parameter setting abnormality	重新调整驱动器参数 Readjust the driver parameters
		驱动器温度过高 The driver temperature too high	请换容量大的电机和驱动器 Please replace it by the motor and driver with large capacity
		受干扰 Disturbed	接地不良 Bad earth
		启动停止时报警，负载惯量大或加减速时间短 Give an alarm when start-up stops, load inertia is large or acceleration and deceleration time is short	减小负载惯量； Decrease load inertia; 增加上位机的加减速时间 Increase acceleration and deceleration time of upper computer
Err 2	过电流 Overcurrent	使能报警，驱动器输出短路 Enabling alarm, the driver output short-circuit	排除短路 Eliminate short-circuit
		运行过程中，电机振荡 Motor oscillates in run procedure	参数设置不当，重新设置参数 Parameter setting is improper, reset parameters
		负载电流过大 Load current is too large	换大容量驱动器 Replace it by a high-capacity driver
		电机绝缘不好 Motor insulation is unsatisfactory	更换电机 Replace motor
		启动停止时报警，负载惯量大或加减速时间短 Give an alarm when start-up stops, load inertia is large or acceleration and deceleration time is short	减小负载惯量； Decrease load inertia; 增加上位机的加减速时间 Increase acceleration and deceleration time of upper computer
Err 3	欠压 Undervoltage	运行过程中报警，电网电压低 Give an alarm in run procedure, mains voltage is low	测量电网电压 Measure mains voltage
		上电报警，电路板故障 Give an alarm during power-on, circuit board fault	与厂家联系 Contact manufacturer
		主回路无输入电压源 There is no input voltage source in main circuit	重新确认供电电源 Reconfirm electric power supply
Err 4	过电压 Overvoltage	制动器没工作 The brake does not work	制动电阻接线断开； 制动晶体管损坏； 制动电阻损坏

			The braking resistor connection is disconnected; the braking transistor is damaged; the braking resistor is damaged
		制动电阻容量不够 The braking resistor capacity is insufficient	换大容量制动电阻 Replace it by a high-capacity braking resistor
		上电报警，电源电压过高 Give an alarm during power-on, mains voltage is too high	检查电源电压 Inspect mains voltage
Err 5	模拟 A 通道无电流 Analog A-channel zero current	接通电源报警，电路板模拟 A 通道故障 Give an alarm during power-on, analog A-channel on circuit board is out of service	与厂家联系 Contact manufacturer
Err 6	模拟 B 通道无电流 Analog B-channel zero current	±12V 电源故障，电路板模拟 B 通道故障 ±12V power failure, analog B-channel circuit board is out of service	与厂家联系 Contact manufacturer
Err 7	超速 Overspeed	接通电源报警，电路板故障，编码器故障 Give an alarm during power-on, circuit board fault, encoder fault	更换驱动器，更换电机 Replace the driver and motor
		编码器电缆不良 Encoder cable is not good	换编码器线 Replace encoder wire
		输入指令脉冲频率过高 Input instruction pulse frequency is too high	正确设定输入脉冲 Correctly set input pulse
		加减速时间常数太小，使速度超调量过大 Acceleration and deceleration time constant is too small and makes speed overshooting oversize	增大上位机的加减速时间常数 Increase acceleration and deceleration time constant of upper computer
		输入电子齿轮比太大 Input electronic gear ratio is too large	请正确设置电子齿轮比 Please correctly set electronic gear ratio
		伺服系统不稳定，引起超调 The servo system instability causes overshooting	重新设置有关增益； 如果增益不能设置到合适值，则减小负载转动惯量比率 Reset related gain; if gain cannot be set to a proper value, then decrease load rotary inertia ratio

报警代码	报警名称	主要原因	处理方法
Err 8	位置超差	接通电源报警，电路板故障	与厂家联系
		电机U、V、W引线接错	正确接线
		编码器电缆引线接错	换编码器线
		电机堵转	检查机械部分，电机是否堵转
		位置超差检测范围设定太小	增加位置超差检测范围
		增益值设定太小	增大增益值
		转矩限制太小	增大转矩设定值
		外部负载太大	更换容量大的电机和驱动器
Err 9	转矩指令超限	转矩指令超限时间大于允许时间	调整转矩指令
		参数设置不合理	调整参数
Err 10	FPGA芯片错误	芯片数据处理传输故障	重新上电
		芯片或电路板故障	与厂家联系
Err 11	编码器故障	接通电源报警，编码器插头没插好	重新拔插编码器插头
		接通电源报警，编码器线故障	换编码器线
		接通电源报警，电机编码器坏	更换电机
		接通电源报警，编码器型号与参数不匹配	重新设置编码器型号
		运行过程中报警，编码器插头螺丝没上好，机械振动引起插头松动	紧固编码器插头
		运行过程中报警，编码器电缆过长，造成编码器供电电压偏低	缩短电缆，采用多芯并联供电
Err 12	编码器信号传输故障	编码器接头接触不良	紧固编码器接头螺丝
		编码器线受干扰	编码器线尽可能短，并采取屏蔽措施
		编码器坏	换电机
Err 13	Z脉冲丢失	编码器连线接触不良	重新连接编码器线
		编码器坏	换电机
		电路板故障	换驱动器
Err 14	电机热过载（ I^2t 检测)	接通电源报警，电路板故障	更换驱动器
		接通电源报警，参数设置错误	正确设置有关参数
		电机长期超过额定转矩运行	检查负载，或换更大功率的驱动器和电机
Err 15	驱动器过载保护	电机动力线未接，驱动器主电路未上电	按要求配线
		电机堵转	检查电机是否卡死
		驱动器输出电流过大	更换驱动器

报警代码 Error code	报警名称 Alarm name	主要原因 Leading cause	处理办法 Method of disposition
Err 8	位置超差 Position is overproof	接通电源报警，电路板故障 Give an alarm during power-on, circuit board fault	与厂家联系 Contact manufacturer
		电机 U、V、W 引线接错 U, V and W down-leads of motor are connected in error	正确接线 Correct wiring
		编码器电缆引线接错 Encoder cable lead is connected in error	换编码器线 Replace encoder wire
		电机堵转 Motor stalling	检测机械部分，电机是否堵转 Detect whether mechanical part causes motor stalling
		位置超差检测范围设定太小 Detection range setting for overproof position is too small	增加位置超差检测范围 Increase detection range for overproof position
		增益值设定太小 Settings for gain value is too small	增大增益值 Increase gain value
		转矩限制太小 Torque limitation is too small	增大转矩设定值 Increase torque setting value
		外部负载太大 External load is oversize	更换容量大的电机和驱动器 Replace it by the motor and driver with large capacity
Err 9	转矩指令超限 Torque instruction ultralimit	转矩指令超限时间大于允许时间 Torque instruction ultralimit time is greater than time allowed	调整转矩指令 Adjust torque instruction
		参数设置不合理 Parameter setting irrationality	调整参数 Adjust parameters
Err 10	FPGA 芯片错误 FPGA chip error	芯片数据处理传输故障 Chip data processing transmission fault	重新上电 Power on over again
		芯片或电路板故障 Chip or circuit board fault	与厂家联系 Contact manufacturer
Err 11	编码器故障 Encoder fault	接通电源报警，编码器插头没插好 Give an alarm during power-on, encoder plug is not inserted very well	重新拔插编码器插头 Pull out and insert encoder plug over again
		接通电源报警，编码器线故障 Give an alarm during power-on, encoder wire fault	换编码器线 Replace encoder wire
		接通电源报警，电机编码器坏 Give an alarm during power-on, motor encoder is broken	更换电机 Replace motor
		接通电源报警，编码器型号与参数不匹配 Give an alarm during power on, encoder model and parameter are of mismatching	重新设置编码器型号 Reset encoder model

		运行过程中报警，编码器插头螺丝没上好，机械振动引起插头松动 Give an alarm in run procedure, encoder plug screw is not screwed down, mechanical vibration causes plug looseness	紧固编码器插头 Fasten encoder plug
		运行过程中报警，编码器电缆过长，造成编码器供电电压偏低 Give an alarm in run procedure, encoder cable is overlong and causes encoder power supply voltage on the low side	缩短电缆，采用多芯并联供电 Shorten cable, adopt multiple core parallel connection electric supply
Err 12	编码器信号传输故障 Encoder signal transmission fault	编码器接头接触不良 Encoder joint is in poor contact	紧固编码器接头螺丝 Screw down encoder joint screw
		编码器线受干扰 Encoder wire is disturbed	编码器线尽可能短，并采取屏蔽措施 Ensure encoder wire is as short as possible and take shielding measures
		编码器坏 Encoder is broken	换电机 Replace motor
Err 13	Z 脉冲丢失 Z-pulse is lost	编码器连线接触不良 Encoder connection is in poor contact	重新连接编码器线 Reconnect encoder wire
		编码器坏 Encoder is broken	换电机 Replace motor
		电路板故障 Circuit board fault	换驱动器 Replace the driver
Err 14	电机热过载（I2t 检测）Motor thermal overload（I2t detection)	接通电源报警，电路板故障 Give an alarm during power-on, circuit board fault	更换驱动器 Replace the driver
		接通电源报警，参数设置错误 Give an alarm during power on, parameter setting error	正确设置有关参数 Correctly set related parameters
		电机长期超过额度转矩运行 Motor running exceeds the rated torque for a long term	检查负载，或换更大功率的驱动器和电机 Inspect load, or replace it by the driver and motor with even higher power
Err 15	驱动器过载保护 Driver overload protection	电机动力线未接，驱动器主电路未上电 Motor power line is not connected, the driver's main circuit is not powered on	按要求配线 Wiring as required
		电机堵转 Motor stalling	检查电机是否卡死 Check whether motor is stuck
		驱动器输出电流过大 The driver output current is oversize	更换驱动器 Replace the driver

报警代码	报警名称	主要原因	处理方法
Err 16	软件过流	驱动器瞬时电流过大	与厂家联系
Err 17	过负载	接通电源报警，电路板故障	换驱动器
		电机超过额定转矩运行	检查负载； 降低启停频率； 减小转矩限制值； 换更大功率的驱动器和电机
		电机不稳定振荡	调整增益； 增加加/减速时间； 减小负载惯量
		U、V、W 有一相断线，或编码器接线错误	检查接线
Err 18	制动故障	接通电源报警，电路板故障	更换驱动器
		制动电阻接线断开	重新接线
		制动电阻损坏	更换制动电阻
		制动回路容量不够	降低起停频率； 增加加/减速时间； 减小负载惯量； 换更大功率的驱动器和电机
		主电路电源过高	检查主电源
Err 21	电源缺相保护	三相电源缺相	检查电源接线
		电路板故障	换驱动器
Err 22	散热器过热报警	环境温度过高	降低环境温度
		风道堵塞	清理风道
		风扇损坏	更换风扇
		模块热敏电阻损坏	更换热敏电阻

报警代码 Error code	报警名称 Alarm name	主要原因 Leading cause	处理办法 Method of disposition
Err 16	软件过流 Software overcurrent	驱动器瞬时电流过大 The driver's instantaneous current is oversize	与厂家联系 Contact manufacturer
Err 17	过负载 Overload	接通电源报警，电路板故障 Give an alarm during power-on, circuit board fault	换驱动器 Replace the driver
		电机超过额度转矩运行 Motor running exceeds the rated torque	检查负载； 降低启停频率； 减小转矩限制值； 换更大功率的驱动器和电机 Check load; reduce start/stop frequency; decrease torque limitation value; replace it by the driver and motor with even higher power
		电机不稳定振荡 Unstable oscillation of motor	调整增益； 增加加减速时间；

			减小负载惯量 Adjust gain; increase acceleration and deceleration time; decrease load inertia
		U、V、W 有一相断线，或编码器接线错误 There is a phase disconnected in U, V and W, or encoder wiring error	检查接线 Check wiring
Err 18	制动故障 Braking fault	接通电源报警，电路板故障 Give an alarm during power-on, circuit board fault	更换驱动器 Replace the driver
		制动电阻接线断开 The braking resistor connection is disconnected	重新接线 Rewiring
		制动电阻损坏 The braking resistor damage	更换制动电阻 Replace the braking resistor
		制动回路容量不够 The braking circuit capacity is insufficient	降低起停频率； 增加加减速时间； 减小负载惯量； 换更大功率的驱动器和电机 Reduce start/stop frequency; increase acceleration and deceleration time; decrease load inertia; replace it by the driver and motor with even higher power
		主电路电源过高 Main circuit power supply is too high	检查主电源 Check main power supply
Err 21	电源缺相保护 Power phase loss protection	三相电源缺相 Three-phase supply open-phase	检查电源接线 Check power supply wiring
		电路板故障 Circuit board fault	换驱动器 Replace the driver
Err 22	散热器过热报警 Radiator temperature alarm	环境温度过高 Ambient temperature is too high	降低环境温度 Reduce ambient temperature
		风道堵塞 Air duct is blocked	清理风道 Clean up air duct
		风扇损坏 Fan damage	更换风扇 Replace fan
		模块热敏电阻损坏 Module thermomistor damage	更换热敏电阻 Replace thermomistor

备注：若出现与上表内不同的异警信息时，请与本公司技术人员联系。Remark: If any abnormal alarm information different from those in the above table appears, please contact technical staff of this company.

第九章 伺服电机部分 Chapter IX Servomotor Part

9.1 铭牌说明 Nameplate information
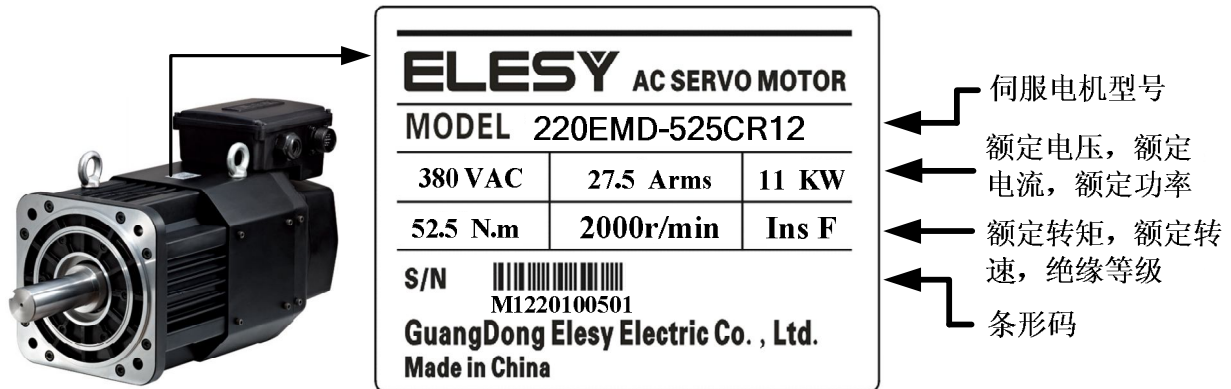
伺服电机型号 Servomotor type,　　　　　额定电压 rated voltage,　额定电流 rated current,

额定功率 rated power,　　　额定转矩 rated torque,　额定转速 rated speed,

绝缘等级 insulation class,　　　　条形码　bar code

图 9.1 伺服电机铭牌说明 Fig. 9.1 Description for Servomotor Nameplate

9.2 命名规则 Naming Rule

220 EM D 525 C R 12

轴伸规则：1:直轴不带键（标准）；
　　　　　2:直轴、带键、带螺纹孔。

选配件：1:不带选配件；2:带油封；
　　　　3:带制动器；　4:带油封,带制动器。

反馈元件：E:增量式编码器；　P:省线式编码器；
　　　　　S:绝对值编码器；　　R:旋转变压器。

额定转速：A:3000rpm；　B:2500rpm；　C:2000rpm；
　　　　　D:1500rpm；　E:1000rpm；　F:1700rpm。

额定转矩：478=47.8Nm；　525=52.5Nm；　700=70.0Nm
　　　　　716=71.6Nm；　955=95.5Nm；　10E=105Nm

设计顺序：A:220V标准型；　B:220V增强型；
　　　　　D:380V标准型；　E:380V增强型。

ELESY伺服电机

机座号
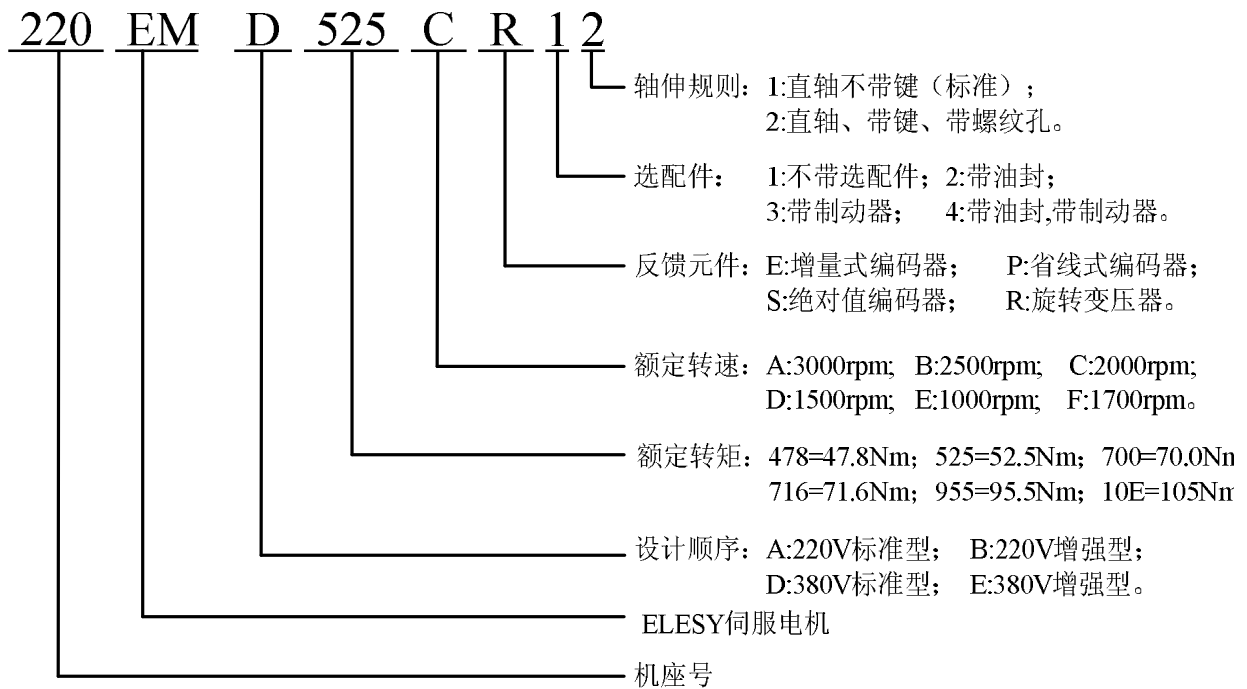
轴伸规则：　1：直轴不带键（标准）；
　　　　　　2：直轴、带键、带螺纹孔。

Shaft extension rule: 1. straight shaft is free of key (standard);
                         2.Straight shaft,   with key and screwed hole.
选配件：   1：不带选配件； 2：带油封；
            3：带制动器；   4：带油封，带制动器。
Optional accessory: 1. without optional accessory; 2. with oil seal;
                        3. with brake; 4. with oil seal and brake.
反馈元件：   E：增量式编码器；   P：省线式编码器；
            S：绝对值编码器；   R：旋转变压器。
Feedback element: E: increment type encoder; P: wire-saving type encoder;
                  S: absolute value encoder; R: rotary transformer.
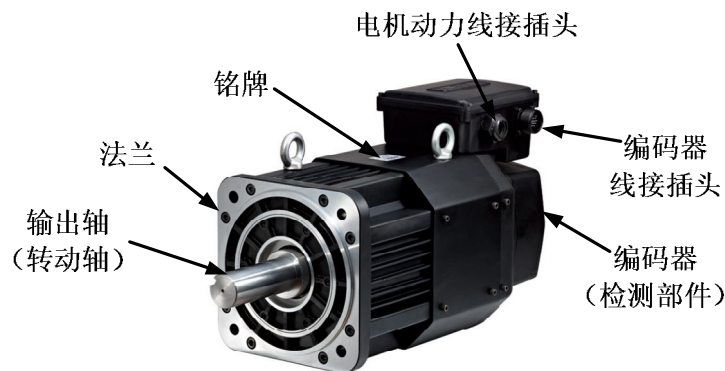额定转速：Rated speed:
额定转矩：Rated torque:
设计顺序：   A：220V 标准型；   B：220V 增强型；
            D：380V 标准型；   E：380V 增强型。
Design sequence: A: 220V standard type; B: 220V   enhancement type;
                   D: 380V standard type; E: 380V enhancement type.
ELESY 伺服电机 ELESY servomotor
机座号 Seat No.

图 9.2 伺服电机命名规则 Fig. 9.2 Servomotor Naming Rule

9.3 电机各部分名称 Name of Each Part of Motor

输出轴（转动轴）Output shaft (rotating shaft),   法兰 flange,   铭牌 nameplate,
电机动力线接插头 motor power line patchplug,   编码器线接插头 encoder wire plug,
编码器（检测部件）encoder (detecting unit)

Fig. 9.3   Name of Each Part of Motor

9.4 伺服电机的安装 Servomotor installation

伺服电机的安装要按照手册要求进行，安装错误或安装在不合适的地方，会缩短电机的使用寿命，甚至会引发意想不到的事故。出厂时伺服电机轴端部分已涂抹防锈剂，在安装之前请擦净该防锈剂。The servomotor shall be installed according to requirements in the manual. The installation error or installation at an improper place would shorten service life of motor, even would trigger an unexpected accident.   When leaving

factory, the servomotor shaft end was already daubbed with antirust. Before installation, please wipe up this antirust.
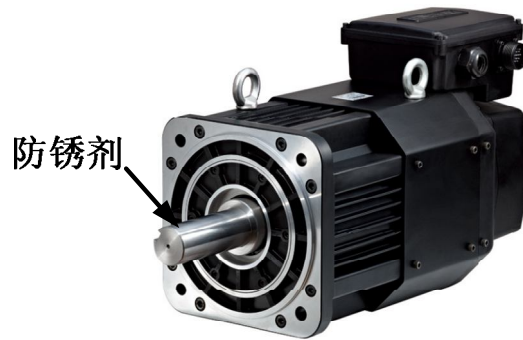
防锈剂 Antirust

图 9.4 防锈剂位置 Fig. 9.4 Antirust Position

一、 安装场所 I. Installation Site

伺服电机应安装在室内，并满足以下环境条件。The servomotor shall be installed indoors and shall meet environmental conditions below.

- 无腐蚀性或易燃、易爆气体；No corrosive or inflammable, explosive gasses;

- 通风良好、少粉尘、环境干燥；Well-ventilated, little dust, dry environment;

- 使用环境温度在0～40 ℃范围；The service environment temperature is in $0 \sim 40℃$;

- 保存温度：-10℃～50℃；Storage temperature: -10℃~ 50℃;

- 相对湿度在30%～95%RH范围内，不结露；The relative humidity is within range of 30% ~ 95%RH, without dew formation;

- 便于检修、清扫。Be convenient for overhaul and cleaning.

二、 安装尺寸 II. Installation Size

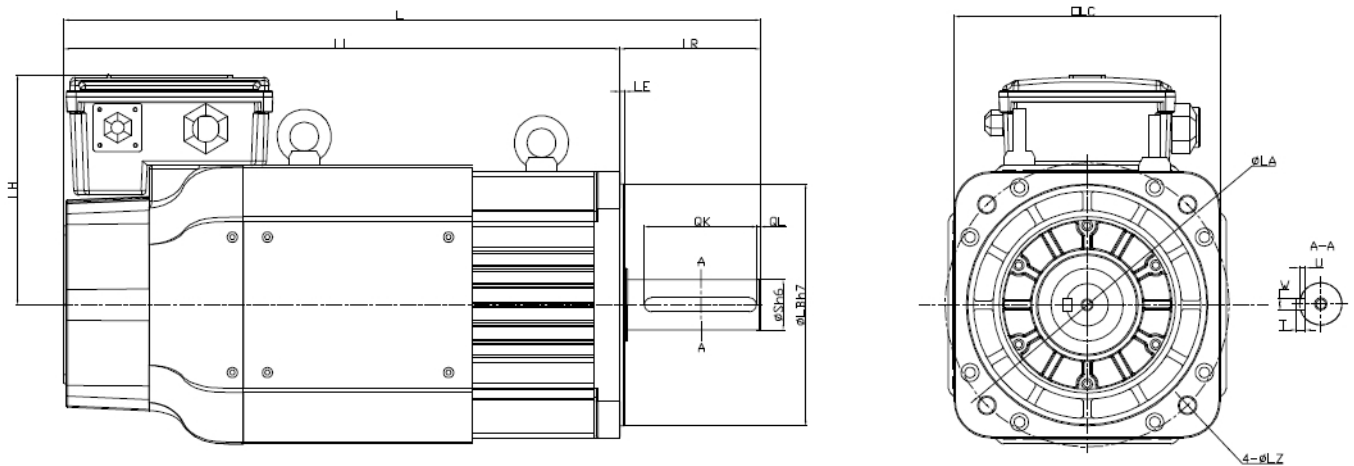**1、220 系列电机安装尺寸 Installation size for 220 series motor**

图 9.5 220 系列伺服电机安装尺寸图

Fig. 9.5　　Installation Size Diagram for 220 Series Servomotor

表 9.1 220 系列伺服电机安装尺寸

Table 9.1　　Installation Size for 220 Series Servomotor

电机型号 尺寸	单位	220EMD-					
		478	525	700	716	955	10E
L	mm	465(545)	465(545)	520(610)	520(610)	565(645)	565(640)
LL	mm	383(463)	383(463)	438(518)	438(518)	483(563)	483(563)
LH	mm	190	190	190	190	190	190
LR	mm	82	82	82	82	82	82
LE	mm	4	4	4	4	4	4
LC	mm	220	220	220	220	220	220
LA	mm	235	235	235	235	235	235
LB	mm	200	200	200	200	200	200
LZ	mm	13.5	13.5	13.5	13.5	13.5	13.5
S	mm	42	42	42	42	42	42
QL	mm	3	3	3	3	3	3
QK	mm	65	65	65	65	65	65
W	mm	12	12	12	12	12	12
T	mm	8	8	8	8	8	8
U	mm	5	5	5	5	5	5

电机型号 motor type　　　尺寸 Size　　单位 Unit

注：括号内的尺寸表示的是带制动器电机的尺寸

Note: The sizes in parenthesis mean those for motor with brake.

2、200 系列电机安装尺寸 Installation Size for 200 Series Motor
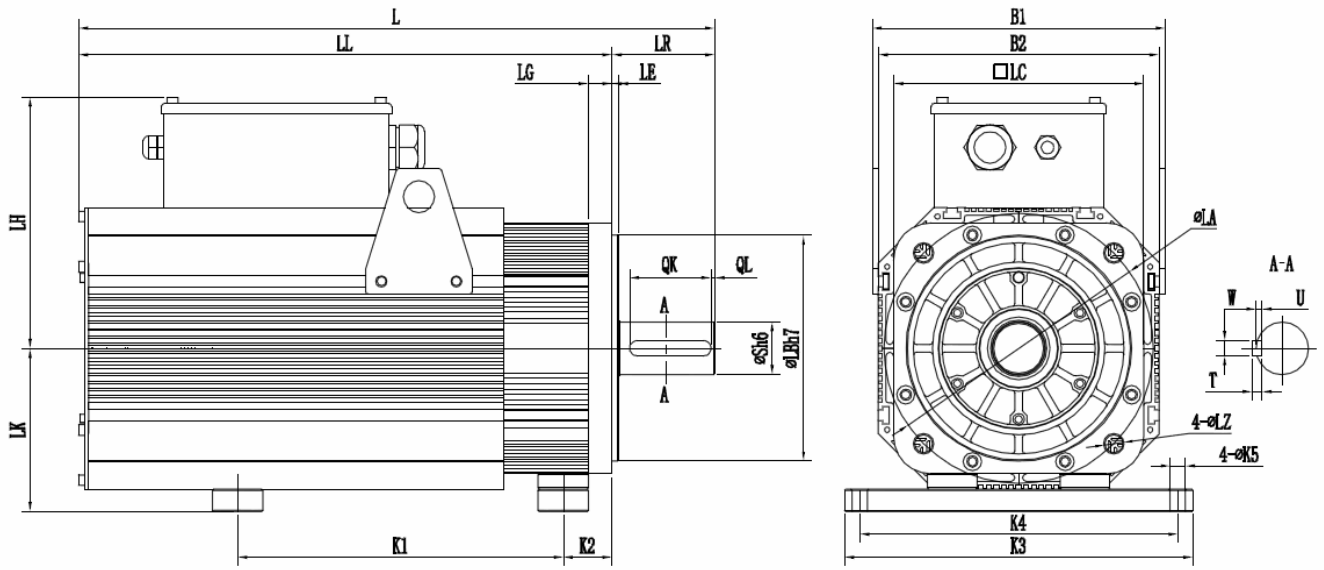

图 9.6 200 系列伺服电机安装尺寸图 Fig. 9.6 Installation Size Diagram for 220 Series Servomotor

表 9.2 200 系列伺服电机安装尺寸 Table 9.2 Installation Size for 200 Series Servomotor

电机型号 尺寸	单位	200EMD-				
		550	750	900	11K	13K
L	mm	473	508	543	583	618
LL	mm	391	426	461	501	536
LH	mm	200	200	200	200	200
LK	mm	130	130	130	130	130
LR	mm	82	82	82	82	82
LE	mm	5	5	5	5	5
LC	mm	200	200	200	200	200
LA	mm	215	215	215	215	215
LB	mm	180	180	180	180	180
LZ	mm	14.5	14.5	14.5	14.5	14.5
LG	mm	19	19	19	19	19
S	mm	42	42	42	42	42
B1	mm	224	224	224	224	224
B2	mm	234	234	234	234	234
K1	mm	225	260	295	335	370
K2	mm	39	39	39	39	39
K3	mm	278	278	278	278	278
K4	mm	254	254	254	254	254
K5	mm	12	12	12	12	12
QL	mm	3	3	3	3	3
QK	mm	65	65	65	65	65
W	mm	12	12	12	12	12
T	mm	8	8	8	8	8
U	mm	5	5	5	5	5

电机型号 Motor type, 尺寸 size, 单位 unit

三、 安装方向 III. Installation Direction

伺服电机可以采取水平，垂直或任意其他方向安装。

The servomotor can be installed on horizontal, vertical or any other direction.

四、 防潮、防尘 IV. Moisture Prevention and Dust Prevention

1、在有水滴滴下的场所使用时，请在确认伺服电机保护构造的基础上进行使用(但轴贯通部除外)。When it is used at a place with water drop dripping, please confirm that servomotor is used on the protective structure foundation (but except the through position of the shaft).

2、在有油滴会滴到轴贯通部的场所使用时，请指定带油封的伺服电机，使用时请确保油位低于油封的唇部，在油封可保持油沫飞溅程度良好的状态下使用，在轴上方使用伺服电机时请注意勿使油封唇部积油。When it is used at a place where oil drop would drip to the through position of the shaft, please specify the servomotor with oil seal. When using, please ensure oil level is lower than the lip of oil seal and oil seal can keep good oil foam splash extent. When using the servomotor above the shaft, please pay attention to not making

the oil seal lip accumulate oil.

3、当引线出口不能朝下安装，只能朝上安装时，请给电缆一定的松弛度，防止油、水进入。同时电缆不要浸泡在水和油中。When down-lead outlet can only be installed upwards instead of being installed downwards, please give certain degree of relaxation to cable to prevent oil and water from entering. Meanwhile never have the cable soak in water and oil.

五、与机械的相关配合 V. Related Match with Machinery

1、在与机械进行连接时，应尽量使用弹性联轴器，并使伺服电机的轴心与机械负载的轴心保持在一条直线上。安装伺服电机时，应使其符合下图中同心度公差的要求。When connecting it with machinery, be sure to use an elastic coupling as far as possible and ensure that servomotor axle center and mechanical load axle center are kept on a straight line.　When installing the servomotor, be sure to ensure it conforms to requirements of concentricity tolerance in the picture.

在一圈的四等分进行测定，最大与最小的差小于0.03mm。（与联轴器一起旋转。）Perform measurement at quartering of a turn.　The difference between maximum and minimum shall be less than 0.03mm. (rotate together with the coupler)
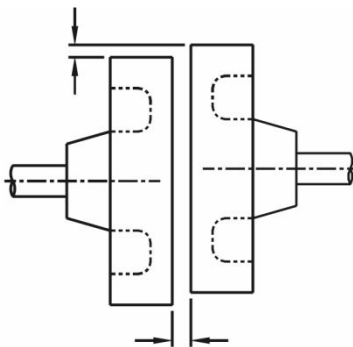

⚠警告 Warning	➢ 如果同心度偏差太大，会产生机械振动，可能损坏轴承与编码器。If concentricity deviation is too large, it would generate mechanical vibration and possibly damage the bearing and encoder.

2、编码器装在电机的后端盖内，直接与电机轴相连接，不要重击电机。如果是位置调整或其他原因，敲击电机不可避免的话，请敲法兰盘前端，尽可能用橡胶锤或塑料锤敲。The encoder is installed inside rear-end plate of motor and directly connected with motor shaft. Don't thump the motor.　If knocking the motor is inevitable for position adjustment or other reasons, please knock the front end of flange with a rubber hammer or a plastic hammer as far as possible

3、 移动齿轮、滑轮时必须使用专用的拔取工具。When moving the gear and pulley, be sure to use special pullout tool.

9.5 伺服电机端子定义及连线 Definition and connection for servomotor terminal
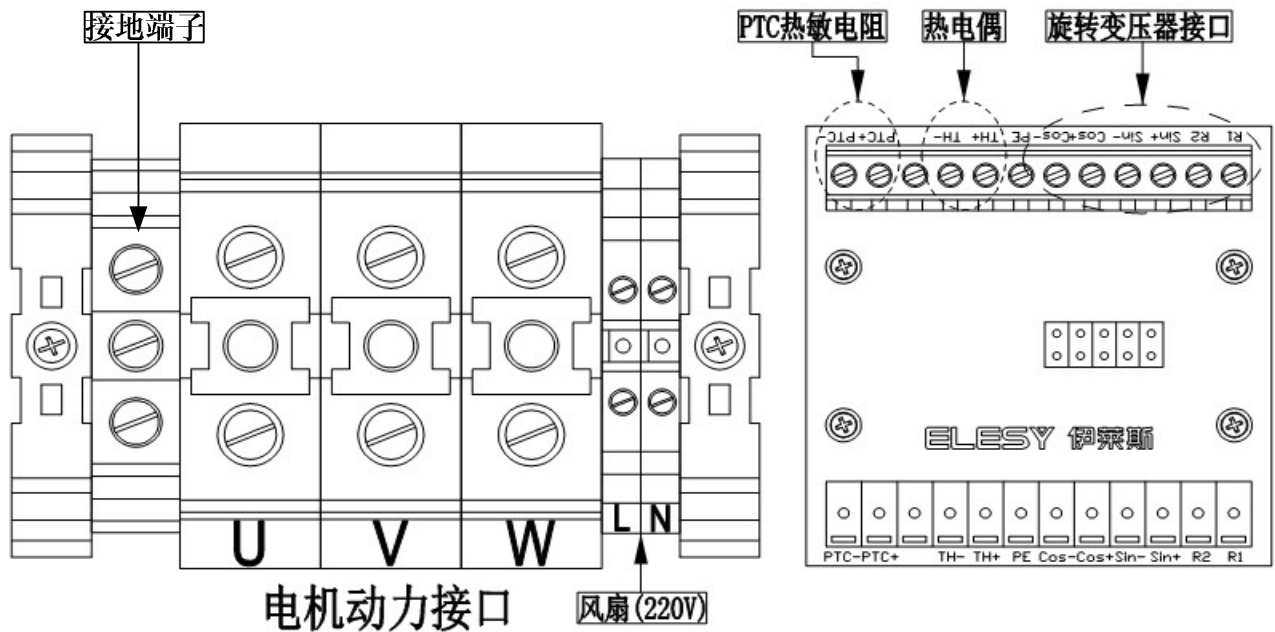
电机动力接口 Motor power interface, 接地端子 earthing terminal, PTC 热敏电阻 PTC thermomistor, 热电偶 thermocouple, 旋转变压器接口 rotary transformer interface, 风扇（220V）fan (220V)

图 9.7 伺服电机接线端子布置图 Fig. 9.7 Layout Drawing for Servomotor Connecting Terminals

表 9.3 伺服电机接线端子信号说明 Table 9.3 Description for Connecting Terminal Signals of Servomotor

端子名称 Terminal name	说明 Description
PTC+	电机过热保护输出
PTC-	Motor overheating protection output
TH+	热电偶输出
TH-	Thermocouple output
R1	激励信号
R2	Excitation signal
SIN+	SIN 反馈信号
SIN-	SIN feedback signal
COS+	COS 反馈信号
COS-	COS feedback signal

附件 电机适配说明

Annex. Adaptive Description for Motor

电机代码 Motor code	电机型号 Motor type	额定转矩 Rated torque	额定转速 Rated speed	额定电流 Rated current	额定功率 Rated power	适配驱动器 Adaptive driver
10	220EMD-478D	47.8Nm	1500rpm	16.5A	7.5KW	ESDD-110
11	220EMD-525C	52.5Nm	2000rpm	23.5A	11KW	ESDD-110
12	220EMD-700D	70.0Nm	1500rpm	22.5A	11KW	ESDD-110
13	220EMD-716C	71.6Nm	2000rpm	32.0A	15KW	ESDD-150
14	220EMD-955D	95.5Nm	1500rpm	36.0A	15KW	ESDD-185
15	220EMD-10EC	105.0Nm	2000rpm	50.0A	22KW	ESDD-300
40	200EMD-550D	55.0Nm	1500rpm	17.0A	8.6KW	ESDD-110
41	200EMD-750D	75.0Nm	1500rpm	22.6A	11.8KW	ESDD-110
42	200EMD-900D	90.0Nm	1500rpm	27.1A	14.1KW	ESDD-150
43	200EMD-11KD	110.0Nm	1500rpm	31.6A	17.3KW	ESDD-150
44	200EMD-13KD	130.0Nm	1500rpm	33.4A	20.4KW	ESDD-185
50	200EMD-550F	55.0Nm	1700rpm	18.4A	9.8KW	ESDD-110
51	200EMD-750F	75.0Nm	1700rpm	25.2A	13.4KW	ESDD-150
52	200EMD-900F	90.0Nm	1700rpm	31.0A	16.0KW	ESDD-150
53	200EMD-11KF	110.0Nm	1700rpm	36.9A	19.6KW	ESDD-185
54	200EMD-13KF	130.0Nm	1700rpm	44.9A	23.1KW	ESDD-220
60	200EMD-550C	55.0Nm	2000rpm	22.1A	11.5KW	ESDD-110
61	200EMD-750C	75.0Nm	2000rpm	32.3A	15.7KW	ESDD-150
62	200EMD-900C	90.0Nm	2000rpm	36.2A	18.8KW	ESDD-185
63	200EMD-11KC	110.0Nm	2000rpm	44.3A	23.0KW	ESDD-220
64	200EMD-13KC	130.0Nm	2000rpm	56.1A	27.2KW	ESDD-300